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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM CORRECTIVE MEASURES STUDY WORK PLAN COMBINED SOLID WASTE MANAGEMENT UNIT 83 (SWMU 83) ZONE E CNC CHARLESTON SC

5/9/2003

CH2M HILL

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan

Combined SWMU 83, Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

May 2003

Contract N62467-99-C-0960

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May 9, 2003

Mr. David Scaturo
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum and CMS Work Plan (Revision 1) – Combined SWMU 83, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum and CMS Work Plan (Revision 1) for Combined SWMU 83 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Sam Naik. Please do not hesitate to contact him at 770/604-9182, extension 255, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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

THE ATTACHED PAGES SHOULD BE INSERTED AS REPLACEMENTS IN THE RFI REPORT ADDENDUM AND CMS WORK PLAN, COMBINED SWMU 83, ZONE E, REVISION 0 SUBMITTAL:

- REVISED TABLE OF CONTENTS PG. V AND VI
- REVISED PGS. 5-3 THROUGH 5-33, WHICH INCLUDES A NEW TABLE (TABLE 5-3 LEACHATE TRANSPORT ANALYSIS MODEL)
- NEW ANALYTICAL DATA SUMMARY TABLE FOR APPENDIX D

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July 12, 2002

Mr. David Scaturo
South Carolina Department of Health and
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Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum and CMS Work Plan (Revision 0) – Combined SWMU 83, Zone E, Charleston Naval Complex

Dear Mr. Scaturo:

Enclosed please find two copies of the RFI Report Addendum and CMS Work Plan (Revision 0) for Combined SWMU 83 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Sam Naik. Please contact him at 770/604-9182, extension 255, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Tim Frederick/Gannett Fleming, Inc., w/att
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RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan
Combined SWMU 83, Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

May 2003

Revision 1
Contract N62467-99-C-0960
158814.ZE.PR.20

Certification Page for RFI Report Addendum (Revision 1) – Combined SWMU 83, Zone E

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

South Carolina

P.E. No. 21428

Dean Williamson, P.E.

5/7/2013

Date

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B Excerpts from the *Zone E RFI Report, Revision 0*, including Figure 10.10.3, *RFI Wipe Sampling Locations*

C Copies of the *AST Removal and Assessment Report* and *Interim Measure Completion Reports for SWMU 83 and AOC 574* (DET)

D Analytical Data Summaries and Data Validation Report for Additional Sampling (CH2M-Jones, 2001)

E UCL_{95} Calculations Tables

F Historic Site Map (Charleston Public Works, 1935)

G Site Photographs (February 2002)

Acronyms and Abbreviations

AOC	Area of concern
AST	Aboveground storage tank
BCT	BRAC Cleanup Team
BEQ	Benzo(a)pyrene equivalent
BRAC	Base Realignment and Closure Act
BRC	Background reference concentration
BTEX	Benzene, toluene, ethylbenzene, and xylene
CA	Corrective action
cm^2	Square centimeters
CMS	Corrective measures study
CNC	Charleston Naval Complex
COC	Contaminant of concern
COPC	Contaminant of potential concern
CSI	Corrective Study Investigation
DAF	Dilution attenuation factor
DET	Environmental Detachment Charleston
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
ft bls	Feet below land surface
HHRA	Human Health Risk Assessment
HI	Hazard index
ILCR	Incremental lifetime cancer risk
IM	Interim measure
LUC	Land use control
MCL	Maximum contaminant level
MCS	Media cleanup standard
$\mu g/kg$	Micrograms per kilogram
$\mu g/L$	Micrograms per liter
mg/kg	Milligrams per kilogram

Acronyms and Abbreviations, Continued

NAVBASE	Naval Base
OWS	Oil/water separator
PAH	Polyaromatic hydrocarbon
PCB	Polychlorinated biphenyl
RAO	Remedial action objective
RBC	Risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RGO	Remedial goal option
RI	Remedial investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SSL	Soil screening level
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TTAL	Treatment technique action level
TDS	Total dissolved solids
VOC	Volatile organic compound
UCL_{95}	95-percent Upper Confidence Limit
UST	Underground storage tank
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).

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Solid Waste Management Units (SWMUs) 83 and 84, and Area of Concern (AOC) 574 in Zone E of the CNC. These sites were investigated together during the RFI due to their proximity, and will be referred to in this report as Combined SWMU 83. The location of Combined SWMU 83 in Zone E is shown in Figure 1-1. Figure 1-2 shows an aerial photograph of the site.

SWMU 83 is part of Building 9, which was originally a foundry. Building 9 is a cross-shaped structure with four wings, and SWMU 83 encompasses the southern wing of this building. The foundry was built in 1906 and was used to cast metal parts in refitting ships. The primary industrial process associated with this facility was melting and casting copper alloy parts. The foundry operations have been discontinued since at least 1991, and at the time the RFI was conducted (1995-1997), the building contained electrical power supply equipment, capacitors, transformers, rectifiers, furnaces, and ovens.

The building is currently being used as a storage warehouse by Detyens Shipyard, Inc. Paints are temporarily stored in the east wing and a variety of old machines and equipment are stored in the rest of wings. Old equipment and scrap metal was observed in the areas outside the building during a site walk-through conducted by CH2M-Jones during February 2002.

SWMU 84 consists of an area outside and to the west of Building 9. This area was formerly used to store lead blankets and shielding. The majority of the lead was encased in either

rubber or fabric; however, uncovered lead materials are also reported to have been stored here. The lead-containing materials were placed either on pallets or directly on the concrete pavement. No containment structures were associated with this unit. No information was found during the RFI regarding the period of operation.

AOC 574 is the former site of a 3,700-gallon aboveground storage tank (AST) on the southeast corner of Building 9. The fuel tank, which has been removed, contained #2 fuel oil for the furnaces and torches in Building 9. The tank was in an unpaved area and had no secondary containment. No information was found during the RFI regarding the period of operation. According to the *Interim Measure Completion Report* for AOC 574 prepared by the Navy Environmental Detachment (DET, 1996), two other ASTs were also located in this area. One was a 250-gallon waste oil tank and the second was a 586-gallon #2 fuel oil tank. The fuel oil tanks were removed by the DET during 1996, and the waste oil tank was removed by the DET sometime between 1993 and 1996.

A review of historical engineering drawings for this site shows that railroad lines were installed between 1929 and 1935 adjacent to and across Combined SWMU 83. Portions of these railroad lines still remain at the site.

Materials of concern identified in the *Zone E RFI Work Plan, Revision 1* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) for the Combined SWMU 83 site were lead, paints, solvents, friable asbestos, dielectric fluid, and petroleum hydrocarbons.

SWMU 83 is located inside Building 9 with concrete paved floors. SWMU 84 and AOC 574 are in a largely unpaved area. This area of Zone E is zoned M-2 (marine industrial use). The CNC RCRA Permit identified the Combined SWMU 83 site as requiring an RFI.

The RFI was initially conducted by the Navy/EnSafe Inc. (EnSafe) team. The RFI activities are presented in the *Zone E RFI Report, Revision 0* (EnSafe, 1997), which was submitted during 1997. Regulatory review was conducted on this document and a draft response to the comments from SCDHEC was prepared by the Navy/EnSafe team. These comment responses are included in Appendix A.

1.1 Purpose of the RFI Report Addendum

The purpose of this RFI Report Addendum is to document the results of previous RFI investigations conducted by EnSafe, as well as provide an evaluation of the supplemental investigations conducted by CH2M-Jones to complete the RFI.

This RFI Report Addendum also discusses the refinement of chemicals of potential concern (COPCs) and chemicals of concern (COCs), current site conditions, and surrounding area land use.

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 considered:

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

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

1.2 Report Organization

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

1.0 Introduction — Presents the purpose of the report and background information relating to the RFI Report Addendum.

2.0 Summary of RFI Conclusions for Combined SWMU 83 – Summarizes the conclusions from the original RFI and risk evaluations for Combined SWMU 83.

3.0 Interim Measures and UST/AST Removals – Provides information regarding any interim measures (IMs) or tank removal activities performed at the site.

4.0 Summary of Additional Investigations – Summarizes information collected after completion of the RFI Report.

5.0 COPC/COC Refinement – Provides further evaluation of COPCs based on RFI and additional data to assess them as 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 Recommendations – Provides recommendations for proceeding with site closure.

8.0 CMS Work Plan – Presents a focused Corrective Measures Study (CMS) Work Plan.

9.0 References – Lists the references used in this document.

Appendix A contains responses to SCDHEC comments for this site from the *Zone E RFI Report, Revision 0.*

Appendix B contains excerpts from the RFI report, including a summary of detections of chemicals, a shallow groundwater flow map for the site vicinity and a copy of Figure 10.10.3 from the report showing wipe sampling locations.

Appendix C contains copies of the AST Removal and Assessment Report and two Interim Measure Completion Reports for SWMU 83 and AOC 574, prepared by the DET.

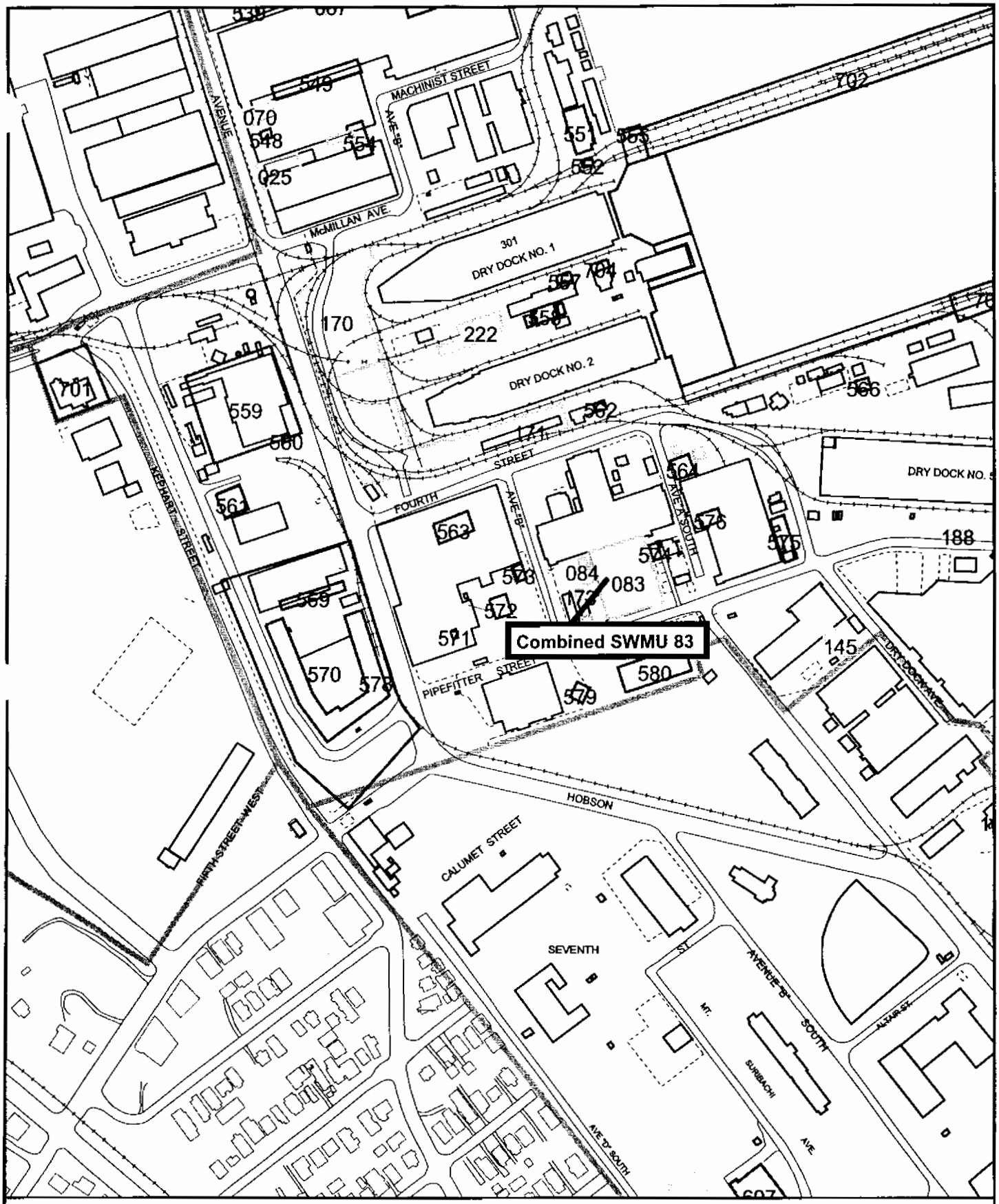
Appendix D contains analytical results and data validation summaries for additional soil samples collected by CH2M-Jones during 2001.

Appendix E contains the summary data for the 95-percent Upper Confidence Limit (UCL_{95}) values calculated for chemicals with maximum concentrations exceeding the U.S. Environmental Protection Agency (EPA) Region III residential RBC and maximum Zone E surface soil background concentration.

Appendix F contains the site location map from the Public Works Map of the Charleston Navy Shipyard, dated June 1935, which depicts the presence of railroad lines at the site.

Appendix G contains copies of site photographs taken during February 2002.

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



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

N

0 200 400 Feet

1 inch = 325 feet

Figure 1-1
Location of Combined SWMU 83 in Zone E
Charleston Naval Complex

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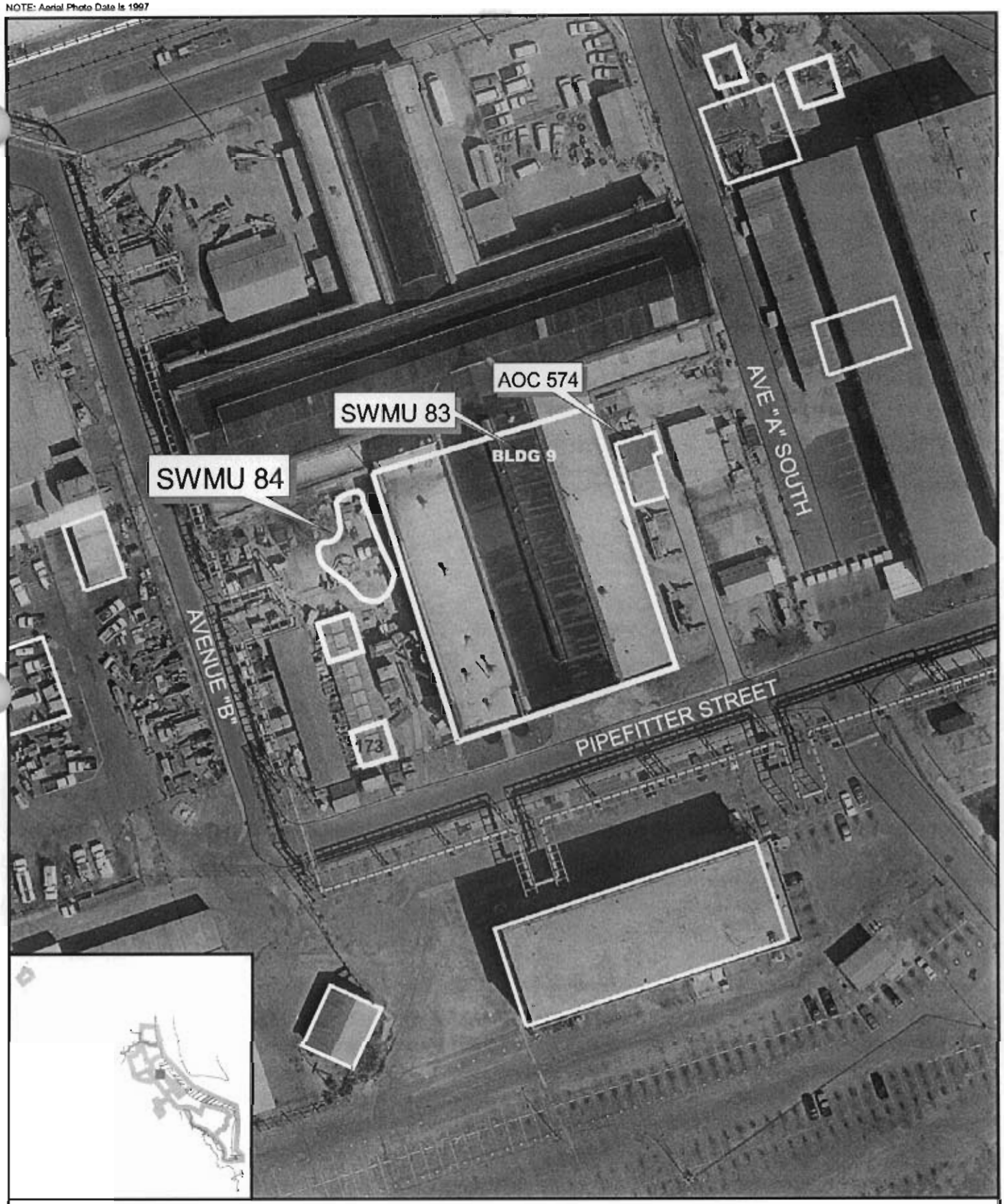
NOTE: Aerial Photo Date is 1997



N

0 60 120 Feet

1 inch = 81 feet

Figure 1-2
Site Location, Combined SWMU 83
Zone E
Charleston Naval Complex

CH2MHILL

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Section 2.0

2.0 Summary of RFI Conclusions for Combined SWMU 83

This section summarizes the results and conclusions from the soil, groundwater, air and wipe sample investigations conducted during 1995 and 1996 at Combined SWMU 83, as reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Figure 2-1 shows the soil and groundwater sampling locations.

The RFI report presented the results of these investigations and conclusions concerning contamination and risk, as summarized in the following sections. A further evaluation of COCs identified in the *Zone E RFI Report, Revision 0*, is provided in Section 5.0.

2.1 Soil Sampling and Analysis

Soil sampling was conducted during two events. During the first sampling event, 19 surface and subsurface soil samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide. The second sampling event was conducted based on exceedances of detected concentrations of some site constituents above screening criteria, during the first sampling event. The second sampling event included sampling at eight locations, and the surface and subsurface soil samples were analyzed for VOCs and SVOCs. One surface soil duplicate sample was analyzed for the extended list of SVOCs, pesticides, metals, and cyanide.

2.1.1 Surface Soil

During the initial RFI, surface soil detections of organic chemicals were screened against the U.S. Environmental Protection Agency (EPA) Region III industrial risk-based concentrations (RBCs). Surface soil detections of inorganic chemicals were evaluated against the EPA Region III industrial RBCs and the Zone E background reference concentrations (BRCs). The human health risk assessment (HHRA) for Combined SWMU 83 evaluated the residential exposure scenario.

Conclusions from the screening evaluation of detected organic and inorganic chemicals in surface soil samples were as follows:

VOCs: The RFI report did not identify any exceedances of VOCs above screening criteria.

SVOCs: Benzo(a)pyrene eqivalent (BEQ) concentrations at 12 locations exceeded the industrial RBC for benzo(a)pyrene of 780 micrograms per kilogram (µg/kg). BEQ concentrations at these 12 locations ranged from 788 µg/kg to 29,000 µg/kg. No other SVOC compounds exceeded the screening criteria.

Pesticides: The RFI report did not identify any exceedances of pesticides above screening criteria.

PCBs: There were no detections of PCBs above laboratory detection limits.

Inorganics: The RFI report identified arsenic and lead exceedances above screening criteria.

- Arsenic detections exceeded the industrial RBC of 3.8 milligrams per kilogram (mg/kg) at 13 locations, and the Zone E BRC of 23.9 mg/kg at one location, E084SB007.
- One lead detection of 1,400 mg/kg at E083SB010 exceeded the industrial re-use criterion for lead of 1,300 mg/kg.

2.1.2 Subsurface Soil

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

VOCs: The RFI report did not identify any exceedances of VOCs above screening criteria.

SVOCs: The RFI report did not identify any exceedances of SVOCs above screening criteria.

Pesticides: Dieldrin was detected above the SSL of 1.9 µg/kg in two subsurface soil samples at E0574SB005 at 4.6 µg/kg, and at E574SB007 at 6.5 µg/kg.

PCBs: There were no detections of PCBs above laboratory detection limits.

Inorganics: The RFI report did not identify any exceedances of inorganics above screening criteria.

2.2 Groundwater Sampling and Analysis

During the RFI, seven shallow and one deep groundwater monitoring wells were installed. Groundwater samples were submitted for analysis for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, chlorides, sulfates, total dissolved solids (TDS), and organotins during the first sampling event. The second sampling event included SVOCs, inorganics, organotins,

and dioxins. Only inorganics were sampled during two additional events for a total of four sampling events.

Detections in groundwater samples were compared during the RFI with the EPA Region III tapwater RBCs, maximum contaminant levels (MCLs) and the Zone E BRCs for shallow and deep zones of the aquifer.

2.2.1 Shallow Groundwater

The following detections were found in the shallow groundwater samples at this site:

VOCs: No VOCs were detected above laboratory detection limits.

SVOCs: No SVOCs were detected above screening criteria.

PCBs: No PCBs were detected above laboratory detection limits.

Pesticides: No pesticides were detected above laboratory detection limits.

Organotins: Tributyltin was detected during the first sampling event and not detected above laboratory detection limits in the subsequent sampling events.

Inorganics: The RFI reported the following inorganic detections above screening criteria:

- Arsenic: The highest detection of arsenic was at 49 micrograms per liter (µg/L), which was above the tapwater RBC of 0.045 µg/L and the Zone E shallow groundwater BRC of 18.7 µg/L, but was below the MCL of 50 µg/L.
- Iron: The highest detection of iron was at 22,100 µg/L, which was above the tapwater RBC of 1,100 µg/L. No primary MCL exists for iron. No shallow groundwater BRC was developed for iron in Zone E.

2.2.2 Deep Groundwater

The following detections were found in the deep groundwater at the site:

VOCs: No VOCs were detected above laboratory detection limits.

SVOCs: No SVOCs were detected above screening criteria.

PCBs: No PCBs were detected above laboratory detection limits.

Pesticides: No pesticides were detected above laboratory detection limits.

Organotins: No organotin compounds were detected above laboratory detection limits.

Inorganics: The RFI reported the following inorganic detections above screening criteria:

- Arsenic: The highest detection of arsenic was at 79 µg/L, which was above the tapwater RBC of 0.045 µg/L and the BRC of 18.7 µg/L and the MCL of 50 µg/L.
- Iron: The highest detection of iron was at 37,000 µg/L, which was above the tapwater RBC of 1,100 µg/L. No primary MCL exists for iron. No deep groundwater BRC was developed for iron in Zone E.
- Manganese: The highest detection of manganese was at 3,380 µg/L, which was above the tapwater RBC of 84 µg/L, and the deep groundwater BRC of 869 µg/L. No primary MCL exists for manganese.

2.3 Wipe Sampling

The *Zone E RFI Work Plan, Revision 1* (EnSafe/Allen & Hoshall, 1995) proposed collection of 16 wipe samples for metals and three wipe samples for PCBs at Combined SWMU 83. All samples were collected and analyzed during the RFI. Sample locations were targeted at floor surfaces, vents, intakes, and other surfaces where the heaviest concentrations of metals could be expected.

Twenty-three metals were detected in wipe samples collected at this site. One of the three PCB samples showed a detection of Aroclor-1242 at 9.8 µg/100 square centimeters (cm^2). The RFI report noted that no RBCs exist for wipe samples. Appendix B contains a copy of Figure 10.10.3 from the RFI report that shows the wipe sampling locations.

No COCs were identified for the site based on wipe samples. As is discussed in Section 3.0, Building 9 has been cleaned, and residual wipe sampling did not detect PCBs in the wipe samples.

2.4 Air Sampling

The *Zone E RFI Work Plan, Revision 1* proposed collection of seventeen air samples for metals at Combined SWMU 83. All samples were collected and analyzed during the RFI. Sample locations were targeted at vents, intakes, and other biased surface areas where the heaviest concentrations of metals could be expected.

Metals were detected in nearly all air samples. No RBCs exist for comparison to the air sampling results. Currently, there are no known sources of air emissions at the site. The building has been cleaned to remove residual dust, as discussed in Section 3.0 of this report.

2.5 RFI Human Health Risk Assessment

The *Zone E RFI Report, Revision 0* considered current and future site resident and site worker scenarios for the human health risk assessment(HHRA). The detailed risk assessment for the Combined SWMU 83 site is presented in Section 10.10.10 of the *Zone E RFI Report Revision 0.*

2.5.1 Soils

The HHRA identified antimony, arsenic, copper, lead and BEQs as COCs for surface soils for the unrestricted future land use scenario. For the industrial reuse scenario, arsenic and BEQs were retained as COCs. The HHRA did not identify COCs in the subsurface soils.

2.5.2 Groundwater

Arsenic was retained as a COC in shallow and deep groundwater.

2.6 RFI Conclusions and Recommendations

The *Zone E RFI Report, Revision 0* recommended that a CMS be conducted for surface soil COCs (arsenic, lead and BEQs), and for arsenic in shallow and deep groundwater.

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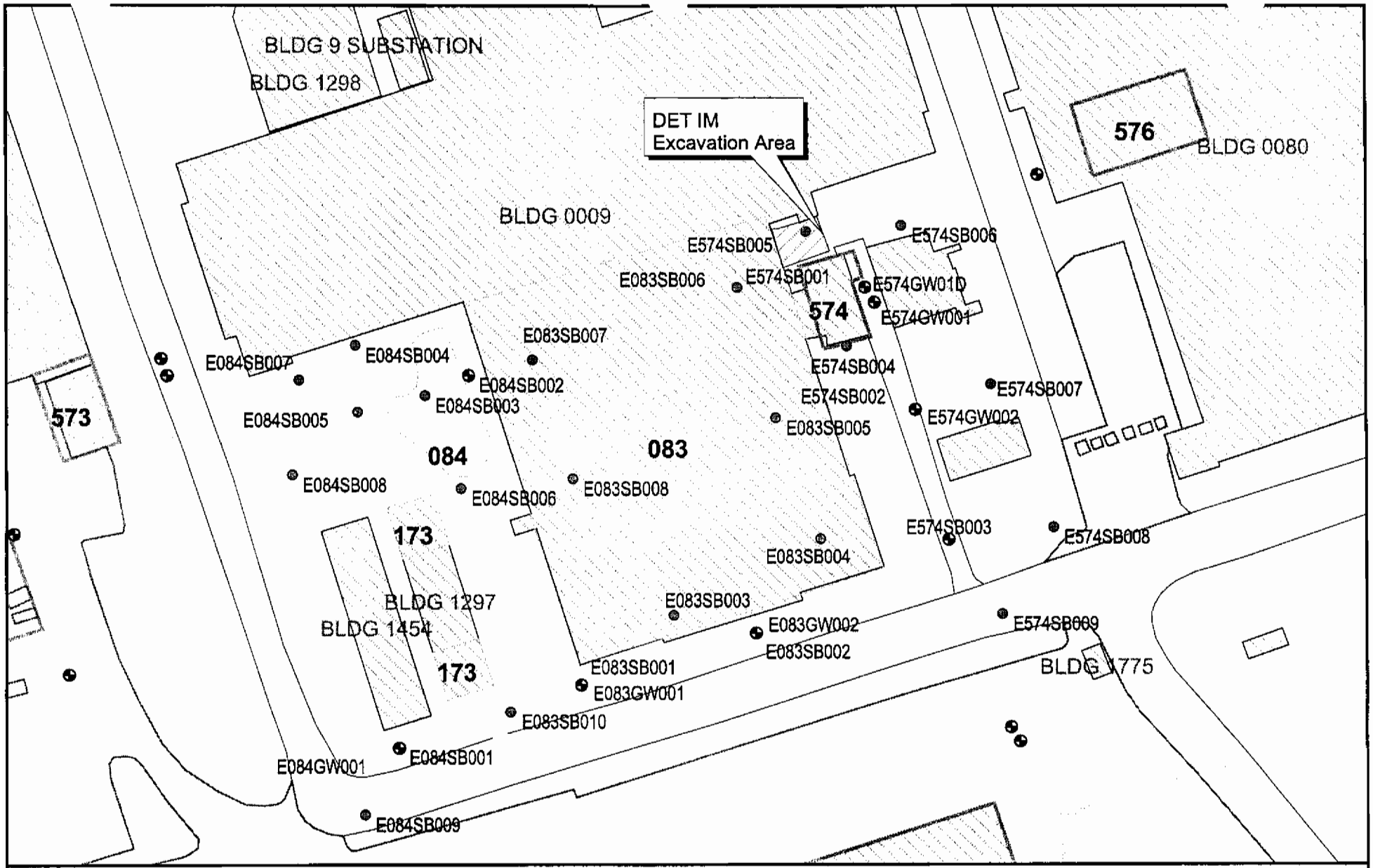

Groundwater Well
Soil Boring Location
Pavement
Roads - Lines
AOC Boundary
SWMU Boundary
Buildings

N

0 40 80 Feet

1 inch = 50 feet

Figure 2-1
RFI Sampling Locations
Combined SWMU 83, Zone E
Charleston Naval Complex

CH2MHILL

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Section 3.0

3.0 Interim Measures and UST/AST Removals

3.1 UST/AST Removals

The *Final RCRA Facility Assessment* (RFA) (EnSafe/Allen & Hoshall, 1995) identified two ASTs that were used to store fuel oil at AOC 574, which is part of Combined SWMU 83. These two ASTs stored #2 fuel oil and had capacities of 586 gallons (AST #9B) and 3,700 gallons (AST #9C). Additionally, a 250-gallon waste oil tank was also present in this area, according to the *Aboveground Storage Tank(AST) Assessment Report* prepared by the Navy Environmental Detachment (DET, 1996). This AST Assessment Report noted that both steel ASTs had visible corrosion and pitting and had leaks on the sides. Neither AST had secondary containment berms around it. A copy of this AST Assessment Report is included in Appendix C.

The ASTs and associated piping were removed by the DET during July 1996 and disposed of off site.

3.2 Interim Measures

3.2.1 Process Closure for Building 9 (SWMU 83) – DET, 1997

The DET completed an IM during March 1997 in the southeast wing of Building 9 as a process closure action. The objectives of the IM were to clean up oil spills, remove oily waste in drains and passageways, disassemble and clean power supply equipment containing PCBs, remove asbestos from smoldering pots, and clean up lead dust from floor and other surfaces within the southeast wing of Building 9. These areas of contamination had been identified during the RFA and from wipe samples collected during the RFI. This IM is described in detail in the *Completion Report, Process Closure for SWMU 83 (Building 9 Foundry)* (DET, 1997a), a copy of which is included in Appendix C.

According to this *Completion Report*, the objectives of the IM were completed and no PCBs were detected in wipe samples collected after the cleanup. As part of the IM, floors and other surfaces suspected of containing lead dust were pressure-washed and the rinsate was sampled and disposed of appropriately.

3.2.2 Excavation of Petroleum-Contaminated Soils at AOC 574 – DET, 1997

The DET completed an IM during July 1997 to remove petroleum-contaminated soil at AOC 574 where the DET had previously removed two ASTs and their associated piping during 1996. The IM entailed the removal of approximately 45 cubic yards (yd^3) of petroleum-contaminated soil from an excavation of approximate size 15 feet x 20 feet in an unpaved area, down to a depth of approximately 4 feet below land surface (ft bls). The excavated area was later backfilled with clean soil and all disturbed areas were raked and groomed to help prevent erosion. All excavated waste was characterized and deemed to be non-hazardous. The excavated waste was transported to Building 1601 at the CNC for storage prior to offsite disposal at a licensed disposal facility. Details of the IM are presented in the *Completion Report for Interim Measure, AOC 574* (DET, 1997b), a copy of which is included in Appendix C.

Confirmatory Soil Sampling and Analytical Results

Following the excavation of contaminated soils, confirmatory soil samples were collected from the bottom and sidewalls of the excavated area. These samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), and metals.

A review of the analytical results included in the *Completion Report for Interim Measure, AOC 574* (DET, 1997b) indicated that there were no exceedances of the industrial RBC for BTEX, inorganics, or PAH compounds, with the exception of two samples, collected from the western sidewall and the bottom of the excavation, which showed BEQ concentrations above the CNC BEQ screening criterion of 1,400 µg/kg. The BEQ concentration at the western sidewall sample location NBCE574S001001 (sample ID SPORT0411-2) was 4,090 µg/kg, and the BEQ concentration at the bottom sample location NBCE574S006004 (sample ID SPORT0352-4) was 1,860 µg/kg. The confirmatory sample locations are shown in Figure B-1 of the *Completion Report for Interim Measure, AOC 574* (DET, 1997b), which is included in Appendix C.

Additional excavation was performed on the western sidewall by the DET where an elevated BEQ concentration was detected at sample location NBCE574S001001. This sidewall was resampled at the new sample location NBCE574S001501, and the new sample was identified as SPORT0425-2. There were no exceedances of the CNC BEQ site-wide reference concentrations in samples collected from this sidewall after the additional excavation was conducted.

According to the *Completion Report for Interim Measure, AOC 574* (DET, 1997b), the excavation was lined with geotextile fabric prior to being backfilled with clean soil.

The confirmatory sampling data presented in Appendix B of the DET's IM Completion Report for AOC 574 were reviewed and compared to generic SSLs (using a DAF=1 for VOCs and DAF=10 for other chemicals). A few samples had several chemicals with results that exceeded the screening criteria, which are as follows:

Benzo(b)fluoranthene. Soil samples from boring locations NBCE574S000404 and NBCE574S000604 had detections of benzo(b)fluoranthene at concentrations of 12,200 μg/kg and 2,860 μg/kg, respectively, which were above the generic SSL of 2,500 μg/kg. None of the other eight confirmatory samples from this area had concentrations of benzo(b)fluoranthene above the SSL, and concentrations were detected below the method detection limit in five samples. The reported concentrations of this chemical are presented in Table 3-1.

An average concentration was calculated for this chemical using the available data and assuming a concentration of half the detection limit for non-detect samples. The calculated average concentration is greater than the SSL, however, this calculated value may be higher than the actual average due to elevated detection limits in several samples that may inaccurately skew this calculation.

Groundwater data for shallow and deep wells at the site, including a well pair located at the area of excavation, indicated that benzo(b)fluoranthene was not detected in any groundwater samples, indicating that it is not leaching or impacting groundwater.

Lead. Lead exceeded the generic SSL screening value of 400 mg/kg in only a single sample, as shown in Table 3-1. The average concentration of lead in the IM samples was 168 mg/kg, which is well below the SSL. None of the groundwater samples collected at Combined SWMU 83 have detectable concentrations of lead. Thus, lead in soil is not impacting groundwater.

Mercury. Two of the 10 confirmatory samples collected by the DET had mercury concentrations above the SSL, as shown in Table 3-1. None of the monitoring wells at Combined SWMU 83, including the well pair that is located where the IM was conducted at AOC 574, have had detectable concentrations of mercury, indicating that mercury is not impacting groundwater.

After reviewing the analytical data for soil and groundwater, it appears that the IM conducted at AOC 574 by the DET is adequate to serve as the final remedy at this location.

TABLE 3-1
Confirmatory Soil Sampling and Analytical Results, IM Performed at AOC 574 (DET, 1997)
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Sample Location	Benzo(b)fluorene (µg/kg)	Generic SSL (µg/kg)	Lead (mg/kg)	Generic SSL (mg/kg)	Mercury (mg/kg)	Generic SSL (mg/kg)
NBCE574S000104	ND (<6540)	2,500	24.1	400	0.0265	1
NBCE574S000304	ND (< 16,700)		21.9		0.115	
NBCE574S000404	**12,200**[1]		165		0.281	
NBCE574S000504	ND (< 1670)		18.7		0.113	
NBCE574S000604	**2,860 J**		237		**32.2**	
NBCE574S000901	ND (<165)		11.5		0.047	
NBCE574S0001001	569		**423**		0.312	
NBCE574S0001101	1,540		338		**5.35**	
NBCE574S0001201	ND (<166)		274		0.024	
NBCE574S0001501	987		NA		NA	
Average[2]	**3,077**		**168**		**4.2**	

1. Concentrations that are in bold text and outlined within the table represent exceedances of the appropriate criterion.

2. Average was calculated using half the detection limit.

Section 4.0

4.0 Summary of Additional Investigations

4.1 Additional Soil Sampling and Analysis

CH2M-Jones conducted additional soil sampling at Combined SWMU 83 during November 2001. Based on an evaluation of the data collected during the RFI, antimony, copper, lead, and BEQs in soils required further delineation to complete the RFI. Figure 4-1 shows the COPCs that were identified based on sample results from the original RFI sampling.

Surface soil results were compared to EPA Region III RBCs (hazard index [HI]=0.1), generic SSLs (based on DAF=1 for VOCs and DAF = 10 for other chemicals) and, for inorganic chemicals, the range of concentrations detected in Zone E grid or background samples. Subsurface soil results were compared to generic SSLs (based on DAF=1 for VOCs and DAF=10 for other chemicals) and, for inorganic chemicals, the range of concentrations detected in Zone E grid or background samples. For BEQs, the screening criteria are the CNC BEQ site-wide reference concentrations of 1,304 µg/kg for surface soils and 1,400 µg/kg for subsurface soils.

Surface and subsurface soil samples were collected from six locations identified as E083SB011 through E083SB016. All locations are beneath asphalt pavement. These sample locations are shown in Figure 4-2. Samples from soil borings at E083SB011 through E083SB014 were analyzed for antimony, copper, lead, and SVOCs. The sample from E083SB015 was analyzed for SVOCs only. The sample location identified as E083SB016 is the former RFI boring location E083SB010, which was re-sampled to verify the presence of cyanide detected in the subsurface soil sample above screening criteria, at 20.7 mg/kg, during the RFI. Table 4-1 shows the detected concentrations of inorganics and BEQs from the November 2001 sampling event. Figure 4-2 shows the detected concentrations of the inorganics and BEQs in the soil samples collected during November 2001. These detections are discussed below.

4.1.1 Antimony

There were three detections of antimony in surface soil samples ranging from 0.54 mg/kg to 2.34 mg/kg (compared to the Zone E background range of 0.5 to 7.4 mg/kg). All surface soil detections were below the residential RBC (with a HI=0.1) of 3.1 mg/kg and the SSL of 3.0 mg/kg. In subsurface soil samples, there were two detections of antimony at 0.65 mg/kg

and 0.86 mg/kg, below the SSL of 3.0 mg/kg and within the Zone E background range of 0.52 to 1.6 mg/kg.

4.1.2 Copper

There were four detections of copper in surface soil samples ranging from 37.4 mg/kg to 309 mg/kg, which are below the residential RBC (HI=0.1) of 310 mg/kg and the maximum Zone E surface soil background concentration of 866 mg/kg. No SSL has been established in the EPA Soil Screening Guidance, therefore the EPA Region III generic SSL of 530 mg/kg (from the October 2000 RBC Table) was used as a screening criterion for copper. In subsurface soil samples, there were four detections of copper ranging from 18.9 mg/kg to 108 mg/kg, below the SSL of 530 mg/kg and the maximum Zone E subsurface soil background concentration of 192 mg/kg.

4.1.3 Cyanide

Cyanide was not detected above laboratory detection limits in the sample from E083SB016, which was collected at the former location of E083SB010.

4.1.4 Lead

There were four detections of lead in surface soil samples ranging from 74 mg/kg to 321 mg/kg, which are below the unrestricted land use screening goal of 400 mg/kg and the SSL of 400 mg/kg. There were four detections of lead in subsurface soil samples ranging from 108 mg/kg to 432 mg/kg, with one detection of 432 mg/kg at E083SB011, above the SSL of 400 mg/kg and the maximum Zone E subsurface soil background concentration of 323 mg/kg.

4.1.5 BEQs

BEQ concentrations in surface soil samples ranged from 400 μg/kg to 8,277 μg/kg, with two detections of 2,178 μg/kg at E083SB012 and 8,277 μg/kg at E083SB014, above the CNC BEQ site-wide reference concentration of 1,304 μg/kg for surface soils. BEQ concentrations in subsurface soil samples ranged from 332 μg/kg to 1,312 μg/kg, below the CNC BEQ site-wide reference concentration of 1,400 μg/kg for subsurface soils.

Table 4-1 shows the detected concentrations of inorganics and BEQs from the November 2001 sampling event. Appendix D contains the analytical results and data validation summaries for these additional soil samples.

TABLE 4-1
Concentrations of Soil COPCs, November 2001 Sampling
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL (DAF=10) (mg/kg)	Zone E Soil Background Range (mg/kg)
Antimony							
Surface Soil	E083SB011	2.34	J	3.1	82	2.5	0.5 - 7.4
	E083SB012	1.96	J				
	E083SB013	0.54	UJ				
	E083SB014	0.81	J				
Subsurface Soil	E083SB011	0.4	UJ			2.5	0.52 - 1.6
	E083SB012	0.65	UJ				
	E083SB013	0.47	UJ				
	E083SB014	0.86	J				
Copper							
Surface Soil	E083SB011	135	=	313	8,176	53[a]	0.47 - 866
	E083SB012	278	=				
	E083SB013	37.4	=				
	E083SB014	309	=				
Subsurface Soil	E083SB011	77.3	=			53[a]	1.3 - 192
	E083SB012	18.9	=				
	E083SB013	10.7	=				
	E083SB014	108	=				
Cyanide							
Surface Soil	E083SB016	1	U	160	4,100	20	NA
Subsurface Soil	E083SB016	1	U				NA
Lead							
Surface Soil	E083SB011	321	=	400	1,300	400	1.0 - 400
	E083SB012	216	=				
	E083SB013	74.4	=				
	E083SB014	134	=				

TABLE 4-1
Concentrations of Soil COPCs, November 2001 Sampling
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL (DAF=10) (mg/kg)	Zone E Soil Background Range (mg/kg)
Lead							
Subsurface Soil	E083SB011	**432**	=			400	1.8 - 322
	E083SB012	36	=				
	E083SB013	20.7	=				
	E083SB014	76.8	=				
BEQs							
Surface Soil	E083SB011	1.173	=	0.087[b]	0.78[b]	NA	1.304[c]
	E083SB012	**8.277**	=				
	E083SB013	0.453	=				
	E083SB014	**2.178**	=				
	E083SB015	0.4	=				
Subsurface Soil	E083SB011	1.312	=			NA	1.400[c]
	E083SB012	0.671	=				
	E083SB013	0.662	=				
	E083SB014	0.355	=				
	E083SB015	0.332	=				

Concentrations in bold text and outlined within the table represent exceedances of the appropriate screening criteria.

[a] EPA Region III generic Soil Screening Level (SSL) with a Dilution Attenuation Factor (DAF)=10, *EPA Region III RBC Tables* (October 2000).

[b] RBC for benzo(a)pyrene

[c] CNC benzo(a)pyrene equivalent (BEQ) Site-wide Reference Concentration- BEQ concentrations are derived from calculations made per the document *Technical Information for Development of Background BEQ Values* (CH2M-Jones, February 2001).

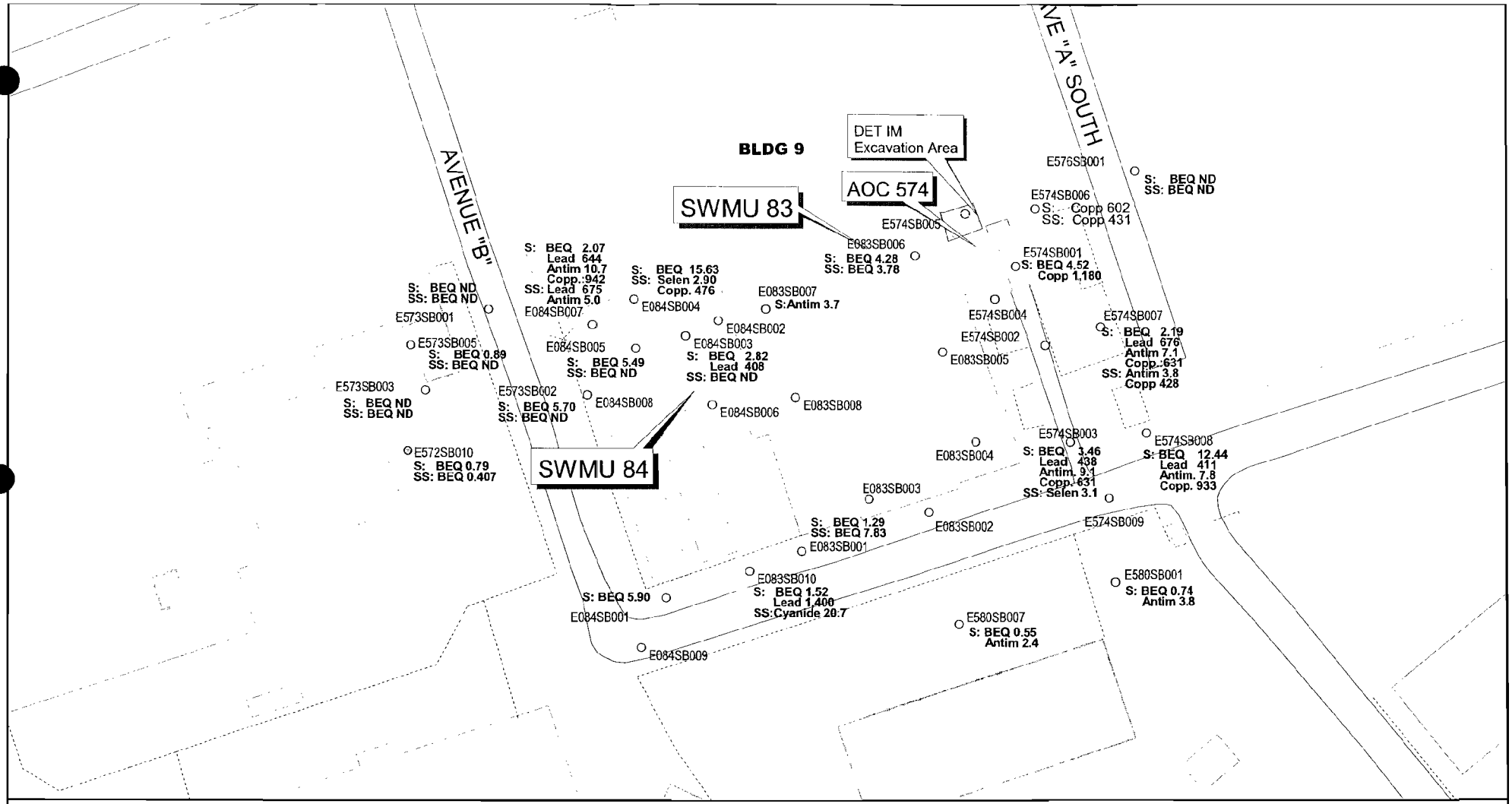
= Indicates that the analyte was detected at the concentration shown.

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

NA Not applicable/not available

U Indicates that the concentration was not detected.

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



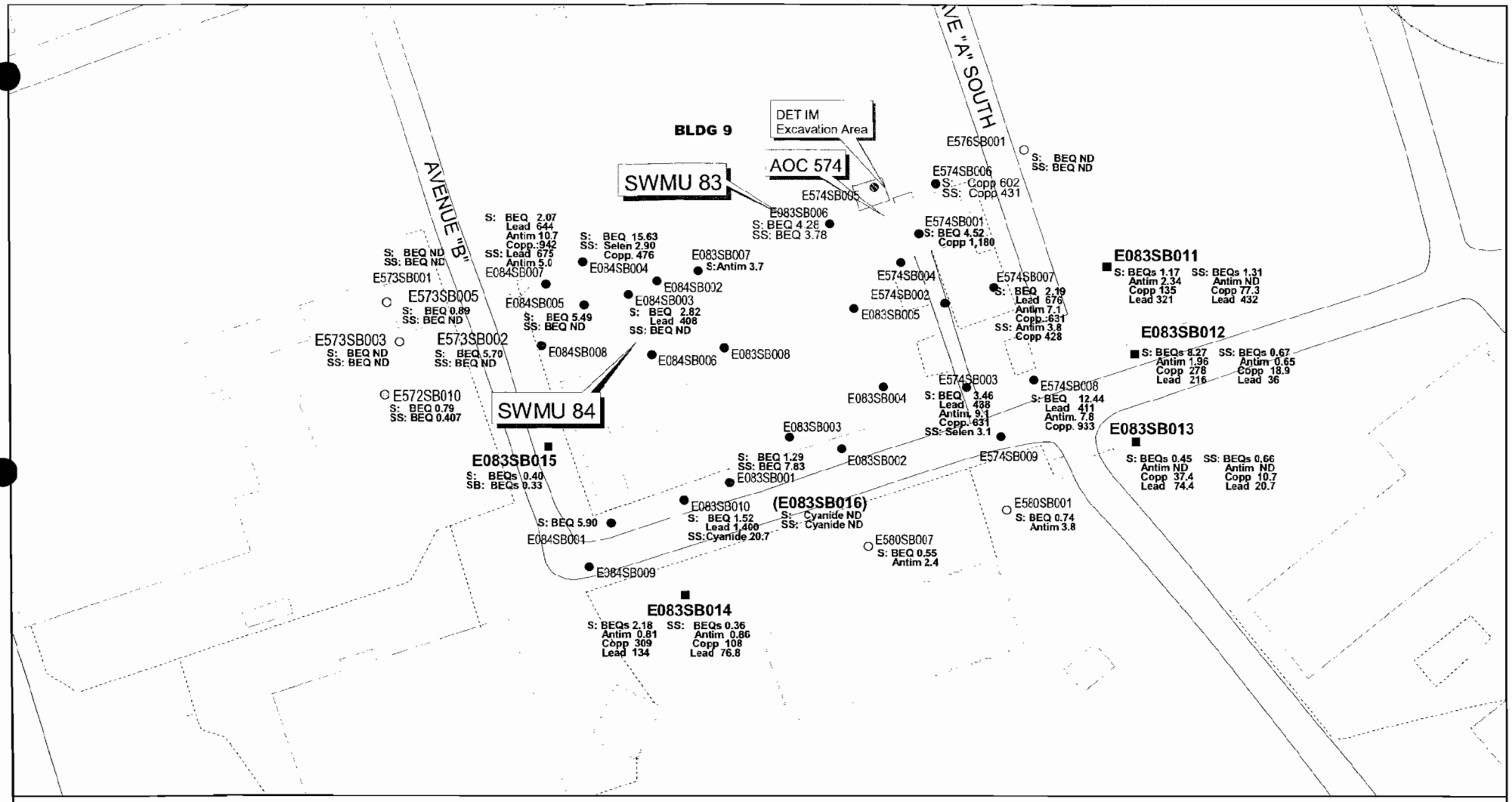
O RFI Soil Boring Location
Roads
AOC Boundary
SWMU Boundary
Buildings

S: Surface Soil Sample
SS: Subsurface Soil Sample

Figure 4-1
RFI Soil Boring Locations with COPC Concentrations
Combined SWMU 83 and Vicinity, Zone E
Charleston Naval Complex

CH2MHILL

File Path c:\18gs_old\cnc\cnc-egis-old_new.apr, Date 11 Jul 2002 14:15, User: SNAIK1



■ Nov. 2001 Sampling Location
⊙ RFI Soil Sampling Location
Roads - Lines
AOC Boundary
SWMU Boundary
Buildings

S: Surface Soil Sample
SS: Subsurface Soil Sample

Figure 4-2
Soil COPCs - RFI and 2001 Sampling
Combined SWMU 83 and Vicinity, Zone E
Charleston Naval Complex

CH2MHILL

File Path c:\18gis_old\cnc\cnc-egis-old_new.apr, Date 06 Jun 2002 20:45, User SNAIKI

Section 5.0

5.0 COPC/COC Refinement

This section discusses the COCs that were identified in the *Zone E RFI Report, Revision 0* (EnSafe, 1997), in addition to any COPCs that were identified in Section 4.0 of this report addendum. In addition, the surface and subsurface soil results for VOCs are re-screened against a generic SSL using a DAF=1, and assessed appropriately.

The *Zone E RFI Report, Revision 0* identified antimony, arsenic, copper, lead, and BEQs as COCs in surface soil. No COCs were identified by the RFI report for subsurface soils. Arsenic was identified as a COC in shallow and deep groundwater.

The nature of occurrence and the relevance of these COCs at this site, and the re-screening of the soil VOC data are further discussed below.

5.1 Soil

5.1.1 Antimony

Tables 5-1 and 5-2 show the detected concentrations of antimony in surface and subsurface soils, respectively, at Combined SWMU 83. Figure 5-1 shows the antimony exceedances in soil at Combined SWMU 83. Four out of 32 surface soil samples from the initial RFI and November 2001 sampling showed detections that exceed the maximum Zone E surface soil background concentration of 7.4 mg/kg for antimony, at E084SB007 (10.7 mg/kg), E574SB003 (9.1 mg/kg), E574SB005 (10.7 mg/kg), and E574SB008 (7.5 mg/kg). The soil at one of these borings (E574SB005) is within the excavation area of the IM conducted by the DET (1997). The estimated exposure concentration in surface soils (using a UCL_{95} calculation) is 2.34 mg/kg, which is below the residential RBC of 3.1 mg/kg (HI=0.1) and the SSL of 2.5 mg/kg. None of the surface soil detections of antimony exceed the industrial RBC (HI =0.1) of 82 mg/kg. All of these sample locations are currently underneath asphalt and concrete pavement, and thus are not available for exposure. Appendix E contains the data and results for the UCL_{95} values calculated.

Three out of 32 subsurface soil samples from the initial RFI and November 2001 sampling showed antimony detections that exceed the SSL of 2.5 mg/kg at E084SB007 (5.0 mg/kg), E574SB005 (7.7 mg/kg), and E574SB007 at (3.8 mg/kg). Soils from the sample location E574SB005 were removed during the 1997 DET IM excavation. The average subsurface antimony concentration at this site is 1.31 mg/kg, which is below the maximum Zone E

subsurface soil antimony concentration of 1.6 mg/kg and the SSL of 2.5 mg/kg. There were no detections of antimony above laboratory detection limits in groundwater, indicating that antimony is not a leaching concern.

The generally low-level detections of antimony and infrequent exceedances of screening criteria in soils are not indicative of a site-related release of antimony. Based on these considerations, antimony is not considered a COC in soils at this site.

5.1.2 Arsenic

The RFI report identified arsenic as a COC in surface soils based on exceedances of the industrial RBC of 3.8 mg/kg. However, detections of arsenic in surface and subsurface soils were below the maximum Zone E surface and subsurface background arsenic concentrations of 68 mg/kg and 26 mg/kg, respectively, as shown in Tables 5-1 and 5-2. This indicates that arsenic detections are within the Zone E background range. Therefore, arsenic is not considered a COC in soils at this site.

5.1.3 Copper

Tables 5-1 and 5-2 show detected concentrations of copper in surface and subsurface soils, respectively, at Combined SWMU 83. Five detections in surface soil samples exceed the maximum Zone E surface soil background concentration for copper of 866 mg/kg at E574SB001 (1,180 mg/kg), E574SB002 (868 mg/kg), E574SB003 (1,260 mg/kg), E084SB007 (942 mg/kg) and E574SB008 (933 mg/kg). The estimated exposure concentration for copper is 476 mg/kg (based on a UCL_{95} calculation). This value is above the residential RBC of 310 mg/kg (HI=0.1), but well below the residential RBC of 3,100 based on a HI=1. The site average for surface soil copper concentrations is 340 mg/kg, which is below the the EPA Region III generic SSL (with a DAF=10) of 530 mg/kg. None of the surface soil detections of copper exceed the industrial RBC (HI=0.1) of 8,176 mg/kg. All of these sample locations are currently underneath asphalt and concrete pavement are thus unavailable for exposure.

Two subsurface detections of copper from the initial RFI exceed the SSL of 530 mg/kg, at E574SB005 (761 mg/kg) and E084SB007 (541 mg/kg). Soils from the location of E574SB005 were removed during the 1997 DET IM excavation. However, the site average for subsurface soil copper concentrations is 121 mg/kg, which is below the EPA Region III generic SSL (with a DAF=10) of 530 mg/kg.

The low level detections of copper and infrequent exceedances of the leachability criteria indicate that the concentrations of copper in soils do not pose a threat to groundwater quality. Additionally, the detections of copper in groundwater are similar to the

background concentrations in Zone E groundwater (0.8 to 9 micrograms per liter [µg/L]), and do not exceed the Treatment Technique Action Level (TTAL) of 1,300 µg/L, as shown in Table 5-4, thus indicating that copper concentrations in soil are not impacting groundwater at the site. Based on these considerations, copper is not considered a COC at this site.

5.1.4 Lead

Tables 5-1 and 5-2 show detections of lead in surface and subsurface soil samples, respectively, at Combined SWMU 83. In surface soils, there were six detections of lead above the unrestricted land use criterion of 400 mg/kg, at E083SB010 (1,400 mg/kg), E084SB003 (408 mg/kg), E084SB007 (644 mg/kg), E574SB002 (476 mg/kg), E574SB003 (438 mg/kg), and E574SB008 (411 mg/kg). The surface soil sample from E574SB005 showed a detection of 700 mg/kg above the 400 mg/kg unrestricted land use criterion, however soils at this location were removed during the 1997 DET IM excavation and replaced with clean backfill. The site average concentration calculated for lead in surface soils (including detections at E574SB005 where soil was removed) is 236 mg/kg (see Table 5-1), below the unrestricted land use criterion for lead of 400 mg/kg. Only one surface soil detection of 1,400 mg/kg at E083SB010 exceeded the residential and industrial reuse criterion of 1,218 mg/kg for lead. All of these sample locations are currently underneath asphalt and concrete pavement. Lead is not considered a COC in surface soilat this site.

In subsurface soils, two detections exceed the SSL of 400 mg/kg, at E084SB007 (675 mg/kg) and at E083SB011 (432 mg/kg). A detection of 602 mg/kg was found at E574SB005, but the soils at this location were removed during the 1997 DET IM excavation, and the excavation was backfilled with clean soils. The site average concentration for lead in subsurface soils as shown in Table 5-1 (including detections at E574SB005 where soil was removed) is 89 mg/kg, which is below the SSL of 400 mg/kg.

There were no detections of lead in groundwater above laboratory detection limits, indicating that lead is not impacting groundwater at this site, and is therefore not a leaching concern. Based on infrequent exceedance of the SSL in subsurface soils, the average lead concentrations in subsurface soil being below the SSL, and the absence of lead in groundwater, lead is not considered a COC in subsurface soils.

5.1.5 BEQs

Tables 5-1 and 5-2 show BEQ concentrations in surface and subsurface soils respectively, at Combined SWMU 83. BEQ detections in 13 out of 32 surface soil samples from the RFI and 2001 sampling events exceed the surface soil CNC BEQ site-wide reference concentration of

1,304 μg/kg, with detections ranging from 1,520 μg/kg to 15,630 μg/kg. Four of these BEQ detections are above the maximum BEQ concentration of 5,133 μg/kg detected during the BEQ sampling investigations conducted along the railroad lines. Details of the railroad area investigation are found in *Technical Memorandum: Results from Additional Background Sampling of the CNC Railroad Lines and Naval Annex (Zone K)* (CH2M-Jones, 2001). The site average for surface soil BEQ concentrations is 2,620 μg/kg.

BEQ detections in two out of 32 subsurface soil samples exceed the subsurface soil CNC BEQ site-wide reference concentration of 1,400 μg/kg. These two detections were at E083SB001 (7,830 μg/kg) and E083SB006 (3,780 μg/kg). The site average for subsurface soil BEQ concentrations is 1,020 μg/kg, which is below the basewide reference concentration .

There were no detections of the PAHs that constitute BEQs above laboratory detection limits in groundwater, thus indicating that BEQs are not a leaching concern at this site. With the exception of one detection of benzo(b)fluoranthene of 5,200 μg/kg at E083SB001 above its SSL of 2,500 μg/kg, none of the PAHs that constitute BEQs exceed their respective SSLs, indicating that subsurface BEQ concentrations are protective of groundwater. Based on the infrequent exceedance of the CNC BEQ site-wide reference concentrations and the above observations, BEQs are not considered subsurface soil COCs at this site.

The figure included in Appendix F of this report shows the presence of historic railroad lines in the areas where elevated BEQ concentrations were detected in surface and subsurface soils. These elevated BEQ detections could be attributed to impacts from these historic railroad activities and might also be related to extensive soil disturbance, historical operations at this site which are typical of older industrial areas, and/or asphalt materials being pushed down during sampling. During a site walk conducted by CH2M-Jones during February 2002, it was observed that with the exception of one sample location, E084SB004 (shown in Figure 4-1), all other areas at the site are under asphalt and concrete pavement, thus limiting exposure to BEQ-contaminated soils. Non-point anthropogenic sources, such as asphalt pavement and railroad lines, may have contributed to the rpesence of BEQs at this site. Site Photograph No. 1, which is included in Appendix G, shows the location of E084SB004 adjacent to the foundation of Building 9. This area has limited accessibility for direct exposure due to the presence of a large tree, as well as the location of the area being within a fenced portion of this industrial site. Thus, overall human activity and exposure are expected to be limited in this area.

The open areas outside Building 9 are currently used to store scrap metal, old equipment and machine parts as shown in Site Photograph No. 2 (see Appendix G). Also, pieces of

spent coke-type material were found littered on the ground in several places around Building 9, as shown in Site Photograph No. 3 (see Appendix G). BEQs are considered COCs in surface soils at this site due to elevated BEQ detections at hotspots. A focused CMS will be performed to evaluate alternatives for corrective action at this site due to the presence of BEQs in surface soils, as outlined in Section 8.0.

5.1.6 Soil VOC Screening using SSL at DAF=1

Soil VOC detections were compared to SSLs at DAF =1. Only one chemical, methylene chloride, exceeded this screening criteria. Methylene chloride was detected in five of 19 surface soil samples and four of 21 subsurface soil samples. There were no methylene chloride detections in groundwater samples collected from monitoring wells associated with the combined SWMU 83 site, indicating that methylene chloride in soil does not pose a threat to groundwater via leaching.

Detections of methylene chloride in surface soil and subsurface soil sampling are shown in Tables 5-1 and 5-2, respectively. All of the methylene chloride detections (ranging from 0.001 to 0.007 mg/kg) exceeded the SSL of 0.001 mg/kg with a DAF=1.

Out of the five surface soil detections of methylene chloride, there were two detections at 0.001 mg/kg, two detections at 0.002 mg/kg and one detection of 0.006 mg/kg. These surface soil detections are well below the EPA Region III residential RBC for methylene chloride of 85 mg/kg, indicating that methylene chloride in surface soil does not pose a concern for direct exposure.

The four subsurface soil detections of methylene chloride range from 0.002 mg/kg to 0.007 mg/kg.

Methylene chloride is considered a common laboratory artifact or contaminant by the EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994). It has been widely detected in grid and blank samples at the CNC. At this site, a travel blank associated with the sample data group (SDG) 24170 of 15 site samples had a 2J μg/L value reported, indicating the potential for low level methylene chloride contamination of the samples due to ambient or laboratory conditions. These blank data will be included in Appendix D of the Revision 1 to this document. Based on EPA's "ten times" rule, methylene chloride concentrations of up to 20 μg/kg would be considered likely due to laboratory contamination.

As agreed by the BCT, in the event that a generic SSL is exceeded, a site-specific SSL is calculated. A site-specific SSL was calculated for methylene chloride for both the paved and

unpaved scenarios. Table 5-3 presents the input parameters and the resulting SSL values. The site-specific SSL for the unpaved scenario is calculated to be 0.013 mg/kg, and the site-specific SSL for the paved scenario is calculated to be 0.107 mg/kg. The soil samples showing the methylene chloride detections were collected from areas under the concrete building floor and asphalt pavement. The methylene chloride detections in both surface and subsurface soil samples from these paved area are below the conservative SSL for the unpaved scenario of 0.013 mg/kg, indicating that methylene chloride is not a leaching concern.

No significant source area of methylene chloride was found in the site soil, and it was not detected in groundwater samples.

For these reasons, methylene chloride is not considered a COC for surface or subsurface soil at this site.

5.2 Shallow Groundwater

5.2.1 Arsenic

Table 5-4 presents arsenic, copper, iron, and manganese data from four groundwater sampling events at shallow wells at this site. None of the detections of arsenic exceeded the MCL of 50 μg/L. Therefore, arsenic is not considered a COC in shallow groundwater.

5.3 Deep Groundwater

5.3.1 Arsenic

The RFI identified arsenic in deep groundwater as a COC based on arsenic detections above the MCL of 50 µg/L. Arsenic detections in the deep well, shown in Table 5-4, ranged from 68 µg/L to 79 µg/L, greater than the MCL but less than the maximum Zone E background arsenic concentration in deep groundwater of 132 µg/L.

Elevated arsenic detections in groundwater at many sites at the CNC have been attributed as most likely due to natural occurrence when elevated iron has also been detected in groundwater at the same site, which suggests that iron-reducing conditions are present at the site and influencing the arsenic concentrations. The iron concentrations in deep groundwater at the site strongly indicate that iron-reducing conditions are present. The mechanism of this natural occurrence is described in the document *Technical Memorandum, An Overview of Arsenic Geochemistry, Terminal Electron Accepting Processes in GW Systems, and Implications for the CNC Hydrogeologic Environment* (CH2M Jones, 2001). These data suggest

that the elevated arsenic in deep groundwater at Combined SWMU 83 is due to natural geochemical processes at this site. Based on these observations and because arsenic is within the range of backgroundconcentrations in Zone E, arsenic in deep groundwater is not considered a COC.

5.4 COC Summary

BEQs in surface soil are identified as COCs for unrestricted and industrial land use. No COCs have been identified for subsurface soil or shallow or deep groundwater.

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Antimony	083SB00101	E083SB001	0.5	UJ	11/30/1995	82	3.1	0.5 - 7.4	2.5
	083SB00201	E083SB002	0.5	UJ	12/18/1995				
	083SB00301	E083SB003	0.5	UJ	12/14/1995				
	083SB00401	E083SB004	0.5	UJ	12/14/1995				
	083SB00501	E083SB005	0.5	UJ	12/18/1995				
	083SB00601	E083SB006	0.5	U	12/19/1995				
	083SB00701	E083SB007	3.7	J	12/14/1995				
	083SB00801	E083SB008	0.4	UJ	12/14/1995				
	083SB01001	E083SB010	3.4	UJ	05/28/1996				
	084SB00101	E084SB001	0.6	J	11/29/1995				
	084SB00201	E084SB002	0.4	UJ	12/01/1995				
	084SB00301	E084SB003	2.1	J	12/01/1995				
	084SB00401	E084SB004	1.6	J	12/01/1995				
	084SB00501	E084SB005	0.6	J	12/01/1995				
	084SB00601	E084SB006	0.4	UJ	12/01/1995				
	084SB00701	E084SB007	**10.7**	J	05/24/1996				
	084SB00801	E084SB008	0.9	J	05/24/1996				
	084SB00901	E084SB009	3.5	UJ	05/28/1996				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Antimony	574SB00101	E574SB001	1.4	UJ	11/30/1995	82	3.1	0.5 - 7.4	2.5
	574SB00201	E574SB002	5.0	J	11/30/1995				
	574SB00301	E574SB003	**9.1**	J	11/30/1995				
	574SB00401	E574SB004	0.9	J	11/30/1995				
	574SB00501a	E574SB005	3.0	J	11/30/1995				
	574SB00501c	E574SB005*	**10.7**	J	05/21/1996				
	574SB00601	E574SB006	2.9	J	05/22/1996				
	574SB00701	E574SB007	7.1	J	05/22/1996				
	574SB00801	E574SB008	**7.5**	J	05/22/1996				
	574SB00901	E574SB009	0.6	J	05/22/1996				
	083SB01101	E083SB011	2.34	J	11/19/2001				
	083SB01201	E083SB012	1.96	J	11/19/2001				
	083SB01301	E083SB013	0.54	UJ	11/19/2001				
	083SB01401	E083SB014	0.81	J	11/19/2001				
Surface Soil Average Concentration			2.46						
Arsenic	083SB00101	E083SB001	2.5	=	11/30/1995	3.8	0.43	0.95 - 68	14.5
	083SB00201	E083SB002	1.9	=	12/18/1995				
	083SB00301	E083SB003	2.8	=	12/14/1995				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Arsenic	083SB00401	E083SB004	2.7	=	12/14/1995	3.8	0.43	0.95 - 68	14.5
	083SB00501	E083SB005	1.3	=	12/18/1995				
	083SB00601	E083SB006	9.3	=	12/19/1995				
	083SB00701	E083SB007	2.8	=	12/14/1995				
	083SB00801	E083SB008	1.3	=	12/14/1995				
	083SB01001	E083SB010	5.40	J	05/28/1996				
	084SB00101	E084SB001	2.2	=	11/29/1995				
	084SB00201	E084SB002	0.87	J	12/01/1995				
	084SB00301	E084SB003	6.8	=	12/01/1995				
	084SB00401	E084SB004	6.2	=	12/01/1995				
	084SB00501	E084SB005	5.9	=	12/01/1995				
	084SB00601	E084SB006	0.5	U	12/01/1995				
	084SB00701	E084SB007	25.0	=	05/24/1996				
	084SB00801	E084SB008	4.8	=	05/24/1996				
	084SB00901	E084SB009	2.90	J	05/28/1996				
	574SB00101	E574SB001	3.2	=	11/30/1995				
	574SB00201	E574SB002	9.9	=	11/30/1995				
	574SB00301	E574SB003	6.7	=	11/30/1995				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Arsenic	574SB00401	E574SB004	2.3	=	11/30/1995	3.8	0.43	0.95 - 68	14.5
	574SB00501a	E574SB005*	9.2	=	11/30/1995				
	574SB00501c	E574SB005*	8.8	=	05/21/1996				
	574SB00601	E574SB006	11.9	=	05/22/1996				
	574SB00701	E574SB007	22.1	=	05/22/1996				
	574SB00801	E574SB008	5.9	=	05/22/1996				
	574SB00901	E574SB009	2.4	=	05/22/1996				
Copper	083SB00101	E083SB001	107.0	=	11/30/1995	8,176	313	0.47 - 866	530[a]
	083SB00201	E083SB002	136.0	=	12/18/1995				
	083SB00301	E083SB003	5.0	=	12/14/1995				
	083SB00401	E083SB004	18.3	=	12/14/1995				
	083SB00501	E083SB005	142.0	=	12/18/1995				
	083SB00601	E083SB006	8.0	=	12/19/1995				
	083SB00701	E083SB007	243.0	=	12/14/1995				
	083SB00801	E083SB008	22.7	=	12/14/1995				
	083SB01001	E083SB010	439.0	J	05/28/1996				
	084SB00101	E084SB001	16.3	=	11/29/1995				
	084SB00201	E084SB002	4.2	J	12/01/1995				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Copper	084SB00301	E084SB003	332.0	J	12/01/1995	8,176	313	0.47 - 866	530[a]
	084SB00401	E084SB004	476.0	J	12/01/1995				
	084SB00501	E084SB005	90.4	J	12/01/1995				
	084SB00601	E084SB006	6.9	J	12/01/1995				
	084SB00701	E084SB007	**942.0**	=	05/24/1996				
	084SB00801	E084SB008	9.1	=	05/24/1996				
	084SB00901	E084SB009	10.1	J	05/28/1996				
	574SB00101	E574SB001	**1,180.0**	=	11/30/1995				
	574SB00201	E574SB002	**868.0**	=	11/30/1995				
	574SB00301	E574SB003	**1,260.0**	=	11/30/1995				
	574SB00401	E574SB004	292.0	=	11/30/1995				
	574SB00501a	E574SB005*	610.0	=	11/30/1995				
	574SB00501c	E574SB005*	729.0	=	05/21/1996				
	574SB00601	E574SB006	602.0	=	05/22/1996				
	574SB00701	E574SB007	631.0	=	05/22/1996				
	574SB00801	E574SB008	**933.0**	=	05/22/1996				
	574SB00901	E574SB009	20.4	=	05/22/1996				
	083SB01101	E083SB011	135	=	11/19/2001				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Copper	083SB01201	E083SB012	278	=	11/19/2001	8,176	313	0.47 - 866	530[a]
	083SB01301	E083SB013	37.4	=	11/19/2001				
	083SB01401	E083SB014	309	=	11/19/2001				
Surface Soil Average Concentration			340.4						
Lead	083SB00101	E083SB001	30.2	J	11/30/1995	1,300	400	1.0 - 400	400
	083SB00201	E083SB002	49.6	J	12/18/1995				
	083SB00301	E083SB003	25.3	J	12/14/1995				
	083SB00401	E083SB004	22.7	J	12/14/1995				
	083SB00501	E083SB005	40.1	J	12/18/1995				
	083SB00601	E083SB006	9.6	=	12/19/1995				
	083SB00701	E083SB007	94.2	J	12/14/1995				
	083SB00801	E083SB008	11.8	J	12/14/1995				
	083SB01001	E083SB010	**1,400**	J	05/28/1996				
	084SB00101	E084SB001	89.9	J	11/29/1995				
	084SB00201	E084SB002	8.7	=	12/01/1995				
	084SB00301	E084SB003	**408.0**	=	12/01/1995				
	084SB00401	E084SB004	317.0	=	12/01/1995				
	084SB00501	E084SB005	281.0	=	12/01/1995				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Lead	084SB00601	E084SB006	2.9	=	12/01/1995	1,300	400	1.0 - 400	400
	084SB00701	E084SB007	**644.0**	J	05/24/1996				
	084SB00801	E084SB008	12.7	J	05/24/1996				
	084SB00901	E084SB009	53.6	J	05/28/1996				
	574SB00101	E574SB001	110.0	J	11/30/1995				
	574SB00201	E574SB002	**476.0**	J	11/30/1995				
	574SB00301	E574SB003	**438.0**	J	11/30/1995				
	574SB00401	E574SB004	46.8	J	11/30/1995				
	574SB00501a	E574SB005*	**700.0**	J	11/30/1995				
	574SB00501c	E574SB005*	**676.0**	J	05/21/1996				
	574SB00601	E574SB006	128.0	J	05/22/1996				
	574SB00701	E574SB007	280.0	J	05/22/1996				
	574SB00801	E574SB008	**411.0**	J	05/22/1996				
	574SB00901	E574SB009	41.0	J	05/22/1996				
	083SB01101	E083SB011	321	=	11/29/2001				
	083SB01201	E083SB012	216	=	11/29/2001				
	083SB01301	E083SB013	74.4	=	11/29/2001				
	083SB01401	E083SB014	134	=	11/29/2001				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Surface Soil Average Concentration			236						
BEQs	083SB00101	E083SB001	1.29	=	11/30/1995	0.78[b]	0.087[b]	1.304[c]	NA
	083SB00201	E083SB002	0.88	U	12/18/1995				
	083SB00301	E083SB003	0.92	U	12/14/1995				
	083SB00401	E083SB004	0.67	=	12/14/1995				
	083SB00501	E083SB005	0.75	=	12/18/1995				
	083SB00601	E083SB006	**4.28**	=	12/19/1995				
	083SB00701	E083SB007	0.92	U	12/14/1995				
	083SB00801	E083SB008	0.83	U	12/14/1995				
	083SB01001	E083SB010	**1.52**	=	05/28/1996				
	084SB00101	E084SB001	**5.90**	=	11/29/1995				
	084SB00201	E084SB002	0.83	U	12/01/1995				
	084SB00301	E084SB003	**2.82**	=	12/01/1995				
	084SB00401	E084SB004	**15.63**	=	12/01/1995				
	084SB00501	E084SB005	**5.49**	=	12/01/1995				
	084SB00601	E084SB006	0.54	=	12/01/1995				
	084SB00701	E084SB007	**2.07**	=	05/24/1996				
	084SB00801	E084SB008	1.15	=	05/24/1996				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
BEQs	084SB00901	E084SB009	0.89	U	05/28/1996	0.78[b]	0.087[b]	1.304[c]	NA
	574SB00101	E574SB001	**4.52**	=	11/30/1995				
	574SB00201	E574SB002	1.26	=	11/30/1995				
	574SB00301	E574SB003	**3.46**	=	11/30/1995				
	574SB00401	E574SB004	4.51	U	11/30/1995				
	574SB00501b	E574SB005*	0.02	U	11/30/1995				
	574SB00601	E574SB006	0.26	=	05/21/1996				
	574SB00701	E574SB007	**2.19**	=	05/22/1996				
	574SB00801	E574SB008	**12.44**	=	05/22/1996				
	574SB00901	E574SB009	0.28	=	05/22/1996				
	083SB01101	E083SB011	1.173	=	05/22/1996				
	083SB01201	E083SB012	**8.277**	=	11/19/2001				
	083SB01301	E083SB013	0.452	=	11/19/2001				
	083SB01401	E083SB014	**2.178**	=	11/19/2001				
	083SB01501	E083SB015	0.4	=	11/19/2001				
Surface Soil Average Concentration			**2.62**						

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Methylene Chloride	084SB00401	E084SB004	0.006	U	12/01/1995	760	85	NA	0.001 (DAF=1)
	084SB00901	E084SB009	0.012	U	05/28/1996				
	084SB00501	E084SB005	0.006	U	12/01/1995				
	084SB00601	E084SB006	0.005	U	12/01/1995				
	084SB00101	E084SB001	0.010	U	11/29/1995				
	084SB00801	E084SB008	**0.006**	=	05/24/1996				
	083SB00601	E083SB006	**0.002**	J	12/19/1995				
	083SB00801	E083SB008	**0.001**	J	12/14/1995				
	083SB01001	E083SB010	0.011	U	05/28/1996				
	083SB00401	E083SB004	**0.001**	J	12/14/1995				
	083SB00301	E083SB003	0.006	U	12/14/1995				
	083SB00701	E083SB007	**0.002**	J	12/14/1995				
	083SB00201	E083SB002	0.006	U	12/18/1995				
	574SB00401	E574SB004	0.019	U	11/30/1995				
	574SB00301	E574SB003	0.010	U	11/30/1995				
	574SB00501a	E574SB005*	0.006	U	11/30/1995				
	083SB00101	E083SB001	0.010	U	11/30/1995				

TABLE 5-1
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Surface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	EPARegion III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Range	SSL (DAF=10)
Methylene Chloride	084SB00301	E084SB003	0.006	U	12/01/1995	760	85	NA	0.001 (DAF=1)
	084SB00201	E084SB002	0.005	U	12/01/1995				

Concentrations in bold text and outlined within the table represent exceedances of the appropriate screening criteria.

All values are presented in milligrams per kilogram (mg/kg).

[a] EPA Region III generic Soil Screening Level (SSL) with a Dilution Attenuation Factor (DAF)=10, *EPA Region III RBC Tables* (October 2000).

[b] RBC for benzo(a)pyrene

[c] Surface Soil CNC benzo(a)pyrene equivalent (BEQ) Site-wide Reference Concentration- BEQ concentrations are derived from calculations made per the document *Technical Information for Development of Background BEQ Values* (CH2M-Jones, February 2001).

* Station removed during IM for AOC 574 (1997).

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

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

NA Not applicable/not available

U Indicates that the concentration was not detected.

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

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Antimony	083SB00102	E083SB001	0.52	UJ	11/30/1995	0.52 - 1.6	2.5
	083SB00202	E083SB002	0.67	UJ	12/18/1995		
	083SB00302	E083SB003	0.48	UJ	12/14/1995		
	083SB00402	E083SB004	0.49	UJ	12/14/1995		
	083SB00502	E083SB005	0.63	UJ	12/18/1995		
	083SB00602	E083SB006	0.50	U	12/19/1995		
	083SB00702	E083SB007	0.52	UJ	12/14/1995		
	083SB00802	E083SB008	0.47	UJ	12/14/1995		
	083SB01002	E083SB010	3.70	UJ	05/28/1996		
	084SB00102a	E084SB001	0.47	UJ	11/29/1995		
	084SB00202	E084SB002	0.48	UJ	12/01/1995		
	084SB00302	E084SB003	0.47	UJ	12/01/1995		
	084SB00402	E084SB004	0.49	UJ	12/01/1995		
	084SB00502	E084SB005	0.46	UJ	12/01/1995		
	084SB00602	E084SB006	0.47	UJ	12/01/1995		
	084SB00702	E084SB007	**5.00**	J	05/24/1996		
	084SB00802	E084SB008	0.44	UJ	05/24/1996		
	084SB00902	E084SB009	3.50	UJ	05/28/1996		
	574SB00102	E574SB001	0.71	J	11/30/1995		
	574SB00202	E574SB002	0.86	J	11/30/1995		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Antimony	574SB00302	E574SB003	0.71	J	11/30/1995	0.52 - 1.6	2.5
	574SB00402	E574SB004	0.66	J	11/30/1995		
	574SB00502a	E574SB005*	**7.70**	J	11/30/1995		
	574SB00502b	E574SB005*	**6.30**	J	05/21/1996		
	574SB00602	E574SB006	2.10	J	05/22/1996		
	574SB00702	E574SB007	**3.80**	J	05/22/1996		
	574SB00802	E574SB008	1.20	J	05/22/1996		
	574SB00902	E574SB009	0.45	UJ	05/22/1996		
	083SB011	E083SB01	0.4	UJ	11/19/2001		
	083SB012	E083SB01	0.65	UJ	11/19/2001		
	083SB013	E083SB01	0.47	UJ	11/19/2001		
	083SB014	E083SB01	0.86	J	11/19/2001		
Subsurface Soil Average Concentration			1.31				
Arsenic	084SB00502	E084SB005	0.81	J	12/01/1995	0.83 - 26	14.5
	084SB00802	E084SB008	0.99	J	05/24/1996		
	083SB00402	E083SB004	1.10	J	12/14/1995		
	084SB00902	E084SB009	1.80	J	05/28/1996		
	083SB00302	E083SB003	2.30	=	12/14/1995		
	084SB00402	E084SB004	2.30	=	12/01/1995		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Arsenic	574SB00902	E574SB009	2.50	=	05/22/1996	0.83 - 26	14.5
	084SB00302	E084SB003	3.00	=	12/01/1995		
	083SB00802	E083SB008	3.10	=	12/14/1995		
	084SB00102a	E084SB001	3.20	=	11/29/1995		
	084SB00602	E084SB006	3.20	=	12/01/1995		
	083SB00602	E083SB006	4.00	=	12/19/1995		
	083SB00702	E083SB007	4.20	=	12/14/1995		
	083SB00102	E083SB001	4.30	=	11/30/1995		
	083SB01002	E083SB010	4.70	J	05/28/1996		
	084SB00202	E084SB002	5.20	=	12/01/1995		
	574SB00102	E574SB001	6.10	=	11/30/1995		
	574SB00502a	E574SB005*	7.00	=	11/30/1995		
	083SB00502	E083SB005	7.30	=	12/18/1995		
	084SB00702	E084SB007	8.00	=	05/24/1996		
	083SB00202	E083SB002	9.00	=	12/18/1995		
	574SB00502b	E574SB005	9.20	=	05/21/1996		
	574SB00702	E574SB007	9.20	=	05/22/1996		
	574SB00602	E574SB006	9.50	=	05/22/1996		
	574SB00402	E574SB004	9.80	=	11/30/1995		
	574SB00302	E574SB003	10.50	=	11/30/1995		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Arsenic	574SB00202	E574SB002	13.60	=	11/30/1995	0.83 - 26	14.5
	574SB00802	E574SB008	16.70	=	05/22/1996		
Copper	083SB00102	E083SB001	3.60	=	11/30/1995	1.3 - 192	530[a]
	083SB00202	E083SB002	17.60	=	12/18/1995		
	083SB00302	E083SB003	**292.00**	=	12/14/1995		
	083SB00402	E083SB004	19.80	=	12/14/1995		
	083SB00502	E083SB005	49.90	=	12/18/1995		
	083SB00602	E083SB006	5.70	=	12/19/1995		
	083SB00702	E083SB007	3.00	J	12/14/1995		
	083SB00802	E083SB008	1.70	J	12/14/1995		
	083SB01002	E083SB010	2.70	J	05/28/1996		
	084SB00102a	E084SB001	1.50	J	11/29/1995		
	084SB00202	E084SB002	1.10	J	12/01/1995		
	084SB00302	E084SB003	2.50	J	12/01/1995		
	084SB00402	E084SB004	7.50	J	12/01/1995		
	084SB00502	E084SB005	6.80	J	12/01/1995		
	084SB00602	E084SB006	1.30	J	12/01/1995		
	084SB00702	E084SB007	**541.00**	=	05/24/1996		
	084SB00802	E084SB008	3.30	=	05/24/1996		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Copper	084SB00902	E084SB009	1.20	UJ	05/28/1996	1.3 - 192	530[a]
	574SB00102	E574SB001	141.00	=	11/30/1995		
	574SB00202	E574SB002	21.90	=	11/30/1995		
	574SB00302	E574SB003	31.90	=	11/30/1995		
	574SB00402	E574SB004	99.50	=	11/30/1995		
	574SB00502a	E574SB005*	**493.00**	=	11/30/1995		
	574SB00502b	E574SB005*	**761.00**	=	05/21/1996		
	574SB00602	E574SB006	**431.00**	=	05/22/1996		
	574SB00702	E574SB007	**428.00**	=	05/22/1996		
	574SB00802	E574SB008	22.80	=	05/22/1996		
	574SB00902	E574SB009	4.00	=	05/22/1996		
Subsurface Soil Average Concentration			121.30				
Lead	083SB00102	E083SB001	19.90	J	11/30/1995	1.80 - 322	400
	083SB00202	E083SB002	23.60	J	12/18/1995		
	083SB00302	E083SB003	88.80	J	12/14/1995		
	083SB00402	E083SB004	9.10	J	12/14/1995		
	083SB00502	E083SB005	39.70	J	12/18/1995		
	083SB00602	E083SB006	5.70	=	12/19/1995		
	083SB00702	E083SB007	9.20	J	12/14/1995		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Lead	083SB00802	E083SB008	3.20	J	12/14/1995	1.80 - 322	400
	083SB01002	E083SB010	17.70	J	05/28/1996		
	084SB00102a	E084SB001	4.00	J	11/29/1995		
	084SB00202	E084SB002	3.50	=	12/01/1995		
	084SB00302	E084SB003	6.80	=	12/01/1995		
	084SB00402	E084SB004	17.60	=	12/01/1995		
	084SB00502	E084SB005	15.00	=	12/01/1995		
	084SB00602	E084SB006	2.90	=	12/01/1995		
	084SB00702	E084SB007	**675.00**	J	05/24/1996		
	084SB00802	E084SB008	4.00	J	05/24/1996		
	084SB00902	E084SB009	2.60	UJ	05/28/1996		
	574SB00102	E574SB001	25.30	J	11/30/1995		
	574SB00202	E574SB002	19.80	J	11/30/1995		
	574SB00302	E574SB003	17.80	J	11/30/1995		
	574SB00402	E574SB004	19.60	J	11/30/1995		
	574SB00502a	E574SB005*	**466.00**	J	11/30/1995		
	574SB00502b	E574SB005*	**602.00**	J	05/21/1996		
	574SB00602	E574SB006	45.60	J	05/22/1996		
	574SB00702	E574SB007	106.00	J	05/22/1996		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Lead	574SB00802	E574SB008	27.10	J	05/22/1996	1.80 - 322	400
	574SB00902	E574SB009	9.50	J	05/22/1996		
	E083SB01102	E083SB011	**432**	=	11/19/2001		
	E083SB01202	E083SB012	36	=	11/19/2001		
	E083SB01302	E083SB013	20.7	=	11/19/2001		
	E083SB01402	E083SB014	76.8	=	11/19/2001		
Subsurface Soil Average Concentration			89.14				
BEQs	083SB00102	E083SB001	**7.83**	=	11/30/1995	1.4[b]	NA
	083SB00202	E083SB002	1.16	U	12/18/1995		
	083SB00302	E083SB003	0.90	U	12/14/1995		
	083SB00402	E083SB004	0.94	U	12/14/1995		
	083SB00502	E083SB005	7.16	U	12/18/1995		
	083SB00602	E083SB006	**3.78**	=	12/19/1995		
	083SB00702	E083SB007	1.02	U	12/14/1995		
	083SB00802	E083SB008	0.90	U	12/14/1995		
	083SB01002	E083SB010	0.92	U	05/28/1996		
	084SB00102a	E084SB001	0.90	U	11/29/1995		
	084SB00202	E084SB002	0.90	U	12/01/1995		
	084SB00302	E084SB003	0.60	=	12/01/1995		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
BEQs	084SB00402	E084SB004	0.64	=	12/01/1995	1.4[b]	NA
	084SB00502	E084SB005	0.89	U	12/01/1995		
	084SB00602	E084SB006	0.90	U	12/01/1995		
	084SB00702	E084SB007	0.64	=	05/24/1996		
	084SB00802	E084SB008	0.84	U	05/24/1996		
	084SB00902	E084SB009	0.88	U	05/28/1996		
	574SB00102	E574SB001	1.09	U	11/30/1995		
	574SB00202	E574SB002	1.39	U	11/30/1995		
	574SB00302	E574SB003	0.86	=	11/30/1995		
	574SB00402	E574SB004	2.54	U	11/30/1995		
	574SB00502a	E574SB005*	1.15	=	11/30/1995		
	574SB00602	E574SB006	0.47	U	05/21/1996		
	574SB00702	E574SB007	1.06	=	05/22/1996		
	574SB00802	E574SB008	0.73	=	05/22/1996		
	574SB00902	E574SB009	0.43	U	05/22/1996		
	E083SB01102	E083SB011	1.312	=	05/22/1996		
	E083SB01202	E083SB012	0.671	=	11/19/2001		
	E083SB01302	E083SB013	0.662	=	11/19/2001		
	E083SB01402	E083SB014	0.335	=	11/19/2001		
	E083SB01502	E083SB015	0.332	=	11/19/2001		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Subsurface Soil Average Concentration			1.02				
Methylene Chloride	084SB00102a	E084SB001	0.010	U	11/29/1995	NA	0.001 (DAF=1)
	084SB00402	E084SB004	0.032	U	12/01/1995		
	084SB00702	E084SB007	**0.007**	=	05/24/1996		
	084SB00802	E084SB008	**0.006**	=	05/24/1996		
	084SB00602	E084SB006	0.006	U	12/01/1995		
	083SB00802	E083SB008	0.006	UJ	12/14/1995		
	083SB00302	E083SB003	**0.002**	J	12/14/1995		
	083SB00602	E083SB006	0.790	U	12/19/1995		
	083SB00702	E083SB007	0.007	UJ	12/14/1995		
	083SB01002	E083SB010	0.012	U	05/28/1996		
	083SB00202	E083SB002	0.008	U	12/18/1995		
	574SB00502a	E574SB005*	**0.007**	=	11/30/1995		
	574SB00102	E574SB001	0.009	UJ	11/30/1995		
	574SB00302	E574SB003	0.009	U	11/30/1995		
	574SB00402	E574SB004	0.009	U	11/30/1995		
	574SB00202	E574SB002	0.012	U	11/30/1995		
	084SB00902	E084SB009	0.011	U	05/28/1996		

TABLE 5-2
Detected Concentrations of Antimony, Arsenic, BEQs, Copper, Lead, and Methylene Chloride in Subsurface Soil
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Collected	Zone E Subsurface Soil Background Range	SSL (DAF=10)
Methylene Chloride	084SB00502	E084SB005	0.006	U	12/01/1995	NA	0.001 (DAF=1)
	084SB00302	E084SB003	0.006	U	12/01/1995		
	084SB00202	E084SB002	0.006	U	12/01/1995		
	083SB00102	E083SB001	0.006	U	11/30/1995		

Concentrations in bold text and outlined within the table represent exceedances of the appropriate screening criteria.

All values are presented in milligrams per kilogram (mg/kg).

[a] EPA Region III generic Soil Screening Level (SSL) with a Dilution Attenuation Factor (DAF)=10, *EPA Region III RBC Tables* (October 2000).

[b] Subsurface Soil CNC BEQ Sitewide Reference Concentration.

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

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

NA Not applicable/not available

U Indicates that the concentration was not detected.

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

TABLE 5-3
Leachate Transport Analysis Model
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval ComplexParameterMethylene chloride

							Parameter	Methylene chloride
Chemical Specific Input Parameters								
Cw =	Target groundwater concentration MCL (mg/L)							**5.00E-03**
H =	Henry's Law Constant, dimensionless							**8.98E-02**
ks =	Soil-water sorption coefficient (cm3 water/g soil = L/kg) = Koc x foc where							4.33E-01
	koc = organic carbon-water sorption coefficient, (cm3 (ml) water)/(g soluble organic carbon)							**1.17E+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)	**15.2** m		50 ft		
da =	Aquifer Thickness			**7.3** m		**24** ft		
d =	Groundwater Mixing Zone thickness	(paved)		**1.66** m		5.5 ft		
		(unpaved)		**2.38** m		7.8 ft		
i =	Groundwater Gradient				**3.8E-03** (unitless)			
Ks =	Saturated Hydraulic Conductivity			**667.5** m/yr		2190.0 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)		**0.1372** m/yr		0.4500 ft/yr		
	Partition Term, Cw/Csoil, (L/kg)							6.42E-01
	Dilution Term, dimensionless		(paved)					3.35E+01
			(unpaved)					3.93E+00
	Csoil/Cw =Partition term * Dilution term (mg/kg / mg/L) = L/kg		(paved)					2.15E+01
			(unpaved)					2.52E+00
	Calculated Site Specific Target Level for Soil							
	C_{soil} calculated source soil concentration (SSL, mg/kg) Cw*(partion term)*(dilution term)						(paved)	**0.107**
							(unpaved)	**0.013**

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

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).
ks	= koc x foc.
koc	from Table 39 of the Soil Screening Guidance; Technical Background Document (EPA, 1996).
foc	calculated as the mean foc from TOC measurements from Zone E.
Sw	Estimated as the distance along gw flow path (length, NW-SE) of AOC 563 (120 ft).
d	is calculated as $M = (0.0112\ L^2)^{0.5} + da\{1 - e^{(-L\ qi/Ks\ da)}\}$ or da, whichever is less.
da	is based on top of Ashley (-20 ft, GIS) and nearest isocontour line for groundwater level (3.25 ft msl, GIS).
i	Calculated from isocontour groundwater map for Zone E ([3.11-2.89]/38.5 ~ 0.005, CH2MHill, 2002).
Ks	Based on CH2MHill's hydraulic conductivity theme in the GIS (6 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) - qw (0.3) = 0.15.
ρs	is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
qi	is a derived value (unpaved, 5.4 in/yr or paved, 0.34 in/yr) based on annual precipitation, evapo-transportation, and runoff coefficient values for the Charleston area.

TABLE 5-4
Arsenic, Copper, Iron, and Manganese in Groundwater
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

		Arsenic		Copper		Iron		Manganese	
Location	**Sample Collection Date**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**
MCL		50		1,300		NA		NA	
EPA Region III Tap Water RBC (HI=0.1)		0.045		150		1,100		73	
Zone E Shallow Mean Background Reference Concentration[a]		36		3		9,023		442	
Zone E Shallow Background Range Concentration[a]		2.6 - 316		0.9 - 8		144 - 76,600		2 – 2,650	
Zone E Deep Mean Background Reference Concentration[a]		21		2		3,529		288	
Zone E Deep Background Range Concentration[a]		3 - 132		0.6 - 6		19 - 26,000		1.3 - 1,660	
E083GW001	04/04/1996	19	=	2	U	11,400	J	237	=
E083GW001	07/19/1996	26	=	1	UJ	15,500	=	219	=
E083GW001	11/14/1996	43	=	1	U	22,100	=	295	=
E083GW001	01/24/1997	39	=	1	J	21,900	=	302	J
E083GW002	04/08/1996	8	J	8	U	2,470	=	58	=
E083GW002	07/18/1996	11	J	10	J	7,860	=	63	=
E083GW002	11/14/1996	13	J	11	U	6,200	=	26	=
E083GW002	01/27/1997	3	J	5	U	652	=	22	=
E084GW001	04/02/1996	5	U	2	U	167	=	34	=
E084GW001	07/22/1996	3	U	1	UJ	283	J	31	=
E084GW001	11/15/1996	3	UJ	1	U	225	=	41	=
E084GW001	01/28/1997	3	U	1	U	395	=	22	=

TABLE 5-4
Arsenic, Copper, Iron, and Manganese in Groundwater
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

		Arsenic		Copper		Iron		Manganese	
Location	Sample Collection Date	Concentration (µg/L)	Qualifier	Concentration (µg/L)	Qualifier	Concentration (µg/L)	Qualifier	Concentration (µg/L)	Qualifier
MCL		50		1,300		NA		NA	
EPA Region III Tap Water RBC (HI=0.1)		0.045		150		1,100		73	
Zone E Shallow Mean Background Reference Concentration[a]		36		3		9,023		442	
Zone E Shallow Background Range Concentration[a]		2.6 - 316		0.9 - 8		144 - 76,600		2 – 2,650	
Zone E Deep Mean Background Reference Concentration[a]		21		2		3,529		288	
Zone E Deep Background Range Concentration[a]		3 - 132		0.6 - 6		19 - 26,000		1.3 - 1,660	
E084GW002	04/02/1996	36	=	2	U	2,030	=	170	=
E084GW002	07/22/1996	45	=	1	UJ	2,440	J	221	=
E084GW002	11/15/1996	46	=	2	U	2,040	=	272	=
E084GW002	01/28/1997	38	=	1	U	1,840	=	171	=
E574GW001	04/04/1996	5	U	2	U	4,220	J	350	=
E574GW001	07/17/1996	6	U	2	U	3,760	=	210	=
E574GW001	11/12/1996	3	U	11	UJ	5,740	=	385	=
E574GW001	01/23/1997	3	U	3	J	5,180	=	404	J
E574GW002	04/04/1996	5	U	2	U	1,650	J	383	=
E574GW002	07/17/1996	5	U	1	U	2,030	=	252	=
E574GW002	11/13/1996	3	J	1	UJ	3,400	=	322	=
E574GW002	01/24/1997	3	U	2	J	3,340	=	281	J

TABLE 5-4
Arsenic, Copper, Iron, and Manganese in Groundwater
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

		Arsenic		Copper		Iron		Manganese	
Location	**Sample Collection Date**	**Concentration (µg/L)**	**Qualifier**	**Concentration (µg/L)**	**Qualifier**	**Concentration (µg/L)**	**Qualifier**	**Concentration (µg/L)**	**Qualifier**
MCL		50		1,300		NA		NA	
EPA Region III Tap Water RBC (HI=0.1)		0.045		150		1,100		73	
Zone E Shallow Mean Background Reference Concentration[a]		36		3		9,023		442	
Zone E Shallow Background Range Concentration[a]		2.6 - 316		0.9 - 8		144 - 76,600		2 – 2,650	
Zone E Deep Mean Background Reference Concentration[a]		21		2		3,529		288	
Zone E Deep Background Range Concentration[a]		3 - 132		0.6 - 6		19 - 26,000		1.3 - 1,660	
E574GW003	04/04/1996	5	U	3	J	1,310	J	102	=
E574GW003	07/18/1996	3	UJ	1	UJ	19	U	73	=
E574GW003	11/13/1996	22	=	2	UJ	12,000	=	74	=
E574GW003	01/24/1997	19	=	3	J	7,250	=	101	J
E574GW01D	04/04/1996	68	=	2	U	37,000	J	3,380	=
E574GW01D	07/17/1996	71	=	1	U	36,200	=	3,210	=
E574GW01D	11/13/1996	74	=	3	UJ	35,900	=	3,010	=
E574GW01D	01/23/1997	79	=	1	U	30,300	=	2,300	J

[a] The Zone E Mean Background Reference Concentrations and Range of Concentrations were obtained from Appendix J of the *Project Team Notebook and Instructions - Charleston Naval Complex, Environmental Restoration Project, Revision 1A* (CH2M-Jones, December 2001).

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

HI Hazard index

J Indicates an estimated value. A "J" qualifier may signify that the concentration is below the PQL, or that the "J" has been applied as a result of the data validation.

TABLE 5-4
Arsenic, Copper, Iron, and Manganese in Groundwater
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

		Arsenic		Copper		Iron		Manganese	
Location	**Sample Collection Date**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**	**Concentration (μg/L)**	**Qualifier**
MCL		50		1,300		NA		NA	
EPA Region III Tap Water RBC (HI=0.1)		0.045		150		1,100		73	
Zone E Shallow Mean Background Reference Concentration[a]		36		3		9,023		442	
Zone E Shallow Background Range Concentration[a]		2.6 - 316		0.9 - 8		144 - 76,600		2 – 2,650	
Zone E Deep Mean Background Reference Concentration[a]		21		2		3,529		288	
Zone E Deep Background Range Concentration[a]		3 - 132		0.6 - 6		19 - 26,000		1.3 - 1,660	

μg/L micrograms per liter

NA Screening criteria not available for the referenced compound.

U Indicates analyte not detected above laboratory detection limit.

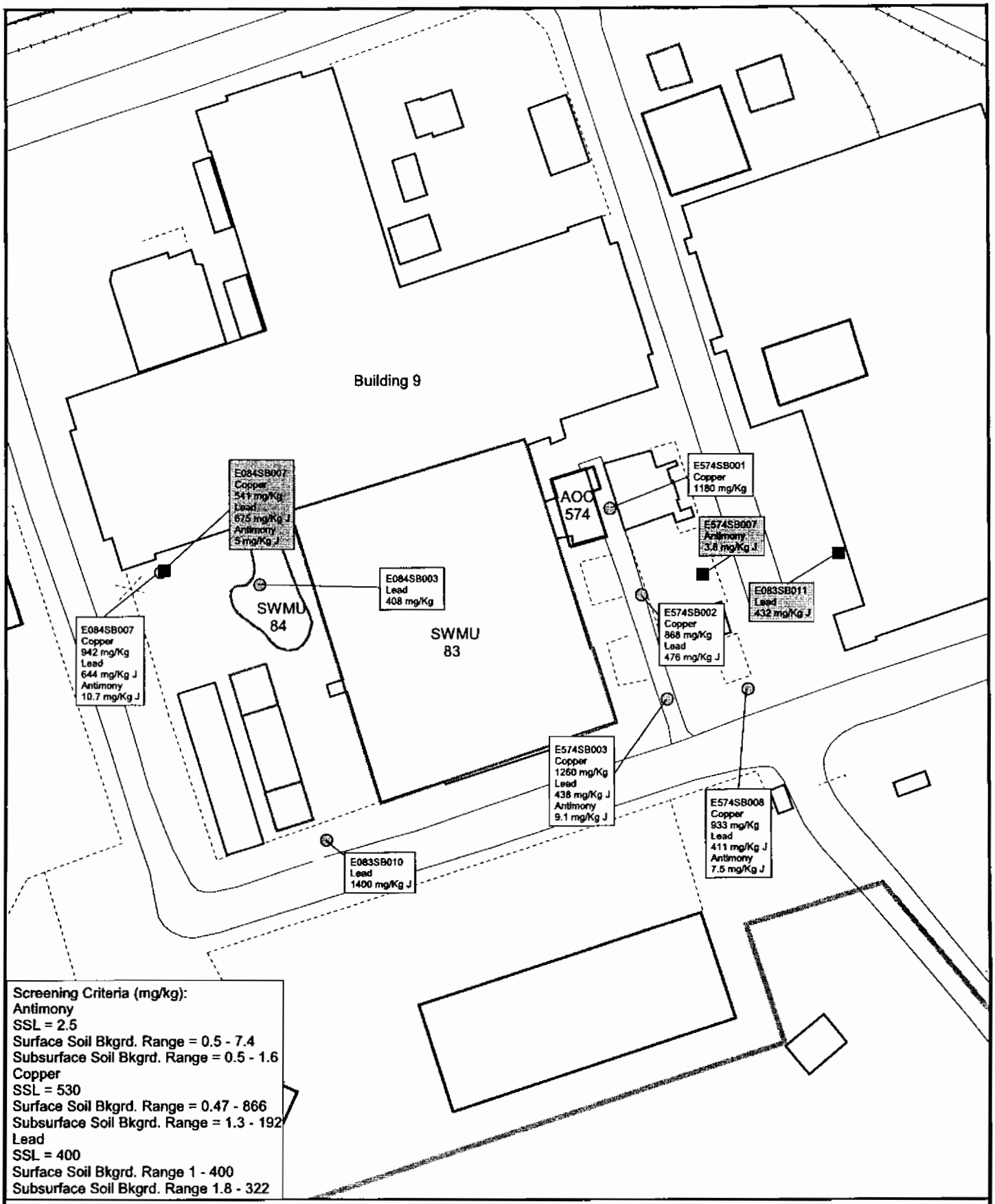


Figure 5-1
Soil Exceedances
Combined SWMU 83, Zone E
Charleston Naval Complex

CH2MHILL

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Section 6.0

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 andAOCs within Zone E of the CNC, including Combined SWMU 83. With the submission of this RFI Report Addendum, the RFI is considered to be complete. The remaining subsections address the issues that the BCT agreed to evaluate prior to site closeout.

6.2 Presence of Inorganics in Groundwater

For the purpose of site closeout documentation, the inorganics in groundwater issue refers to the occasional or intermittent detection of several metals (primarily arsenic, thallium, and antimony) in groundwater at concentrations above the applicable MCL, preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit. There were no detections of antimony in shallow or deep wells above the laboratory detection limits. There were no detections of arsenic above the MCL in samples from the shallow groundwater monitor wells. Detections of arsenic in deep wells above the MCL in the single deep well at the site are not attributed to site-specific sources but to natural occurrence, as discussed in Section 5.3. Intermittent detections of thallium in shallow and deep groundwater at the site at concentrations above the MCL and Zone E BRCs do not point to a site-specific source, but can be attributed to natural occurrence. Thallium was not identified as a COC in the RFI report. Further evaluation of this issue is not warranted.

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

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

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

No direct connection from these sites to the storm sewers are known to exist. Based on these findings, further evaluation of this issue is not warranted.

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

The nearest railroad line to Combined SWMU 83 is approximately 300 feet north of the site. There is no known linkage between Combined SWMU 83 and the investigated railroad lines of AOC 504, so 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 Combined SWMU 83 is the Cooper River, which lies approximately 450 feet northeast of the site. The only potential migration pathway from the site to surface water is via overland flow via stormwater runoff. The site is almost entirely covered with buildings and pavement, which eliminates contact of surface soil with stormwater. Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River, does not contact the surface soil. Therefore, further evaluation of a potential pathway for contaminant migration via stormwater runoff is not warranted.

6.7 Potential Contamination in Oil/Water Separators (OWSs)

There are no OWSs associated with Combined SWMU 83. In addition, there is no reference to an OWS at this facility in the *Oil Water Separator Data* report issued by the Department of the Navy (September 2000). Therefore, further evaluation of this issue is not warranted.

6.8 Land Use Controls (LUCs)

The CNC BCT has agreed that all of Zone E will have at least some LUCs and restrictions. At a minimum, these LUCs are likely to include restrictions against residential land use. LUCs are expected to be applied at this site in order to limit reuse of this site to industrial use. A focused CMS will be conducted to evaluate alternatives for corrective action, as outlined in Section 8.0.

Section 7.0

7.0 Recommendations

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified antimony, arsenic, copper, lead and BEQs in surface soils as COCs. No COCs were identified by the RFI report for subsurface soils. Arsenic in shallow groundwater, and arsenic and manganese in deep groundwater were identified as COCs. Additional soil sampling was conducted by CH2M-Jones during November 2001 for antimony, arsenic, copper, lead and BEQs to further delineate the extent of their presence in surface and subsurface soils at this site.

Based on an evaluation of COPCs and COCs, BEQs in surface soils are identified as COCs at this site for the unrestricted and industrial land use scenarios. A CMS is recommended for this site to address these COCs. Section 8.0 presents a CMS Work Plan.

Section 8.0

8.0 CMS Work Plan for Combined SWMU 83

BEQs were identified as COCs in surface soils at Combined SWMU 83. Because there is only one unpaved location with elevated BEQs that has limited accessibility for direct exposure, there is currently no unacceptable exposure or risk from these COCs. However, it is feasible that in the future, should site conditions change, some exposure could occur. Therefore, a CMS should be conducted to evaluate potential corrective measures and identify an appropriate remedy for the site.

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

8.1 Remedial Action Objectives

Remedial action objectives (RAOs) are medium-specific goals that the remedial actions are 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 surface soil at Combined SWMU 83 are being chosen to prevent ingestion and direct/dermal contact with surface soil containing COCs at unacceptable levels.

8.2 Remedial Goal Options and Media Cleanup Standards

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

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

The exposure medium of concern for Combined SWMU 83 is surface soil impacted by BEQs. Because Combined SWMU 83 is located within a highly developed area of the CNC and there are no surface water bodies in the immediate vicinity of the site, ecological exposures were not considered applicable for evaluation.

For BEQs, the target MCS for surface soil should be the CNC BEQ site-wide reference concentration of 1,304 $\mu g/kg$, which was developed by the BCT. Other potential RGOs, such as the 1E-06 ILCR level, were considered but regarded as not applicable because the site background concentrations of BEQs are significantly greater than this level. No BEQ reference concentrations for industrial use have been developed for CNC.

8.3 Potential Remedies to Evaluate

Because of the relatively small quantity of contaminated soil, and the presence of several subsurface utilities, vaults, and other unknown obstructions at the site, the list of practicable remedial alternatives for this site is limited. The two presumptive remedies that will be evaluated as part of the CMS include:

- Soil excavation and offsite disposal
- LUCs

8.4 Focused CMS Approach

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

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

8.5 Approach to Evaluating Corrective Measure Alternatives

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

1. Protecting human health and the environment.
2. Attaining media cleanup standards (RGOs).

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

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

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

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

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

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

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

a. Long-term reliability and effectiveness

The two alternatives will be evaluated on the basis of their reliability, and the potential impact should the chosen alternative fail. In other words, a qualitative

assessment will be made as to the chance of the alternative's failure 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.

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

8.6 Focused CMS Report

A focused CMS Report will be prepared to present the identification, development, and evaluation of potential corrective measures for Combined SWMU 83. A proposed outline of the report, as shown in Table 8-1, provides an example of the report format and content.

TABLE 8-1
Outline of Focused CMS Report for Combined SWMU 83
RFI Report Addendum & CMS Work Plan, Combined SWMU 83, Zone E, Charleston Naval Complex

Section No.	Section Title
1.0	**Introduction**
1.1	Corrective Measures Study Purpose and Scope
1.2	Report Organization
1.3	Background Information
1.3.1	Facility Description
1.3.2	Site History and Background
1.3.2.1	Nature and Extent of Contamination
1.3.2.2	Summary of Risk Assessment
2.0	**Remedial Goal Objectives**
3.0	**Detailed Analysis of Focused Alternatives**
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Alternatives
3.3.1	Alternative 1: Soil removal and Offsite Disposal
3.3.2	Alternative 2: Land Use Controls
3.4	Detailed Analysis of Alternatives
3.4.1	Analysis of Alternative 1
3.4.2	Analysis of Alternative 2
3.5	Comparative Analysis of Alternatives
4.0	**Recommended Remedial Alternative**
5.0	**References**
Appendix A	**Corrective Measure Alternative Cost Estimates**[b]
List of Tables	
List of Figures	

[a] Additional alternatives will be analyzed as found necessary.

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

Section 9.0

9.0 References

EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston*. November 1997.

EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, Naval Base Charleston*. June 1995.

EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, Naval Base Charleston*. June 1995.

EnSafe Inc. *Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) Report*. July 1995.

U.S. Navy Environmental Detachment (DET). *Completion Report, Process Closure for SWMU 83 (Building 9 Foundry)*. March 1997.

U.S. Navy Environmental Detachment (DET). *Completion Report, Interim Measure for AOC 574*. July 1997.

Appendix A

Comments Prepared by Charles Watson

SWMU 83/84, AOC 574

SCDHEC Comment 18:

The upper interval soil boring 083SB010 (1,400 mg/kg) exceeded the lead industrial RBC of 1,300 mg/kg and the lead background RC of 265 mg/kg. The RFI states that a soil cleanup/screening level for lead of 1,300 mg/kg was calculated for the Zone H RFI using the Adult Lead Model. The RFI states that only one surface soil sample exceeded this limit; however, the mean surface soil concentration for combined SWMU 83 is 231 mg/kg and falls below the USEPA both child and adult cleanup/screening levels. The Navy has calculated the mean lead value and has therefore concluded no further action. The Department recommends that the Navy install additional sampling points of the area surrounding 083SB010. The horizontal and vertical extent of the lead contamination should be determined. In summary, the Department does not accept that localized elevations of lead should be diluted with analytical values from surrounding sample points that may be below detection limits.

EnSafe/Navy Response 18:

As shown on Figure 10.10.11, the horizontal extent has been defined to the east by 083SB001, to the west by 084SB001, and to the south by 083SB009. An additional soil boring will be installed to delineate the northern edge.

CH2M-Jones Response 18:

An additional delineation sample E083SB014 was collected by CH2M-Jones during November 2001 on the southern side of E083SB010. Lead was detected at this location at 134 mg/kg in the surface soil sample and 76.8 mg/kg in the subsurface soil sample. During the RFI, samples were collected from soil boring E173SB002, which is north of E083SB010, and showed a lead detection of 3.4 mg/kg in the surface soil and 4.1 mg/kg in the subsurface soil.

SCDHEC Comment 19:

Data reveals that arsenic may be a key COC at this area for both the soils and the groundwater. The Department agrees with the Navy's recommendation for CMS. The Department would also recommend the formation of an isoconcentration map and integration of potential sensitive receptors that may mobilize contaminants.

EnSafe/Navy Response 19:

Arsenic was identified as a COC in both soil and deep and shallow groundwater, which have been recommended for CMS at this site. The site will undergo further evaluation during the CMS, at which time the proper alternative for remediation will be selected. Isoconcentration maps will also be included in the Final Zone E RFI Report. The Navy does not understand the comment "integration of potential sensitive receptors that may mobilize contaminants", therefore a response cannot be submitted.

CH2M-Jones Response 19:

Arsenic detections in surface soil are below the maximum Zone E surface soil arsenic background concentration of 68 mg/kg. Arsenic detections in subsurface soil were below the maximum Zone E subsurface soil arsenic background concentration of 26 mg/kg. Arsenic detections in shallow groundwater did not exceed the MCL of 50 µg/L or the maximum Zone E background arsenic concentration for deep groundwater of 132 µg/L. Based on these observations, arsenic is not considered a COC at this site.

SCDHEC Comment 20:

Groundwater data reports that thallium was detected at levels above the MCL (.002mg/l) for four wells during the second, third, and fourth quarters of groundwater sampling. The horizontal and vertical extent of thallium concentrations in the area must be determined.

EnSafe/Navy Response 20:

A significant number of wells throughout Zone E have shown thallium concentrations exceeding its MCL of 2 µg/L and its Tap Water RBC of 2.9 µg/L. 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.

CH2M-Jones Response 20:

Thallium has been established to be widely present in the groundwater at the CNC. The detections of thallium in shallow and deep groundwater samples at this site have been intermittent. There were five detections out of 32 samples at this site. Thallium detections in groundwater samples were either preceded or followed by no detections above laboratory detection limits, indicating that thallium is not present in a plume or in a persistent source, but points to the possibility of natural occurrence.

SCDHEC Comment 21:

Page 10.6-42 states that "PAHs are not of concern because most chemicals from group are not particularly mobile in soil or groundwater." The Department does not agree with this comment and recommends delineating the horizontal and vertical extent of PAHs in the area.

EnSafe/Navy Response 21:

In accordance with carcinogenic polynuclear aromatic hydrocarbon (cPAH) guidance, BEQs were calculated for cPAHs at this site. At issue seems to be whether or not it would be feasible to continue sampling when constituents are so wide-spread and samples have already been collected from all across the zone. Due to the high number of potential point sources close to one another and the shallow depth of groundwater, contribution of contaminants may or may not be attributable to any one site or source. The majority of second round soil sampling was conducted on the basis of arsenic and BEQs detected in the initial round of sampling and for the purpose of determining whether or not these constituents

were wide-spread across Zone E. Results of second round sampling indicate that BEQ is wide-spread across Zone E, as well as NAVBASE Charleston in general, and the feasibility of additional sampling is questionable.

CH2M-Jones Response 21:

The BEQ delineation has been adequately completed at this site, as discussed in the RFI Report Addendum.

Comments Prepared by Susan Byrd

SWMU 83/84: AOC 574

SCDHEC Comment:
Section 10.10.10.7, Page 10.10-64, Line 18: The text states that concentrations of manganese equate with a hazard quotient of nine. The concentrations of manganese equate with a hazard index of nine. The text should be corrected.

EnSafe/Navy Response:
The text will be revised to reflect this correction.

CH2M-Jones Response:
No additional response.

Appendix B

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Volatile Organic Compounds (ug/kg)						
2-Butanone (MEK)	083SB006	6.00	ND	4700000	NA	NA
Acetone	083SB001	6.00	ND	780000	NA	NA
	083SB002	ND	13.00			
	083SB003	88.00	31.00			
	083SB004	58.00	60.00			
	083SB006	82.00	ND			
	083SB007	27.00	92.00			
	083SB008	67.00	28.00			
Carbon disulfide	083SB007	ND	4.00	780000	NA	NA
Chlorobenzene	083SB007	ND	2.00	160000	NA	NA
Methylene chloride	083SB004	1.00	4.00	85000	NA	NA
	083SB006	2.00	ND			
	083SB007	2.00	ND			
	083SB008	1.00	ND			
Toluene	083SB001	1.00	ND	1600000	NA	NA
	083SB007	ND	2.00			
Semi-volatile Compounds (ug/kg)						
2-Chlorophenol	083SB003	100.00	ND	390000	NA	NA
2-Methylnaphthalene	083SB004	96.00	840.00	NA	NA	NA
	083SB005	5500.00	62000.00			
	083SB006	ND	260.00			
	083SB007	ND	880.00			
	083SB010	130.00	ND			
Acenaphthene	083SB005	ND	2400.00	470000	NA	NA
	083SB006	3600.00	1700.00			
Acenaphthylene	083SB001	ND	190.00	310000	NA	NA
Anthracene	083SB001	160.00	380.00	23000000	NA	NA
	083SB005	1300.00	1800.00			
	083SB006	1800.00	3400.00			
	083SB010	250.00	ND			
Benzo(a)anthracene	083SB001	730.00	4900.00	880	NA	NA
	083SB005	320.00	ND			
	083SB006	3500.00	3600.00			
	083SB010	1100.00	ND			
Benzo(a)pyrene	083SB001	860.00	5700.00	88	NA	NA
	083SB004	170.00	ND			
	083SB005	270.00	ND			
	083SB006	2900.00	2600.00			
	083SB010	1100.00	ND			
Benzo(b)fluoranthene	083SB001	800.00	5200.00	880	NA	NA
	083SB006	2500.00	2000.00			
	083SB010	1100.00	ND			
Benzo(g,h,i)perylene	083SB001	460.00	2900.00	310000	NA	NA
	083SB004	130.00	ND			
	083SB005	340.00	ND			
	083SB006	1700.00	1300.00			
	083SB010	400.00	ND			
Benzo(k)fluoranthene	083SB001	860.00	3400.00	8800	NA	NA

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	083SB005	340.00	ND			
	083SB006	2800.00	2200.00			
	083SB010	1300.00	ND			
Butylbenzylphthalate	083SB003	ND	110.00	1600000	NA	NA
	083SB005	300.00	ND			
	083SB006	240.00	ND			
	083SB007	190.00	ND			
Chrysene	083SB001	780.00	4500.00	88000	NA	NA
	083SB005	240.00	ND			
	083SB006	3000.00	2800.00			
	083SB010	1300.00	ND			
Di-n-butylphthalate	083SB004	ND	140.00	7800000	NA	NA
Dibenz(a,h)anthracene	083SB001	210.00	700.00	88000	NA	NA
	083SB006	550.00	440.00			
	083SB010	150.00	ND			
Dibenzofuran	083SB006	ND	1700.00	31000	NA	NA
Fluoranthene	083SB001	1800.00	7700.00	3100000	NA	NA
	083SB004	310.00	ND			
	083SB005	760.00	ND			
	083SB006	7500.00	7100.00			
	083SB010	2200.00	ND			
Fluorene	083SB005	3300.00	3700.00	310000	NA	NA
	083SB006	5600.00	3100.00			
	083SB007	ND	1500.00			
Indeno(1,2,3-cd)pyrene	083SB001	570.00	3800.00	880	NA	NA
	083SB005	220.00	ND			
	083SB006	2000.00	1600.00			
	083SB010	390.00	ND			
Naphthalene	083SB004	ND	310.00	310000	NA	NA
	083SB006	ND	560.00			
	083SB010	86.00	ND			
Phenanthrene	083SB001	970.00	750.00	310000	NA	NA
	083SB004	240.00	320.00			
	083SB005	7000.00	11000.00			
	083SB006	6500.00	9100.00			
	083SB007	ND	680.00			
	083SB010	1200.00	ND			
Pyrene	083SB001	1000.00	8600.00	230000	NA	NA
	083SB004	230.00	84.00			
	083SB005	890.00	ND			
	083SB006	6100.00	5600.00			
	083SB007	160.00	ND			
	083SB010	2400.00	ND			
bis(2-Ethylhexyl)phthalate (BEHP)	083SB003	140.00	ND	4600	NA	NA
Chlorinated Pesticides (ug/kg)						
4,4'-DDE	083SB010	12.00	ND	19000	NA	NA
4,4'-DDT	083SB010	11.00	ND	1900	NA	NA
Endrin ketone	083SB010	4.80	ND	2300	NA	NA
Heptachlor	083SB003	1.80	2.50	140	NA	NA

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	083SB008	2.30	ND			
Methoxychlor	083SB001	ND	25.00	39000	NA	NA
gamma-BHC (Lindane)	083SB008	ND	2.30	350	NA	NA
gamma-Chlordane	083SB007	12.00	ND	490	NA	NA
Inorganic Compounds (mg/kg)						
Cyanide (CN)	083SB010	ND	20.70	73	0.5	NA
Aluminum (Al)	083SB001	5070.00	6580.00	7800	26000	41100
	083SB002	6300.00	6700.00			
	083SB003	4900.00	3690.00			
	083SB004	3650.00	2390.00			
	083SB005	3680.00	6500.00			
	083SB006	4330.00	4070.00			
	083SB007	2960.00	6690.00			
	083SB008	4220.00	7280.00			
	083SB010	4450.00	8420.00			
Antimony (Sb)	083SB007	3.70	ND	3.1	1.77	1.6
Arsenic (As)	083SB001	2.50	4.30	0.43	23.9	19.9
	083SB002	1.90	9.00			
	083SB003	2.80	2.30			
	083SB004	2.70	1.10			
	083SB005	1.30	7.30			
	083SB006	9.30	4.00			
	083SB007	2.80	4.20			
	083SB008	1.30	3.10			
	083SB010	5.40	4.70			
Barium (Ba)	083SB001	25.90	28.70	550	130	94.1
	083SB002	47.10	31.90			
	083SB003	25.60	19.70			
	083SB004	14.20	6.90			
	083SB005	27.80	27.80			
	083SB006	19.70	13.10			
	083SB007	17.40	16.80			
	083SB008	24.30	23.20			
Beryllium (Be)	083SB001	0.40	0.49	0.15	1.7	2.71
	083SB002	0.56	0.72			
	083SB003	0.33	0.21			
	083SB004	0.14	ND			
	083SB005	0.36	0.65			
	083SB006	0.48	0.37			
	083SB007	0.18	0.29			
	083SB008	0.40	0.22			
	083SB010	0.27	0.24			
Cadmium (Cd)	083SB001	0.36	0.36	3.9	1.5	0.96
	083SB002	0.40	0.46			
	083SB003	ND	0.29			
	083SB005	0.42	0.33			
	083SB006	0.24	0.25			
	083SB007	0.43	ND			
	083SB010	0.46	ND			

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Calcium (Ca)	083SB001	3860.00	2860.00	NA	NA	NA
	083SB002	16000.00	34500.00			
	083SB003	19200.00	617.00			
	083SB004	4240.00	761.00			
	083SB005	5480.00	26100.00			
	083SB006	5170.00	28500.00			
	083SB007	657.00	3640.00			
	083SB008	1270.00	1130.00			
	083SB010	3820.00	ND			
Chromium (Cr)	083SB001	4.50	7.60	39	94.6	75.2
	083SB002	4.80	22.90			
	083SB003	8.50	6.30			
	083SB004	6.40	3.10			
	083SB005	3.50	18.50			
	083SB006	10.50	16.30			
	083SB007	5.10	12.90			
	083SB008	3.30	9.90			
	083SB010	7.10	14.40			
Cobalt (Co)	083SB001	1.00	1.60	470	19	14.9
	083SB002	1.40	2.80			
	083SB003	4.30	3.10			
	083SB004	12.70	0.87			
	083SB005	21.00	11.20			
	083SB006	2.60	1.10			
	083SB007	4.50	1.50			
	083SB008	14.40	1.50			
	083SB010	11.90	0.87			
Copper (Cu)	083SB001	107.00	3.60	310	66	152
	083SB002	136.00	17.60			
	083SB003	5.00	292.00			
	083SB004	18.30	19.80			
	083SB005	142.00	49.90			
	083SB006	8.00	5.70			
	083SB007	243.00	3.00			
	083SB008	22.70	1.70			
	083SB010	439.00	2.70			
Iron (Fe)	083SB001	4120.00	7070.00	2300	NA	NA
	083SB002	3530.00	11900.00			
	083SB003	4870.00	7560.00			
	083SB004	2680.00	1270.00			
	083SB005	5130.00	11600.00			
	083SB006	8870.00	4110.00			
	083SB007	5670.00	6860.00			
	083SB008	2820.00	8600.00			
	083SB010	10200.00	13300.00			
Lead (Pb)	083SB001	30.20	19.90	400	265	173
	083SB002	49.60	23.60			
	083SB003	25.30	88.80			
	083SB004	22.70	9.10			
	083SB005	40.10	39.70			

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	083SB007	0.34	ND			
	083SB010	0.58	ND			
Sodium (Na)	083SB002	95.80	533.00	NA	NA	NA
	083SB003	187.00	ND			
	083SB005	ND	578.00			
	083SB006	139.00	567.00			
	083SB007	ND	209.00			
	083SB008	83.10	ND			
Tin (Sn)	083SB007	30.30	ND	4700	59.4	9.23
	083SB010	45.90	6.40			
Vanadium (V)	083SB001	5.40	13.10	55	94.3	155
	083SB002	4.60	25.80			
	083SB003	10.90	8.40			
	083SB004	4.20	3.30			
	083SB005	4.60	19.50			
	083SB006	17.60	10.00			
	083SB007	7.60	16.00			
	083SB008	4.10	16.00			
	083SB010	24.40	ND			
Zinc (Zn)	083SB001	121.00	11.40	2300	827	886
	083SB002	134.00	53.20			
	083SB003	21.80	228.00			
	083SB004	29.20	11.20			
	083SB005	132.00	55.10			
	083SB006	31.50	26.60			
	083SB007	251.00	12.70			
	083SB008	13.20	8.50			
	083SB010	335.00	11.50			

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.
* Surface soil samples will be used for human health risk assessment for the Zone E report.

Chemicals Detected in Zone E Soil Samples
SWMU 83

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	083SB006	9.60	5.70			
	083SB007	94.20	9.20			
	083SB008	11.80	3.20			
	083SB010	1400.00	17.70			
Magnesium (Mg)	083SB001	454.00	608.00	NA	NA	NA
	083SB002	480.00	2790.00			
	083SB003	875.00	ND			
	083SB004	210.00	106.00			
	083SB005	415.00	2690.00			
	083SB006	912.00	1370.00			
	083SB007	314.00	1170.00			
	083SB008	270.00	548.00			
	083SB010	513.00	597.00			
Manganese (Mn)	083SB001	75.20	18.90	180	302	881
	083SB002	104.00	128.00			
	083SB003	53.60	47.60			
	083SB004	22.70	4.60			
	083SB005	144.00	139.00			
	083SB006	86.60	39.50			
	083SB007	45.70	27.00			
	083SB008	42.10	21.30			
	083SB010	117.00	33.30			
Mercury (Hg)	083SB001	0.11	0.03	2.3	2.6	1.59
	083SB002	0.05	0.04			
	083SB005	0.03	0.06			
	083SB006	0.03	ND			
	083SB010	0.09	0.04			
Nickel (Ni)	083SB001	2.90	3.30	160	77.1	57
	083SB002	5.50	12.30			
	083SB003	3.10	8.10			
	083SB004	5.80	1.20			
	083SB005	7.80	9.80			
	083SB006	4.60	5.80			
	083SB007	3.20	3.10			
	083SB008	3.20	3.00			
	083SB010	9.50	2.40			
Potassium (K)	083SB001	800.00	1390.00	NA	NA	NA
	083SB002	536.00	1970.00			
	083SB003	1060.00	497.00			
	083SB004	308.00	ND			
	083SB005	800.00	1560.00			
	083SB006	818.00	447.00			
	083SB007	491.00	1270.00			
	083SB008	841.00	531.00			
Selenium (Se)	083SB001	0.60	ND	39	1.7	2.4
	083SB002	ND	1.70			
	083SB005	ND	0.94			
	083SB006	0.71	0.75			
Silver (Ag)	083SB004	3.00	ND	39	NA	NA
	083SB005	2.40	ND			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Volatile Organic Compounds (ug/kg)						
Acetone	084SB004	ND	730.00	780000	NA	NA
	084SB005	170.00	ND			
Methylene chloride	084SB007	14.00	7.00	85000	NA	NA
	084SB008	6.00	6.00			
Toluene	084SB001	1.00	ND	1600000	NA	NA
	084SB006	1.00	ND			
Trichloroethene	084SB004	37.00	ND	58000	NA	NA
Xylene (Total)	084SB001	2.00	ND	16000000	NA	NA
Semi-volatile Compounds (ug/kg)						
2-Methylnaphthalene	084SB001	290.00	ND	NA	NA	NA
	084SB004	1400.00	ND			
	084SB007	180.00	ND			
4-Methylphenol (p-Cresol)	084SB004	110.00	ND	390000	NA	NA
Acenaphthene	084SB001	640.00	ND	470000	NA	NA
	084SB003	220.00	ND			
	084SB004	2200.00	ND			
	084SB005	120.00	ND			
	084SB007	94.00	ND			
Acenaphthylene	084SB001	84.00	ND	310000	NA	NA
	084SB005	88.00	ND			
Anthracene	084SB001	1400.00	ND	23000000	NA	NA
	084SB003	680.00	ND			
	084SB004	5000.00	ND			
	084SB005	500.00	ND			
	084SB007	170.00	ND			
Benzo(a)anthracene	084SB001	4200.00	ND	880	NA	NA
	084SB003	1700.00	150.00			
	084SB004	11000.00	180.00			
	084SB005	3000.00	ND			
	084SB006	270.00	ND			
	084SB007	980.00	130.00			
	084SB008	480.00	ND			
Benzo(a)pyrene	084SB001	4100.00	ND	88	NA	NA
	084SB003	1700.00	140.00			
	084SB004	9300.00	170.00			
	084SB005	3400.00	ND			
	084SB006	370.00	ND			
	084SB007	1200.00	150.00			
	084SB008	620.00	ND			
Benzo(b)fluoranthene	084SB001	3700.00	ND	880	NA	NA
	084SB003	1600.00	140.00			
	084SB004	8500.00	170.00			
	084SB005	3200.00	ND			
	084SB006	380.00	ND			
	084SB007	1100.00	120.00			
	084SB008	530.00	ND			
Benzo(g,h,i)perylene	084SB001	2300.00	ND	310000	NA	NA
	084SB003	2100.00	100.00			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	084SB004	8400.00	100.00			
	084SB005	2700.00	ND			
	084SB006	230.00	ND			
	084SB007	1400.00	ND			
	084SB008	510.00	ND			
Benzo(k)fluoranthene	084SB001	4000.00	ND	8800	NA	NA
	084SB003	1200.00	120.00			
	084SB004	8700.00	140.00			
	084SB005	2800.00	ND			
	084SB006	290.00	ND			
	084SB007	1100.00	150.00			
	084SB008	510.00	ND			
Chrysene	084SB001	4300.00	ND	88000	NA	NA
	084SB003	1800.00	160.00			
	084SB004	12000.00	210.00			
	084SB005	3300.00	ND			
	084SB006	320.00	ND			
	084SB007	1200.00	150.00			
	084SB008	640.00	ND			
Di-n-octyl phthalate	084SB004	170.00	ND	1600000	NA	NA
Dibenz(a,h)anthracene	084SB001	700.00	ND	88000	NA	NA
	084SB003	630.00	ND			
	084SB004	3600.00	ND			
	084SB005	1200.00	ND			
	084SB006	83.00	ND			
	084SB007	500.00	ND			
Dibenzofuran	084SB001	480.00	ND	31000	NA	NA
	084SB003	110.00	ND			
	084SB004	2400.00	ND			
Fluoranthene	084SB001	12000.00	98.00	3100000	NA	NA
	084SB003	3300.00	320.00			
	084SB004	24000.00	540.00			
	084SB005	6400.00	160.00			
	084SB006	450.00	ND			
	084SB007	1900.00	250.00			
	084SB008	1000.00	76.00			
Fluorene	084SB001	590.00	ND	310000	NA	NA
	084SB003	170.00	ND			
	084SB004	200.00	ND			
	084SB005	130.00	ND			
Indeno(1,2,3-cd)pyrene	084SB001	2700.00	ND	880	NA	NA
	084SB003	1500.00	ND			
	084SB004	6800.00	94.00			
	084SB005	2400.00	ND			
	084SB006	200.00	ND			
	084SB007	1500.00	ND			
	084SB008	610.00	ND			
Naphthalene	084SB001	630.00	ND	310000	NA	NA
	084SB004	3000.00	ND			
	084SB007	160.00	ND			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Pentachlorophenol	084SB009	ND	270.00	5300	NA	NA
Phenanthrene	084SB001	8300.00	ND	310000	NA	NA
	084SB003	2600.00	120.00			
	084SB004	26000.00	430.00			
	084SB005	2500.00	ND			
	084SB006	100.00	ND			
	084SB007	1100.00	180.00			
	084SB008	360.00	ND			
Pyrene	084SB001	6800.00	100.00	230000	NA	NA
	084SB003	3700.00	260.00			
	084SB004	24000.00	340.00			
	084SB005	4600.00	140.00			
	084SB006	410.00	ND			
	084SB007	1600.00	210.00			
	084SB008	840.00	ND			
bis(2-Ethylhexyl)phthalate (BEHP)	084SB004	320.00	ND	4600	NA	NA
Chlorinated Pesticides (ug/kg)						
4,4'-DDE	084SB004	16.00	ND	19000	NA	NA
4,4'-DDT	084SB007	19.00	ND	1900	NA	NA
Endrin	084SB007	16.00	ND	23000	NA	NA
	084SB008	5.80	ND			
Endrin aldehyde	084SB004	14.00	ND	2300	NA	NA
	084SB007	ND	5.60			
Heptachlor	084SB003	2.00	ND	140	NA	NA
	084SB005	ND	1.80			
Heptachlor epoxide	084SB004	3.90	ND	70	NA	NA
Methoxychlor	084SB007	ND	27.00	390000	NA	NA
	084SB008	ND	21.00			
Inorganic Compounds (mg/kg)						
Cyanide (CN)	084SB004	0.39	ND	73	0.5	NA
	084SB007	0.57	ND			
Aluminum (Al)	084SB001	4120.00	6050.00	7800	26000	41100
	084SB002	1990.00	6320.00			
	084SB003	4250.00	7530.00			
	084SB004	4130.00	5860.00			
	084SB005	6640.00	2360.00			
	084SB006	1350.00	4360.00			
	084SB007	6060.00	6730.00			
	084SB008	4990.00	3820.00			
	084SB009	5900.00	3150.00			
Antimony (Sb)	084SB001	0.59	ND	3.1	1.77	1.6
	084SB003	2.10	ND			
	084SB004	1.60	ND			
	084SB005	0.60	ND			
	084SB007	10.70	5.00			
	084SB008	0.86	ND			
Arsenic (As)	084SB001	2.20	3.20	0.43	23.9	19.9
	084SB002	0.87	5.20			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	084SB003	6.80	3.00			
	084SB004	6.20	2.30			
	084SB005	5.90	0.81			
	084SB006	ND	3.20			
	084SB007	25.00	8.00			
	084SB008	4.80	0.99			
	084SB009	2.90	1.80			
Barium (Ba)	084SB001	31.10	27.10	550	130	94.1
	084SB002	10.70	23.50			
	084SB003	60.50	29.10			
	084SB004	142.00	18.70			
	084SB005	57.30	9.20			
	084SB006	10.70	15.10			
	084SB007	91.30	44.60			
	084SB008	17.10	12.60			
Beryllium (Be)	084SB001	0.44	0.26	0.15	1.7	2.71
	084SB002	0.17	0.26			
	084SB003	0.33	0.24			
	084SB004	0.72	0.49			
	084SB005	0.54	0.18			
	084SB006	0.11	0.14			
	084SB007	0.76	0.94			
	084SB008	0.48	0.38			
	084SB009	0.48	0.21			
Cadmium (Cd)	084SB003	1.30	ND	3.9	1.5	0.96
	084SB004	2.50	0.31			
	084SB005	1.30	ND			
	084SB007	1.20	0.35			
Calcium (Ca)	084SB001	6700.00	1550.00	NA	NA	NA
	084SB002	2330.00	1090.00			
	084SB003	14200.00	1340.00			
	084SB004	6250.00	8980.00			
	084SB005	5600.00	1090.00			
	084SB006	123.00	699.00			
	084SB007	16000.00	19500.00			
	084SB008	26700.00	2230.00			
	084SB009	7310.00	ND			
Chromium (Cr)	084SB001	3.60	7.90	39	94.6	75.2
	084SB002	2.40	9.60			
	084SB003	12.80	9.90			
	084SB004	37.90	15.00			
	084SB005	9.10	3.00			
	084SB006	1.90	8.10			
	084SB007	20.90	25.40			
	084SB008	19.50	2.80			
	084SB009	5.80	4.90			
Cobalt (Co)	084SB001	1.80	0.96	470	19	14.9
	084SB002	4.30	1.10			
	084SB003	61.60	1.80			
	084SB004	3.90	1.20			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	084SB005	5.20	0.85			
	084SB006	1.60	1.60			
	084SB007	3.00	3.20			
	084SB008	11.70	2.40			
	084SB009	14.50	0.64			
Copper (Cu)	084SB001	16.30	1.50	310	66	152
	084SB002	4.20	1.10			
	084SB003	332.00	2.50			
	084SB004	476.00	7.50			
	084SB005	90.40	6.80			
	084SB006	6.90	1.30			
	084SB007	942.00	541.00			
	084SB008	9.10	ND			
	084SB009	10.10	ND			
Iron (Fe)	084SB001	3230.00	8330.00	2300	NA	NA
	084SB002	1870.00	10200.00			
	084SB003	28900.00	8780.00			
	084SB004	12200.00	4230.00			
	084SB005	9230.00	1610.00			
	084SB006	1250.00	7540.00			
	084SB007	14400.00	12400.00			
	084SB008	4820.00	1400.00			
	084SB009	4910.00	5600.00			
Lead (Pb)	084SB001	89.90	4.00	400	265	173
	084SB002	8.70	3.50			
	084SB003	408.00	6.80			
	084SB004	317.00	17.60			
	084SB005	281.00	15.00			
	084SB006	2.90	2.90			
	084SB007	644.00	675.00			
	084SB008	12.70	4.00			
	084SB009	53.60	ND			
Magnesium (Mg)	084SB001	231.00	342.00	NA	NA	NA
	084SB002	199.00	384.00			
	084SB003	875.00	488.00			
	084SB004	9220.00	884.00			
	084SB005	648.00	183.00			
	084SB006	278.00	524.00			
	084SB007	944.00	1070.00			
	084SB008	2080.00	306.00			
	084SB009	355.00	ND			
Manganese (Mn)	084SB001	138.00	70.90	180	302	881
	084SB002	22.50	47.50			
	084SB003	192.00	84.70			
	084SB004	126.00	16.60			
	084SB005	216.00	11.90			
	084SB006	30.80	14.40			
	084SB007	109.00	61.50			
	084SB008	27.00	7.50			
	084SB009	178.00	60.00			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Mercury (Hg)	084SB001	0.04	0.03	2.3	2.6	1.59
	084SB003	0.17	0.04			
	084SB004	0.30	ND			
	084SB005	0.13	ND			
	084SB006	ND	0.05			
	084SB007	1.20	0.16			
	084SB008	0.05	0.04			
Nickel (Ni)	084SB001	2.50	2.60	160	77.1	57
	084SB002	22.10	2.70			
	084SB003	18.40	3.20			
	084SB004	28.10	6.10			
	084SB005	11.00	1.90			
	084SB006	1.40	1.50			
	084SB007	19.70	12.50			
	084SB008	8.30	2.00			
	084SB009	5.20	1.40			
Potassium (K)	084SB001	750.00	579.00	NA	NA	NA
	084SB002	727.00	760.00			
	084SB003	805.00	853.00			
	084SB004	564.00	772.00			
	084SB005	798.00	451.00			
	084SB006	363.00	526.00			
	084SB007	551.00	436.00			
	084SB008	498.00	ND			
Selenium (Se)	084SB003	0.62	ND	39	1.7	2.4
	084SB004	0.63	2.90			
Silver (Ag)	084SB004	0.26	ND	39	NA	NA
	084SB009	0.82	ND			
Sodium (Na)	084SB002	62.70	54.90	NA	NA	NA
	084SB003	83.90	79.10			
	084SB004	109.00	194.00			
	084SB005	73.50	43.80			
	084SB006	38.00	35.70			
	084SB008	476.00	ND			
Thallium (Tl)	084SB003	0.59	ND	0.29	2.8	NA
Tin (Sn)	084SB002	4.50	4.40	4700	59.4	9.23
	084SB003	27.00	4.50			
	084SB004	30.00	4.80			
	084SB005	11.80	4.50			
	084SB006	4.00	4.60			
	084SB007	59.20	ND			
Vanadium (V)	084SB001	5.50	15.40	55	94.3	155
	084SB002	2.80	19.60			
	084SB003	10.60	16.20			
	084SB004	17.90	11.20			
	084SB005	9.70	3.10			
	084SB006	1.80	14.50			
	084SB007	18.80	20.30			
	084SB008	13.30	3.00			
	084SB009	8.10	10.60			

Chemicals Detected in Zone E Soil Samples
SWMU 84

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Zinc (Zn)	084SB001	28.10	7.10	2300	827	886
	084SB002	13.50	6.90			
	084SB003	570.00	13.20			
	084SB004	599.00	27.40			
	084SB005	552.00	22.20			
	084SB006	12.30	5.10			
	084SB007	753.00	1190.00			
	084SB008	28.10	7.80			
	084SB009	22.40	ND			

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.
* Surface soil samples will be used for human health risk assessment for the Zone E report.

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Volatile Organic Compounds (ug/kg)						
1,1,1-Trichloroethane	574SB003	1.00	ND	270000.00	NA	NA
	574SB005	1.00	ND			
2-Hexanone	574SB001	20.00	ND	NA	NA	NA
Acetone	574SB001	28.00	69.00	780000.00	NA	NA
	574SB002	200.00	15.00			
	574SB003	40.00	31.00			
	574SB004	46.00	32.00			
	574SB005	90.00	190.00			
Methylene chloride	574SB005	ND	7.00	85000.00	NA	NA
Toluene	574SB002	1.00	ND	1600000.00	NA	NA
Xylene (Total)	574SB001	ND	5.00	16000000.00	NA	NA
	574SB004	6.00	2.00			
Semi-volatile Compounds (ug/kg)						
2-Methylnaphthalene	574SB001	ND	8200.00	NA	NA	NA
	574SB003	ND	1600.00			
	574SB004	1500.00	18000.00			
	574SB005	1880.00	675.00			
	574SB006	140.00	47.00			
	574SB007	75.00	52.00			
	574SB008	780.00	ND			
	574SB009	51.00	ND			
4-Methylphenol (p-Cresol)	574SB005	44.00	ND	39000.00	NA	NA
	574SB008	96.00	ND			
Acenaphthene	574SB003	110.00	420.00	470000.00	NA	NA
	574SB005	4900.00	99.00			
	574SB008	1400.00	ND			
Acenaphthylene	574SB001	290.00	ND	310000.00	NA	NA
	574SB003	110.00	ND			
	574SB005	140.00	43.00			
	574SB007	130.00	ND			
	574SB008	180.00	ND			
Anthracene	574SB001	370.00	ND	23000000.00	NA	NA
	574SB002	95.00	ND			
	574SB003	300.00	120.00			
	574SB004	ND	300.00			
	574SB005	10150.00	240.00			
	574SB007	180.00	100.00			
	574SB008	3545.00	79.00			
Benzo(a)anthracene	574SB001	3100.00	ND	880.00	NA	NA
	574SB002	490.00	ND			
	574SB003	2200.00	ND			
	574SB005	15800.00	620.00			
	574SB006	79.00	ND			
	574SB007	1400.00	670.00			
	574SB008	5500.00	430.00			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB009	95.00	ND			
Benzo(a)pyrene	574SB001	3100.00	ND	88.00	NA	NA
	574SB002	700.00	ND			
	574SB003	2600.00	140.00			
	574SB005	12650.00	615.00			
	574SB006	64.00	ND			
	574SB007	1300.00	660.00			
	574SB008	4950.00	430.00			
	574SB009	65.00	ND			
Benzo(b)fluoranthene	574SB001	3900.00	ND	880.00	NA	NA
	574SB002	710.00	ND			
	574SB003	2700.00	ND			
	574SB005	13450.00	570.00			
	574SB006	100.00	ND			
	574SB007	1300.00	620.00			
	574SB008	3700.00	420.00			
	574SB009	130.00	ND			
Benzo(g,h,i)perylene	574SB001	1600.00	ND	310000.00	NA	NA
	574SB002	420.00	ND			
	574SB003	1300.00	ND			
	574SB005	5500.00	615.00			
	574SB006	70.00	ND			
	574SB007	640.00	360.00			
	574SB008	2800.00	340.00			
	574SB009	50.00	ND			
Benzo(k)fluoranthene	574SB001	4300.00	ND	8800.00	NA	NA
	574SB002	710.00	ND			
	574SB003	2600.00	ND			
	574SB005	10600.00	500.00			
	574SB007	1000.00	610.00			
	574SB008	3850.00	420.00			
Benzoic acid	574SB001	89.00	ND	31000000.00	NA	NA
Butylbenzylphthalate	574CB008	130.00	ND	1600000.00	NA	NA
Chrysene	574SB001	4000.00	ND	88000.00	NA	NA
	574SB002	560.00	ND			
	574SB003	2200.00	ND			
	574SB005	13100.00	595.00			
	574SB006	100.00	ND			
	574SB007	1400.00	680.00			
	574SB008	5650.00	480.00			
	574SB009	99.00	ND			
Di-n-butylphthalate	574SB008	68.00	ND	7800000.00	NA	NA
Di-n-octyl phthalate	574SB008	52.00	ND	160000.00	NA	NA
Dibenz(a,h)anthracene	574SB001	490.00	ND	88000.00	NA	NA
	574SB003	200.00	ND			
	574SB005	2300.00	220.00			
	574SB007	510.00	ND			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB008	1705.00	170.00			
Dibenzofuran	574SB001	ND	380.00	31000.00	NA	NA
	574SB004	ND	870.00			
	574SB005	3170.00	135.00			
	574SB007	47.00	45.00			
	574SB008	1595.00	ND			
Diethylphthalate	574SB001	ND	210.00	6300000.00	NA	NA
	574SB003	ND	220.00			
	574SB004	790.00	370.00			
	574SB005	5900.00	ND			
Dimethyl phthalate	574SB005	2400.00	ND	78000000.00	NA	NA
Fluoranthene	574SB001	2100.00	ND	3100000.00	NA	NA
	574SB002	730.00	ND			
	574SB003	4900.00	ND			
	574SB005	41500.00	1065.00			
	574SB006	130.00	70.00			
	574SB007	2100.00	1100.00			
	574SB008	13200.00	730.00			
	574SB009	100.00	ND			
Fluorene	574SB001	ND	800.00	310000.00	NA	NA
	574SB003	100.00	570.00			
	574SB004	1000.00	1600.00			
	574SB005	4600.00	94.50			
	574SB008	1595.00	ND			
Indeno(1,2,3-cd)pyrene	574CB008	1400.00	ND	880.00	NA	NA
	574SB001	1800.00	ND			
	574SB002	460.00	ND			
	574SB003	1400.00	ND			
	574SB005	6350.00	450.00			
	574SB006	43.00	ND			
	574SB007	1000.00	450.00			
	574SB008	3450.00	440.00			
	574SB009	71.00	ND			
Naphthalene	574SB005	6.00	ND	310000.00	NA	NA
	574SB001	ND	340.00			
	574SB004	ND	1800.00			
	574SB005	3780.00	820.00			
	574SB006	68.00	ND			
	574SB007	87.00	ND			
	574SB007	ND	74.00			
	574SB008	1615.00	ND			
	574SB009	64.00	ND			
Pentachlorophenol	574SB008	220.00	ND	5300.00	NA	NA
Phenanthrene	574SB001	620.00	1600.00	310000.00	NA	NA
	574SB002	310.00	ND			
	574SB003	1800.00	760.00			
	574SB004	2600.00	3500.00			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB005	46500.00	910.00			
	574SB006	160.00	ND			
	574SB007	810.00	460.00			
	574SB008	14800.00	470.00			
	574SB009	96.00	ND			
Pyrene	574SB001	2300.00	140.00	230000.00	NA	NA
	574SB002	580.00	ND			
	574SB003	3200.00	160.00			
	574SB005	36500.00	870.00			
	574SB006	120.00	85.00			
	574SB007	2300.00	1100.00			
	574SB008	10500.00	810.00			
	574SB009	120.00	ND			
bis(2-Ethylhexyl)phthalate	574SB008	605.00	ND	4600.00	NA	NA
Chlorinated Pesticides (ug/kg)						
4,4'-DDD	574SB001	ND	40.00	2700.00	NA	NA
	574SB008	23.50	ND			
	574SB009	3.00	ND			
4,4'-DDE	574SB001	ND	5.20	1900.00	NA	NA
	574SB002	6.00	ND			
	574SB003	4.80	ND			
	574SB008	225.00	ND			
	574SB009	3.30	ND			
4,4'-DDT	574CB008	290.00	ND	1900.00	NA	NA
	574SB005	11.00	13.50			
	574SB007	4.50	ND			
	574SB008	235.00	ND			
Dieldrin	574SB005	ND	4.60	40.00	NA	NA
	574SB006	9.40	ND			
	574SB007	ND	6.50			
Endosulfan sulfate	574SB005	ND	36.00	47000.00	NA	NA
Endrin	574CB008	17.00	ND	2300.00	NA	NA
	574SB005	ND	23.00			
	574SB006	14.00	5.60			
	574SB007	14.00	13.00			
	574SB008	19.00	ND			
	574SB009	3.30	ND			
Endrin aldehyde	574SB005	ND	32.00	2300.00	NA	NA
Endrin ketone	574SB005	ND	6.30	2300.00	NA	NA
Heptachlor epoxide	574CB008	29.00	ND	70.00	NA	NA
	574SB008	33.00	ND			
Methoxychlor	574SB005	ND	24.00	390000.00	NA	NA
alpha-Chlordane	574SB008	18.00	ND	490.00	NA	NA
gamma-Chlordane	574SB005	ND	2.00	490.00	NA	NA
	574SB008	39.00	ND			
	574SB009	3.40	2.20			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
Total Petroleum (ug/kg)						
Gasoline	574SB001	124.00	1900.00	NA	NA	NA
	574SB001	ND	ND	NA	NA	NA
	574SB003	ND	69.60	NA	NA	NA
	574SB004	ND	23200.00	NA	NA	NA
Inorganic Compounds (mg/kg)						
Aluminum (Al)	574SB001	6550.00	10600.00	7800.00	26000	41100
	574SB002	3850.00	13700.00			
	574SB003	3680.00	8800.00			
	574SB004	5380.00	10500.00			
	574SB005	5740.00	5510.00			
	574SB006	1400.00	2530.00			
	574SB007	3840.00	1340.00			
	574SB008	3045.00	10900.00			
	574SB009	5170.00	4070.00			
Antimony (Sb)	574SB002	5.00	0.86	3.10	1.77	1.6
	574SB003	9.10	0.71			
	574SB004	0.93	0.66			
	574SB005	6.85	7.00			
	574SB006	2.90	2.10			
	574SB007	7.10	3.80			
	574SB008	7.50	1.20			
	574SB009	0.60	ND			
Arsenic (As)	574SB001	3.20	6.10	0.43	23.9	19.9
	574SB002	9.90	13.60			
	574SB003	6.70	10.50			
	574SB004	2.30	9.80			
	574SB005	9.00	8.10			
	574SB006	11.90	9.50			
	574SB007	22.10	9.20			
	574SB008	6.05	16.70			
	574SB009	2.40	2.50			
Barium (Ba)	574SB001	34.80	43.00	550.00	130	94.1
	574SB002	74.00	27.90			
	574SB003	46.70	30.20			
	574SB004	38.10	28.00			
	574SB005	62.70	61.10			
	574SB006	11.00	16.30			
	574SB007	102.00	84.80			
	574SB008	64.85	29.40			
	574SB009	48.50	24.50			
Beryllium (Be)	574SB001	0.39	0.85	0.15	1.7	2.71
	574SB002	0.30	1.10			
	574SB003	0.24	0.94			
	574SB004	0.49	0.78			
	574SB005	0.50	0.65			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB006	0.14	0.45			
	574SB007	0.41	0.27			
	574SB008	0.42	1.10			
	574SB009	0.33	0.30			
Cadmium (Cd)	574SB001	0.57	0.29	3.90	1.5	0.96
	574SB002	1.30	ND			
	574SB003	2.00	0.48			
	574SB004	0.17	0.23			
	574SB005	2.10	1.90			
	574SB006	0.29	0.28			
	574SB007	0.34	0.46			
	574SB008	1.70	ND			
Calcium (Ca)	574SB001	1040.00	33100.00	NA	NA	NA
	574SB002	2120.00	21600.00			
	574SB003	12800.00	49000.00			
	574SB004	5000.00	27000.00			
	574SB005	20500.00	16600.00			
	574SB006	548.00	31000.00			
	574SB007	16900.00	19400.00			
	574SB008	13850.00	11000.00			
	574SB009	3100.00	1160.00			
Chromium (Cr)	574SB001	5.40	28.90	39.00	94.6	75.2
	574SB002	15.00	30.30			
	574SB003	17.30	31.50			
	574SB004	4.50	24.50			
	574SB005	18.60	19.45			
	574SB006	5.30	20.80			
	574SB007	11.40	5.20			
	574SB008	38.50	30.30			
	574SB009	8.40	5.60			
Cobalt (Co)	574SB001	1.70	4.40	470.00	19	14.9
	574SB002	6.70	6.40			
	574SB003	3.80	3.50			
	574SB004	6.40	4.60			
	574SB005	3.25	3.80			
	574SB006	3.90	2.50			
	574SB007	21.70	6.20			
	574SB008	3.55	2.80			
	574SB009	10.50	0.68			
Copper (Cu)	574SB001	1180.00	141.00	310.00	66	152
	574SB002	868.00	21.90			
	574SB003	1260.00	31.90			
	574SB004	292.00	99.50			
	574SB005	669.50	627.00			
	574SB006	602.00	431.00			
	574SB007	631.00	428.00			
	574SB008	966.50	22.80			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB009	20.40	4.00			
Cyanide (CN)	574SB005	ND	0.25	73.00	0.5	NA
	574SB007	0.34	ND			
	574SB008	0.35	ND			
Iron (Fe)	574SB001	9160.00	13100.00	2300.00	NA	NA
	574SB002	60000.00	25200.00			
	574SB003	13800.00	16900.00			
	574SB004	3310.00	13900.00			
	574SB005	16450.00	14700.00			
	574SB006	23900.00	10500.00			
	574SB007	50100.00	18700.00			
	574SB008	11600.00	ND			
	574SB008	18700.00	ND			
	574SB009	4090.00	3590.00			
Lead (Pb)	574SB001	110.00	25.30	400.00	265	173
	574SB002	476.00	19.80			
	574SB003	438.00	17.80			
	574SB004	46.80	19.60			
	574SB005	688.00	534.00			
	574SB006	128.00	45.60			
	574SB007	280.00	411.00			
	574SB008	411.00	27.10			
	574SB009	41.00	9.50			
Magnesium (Mg)	574SB001	278.00	2370.00	NA	NA	NA
	574SB002	480.00	4350.00			
	574SB003	1790.00	6470.00			
	574SB004	387.00	2870.00			
	574SB005	2255.00	1265.00			
	574SB006	66.60	871.00			
	574SB007	1250.00	1340.00			
	574SB008	727.50	2560.00			
	574SB009	364.00	192.00			
Manganese (Mn)	574SB001	85.00	135.00	180.00	302	881
	574SB002	441.00	267.00			
	574SB003	183.00	149.00			
	574SB004	33.40	153.00			
	574SB005	167.00	147.50			
	574SB006	87.40	64.90			
	574SB007	400.00	136.00			
	574SB008	126.00	80.40			
	574SB009	124.00	44.70			
Mercury (Hg)	574SB001	0.13	0.04	2.30	2.6	1.59
	574SB002	0.05	0.07			
	574SB003	0.38	0.13			
	574SB004	0.08	ND			
	574SB005	9.90	6.95			
	574SB006	0.13	ND			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB007	0.35	0.26			
	574SB008	0.42	ND			
Nickel (Ni)	574CB008	83.00	ND	160.00	77.1	57
	574SB001	9.60	10.20			
	574SB002	66.90	11.70			
	574SB003	48.20	14.30			
	574SB004	7.60	10.60			
	574SB005	22.70	33.60			
	574SB006	10.20	13.10			
	574SB007	19.80	8.50			
	574SB008	76.65	12.10			
	574SB009	4.30	1.70			
Potassium (K)	574SB001	ND	1700.00	NA	NA	NA
	574SB002	886.00	3470.00			
	574SB003	1040.00	1970.00			
	574SB004	959.00	2050.00			
	574SB005	579.00	546.00			
	574SB008	ND	1210.00			
Selenium (Se)	574SB001	0.67	0.86	39.00	1.7	2.4
	574SB002	0.74	ND			
	574SB003	ND	3.10			
	574SB004	ND	1.10			
	574SB005	0.65	0.89			
	574SB009	0.58	ND			
Silver (Ag)	574SB002	0.25	ND	39.00	NA	NA
	574SB003	0.56	ND			
Sodium (Na)	574SB001	ND	630.00	NA	NA	NA
	574SB002	97.50	460.00			
	574SB003	133.00	420.00			
	574SB004	ND	358.00			
	574SB005	412.00	403.00			
	574SB008	196.00	ND			
Thallium (Tl)	574SB002	2.80	ND	0.29	2.8	NA
	574SB005	1.80	0.72			
Tin (Sn)	574SB001	53.50	ND	4700.00	59.4	9.23
	574SB002	49.50	ND			
	574SB003	148.00	ND			
	574SB004	18.50	ND			
	574SB005	70.60	59.15			
	574SB007	69.10	36.50			
	574SB008	91.35	ND			
Vanadium (V)	574SB001	13.20	25.40	55.00	94.3	155
	574SB002	21.90	37.80			
	574SB003	14.70	28.60			
	574SB004	5.00	26.70			
	574SB005	17.05	15.15			
	574SB006	4.10	10.70			

Chemicals Detected in Zone E Soil Samples
AOC 574

Name	ID	Surface Conc.	Subsurface Conc.	RBC (THQ=.1)	Surface UTL	Subsurface UTL *
	574SB007	19.30	7.90			
	574SB008	19.25	36.90			
	574SB009	6.30	6.60			
Zinc (Zn)	574SB001	366.00	77.60	2300.00	827	886
	574SB002	1040.00	73.80			
	574SB003	1080.00	73.30			
	574SB004	129.00	77.80			
	574SB005	1027.50	1014.50			
	574SB006	303.00	278.00			
	574SB007	623.00	488.00			
	574SB008	556.50	45.60			
	574SB009	28.30	7.40			

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.
* Surface soil samples will be used for human health risk assessment for the Zone E report.

Chemicals Detected in Zone E Groundwater Samples
SWMU 083

Name	Location	Round 1 Conc.	Round 2 Conc.	Round 3 Conc.	Round 4 Conc.	RBC (THQ=.1)	UTL	MCL
Semi-volatile Compounds (ug/l)								
Benzoic acid	083GW001	ND	2.00	NS	NS	15000.00	NA	NA
	083GW002	3.00	2.00	NS	NS			
bis(2-Ethylhexyl)phthalate	083GW001	ND	2.00	NS	NS	4.80	NA	6
Organotin Compounds (ug/l)								
Tributyltin	083GW002	24.00	ND	NS	NS	NA	NA	NA
Other Compounds (mg/l)								
Chloride	083GW001	7.60	ND	ND	5.30	NA	NA	NA
	083GW002	943.00	925.00	310.00	361.00			
Sulfate	083GW001	17.00	ND	9.80	10.00	NA	NA	NA
	083GW002	ND	127.00	73.60	118.00			
Total Dissolved Solids (TDS)	083GW001	214.00	ND	ND	260.00	NA	NA	NA
	083GW002	3070.00	1400.00	1300.00	1560.00			
Inorganic Compounds (ug/l)								
Aluminum (Al)	083GW001	54.70	33.30	51.10	44.70	3700.00	2810	NA
	083GW002	408.00	430.00	2080.00	349.00			
Arsenic (As)	083GW001	18.90	25.60	42.80	38.70	0.05	18.7	50
	083GW002	7.70	10.50	12.90	2.90			
Barium (Ba)	083GW001	9.70	ND	8.00	8.30	260.00	211	2000
	083GW002	ND	ND	15.80	17.30			
Calcium (Ca)	083GW001	16800.00	15800.00	19000.00	19200.00	NA	NA	NA
	083GW002	31900.00	29900.00	16600.00	38600.00			
Chromium (Cr)	083GW001	ND	ND	ND	9.00	3700.00	12.3	100
	083GW002	2.40	1.40	ND	0.94			
Cobalt (Co)	083GW001	ND	ND	1.10	1.40	220.00	2.5	NA
	083GW002	2.70	ND	1.60	1.00			
Copper (Cu)	083GW001	ND	ND	ND	0.79	150.00	2.7	1300
	083GW002	ND	9.60	ND	ND			
Iron (Fe)	083GW001	11400.00	15500.00	22100.00	21900.00	1100.00	NA	NA
	083GW002	2470.00	7860.00	6200.00	652.00			
Magnesium (Mg)	083GW001	12500.00	12400.00	13500.00	14100.00	NA	NA	NA
	083GW002	46300.00	31700.00	13200.00	23500.00			
Manganese (Mn)	083GW001	237.00	219.00	295.00	302.00	84.00	2560	NA
	083GW002	57.80	62.90	25.90	21.90			
Nickel (Ni)	083GW001	2.00	ND	ND	ND	73.00	15.2	100
	083GW002	2.20	ND	ND	1.50			
Potassium (K)	083GW001	6510.00	ND	4930.00	4500.00	NA	NA	NA
	083GW002	24200.00	25200.00	20200.00	28000.00			
Selenium (Se)	083GW002	ND	ND	ND	3.10	18.00	NA	50
Silver (Ag)	083GW002	ND	ND	ND	1.20	18.00	NA	NA
Sodium (Na)	083GW001	37500.00	ND	37500.00	33900.00	NA	NA	NA
	083GW002	1130000.00	795000.00	428000.00	487000.00			
Thallium (Tl)	083GW001	ND	ND	ND	5.10	0.29	5.4	2
Vanadium (V)	083GW001	1.40	ND	0.82	ND	26.00	11.4	NA
	083GW002	3.20	ND	6.00	5.30			
Zinc (Zn)	083GW001	ND	ND	ND	20.70	1100.00	27.3	NA

Chemicals Detected in Zone E Groundwater Samples
SWMU 083

Name	Location	Round 1 Conc.	Round 2 Conc.	Round 3 Conc.	Round 4 Conc.	RBC (THQ=.1)	UTL	MCL

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.

Chemicals Detected in Zone E Groundwater Samples
SWMU 084

Name	Location	Round 1 Conc.	Round 2 Conc.	Round 3 Conc.	Round 4 Conc.	RBC (THQ=.1)	UTL	MCL
Dioxin Compounds (pg/l)								
1234678-HpCDD	084GW001	ND	6.70	NS	NS	NA	NA	NA
	084GW002	ND	10.10	NS	NS			
1234678-HpCDF	084GW002	3.50	ND	NS	NS	NA	NA	NA
234678-HxCDF	084GW002	ND	2.63	NS	NS	NA	NA	NA
OCDD	084GW001	ND	68.60	NS	NS	NA	NA	NA
	084GW002	10.50	41.10	NS	NS			
OCDF	084GW001	ND	13.60	NS	NS	NA	NA	NA
	084GW002	ND	12.40	NS	NS			
Other Compounds (mg/l)								
Chloride	084GW001	7.00	4.60	ND	4.60	NA	NA	NA
	084GW002	6.20	7.70	11.80	6.45			
Sulfate	084GW001	35.00	33.20	40.30	32.70	NA	NA	NA
	084GW002	20.50	12.15	9.85	16.15			
Total Dissolved Solids (TDS)	084GW001	100.00	118.00	ND	ND	NA	NA	NA
	084GW002	130.00	194.00	ND	ND			
Inorganic Compounds (ug/l)								
Aluminum (Al)	084GW001	ND	214.00	296.00	350.00	3700.00	2810	NA
	084GW002	ND	45.90	109.05	50.65			
Arsenic (As)	084GW002	36.20	44.45	44.35	37.80	0.05	18.7	50
Barium (Ba)	084GW001	ND	6.00	7.30	5.10	260.00	211	2000
	084GW002	ND	ND	4.80	2.80			
Beryllium (Be)	084GW002	ND	0.31	ND	ND	0.02	0.43	4
Calcium (Ca)	084GW001	ND	2070.00	4110.00	2000.00	NA	NA	NA
	084GW002	ND	16650.00	22650.00	14600.00			
Cobalt (Co)	084GW001	ND	1.00	ND	ND	220.00	2.5	NA
	084GW002	ND	1.80	2.40	1.10			
Iron (Fe)	084GW001	167.00	283.00	225.00	395.00	1100.00	NA	NA
	084GW002	2130.00	2420.00	1980.00	1800.00			
Magnesium (Mg)	084GW001	ND	683.00	1530.00	645.00	NA	NA	NA
	084GW002	ND	3790.00	5400.00	3500.00			
Manganese (Mn)	084GW001	34.20	31.40	41.10	22.20	84.00	2560	NA
	084GW002	168.50	224.00	271.50	167.50			
Nickel (Ni)	084GW001	ND	0.90	ND	ND	73.00	15.2	100
	084GW002	ND	1.18	ND	ND			
Potassium (K)	084GW001	ND	ND	1790.00	ND	NA	NA	NA
	084GW002	ND	1830.00	2820.00	2110.00			
Sodium (Na)	084GW001	ND	20300.00	22900.00	21100.00	NA	NA	NA
	084GW002	ND	37100.00	44000.00	30250.00			
Thallium (Tl)	084GW002	ND	ND	8.20	ND	0.29	5.4	2
Tin (Sn)	084GW001	ND	3.90	ND	ND	2200.00	NA	NA
	084GW002	ND	ND	2.70	ND			
Vanadium (V)	084GW001	ND	ND	0.58	0.65	26.00	11.4	NA
	084GW002	ND	0.67	0.68	0.51			

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.

Chemicals Detected in Zone E Groundwater Samples
AOC 574

Name	Location	Round 1 Conc.	Round 2 Conc.	Round 3 Conc.	Round 4 Conc.	RBC (THQ=.1)	UTL	M
Semi-volatile Compounds (ug/l)								
2-Methylnaphthalene	574GW001	75.00	84.00	ND	ND	150.00	NA	NA
Acenaphthene	574GW001	2.00	3.00	ND	ND	220.00	NA	NA
Benzoic acid	574GW003	ND	ND	2.00	ND	15000.00	NA	NA
Butylbenzylphthalate	574GW001	ND	2.00	ND	ND	730.00	NA	NA
Di-n-butylphthalate	574GW001	ND	1.00	ND	ND	370.00	NA	NA
Dibenzofuran	574GW001	3.00	4.00	ND	ND	15.00	NA	NA
Fluorene	574GW001	5.00	6.00	ND	ND	150.00	NA	NA
Naphthalene	574GW001	7.00	6.00	ND	ND	150.00	NA	NA
	574GW01D	ND	2.00	ND	ND			
Phenanthrene	574GW001	3.00	4.00	ND	ND	150.00	NA	NA
Other Compounds (mg/l)								
Chloride	574GW001	14.10	20.40	27.60	30.50	NA	NA	NA
	574GW002	70.00	114.00	49.90	74.50			
	574GW003	138.00	159.00	182.00	155.00			
	574GW01D	2340.00	2400.00	2250.00	1930.00			
Sulfate	574GW001	1.00	0.23	0.24	ND	NA	NA	NA
	574GW002	14.00	12.60	3.10	2.30			
	574GW003	4.00	63.90	48.10	22.20			
	574GW01D	28.00	21.60	23.00	20.10			
Total Dissolved Solids	574GW001	328.00	418.00	364.00	480.00	NA	NA	NA
	574GW002	474.00	546.00	ND	532.00			
	574GW003	722.00	434.00	796.00	808.00			
	574GW01D	4810.00	4820.00	4450.00	4190.00			
Inorganic Compounds (ug/l)								
Aluminum (Al)	574GW001	90.20	160.00	55.80	160.00	73.00	7.90	200
	574GW002	102.00	181.00	41.60	77.40			
	574GW003	695.00	ND	1390.00	499.00			
	574GW01D	32.70	ND	ND	23.50			
Arsenic (As)	574GW002	ND	3.00	22.40	19.20	0.05	18.70	50
	574GW01D	67.50	70.70	74.10	79.40			
Barium (Ba)	574GW001	32.00	37.50	50.90	34.70	260.00	211.00	2000
	574GW002	14.30	ND	19.20	14.70			
	574GW003	10.60	ND	15.50	13.20			
	574GW01D	198.00	182.00	171.00	157.00			
Beryllium (Be)	574GW001	0.50	0.50	ND	ND	0.02	0.43	4
	574GW002	ND	ND	ND	ND			
	574GW01D	0.80	ND	ND	ND			
Calcium (Ca)	574GW001	81200.00	65900.00	67700.00	63100.00	NA	NA	NA
	574GW002	48200.00	34100.00	47200.00	43100.00			
	574GW003	10300.00	208000.00	7960.00	10000.00			
	574GW01D	227000.00	215000.00	204000.00	177000.00			
Chromium (Cr)	574GW003	ND	ND	2.50	ND	3700.00	12.30	100
Cobalt (Co)	574GW001	ND	ND	ND	2.60	220.00	2.50	NA
	574GW002	ND	ND	ND	1.38			
	574GW002	ND	ND	ND	ND			
	574GW003	3.00	ND	1.80	ND			
	574GW003	ND	ND	ND	ND			

Chemicals Detected in Zone E Groundwater Samples
AOC 574

Name	Location	Round 1 Conc.	Round 2 Conc.	Round 3 Conc.	Round 4 Conc.	RBC (THQ=.1)	UTL	N.
	574GW003	ND	ND	ND	2.50			
	574GW003	ND	ND	ND	ND			
Copper (Cu)	574GW01D	2.30	3.10	1.90	2.00	150.00	2.70	1300
	574GW01D	ND	ND	ND	ND			
	574GW01D	ND	ND	ND	ND			
	574GW01D	ND	ND	ND	ND			
Iron (Fe)	574GW001	4220.00	3760.00	5740.00	5180.00	1100.00	NA	NA
	574GW002	1650.00	2030.00	3400.00	3340.00			
	574GW003	1310.00	ND	12000.00	7250.00			
	574GW01D	37000.00	36200.00	35900.00	30300.00			
Magnesium (Mg)	574GW001	6730.00	7190.00	6610.00	6870.00	NA	NA	NA
	574GW002	14500.00	12500.00	13400.00	13800.00			
	574GW003	10400.00	559000.00	7770.00	9900.00			
	574GW01D	125000.00	124000.00	122000.00	97700.00			
Manganese (Mn)	574GW001	350.00	210.00	385.00	404.00	84.00	2560.00	NA
	574GW002	383.00	252.00	322.00	281.00			
	574GW003	102.00	73.10	73.50	101.00			
	574GW01D	3380.00	3210.00	3010.00	2300.00			
Nickel (Ni)	574GW003	1.50	ND	2.60	ND	73.00	15.20	100
	574GW01D	4.30	ND	0.87	ND			
Potassium (K)	574GW001	11200.00	12100.00	12400.00	11000.00	NA	NA	NA
	574GW002	19900.00	23600.00	19900.00	18800.00			
	574GW003	7460.00	194000.00	8860.00	9100.00			
	574GW01D	51500.00	45300.00	49000.00	43900.00			
Silver (Ag)	574GW001	2.10	ND	ND	ND	18.00	NA	NA
	574GW002	ND	1.20	ND	ND			
	574GW01D	ND	5.30	ND	ND			
Sodium (Na)	574GW001	24600.00	31900.00	43500.00	45400.00	NA	NA	NA
	574GW002	90200.00	113000.00	68200.00	90500.00			
	574GW003	292000.00	4500000.00	259000.00	238000.00			
	574GW01D	1290000.00	1240000.00	1260000.00	1070000.00			
Thallium (Tl)	574GW001	ND	3.40	ND	ND	0.29	5.40	2
	574GW01D	ND	8.30	ND	4.10			
	574GW01D	ND	ND	ND	ND			
Vanadium (V)	574GW001	1.80	10.20	ND	1.50	26.00	11.40	NA
	574GW002	2.20	2.20	ND	0.85			
	574GW003	2.00	ND	ND	2.20			
	574GW01D	1.90	1.60	ND	0.61			
Zinc (Zn)	574GW001	ND	ND	9.30	9.30	1100.00	27.30	NA
	574GW002	4.10	ND	ND	ND			
	574GW003	8.70	ND	23.60	11.50			

Notes:
ND: Not Detected
NS: No Sample Taken/Sample Not Analyzed
NA: Not Applicable
For compounds detected in both the primary and duplicate sample, the concentration for both detections are averaged and listed as one detection.
For compounds that were detected in only one of the primary or duplicate sample, the value of the detection was used.

Table 10.10.B
Chemicals Present in Site Samples
SWMUs 83, 84; AOC 574 - Groundwater
NAVBASE - Charleston
Charleston, SC

Parameter		Frequency of Detection		Range of Detection		Average Detected Conc.	Range of SQL		Screening Concentration Residential RBC	Reference	Units	Number Exceeding RBC	Ref.
Deep wells													
Inorganics													
Aluminum (Al)		1	1	32.7	32.7	32.7	NA	NA	3700	319	UG/L		
Arsenic (As)	*	1	1	67.5	67.5	67.5	NA	NA	0.045	16.4	UG/L	1	1
Barium (Ba)		1	1	198	198	198	NA	NA	260	218	UG/L		
Calcium (Ca)	N	1	1	227000	227000	227000	NA	NA	NA	NA	UG/L		
Cobalt (Co)		1	1	2.3	2.3	2.3	NA	NA	220	12.9	UG/L		
Iron (Fe)	N	1	1	37000	37000	37000	NA	NA	1100	NA	UG/L		
Magnesium (Mg)	N	1	1	125000	125000	125000	NA	NA	NA	NA	UG/L		
Manganese (Mn)	*	1	1	3380	3380	3380	NA	NA	84	869	UG/L	1	1
Nickel (Ni)		1	1	4.3	4.3	4.3	NA	NA	73	42.2	UG/L		
Potassium (K)	N	1	1	51500	51500	51500	NA	NA	NA	NA	UG/L		
Sodium (Na)	N	1	1	1290000	1290000	1290000	NA	NA	NA	NA	UG/L		
Vanadium (V)		1	1	1.9	1.9	1.9	NA	NA	26	5.3	UG/L		
Shallow Wells													
TCDD Equivalents													
Dioxin Equiv.		1	1	0.0455	0.0455	0.0455	NA	NA	0.43	NA	PG/L		
Inorganics													
Aluminum (Al)		5	7	54.7	695	270.0	58.4	131	3700	2810	UG/L		
Arsenic (As)	*	3	7	7.7	36.9	21.2	5	5	0.045	18.7	UG/L	3	2
Barium (Ba)		4	7	9.7	32	16.7	2.2	26.1	260	211	UG/L		
Calcium (Ca)	N	5	7	10300	81200	37680	3210	10500	NA	NA	UG/L		
Chromium (Cr)		1	7	2.4	2.4	2.4	1	1	18	12.3	UG/L		
Cobalt (Co)		1	7	2.7	2.7	2.7	2	2	220	2.5	UG/L		1
Copper (Cu)		1	7	3	3	3	2	8.1	150	2.7	UG/L		1
Iron (Fe)	N	7	7	167	11400	3350	NA	NA	1100	NA	UG/L		
Magnesium (Mg)	N	5	7	6730	46300	18086	884	2510	NA	NA	UG/L		
Manganese (Mn)		7	7	34.2	383	191	NA	NA	84	2560	UG/L	5	
Nickel (Ni)		3	7	1.5	2.2	1.9	1	1	73	15.2	UG/L		
Potassium (K)	N	5	7	6510	24200	13854	1500	2050	NA	NA	UG/L		
Silver (Ag)		1	7	2.1	2.1	2.1	2	2	18	NA	UG/L		
Sodium (Na)	N	5	7	24600	1130000	314860	21600	24100	NA	NA	UG/L		
Vanadium (V)		5	7	1.4	3.2	2.12	1	1	26	11.4	UG/L		
Zinc (Zn)		2	7	4.1	8.7	6.4	4	11.1	1100	27.3	UG/L		
Semivolatile Organics													
2-Methylnaphthalene		1	7	75	75	75	10	10	150	NA	UG/L		
Acenaphthene		1	7	2	2	2	10	10	220	NA	UG/L		
Benzoic acid		1	7	3	3	3	50	53	15000	NA	UG/L		
Dibenzofuran		1	7	3	3	3	10	10	15	NA	UG/L		
Fluorene		1	7	5	5	5	10	10	150	NA	UG/L		
Naphthalene		1	7	7	7	7	10	10	150	NA	UG/L		
Phenanthrene		1	7	3	3	3	10	10	150	NA	UG/L		
Organotins													
Tributyltin		1	7	24	24	24	2	2	NA	NA	UG/L		

* - Identified as a COPC
N - Essential nutrient
UG/L - micrograms per liter
PG/L - picograms per liter
SQL - Sample quantitation limit
NA - Not applicable

Table 10.10.6.1
SWMUs 83 and 84 and AOC 574
Organic Compounds Detected in Wipe Samples

Element	Freq. of Detection	Range of Detected Conc. (µg/wipe)	Mean of Detected Conc. (µg/wipe)
PCBs			
Aroclor-1242	1/3	9.80	9.8

Note:
µg/wipe = Micrograms per wipe sample

Table 10.10.6.2
SWMUs 83 and 84 and AOC 574
Inorganic Detections in Wipe Samples

Element	Freq. of Detection	Range of Detected Conc. (mg/wipe)	Mean of Detected Conc. (mg/wipe)
Aluminum (Al)	16/16	554 - 47,000	4,870
Antimony (Sb)	16/16	1.30 - 74.8	11.5
Arsenic (As)	14/16	1.10 - 59.8	7.74
Barium (Ba)	16/16	13.6 - 308	95.0
Beryllium (Be)	3/16	0.200 - 0.220	0.213
Cadmium (Cd)	16/16	0.850 - 15.6	5.07
Calcium (Ca)	16/16	1,150 - 12,500	5,810
Chromium (Cr)	16/16	6.50 - 300	55.7
Cobalt (Co)	16/16	0.620 - 116	10.3
Copper (Cu)	16/16	956 - 594,000	42,900
Iron (Fe)	16/16	1,660 - 167,000	18,500
Lead (Pb)	16/16	84.5 - 11,500	1,120
Magnesium (Mg)	16/16	77.0 - 1,750	419
Manganese (Mn)	16/16	57.0 - 3,640	460
Mercury (Hg)	15/16	0.0500 - 1.80	0.446
Nickel (Ni)	16/16	120 - 74,500	5370
Potassium (K)	16/16	238 - 1,160	708
Selenium (Se)	3/16	1.000 - 2.40	1.90

Table 10.10.6.2
SWMUs 83 and 84 and AOC 574
Inorganic Detections in Wipe Samples

Element	Freq. of Detection	Range of Detected Conc. (mg/wipe)	Mean of Detected Conc. (mg/wipe)
Silver (Ag)	11/16	0.460 - 52.3	6.07
Sodium (Na)	4/16	1,130 - 4,840	2,340
Tin (Sn)	16/16	74.6 - 25,100	1,930
Vanadium (V)	16/16	0.970 - 39.5	8.36
Zinc (Zn)	16/16	339 - 21,300	2,790

Note:
mg/wipe = Milligrams per wipe sample

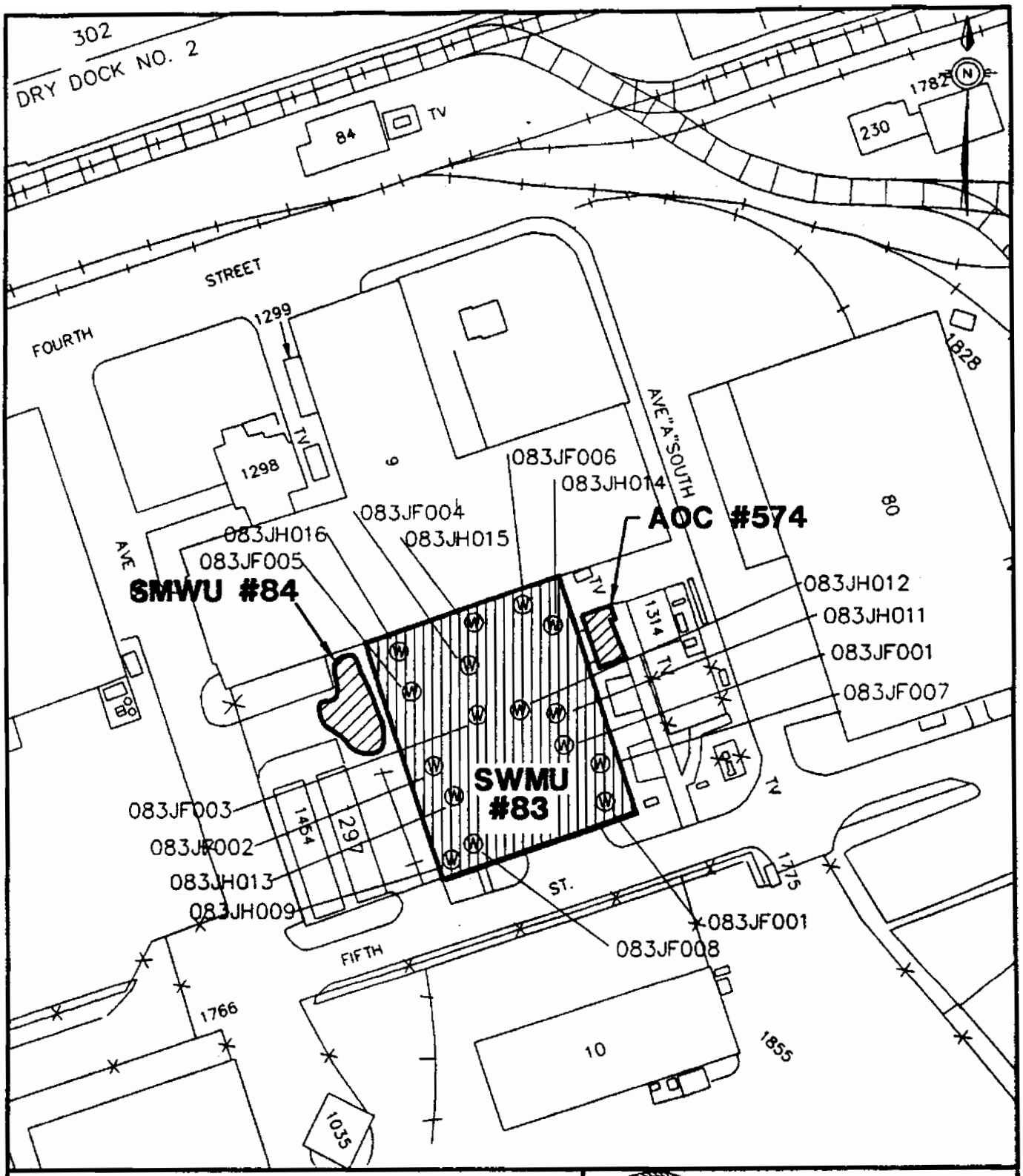
Table 10.10.8.1
SWMU 83
Air Sample Results

Element	Frequency of Detection	Range of Detections ($\mu g/m^3$)
Aluminum	15/15	0.012 - 0.060
Arsenic	10/15	0.0012 - 0.0022
Barium	15/15	0.0013 - 0.0027
Beryllium	8/15	0.0001 - 0.0001
Cadmium	10/15	0.0001 - 0.0002
Calcium	15/15	0.05 - 0.112
Chromium	15/15	0.0004 - 0.0016
Cobalt	4/15	0.0001 - 0.0002
Copper	14/15	0.0103 - 0.060
Iron	15/15	0.021 - 0.164
Lead	11/15	0.0009 - 0.0034
Magnesium	15/15	0.016 - 0.0352
Manganese	15/15	0.0014 - 0.0038

Table 10.10.8.1
SWMU 83
Air Sample Results

Element	Frequency of Detection	Range of Detections ($\mu g/m^3$)
Mercury	15/15	0.0001 - 0.0006
Nickel	15/15	0.0009 - 0.0774
Potassium	15/15	0.022 - 0.088
Selenium	10/15	0.0010 - 0.0022
Sodium	15/15	0.10 - 0.22
Thallium	2/15	0.0015 - 0.0023
Vanadium	15/15	0.0010 - 0.0070
Zinc	15/15	0.0066 - 0.021
Alkalinity		
Total Alkalinity	15/15	4.3 - 30.4

Note:
$\mu g/m^3$ = Micrograms per cubic meter



LEGEND

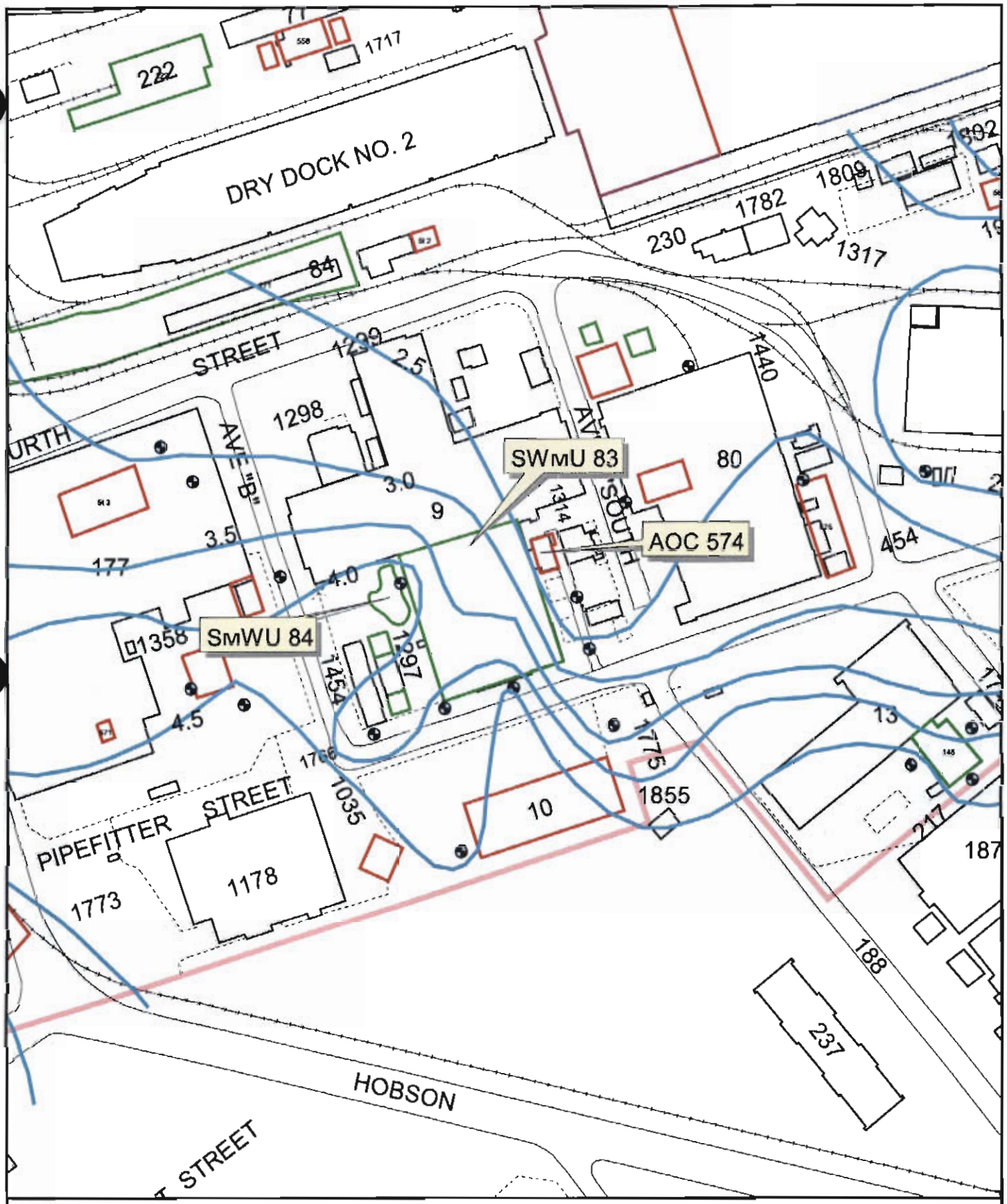
- ● – SOIL BORINGS
- Ⓒ – CORE SAMPLES
- ◒ – DEEP MONITORING WELLS
- ◭ – SHALLOW MONITORING WELLS
- ▲ – SEDIMENT SAMPLES
- Ⓣ – THICKNESS SAMPLES
- Ⓦ – WIPE SAMPLES
- Ⓢ – SURFACE WATER SAMPLES

GRAPHIC SCALE 100 0 100 200

ZONE E
RFI REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.

FIGURE 10.10.3
WIPE SAMPLE LOCATIONS
SWMU #83, BUILDING 9
SWMU #84, LEAD STORAGE, BLDG 9
AOC #574, BUILDING 9, SAA

DWG DATE: 09/02/97 | DWG NAME: 10-10-3



2.0 Shallow Groundwater Elevation Contours (May 2002)
Shallow Groundwater Wells
Railroads
Roads
Shoreline
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 100 200 Feet

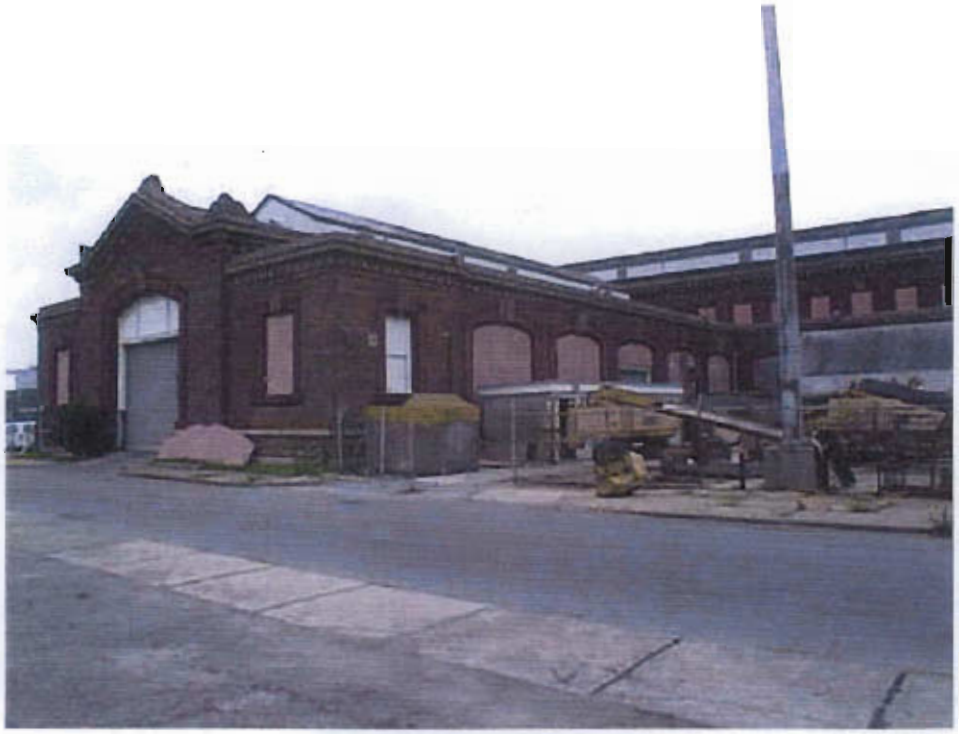
1 inch = 150 feet

Figure B-1
Shallow Groundwater Elevation (May 2002)
Combined SWMU 83, Zone E
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\projects\zone_e\swmu 83-cno-egis.apr, Date: 03 Jul 2002 15:53, User: TWILEY

Appendix C



BUILDING MATRIX

Building Number	9
Square Footage	74,612
Map Location	G-39
Zone	E
EBS Binder No.	11
Street Address	1390 Pipefitter Street
Use:	Originally: foundry. Later: Temporary services shop
Year Built:	1906
Historic (Y/N)	Y
Notes:	Site of AOC 574, building 9 fuel tank.

Date Received

State Use Only

I OWNERSHIP OF AST(S)

Agency/Owner: Southern Division, Naval Facilities Engineering Command, Caretaker Site Office

Mailing Address: P.O. Box 190010

City: N. Charleston State: SC Zip Code: 29419-9010

Area Code: 803 Telephone Number: 743-9985 Contact Person: LCDR Paul Rose

II SITE IDENTIFICATION AND LOCATION

Site I.D. #: AOC #574

Facility Name: Charleston Naval Base Complex, BLDG 9, ASTs 9B and 9C

Street Address: South Hobson Avenue

City: North Charleston, 29405-2413 County: Charleston

III CLOSURE INFORMATION

Closure Started: 20 June 1996 Closure Completed: 24 July 1996

Number of ASTs Closed: 2

N/A
Consultant

SPORTENVDETCHASN
UST Removal Contractor

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

I certify that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate and complete.

LCDR Paul Rose
Name (Type or Print)

Signature

V. AST INFORMATION

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
A. Product.....	9B #2 Fuel Oil	9C #2 Fuel Oil			
B. Capacity.....	586 gal.	3,700 gal			
C. Age.....	1939	1939			
D. Construction Material.....	Steel	Steel			
E. Month/Year of Last Use.....	1995	Unk.			
F. Spill Prevention Equipment Y/N.....	N	N			
G. Overfill Prevention Equipment Y/N.....	N	N			
H. Method of Closure Removed/Filled....	R	R			
I. Visible Corrosion or Pitting Y/N.....	Y	Y			
J. Visible Holes Y/N.....					

L. Method of disposal for any ASTs removed (attach disposal manifests).

ASTs 9B and 9C were removed from the site, steam cleaned, and cut up for recycling as scrap metal. See Attachment II.

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

The tanks were empty. No sludge was removed.

N. Were any corrosion, pitting, or holes observed on the AST?

The ASTs were in poor condition. Oil was leaching out of the sides of the tanks. See photographs in Attachment I.

VI. PIPING INFORMATION

		Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
A.	Construction Material.....	Steel	Steel				
B.	Distance from AST to Dispenser.....	25' (Bldg 9)	25' (Bldg 9)				
C.	Number of Dispensers.....	1	1				
D.	Type of System P/S.....	P	P				
E.	Was Piping Removed Y/N.....	Y	Y				
F.	Visible Corrosion or Pitting Y/N.....	N	N				
G.	Visible Holes Y/N.....	N	N				
H.	Age.....	> 20 yrs.	> 20 yrs.				

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

The piping was sound. No evidence of leakage was found in them.

VII. BRIEF SITE DESCRIPTION AND HISTORY

Building 9 is located inside the Controlled Industrial Area of the Charleston Naval Shipyard. ASTs 9B and 9C provided #2 fuel oil to Building 9's foundry furnaces and torches. This location is designated as Area of Concern (AOC) #574 in the Naval Base Resource Conservation and Recovery Act (RCRA) Facility Assessment. The site also contained a waste oil tank which was removed prior to base closure. See photograph, Attachment I.

The condition of the tanks and the available documentation support the conclusion that the tanks had been leaking for many years. Prior to base closure, Public Works planned to replace ASTs 9B and 9C because of their poor condition.

VIII. SITE CONDITIONS

		Yes	No	Unk
A.	Were any petroleum-stained or contaminated soils found near the AST?	X		
B.	Were any petroleum odors detected? If yes, indicate location on site map and describe the odor (strong, mild, etc.) [*mild, from contaminated soil beneath ASTs]	*X		

IX. SAMPLE INFORMATION

S.C.D.H.E.C. Lab Certification Number 10120

Sample #	Location	Sample Type (Soil/Water)	Depth *	Date/Time of Collection	Collected By	OVA#
See Note 1.						

* = Depth Below the Surrounding Land Surface

Note 1:
No samples were taken of this location per agreement with the Project Team. The site is presently being assessed and worked under the RCRA permit for Naval Base Charleston.

X. SAMPLING METHODOLOGY

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

No samples were taken.

XI. RECEPTORS

		Yes	No
A.	Are there any lakes, ponds, streams, or wetlands located within 1000 feet of the AST system? [* Cooper R. 320'] If yes, indicate type of receptor, distance, and direction on site map.	*X	
B.	Are there any public, private, or irrigation water supply wells within 1000 feet of the AST system? If yes, indicate type of well, distance, and direction on site map.		X
C.	Are there any underground structures (e.g., basements) located within 100 feet of the AST system? If yes, indicate the type of structure, distance, and direction on site map.		X
D.	Are there any underground utilities (e.g., telephone, electricity, gas, water, sewer, storm drain) located within 100 feet of the AST system that could potentially come in contact with the contamination? [* Storm drain, electrical] If yes, indicate the type of utility, distance, and direction on the site map.	*X	

Attachment I

SITE MAP

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

Site Maps 1 and 2
Photographs 1 through 5

Attachment II

ANALYTICAL RESULTS

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

Certified Analytical Results
Chain-of-Custody

Attachment II

Certificate of Disposal (tank)

ASTs 9B and 9C

Photo 1: Building 9 waste oil tank, AST 9C, and AST 9B from left to right. This photo was taken before the waste oil tank was removed, prior to base closure.

Photo 2: ASTs 9B and 9C, taken prior to base closure.

ASTs 9B and 9C

Photo 3: ASTs 9B and 9C, taken prior to removal.

Photo 4: AST 9B foundation soil staining.

Photo 5: AST 9C foundation soil staining.

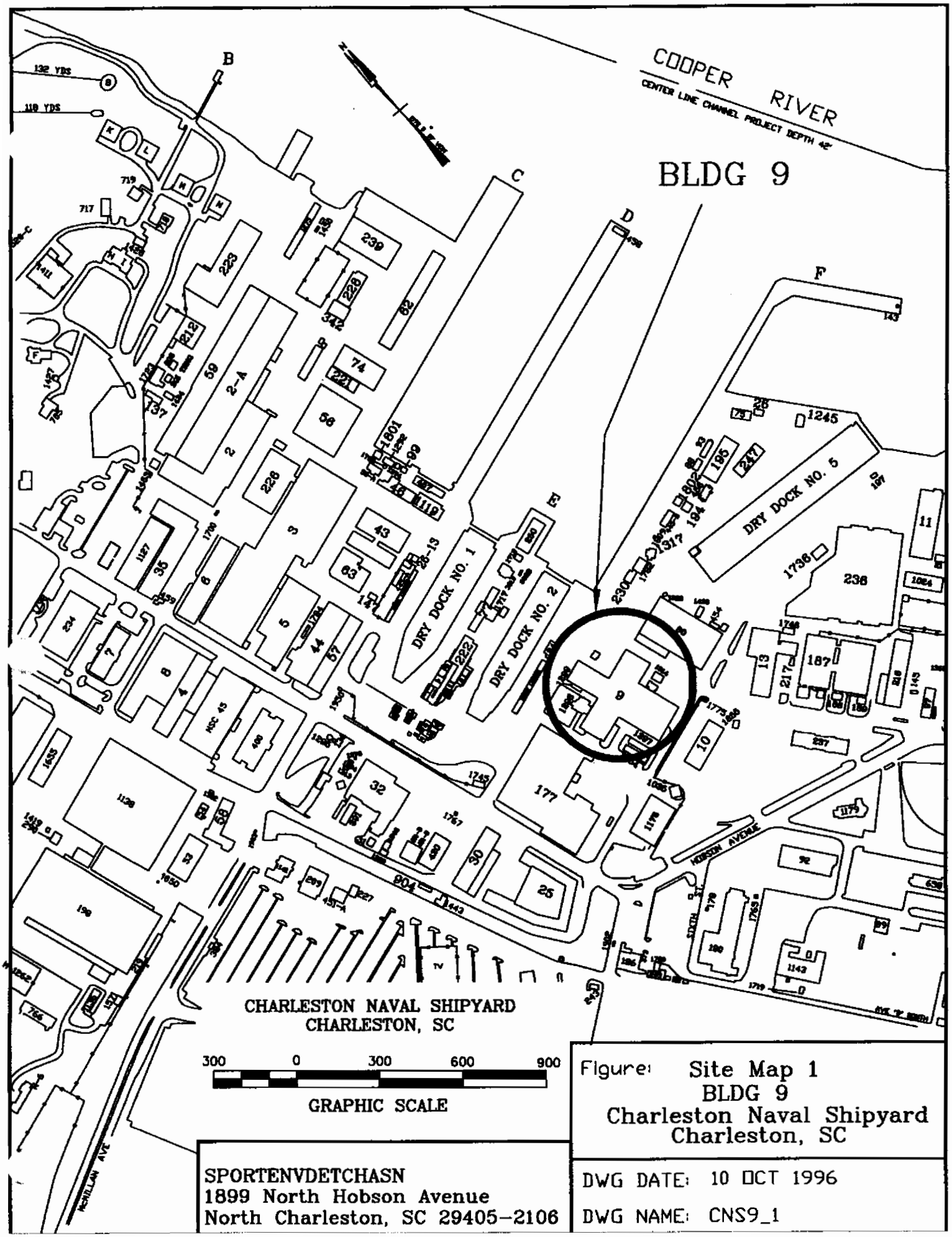
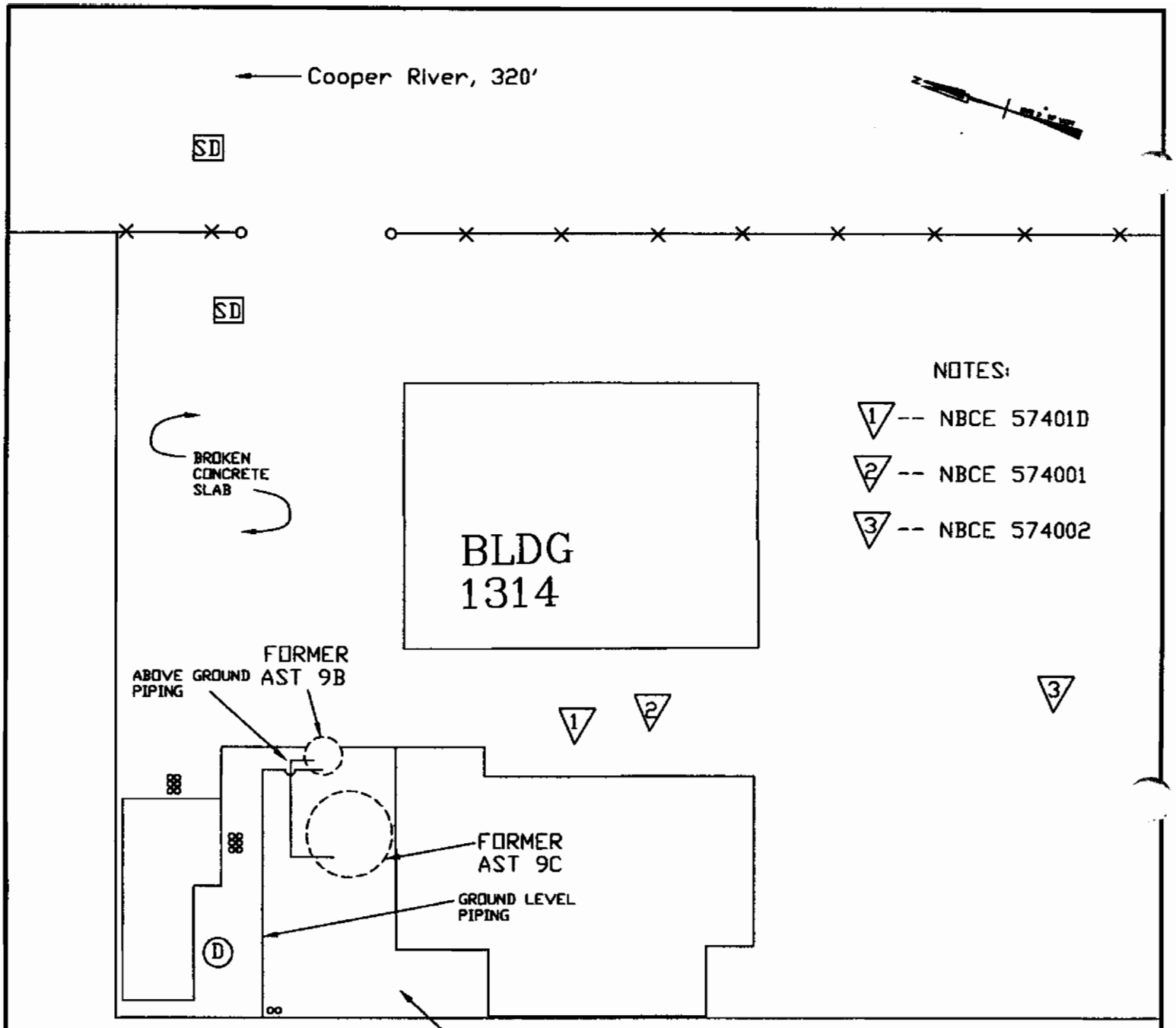


Figure: Site Map 1
BLDG 9
Charleston Naval Shipyard
Charleston, SC

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

DWG DATE: 10 OCT 1996

DWG NAME: CNS9_1



KEY:

D -- DRAIN

∞ -- ELECTRICAL CONDUIT ENTER GROUND

2 -- PERMANENT MONITORING WELL

SD -- STORM DRAIN

Figure: Site Map 2
AST 9B & 9C
Charleston Naval Base
Charleston, SC

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

DWG DATE: 16 OCT 1996

DWG NAME: CNS9_2

Ser: 498
APR 15 1997

MEMORANDUM

From: Director, Supervisor of Shipbuilding, Conversion and Repair, USN Portsmouth, Va., Environmental Detachment, Charleston, SC (SPORTENVDETCHASN)
To: Southern Division Naval Facilities Engineering Command (Code 18B - Hayes Patterson)

Subj: COMPLETION REPORT FOR PROCESS CLOSURE SWMU-83 FORMER BUILDING 9 FOUNDRY

Ref: (a) Authorization For Project C96017, Interim measures At Sites SWMU-8, SWMU-14, And SWMU-83, Charleston Naval Complex, Southern Division Memo 5090, Code 18B4(dated 29 August 1996)

Encl: Completion Report for Process Closure for SWMU-83

1. Background. SPORTENVDETCHASN was authorized per reference (a) to proceed with the execution of Process Closure (PC) for Building 9 (Former Foundry). The PC consisted of the cleanup and removal of oil/oily waste in below deck passageways and drains, poly-chlorinated biphenyl containing oils, friable asbestos, equipment power supplies, and surface dust containing lead. The objectives have been completed as outlined in the following Closure Report. Questions or comments concerning this report may be addressed to Bernard Brown at 743-4777 (ext. 148) or Jed Heames (ext. 123).

2. Action. Southern Division is requested to review the enclosed Completion Report of the Process Closure for SWMU-83. Following concurrence by Southern Division, final copies of the Completion Report will be provided to SDIV (if required).

for M.K. Tinstell
E. R. Dearhart

Copy to (w/o encls):
File
Jed Heames (Engineering)

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

5090
Code 18B4
29 August 1996

From: Commanding Officer, Southern Division Naval Facilities Engineering Command
To: Supervisor of Shipbuilding, Conversion and Repair, Portsmouth

Subj: AUTHORIZATION FOR PROJECT C96017, INTERIM MEASURES AT SITES SWMU-8, SWMU-14, AND SWMU-83, CHARLESTON NAVAL COMPLEX

Ref: (a) SPORTENVDETCHASN PEP for SWMU 14 dated 28 June 1996 as amended by SPORTENVDETCHASN revised cost estimate of 20 August 1996
(b) SPORTENVDETCHASN PEP for SWMU 83 dated 23 July 1996 as amended by SPORTENVDETCHASN revised cost estimate of 8 August 1996
(c) NAVCOMPT F2275, Project Order N62467-96-POE00004 of 20 March, 1996
(d) SOUTHNAVFACENGCOM ltr of 22 May 1996, Authorization for Project C96017, Interim Measures at SWMU-8, SWMU-14 and SWMU-83, Charleston Naval Complex

1. The Project Execution Packages (PEPs) for interim measures at SWMU-14 and SWMU-83, references (a) and (b), have been reviewed and determined cost effective. As such, Supervisor of Shipbuilding, Conversion and Repair, Portsmouth, Environmental Detachment, Charleston (SPORTENVDETCHASN) is hereby authorized to accomplish these projects. The total project costs are $242,443 for SWMU-14 and $148,947 for SWMU-83. These totals include overhead costs as well as direct labor and material costs therefore, as appropriate, increase the direct labor and material job order funding for executing project C96017 in accordance with references (c) and (d).

2. The subject projects shall start during fiscal year 1996. Work is expected to begin on 30 August 1996. SPORTENVDETCHASN shall provide SOUTHNAVFACENGCOM a separate monthly project progress report and detailed cost accounting of expenditures on these projects.

3. **Release of Information.** SOUTHNAVFACENGCOM is the releasing authority for all information/documents regarding this project. Therefore, SPORTENVDETCHASN shall obtain approval before publicizing, discussing or releasing any documents or information concerning this or any other project with anyone other than government personnel associated with the project in question.

4. Inquires should be directed to Hayes Patterson, Code 18B4 at (803) 820-5658.

J. V. BEROTTI
By direction

Copy to:
SPORTENVDETCHASN

COMPLETION REPORT

PROCESS CLOSURE FOR
SWMU 83 (BUILDING 9 FOUNDRY)
NAVAL BASE CHARLESTON
CHARLESTON, SC

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON S.C.

Prepared by:

Supervisor of Shipbuilding, Conversion and Repair,
USN, (SUPSHIP) Portsmouth Va.,
Environmental Detachment Charleston S.C.
1899 North Hobson Ave.
North Charleston, SC 29405-2106

March 25, 1997

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1. INTRODUCTION

The Southeast wing of Building 9 (the former foundry area) was designated for cleanup as a Process Closure (PC) action. Site investigation revealed the presence of equipment leaking gear oil onto concrete deck areas, oil/oily waste in below deck level covered drains/passageways, poly-chlorinated biphenyl (PCB) containing oils, friable asbestos, a power supply transformer with no PCB certification, hydraulic power supply leaking fluid onto the concrete, a glycol pump and reservoir, and lead dust in areas of the building.

2. OBJECTIVES IDENTIFIED AND ACCOMPLISHED

1. Equipment leaking gear oil: One sand mixing machine and one sand hopper was found leaking gear oil onto the deck areas.

Description of Objectives Accomplished.

1. Cleaned up oil spill produced from sand mixer and sand hopper with absorbent material.
2. Drained oil from the leaky gearbox of the sand mixer and sand hopper and tagged both machines to note that gearbox oil has been drained.
3. Placed oily waste in a 5 gallon drum and shipped to Environmental Detachment Charleston (DET) Waste Disposal Division (estimated waste - 5 gallons).

2. Oil/oily waste below deck level covered drains/passageways: Two areas of the foundry were found to have this problem. The first area located underneath metal storage racks just outside the restroom area was stained with oil. The drain catch passageways in this area contained approximately 5 cubic yards of oily waste. The second area was the hydraulic piping passageway that supplied hydraulic fluid to the Hydro Arc furnace. This piping passageway was filled with sand that was used to absorb hydraulic fluid leaks and contained approximately 1 cubic yard of sand/liquid waste.

Description of Objectives Accomplished.

1. Removed covers, removed waste, and placed in 55 gallon drums.

2. Used detergent (Gamlin) to clean concrete in oil stained areas.
3. Placed waste material in 55 gallon drums and shipped to DET Hazardous Waste Disposal Division (estimated waste - four 55 gallon drums).

3. Ajax power supply: The Resource Conservation Recovery Act (RCRA) Facility Assessment for Zone E, dated June 6, 1995, states that a capacitor exploded in the Ajax power supply on September 18, 1984. Burned Pyranol oil sprayed inside the power supply's 8' x 6' x 7' enclosure. The enclosure was subsequently sealed off and posted with PCB warning labels.

A swipe screening sample taken by the DET in June, 1995, in an oil stained area on the wooden base, was analyzed by General Engineering Laboratories (GEL) for PCB verification. The swipe results revealed PCB 1254 @ 54,800 ug/100 cm^2 and PCB 1260 @ 20,300 ug/100 cm^2. A core sample from the concrete pad taken by the DET on December 16, 1996, was analyzed by GEL for PCB verification. The core results revealed PCB 1254 @ 28.4 PPM and PCB 1260 @ 11.9 PPM .

Description of Objectives Accomplished.

1. Contacted South Carolina Electric & Gas (SCE&G) to disconnect power supply from supply transformer. Disconnected wiring between power supply and motor generator. Cut wiring, cooling supply and return piping.
2. The interior of the power supply was disassembled by sections and components. Each component was swiped for PCB presence and designated as scrap or PCB waste according to the lab results. The outer shell or housing of the power supply was disassembled and disposed in the same manner.
3. The motor generator was cleaned with Gamlin. Swipe results indicated no PCB's present.
4. The wooden deck portion of the power supply was removed. The blower portion was disassembled along with the power supply enclosure. The wooden

deck, blower portion and power enclosure were disposed of as PCB hazardous waste.

5. Approximately 4" of the concrete pad's surface was removed and disposed of as PCB hazardous waste after physical cleaning with CAPSUR failed to yield satisfactory results. Six samples taken after removal of the surface revealed all PCB levels were < 1 PPM. Sample locations are shown on page 16 of this report.

4. Smoldering Pots: One induction fired smoldering pot oven had damaged friable asbestos insulation.

Description of Objectives Accomplished.

1. The friable asbestos was removed and disposed per Building 9 Asbestos Removal Site Specific Work Plan.

5. Hydro Arc Furnace Transformer: This transformer supplied the power for the Hydro Arc electric furnace. The transformer was built in 1968 and was filled with 9,150 pounds of oil. A slight amount of oil was found leaking out of the sightglass gaskets. An oil stained area was visible on the deck beneath the transformer. A swipe screening sample taken on 30 April, 1996 from below the transformer sightglass window was analyzed by GEL for PCB verification. The swipe results revealed PCB 1254 @ 15 ug/100 cm^2 and PCB 1260 @ 7. 5 ug/100 cm^2.

A follow-up screening sample taken by the DET on 10 May, 1996 and analyzed by GEL establish the PCB content of the transformer oil. The sample results revealed PCB 1254 @ 25 PPM and PCB 1260 @ 10 PPM.

Description of Objectives Accomplished.

1. Oil was drained from the transformer and shipped to DET Hazardous Waste Disposal Division. The surface of the transformer was cleaned to <10 ug/100 cm^2 PCB.

6. Hydro Arc Hydraulic Power Supply and Reservoir: There was a liquid spill beneath the drip tray. This liquid was dipropylene glycol. The glycol pump and reservoir were located in the transformer room. Less than 55 gallons of liquid were evident in the reservoir.

Description of Objectives Accomplished.

1. Drained glycol hydraulic fluid from the reservoir. Cleaned concrete deck and drip pan.

7. Lead Containing Surface Dust: The horizontal surfaces of the building were coated with lead-containing surface dust. Wipe sample results were as follows:

Floor Samples: Eight floor samples were taken ranging from 84.5 ug/100 cm^2 to 831 ug/100 cm^2 with an average of 327 ug/100 cm^2.

Above the Floor Samples: Eight samples were taken at locations above the floor level ranging from 111 ug/100 cm^2 to 11,500 ug/100 cm^2 with an average of 1,920 ug/100 cm^2.

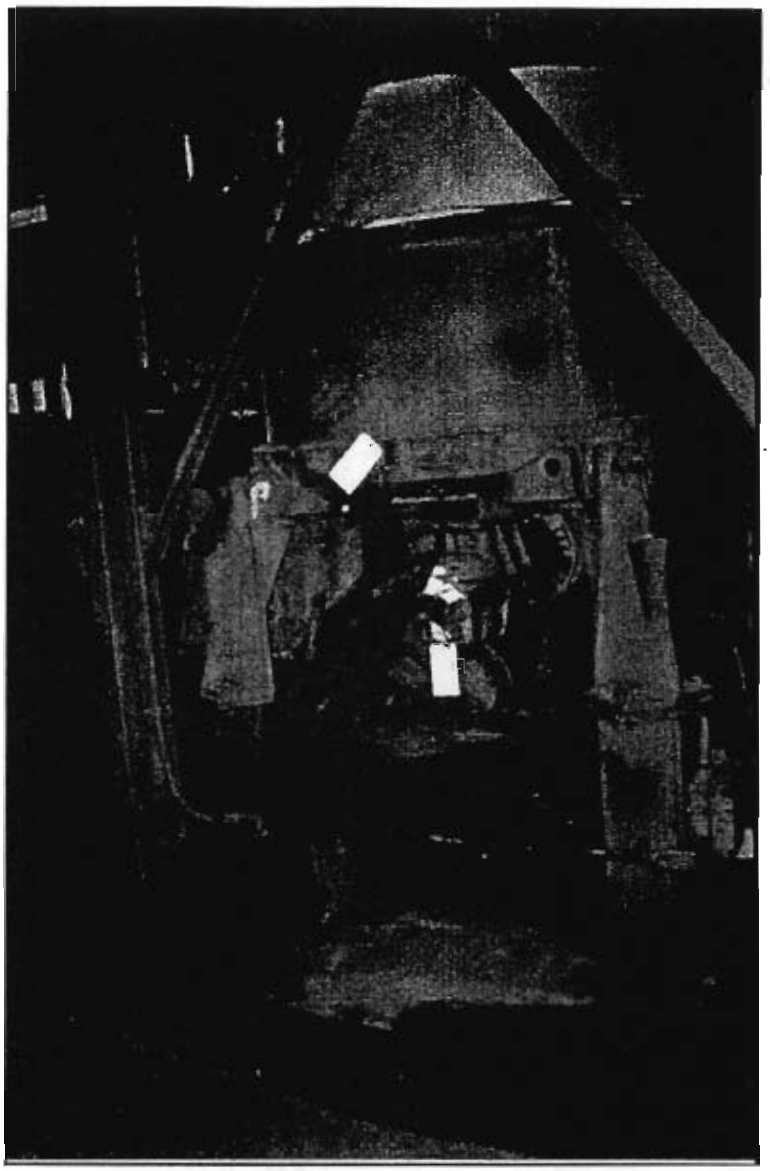
ATLANTIC DIVISION NAVFACENGCOMINST 10360.1 limits lead dust on residential floors to 21.5 ug/100 cm^2 or 200 ug/ft^2.

Description of Objectives Accomplished.

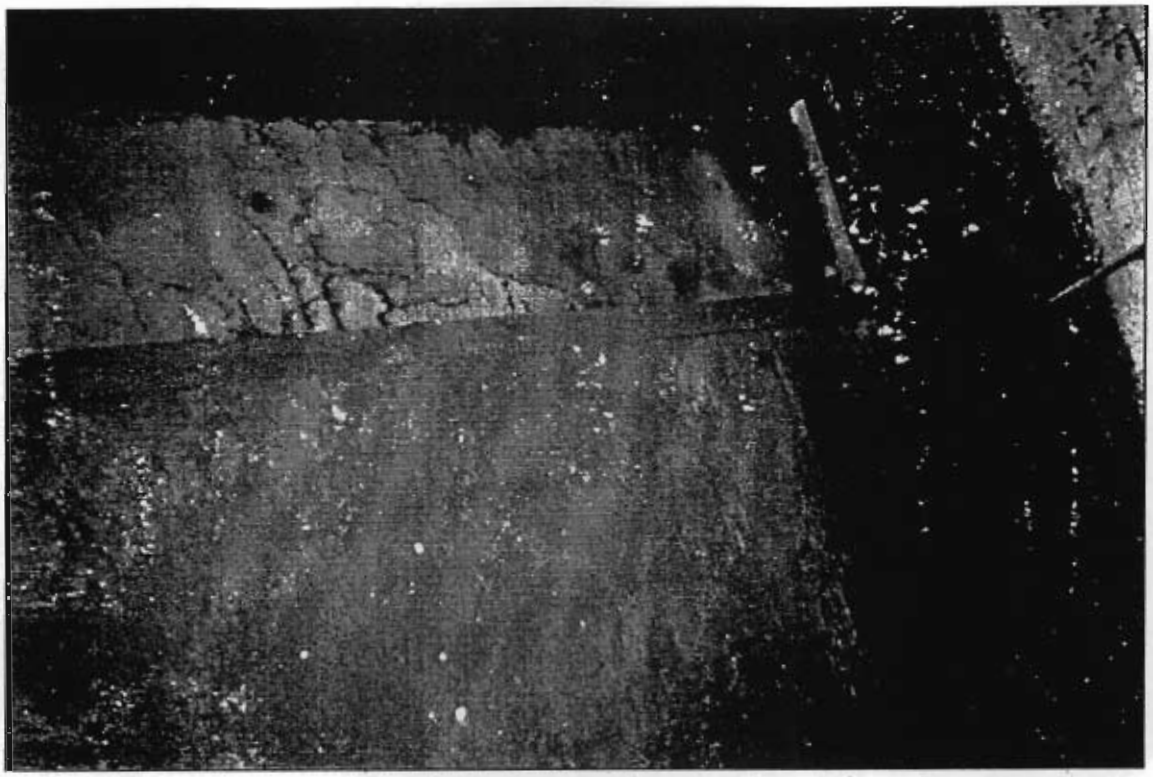
1. Placed sandbags at the entrances to prevent any rinsate water from exiting the building.
2. Covered all electrical panels with 6 mil poly and other items that could be damaged by water.
3. Pressure washed all interior building horizontal surfaces excluding the ceiling and wooden floors. Washed down walls and other vertical surfaces. Pressure washed all molds bearing lead dust. Items that could not be pressure washed

were cleaned by High Efficiency Particulate Air (HEPA) vacuum or hand wiped with soap and water.

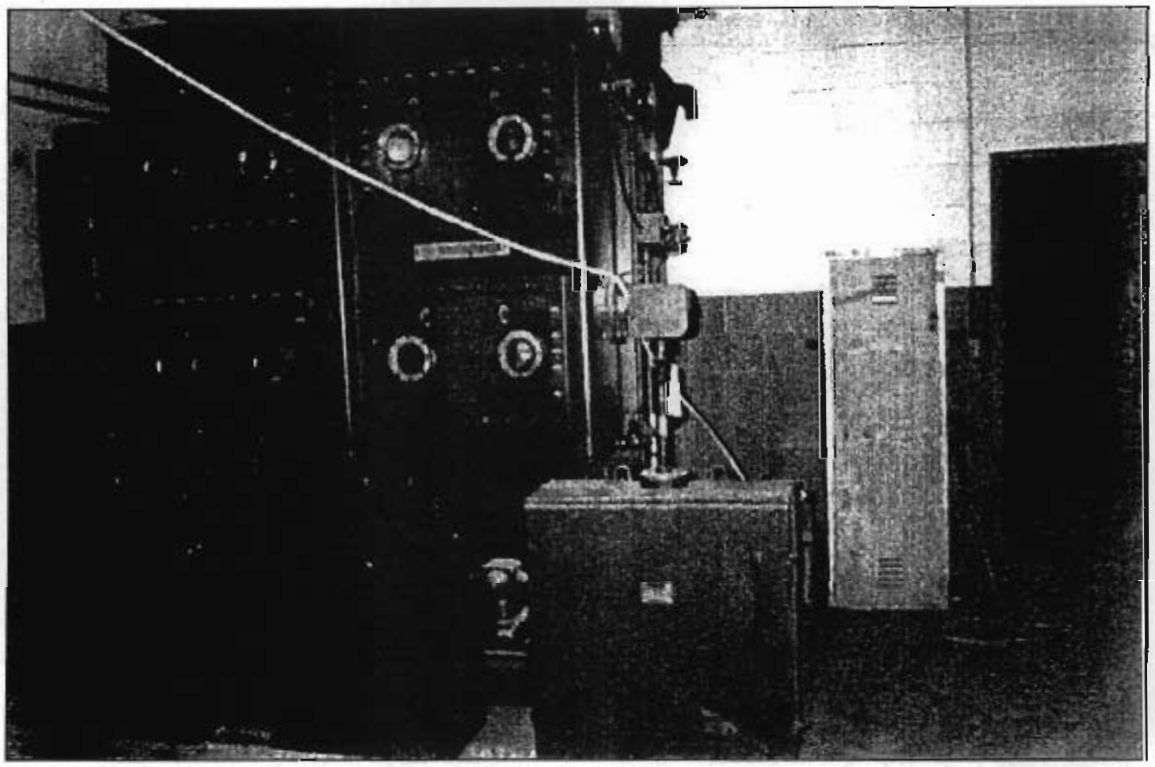
4. The Hydro Arc Furnace sump was used to collect rinsate effluent. The paint chips, which were separated from the rinsate water, were disposed of as lead waste.
5. The rinsate water from the Hydro Arc Furnace Sump was analyzed and pumped into the sanitary sewer after authorization was obtained from the North Charleston Sewer District.



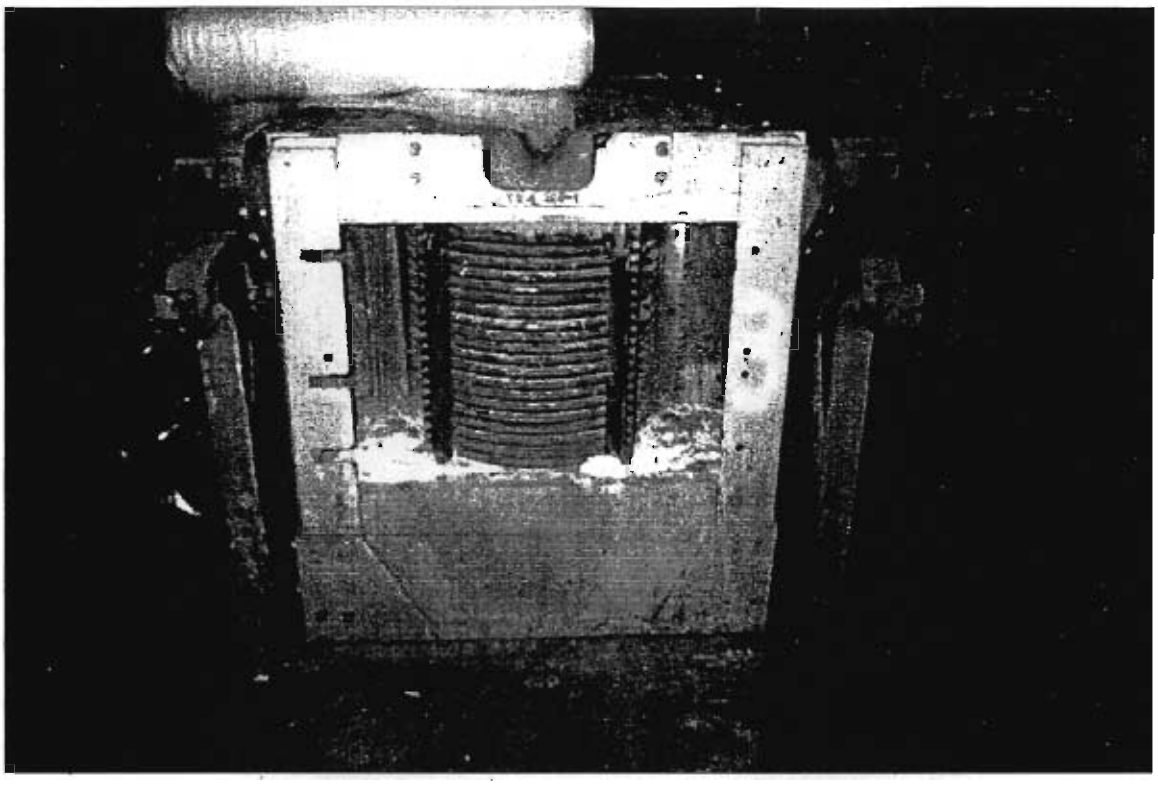
Sand Hopper Leaking Gear Oil



Cleaned Below deck Passage, North Wall

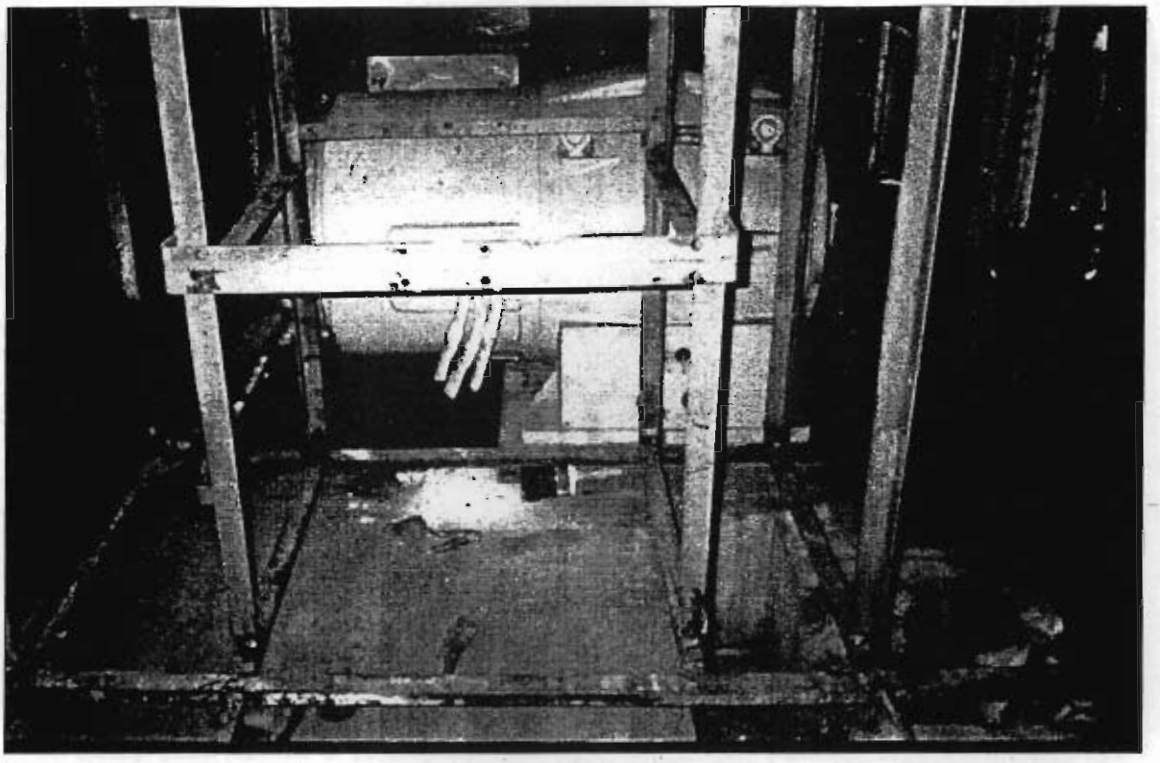


Hydro Arc Transformer



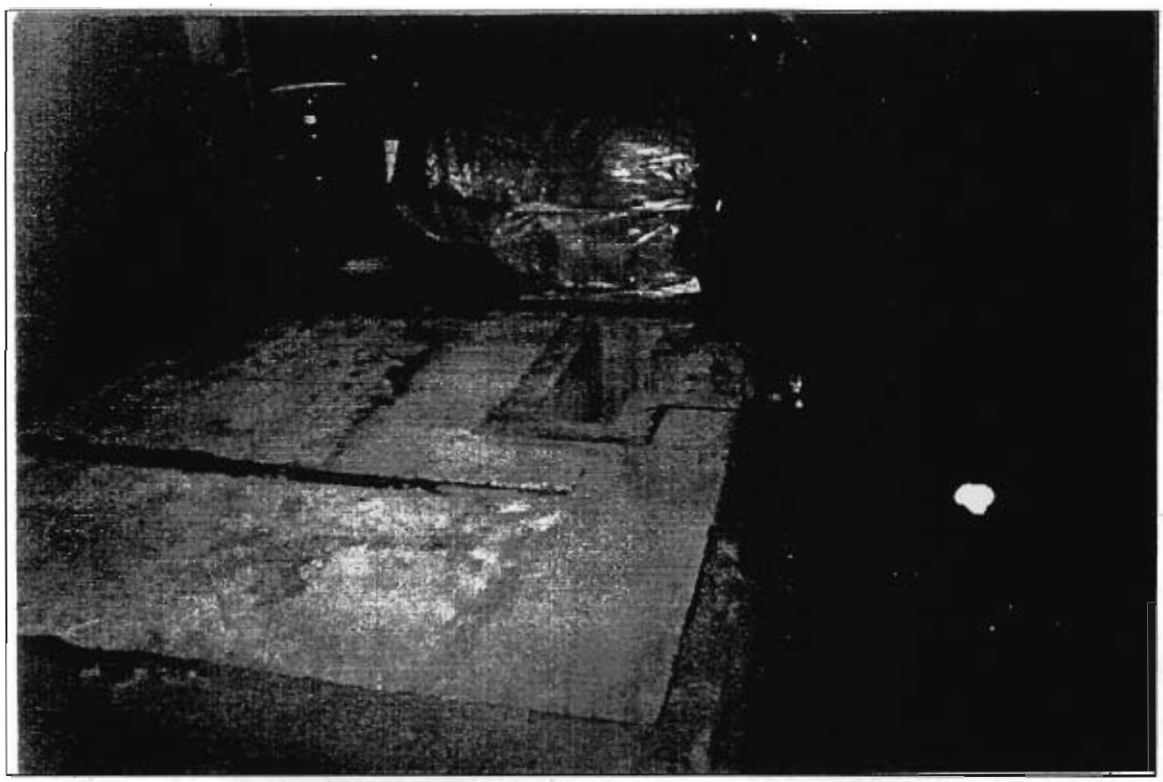
Friable Asbestos Removed From Smoldering Pot Oven

Ajax Power Transformer Enclosure



Ajax Power Transformer Generator In Partially Dismantled Enclosure

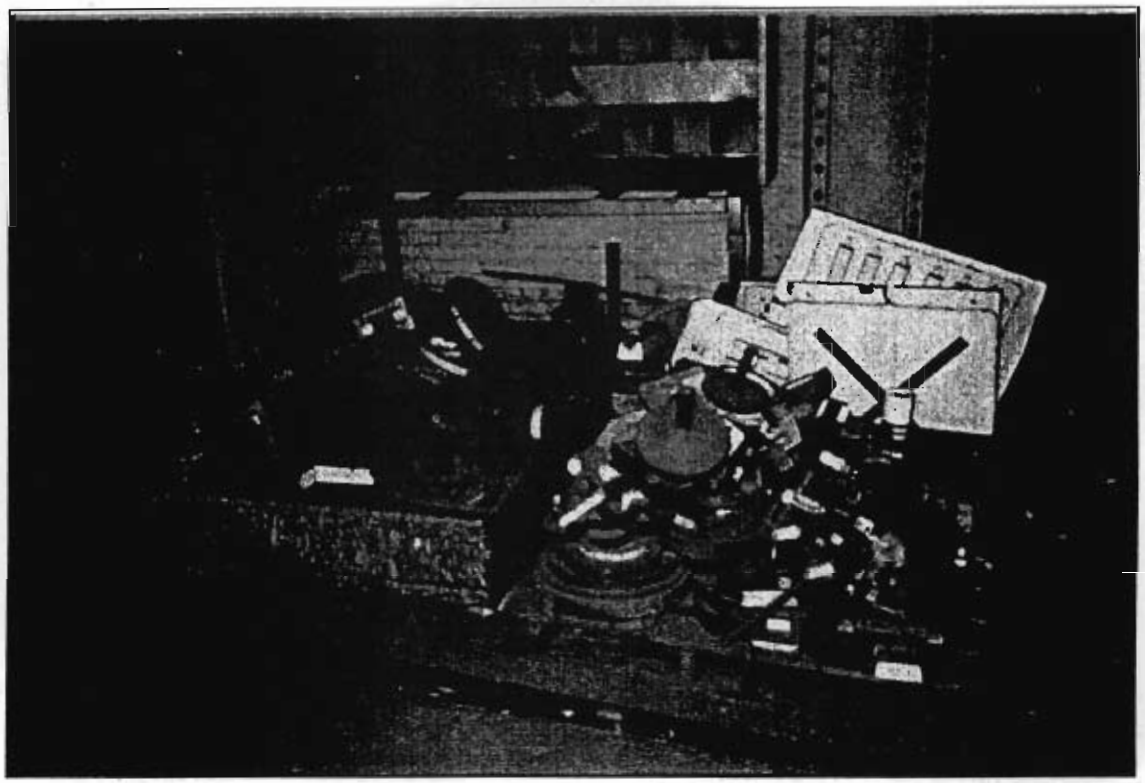
Ajax Power Transformer Blower In Partially Dismantled Enclosure



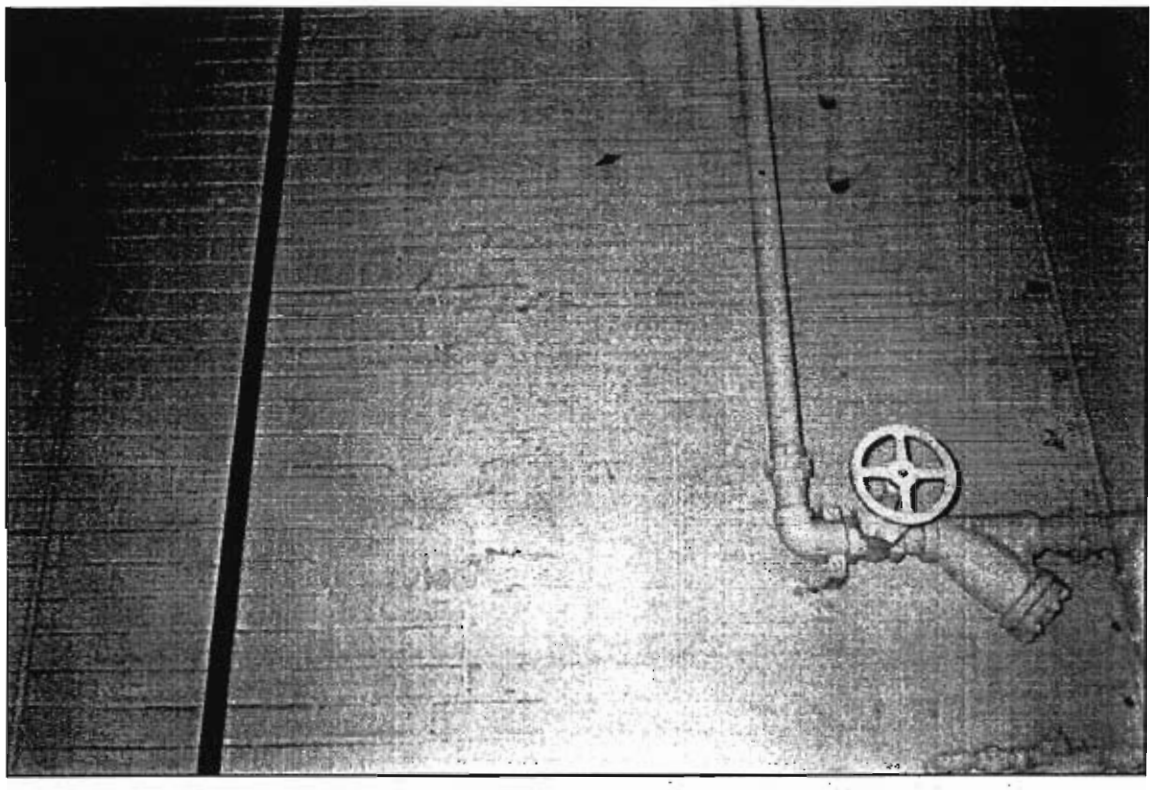
Ajax Transformer Concrete Pad After "CAPSUR" Treatment

Ajax Transformer Concrete Pad After 4" Surface Removal

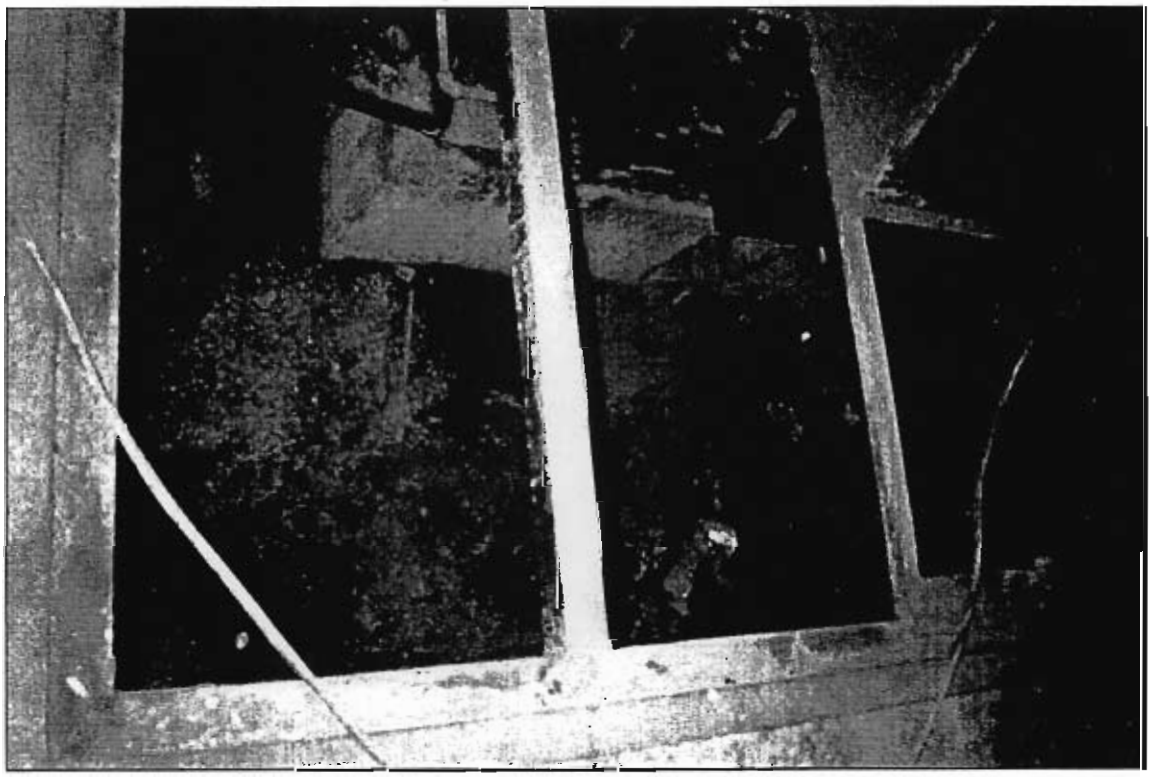
Cleaned Hydro Arc Furnace Sump



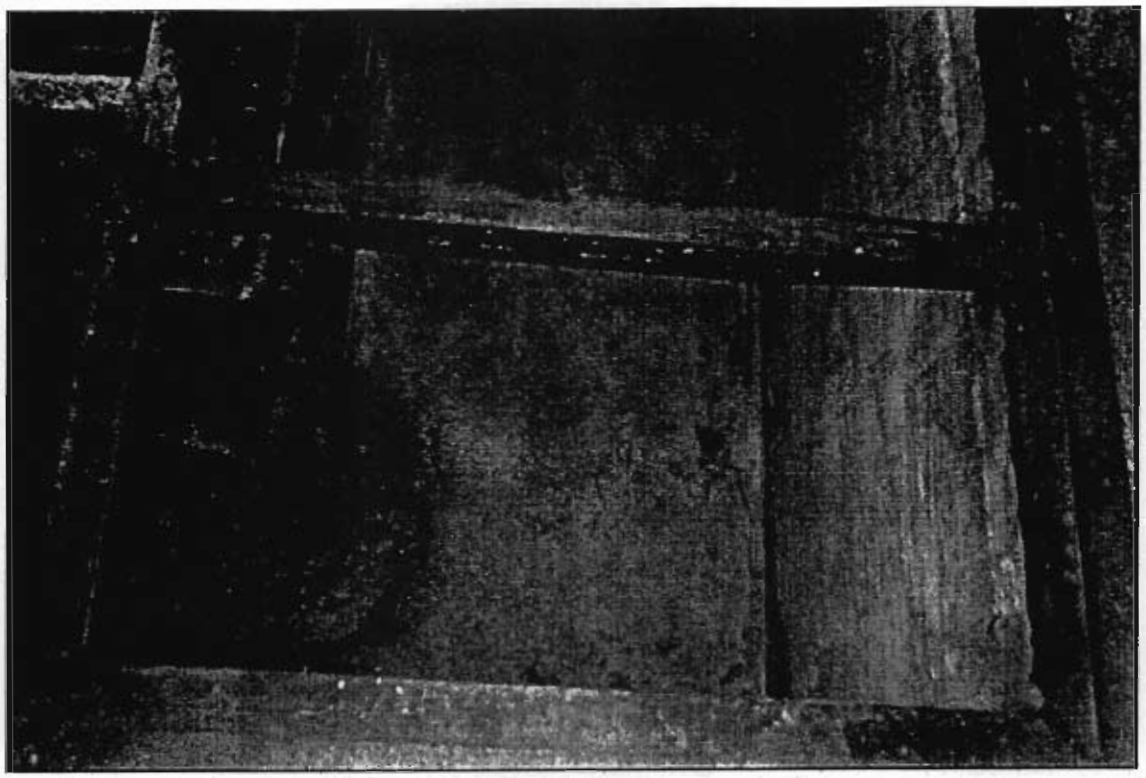
Wooden Molds Covered With Lead Dust



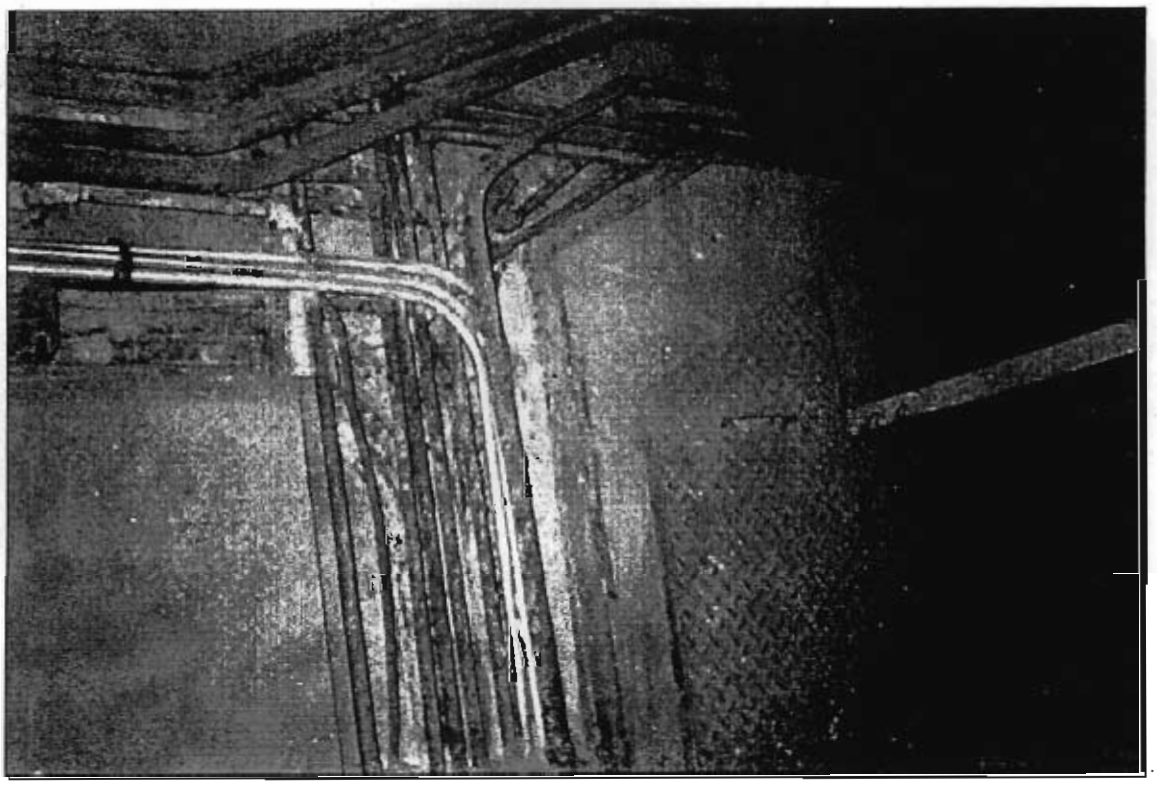
Pressure Washed Wall



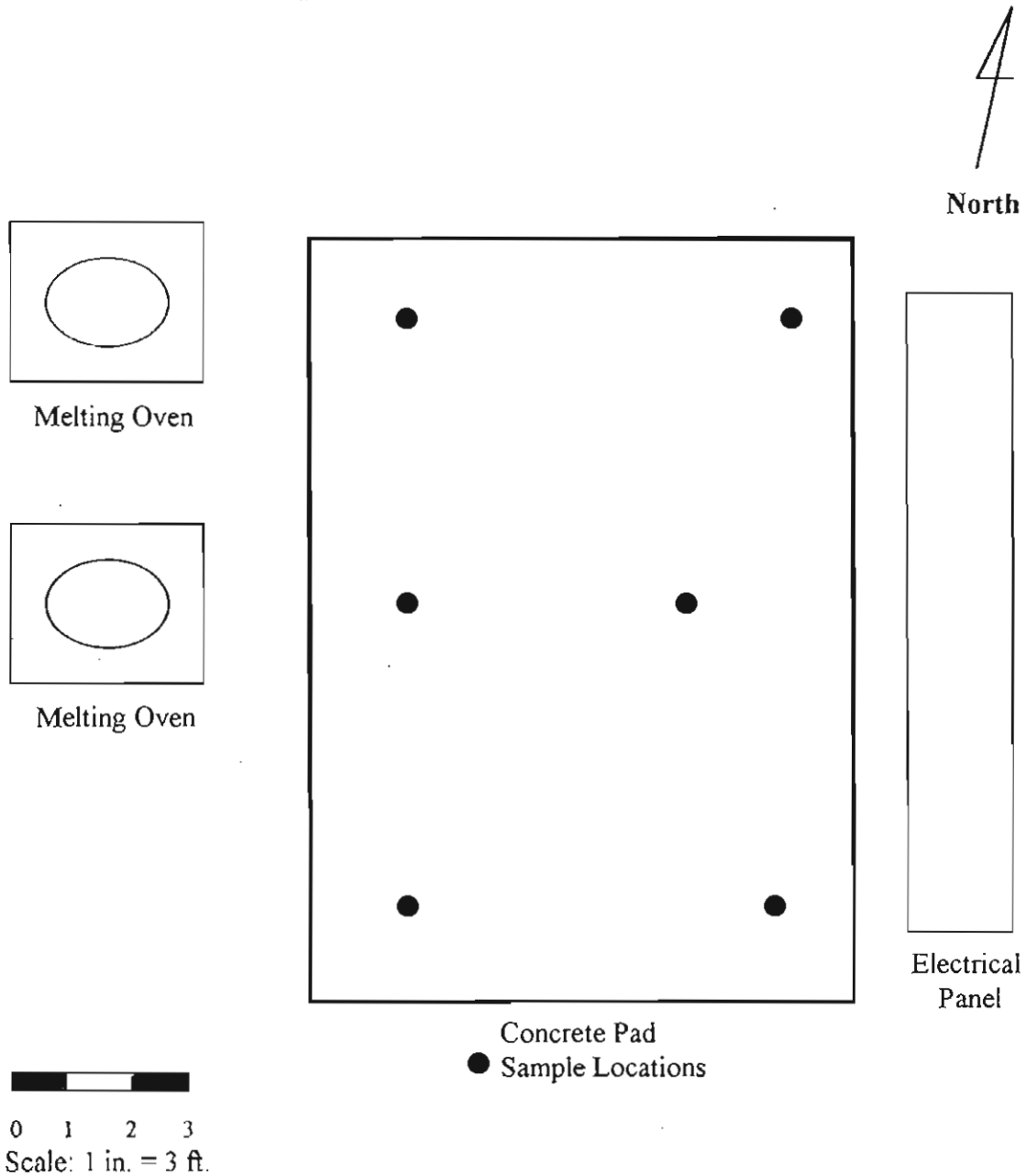
Hydraulic Press Sump With Oily Waste



Cleaned Hydraulic Press Sump



Cleaned Below Deck Passageway In Hydro Arc Transformer Room



Ajax Power Transformer Concrete Pad
Showing Final Sample Locations

DEPARTMENT OF THE NAVY
SUPERVISOR OF SHIPBUILDING, CONVERSION AND REPAIR, USN
PORTSMOUTH, VIRGINIA, DETACHMENT ENVIRONMENTAL CHARLESTON
1899 NORTH HOBSON AVENUE, BUILDING 30
NORTH CHARLESTON, SOUTH CAROLINA 29405-2106

IN REPLY REFER TO:

Ser: 765

JUL 18 1997

Mr. G. Randall Thompson, Director
Division of Hazardous and Infectious Waste Management
Bureau of Solid and Hazardous Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201

Dear Mr. Thompson:

The enclosed interim measure completion report for Area of Concern (AOC) 574 is submitted to fulfill the requirement of Permit Condition IV.D.6 for Permit Number SCO 170 022 560. If the Department of Health and Environmental Control should have any questions, please contact Reece Batten of Southern Division Naval Facilities Engineering Command (NAVFAC) at (803) 820-5578.

Sincerely,

E.R. Dearhart
Director

Encl:
(1) AOC 574 Completion Report

Copy to:
SCDHEC (Mr. Tapia, Mr. Bergstrand)
USEPA (Mr. Bassett)
CSO Naval Base Charleston (LCDR Rose)
NAVFAC (Mr. Batten)
EA&H (Ms. Maddux)

COMPLETION REPORT

INTERIM MEASURE FOR
AOC 574
NAVAL BASE CHARLESTON
CHARLESTON, SC

Prepared for:

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

Prepared by:

Supervisor of Shipbuilding, Conversion and Repair,
USN, (SUPSHIP) Portsmouth Va.,
Environmental Detachment Charleston, S.C.
1899 North Hobson Ave.
North Charleston, SC 29405-2106

July 17, 1997

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Table C-1 Waste Characterization Sampling Results Summary....C-1

ACRONYM LIST

AOC	Area of Concern
BEQ	Benzo(a)pyrene Equivalents
CMS	Corrective Measure Study
CNCRA	Charleston Naval complex Redevelopment Authority
COPC	Constituents of Potential Concern
DERP	Defense Environmental Restoration Program
DON	Department of the Navy
DQO	Data Quality Objective
EOX	Extractable Organic Halides
EPA	U.S. Environmental Protection Agency
IM	Interim Measure
IR	Installation Restoration
PAH	Polynuclear Aromatic Hydrocarbons
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SARA	Superfund Amendments and Restoration Act
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SPORTENVDETCHASN	Supervisor of Shipbuilding, Conversion and Repair, Portsmouth Va., Environmental Detachment Charleston
SSL	Soil Screening Levels
TPH	Total Petroleum Hydrocarbons

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 cleanup 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 (SWMU) and Areas of Concern (AOC) 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 hazardous wastes requiring remediation. Eventually, Corrective Measures Studies (CMS) 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 contamination prior to the completion of RFI CMSs.

1.3 AREA OF CONCERN 574. AOC 574 is located in Zone E near the southeast corner of Building 9. This area formally housed a 3,700 gallon #2 fuel oil tank, a 586 gallon #2 fuel oil tank, and a 250 gallon waste oil tank. All three tanks were aboveground. The two fuel oil tanks were removed by the Detachment in July 1996. The

waste oil tank was removed by Charleston Naval Shipyard sometime between 1993 and April 1996. The two fuel oil tanks leaked #2 fuel oil through the walls of the tanks for a time period of at least four years contaminating the ground beneath. This is an unpaved area which was never equipped with a secondary containment (berm).

1.4 AREA OF CONCERN 574 INTERIM MEASURE. During the interval between the RFI and the completion of the CMS, it was decided by Southern Division Naval Facilities Engineering Command (SOUTHDIV) that an IM would be performed by Supervisor of Shipbuilding, Conversion and Repair, Portsmouth Va., Environmental Detachment Charleston (SPORTENVDETCHASN). The objective of this IM was to remove petroleum contaminated soil. Groundwater remediation was not an objective of this IM. This IM was consistent with the ultimate cleanup of AOC 574 and was not intended to circumvent the public participation process inherent within environmental cleanup under RCRA authority.

2. INTERIM MEASURE EXECUTION

2.1 ACTIONS REQUIRED BY INTERIM MEASURE WORK PLAN. Removal was performed on an estimated 45 cubic yards of petroleum contaminated soil. AOC 574 was excavated to an approximate area of 15' x 20' and 4 foot in depth.

2.2 PROBLEMS ENCOUNTERED. No problems were encountered during execution of the Interim Measure for AOC 574.

2.3 PLAN MODIFICATIONS AND JUSTIFICATION. The use of specific analytical components rather than Total Petroleum Hydrocarbons (TPH) levels as a cleanup objective was implemented during this IM. On November 25, 1996, Southern Division directed that on sites which have petroleum as a contaminate of concern, cleanup standards will be based on components listed in the last paragraph of page 8 of South Carolina Department of Health and Environmental Control (SCDHEC) "Soil/Ground-Water Remediation Guidance" document dated March 3, 1996, and applicable regulatory limits of the United States Environmental Protection Agency (USEPA) Region III, Risk Based Concentration Table (RBCs) dated September 23, 1996. This decision was based on consensus from the Charleston Naval Base Project Team which consists of members of the Navy, Environmental Protection Agency (EPA), and SCDHEC. This new cleanup objective was applied to the confirmatory sampling conducted at this site.

3. INTERIM MEASURE OUTCOME

3.1 SITE CONDITIONS FOLLOWING COMPLETION OF WORK. On 27 May 1997, after completion of work, SPORTENVDETCHASN had removed approximately 45 cubic yards of contaminated soil for disposal and backfilled the excavation. All areas of AOC 574 were raked and groomed to help prevent erosion. All excavated waste was characterized as non-hazardous and transported to Building 1601 for storage, awaiting disposal. Photographs of AOC 574 are included as Appendix D.

3.2 AREAS REQUIRING FURTHER ACTION. No further action per this IM is required.

4. SAMPLING

4.1 SAMPLING EVOLUTIONS AND RESULTS.

4.1.1 Field Sampling. Field samples (immunoassay) were taken during excavation to support removal of TPH contaminated soils during the initial phase of the IM. These samples were collected from the excavation surface as a screening method to determine the presence or absence of TPH. Field samples were not submitted for laboratory analysis. Field sampling results were recorded in the logbook for this site.

4.1.2 Confirmatory Sampling. Following excavation, confirmatory samples (grab) were taken. These samples were collected at the bottom and sidewalls of each excavated area. These samples were analyzed for Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Naphthalene, Polynuclear Aromatic Hydrocarbons (PAH), and Resource Conservation and Recovery Act (RCRA) Metals. Figure B-1 of Appendix B illustrates the sampling locations. A copy of the analytical results of all confirmatory samples is included in Appendix B. Table B-1 of Appendix B summarizes the results and sample coordinates.

With the exception of SPORT0411-2 (NBCE574S001001) there were no detections of BTEX, Naphthalene or PAHs above the USEPA Region III Industrial RBC Limits at the first interval. Due to the Benzo(a)pyrene levels at the location of SPORT0411-2, the west wall of the excavation was expanded to the edge of Building 9. There were no detections of BTEX, Naphthalene or PAHs above the USEPA Region III Soil Screening Levels (SSL) at the second interval.

For several of the samples taken at the four foot in depth interval (second interval) on the side walls and bottom of the excavated area, the detection limits (DL) for Dibenze(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and the Benzo family of PAHs were elevated above the industrial RBC limits due to the samples requiring dilution. Dilution was a result of matrix interference. The DLs ranged from a low of 1.67 parts per million

(ppm) to a high of 16.7 ppm. Due to the high DLs, the excavated area was lined with Geo-textile-fabric® prior to backfilling.

4.1.3 Waste Characterization Sampling. One composite sample was collected from the one stockpile of excavated soil and submitted for laboratory analysis for waste characterization. A copy of the analytical results of all waste characterization samples is included in Appendix C.

5. WASTE GENERATION

5.1 HAZARDOUS/POTENTIALLY HAZARDOUS WASTE. No hazardous or potentially hazardous waste was generated during the accomplishment of the IM for AOC 574.

5.1.1 Hazardous Excavated Soil. No hazardous soil was generated at this site.

5.2 NON-HAZARDOUS WASTE. Approximately 45 cubic yards of non-hazardous soil was generated during the accomplishment of the IM for AOC 574.

5.2.1 Non-Hazardous Excavated Soil. The excavated non-hazardous soil identified was transported from AOC 574 and stored in Building 1601 for proper disposal.

APPENDIX A

SITE MAP

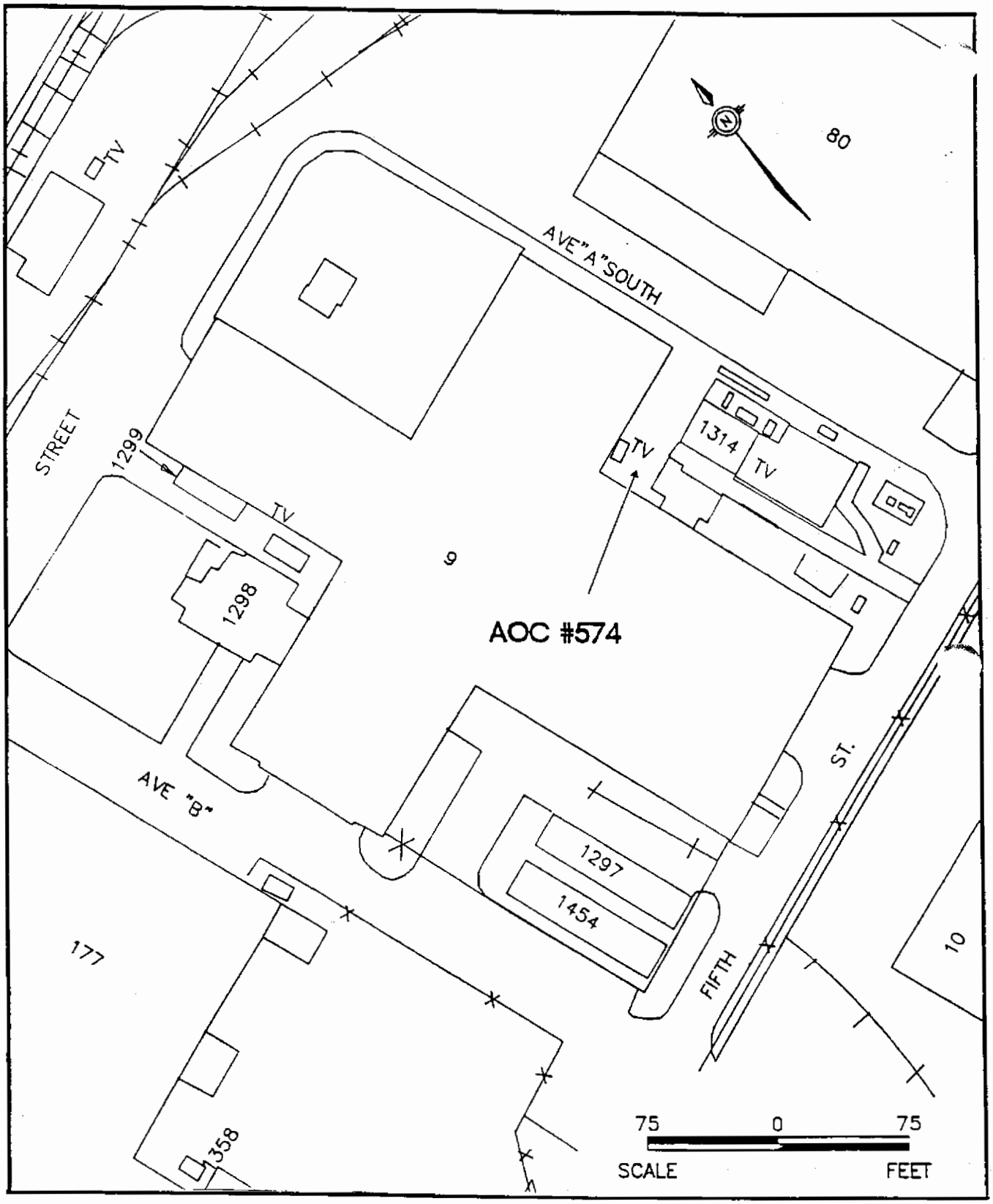
TV
80
AVE"A"SOUTH
STREET
1299
TV
1314
TV
TV
9
1298
AOC #574
AVE "B"
ST.
1297
1454
FIFTH
177
10
358
75
0
75
SCALE
FEET

Figure A-1

APPENDIX B

SAMPLE DATA

AOC 574 CONFIRMATORY SAMPLING MAP

BUILDING 9

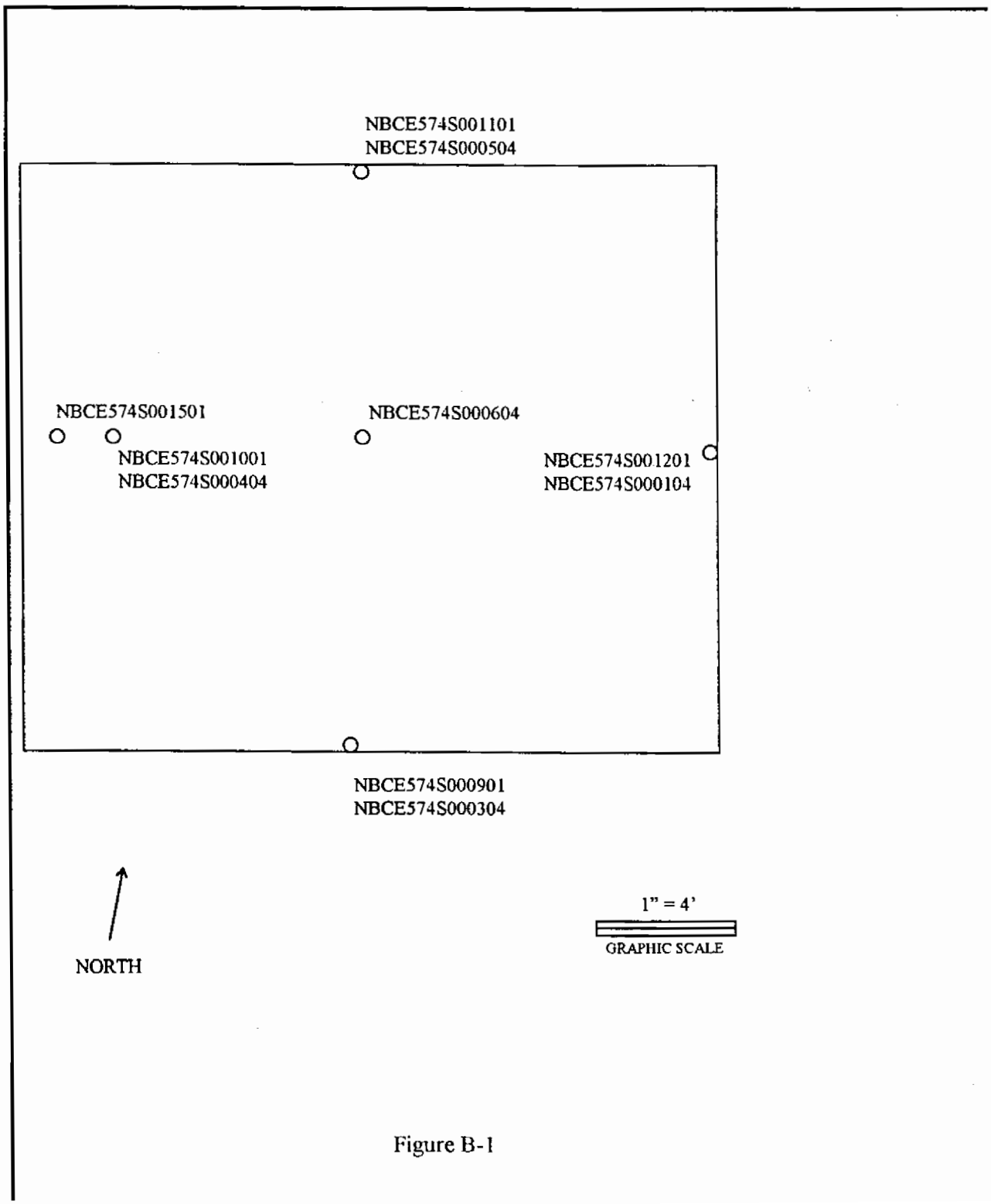

Figure B-1

AOC 574 CONFIRMATORY SAMPLING RESULTS SUMMARY

SAMPLE NUMBER	SAMPLE DATE	SAMPLE ID NUMBER	SC STATE PLANE COORDINATES
1	2/12/97	SPORT0334-1 NBCE574S000104	375644.990N 2317558.870E
2	2/24/97	SPORT0352-1 NBCE574S000304	375637.630N 2317552.690E
3	2/24/97	SPORT0352-2 NBCE574S000404	375639.220N 2317542.460E
4	2/24/97	SPORT0352-3 NBCE574S000504	375651.410N 2317548.750E
5	2/24/97	SPORT0352-4 NBCE574S000604	375646.080 2317549.480E
6	4/8/97	SPORT0411-1 NBCE574S000901	375637.630N 2317552.690E
7	4/8/97	SPORT0411-2 NBCE574S001001	375639.220N 2317542.460E
8	4/8/97	SPORT0411-3 NBCE574S001101	375651.410N 2317548.750E
9	4/8/97	SPORT0411-4 NBCE574S001201	375644.990N 2317558.870E
10	4/17/97	SPORT0425-2 NBCE574S001501	2 FEET WEST OF SAMPLE NBCE574S001001
QC SAMPLES			
1 (TRIP BLANK)	2/12/97	SPORT0334-2 NBCE574T000200	N/A
2 (RINSATE)	2/12/97	SPORT0334-3 NBCE574E000300	N/A
3 (TRIP BLANK)	2/24/97	SPORT0352-5 NBCE574T000700	N/A
4 (DUPLICATE)	4/8/97	SPORT0411-5 NBCE574C001301	N/A
5 (TRIP BLANK)	4/8/97	SPORT0411-6 NBCE574T001400	N/A

Table B-1

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 21, 1997

Sample ID	: SPORT0334-1
Lab ID	: 9702250-01
Matrix	: Soil
Date Collected	: 02/12/97
Date Received	: 02/12/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	200	400	ug/kg	200	SHJ	02/14/97	1050	97753	1
Ethylbenzene	U	0.00	200	400	ug/kg	200					
Toluene	U	0.00	200	400	ug/kg	200					
Xylenes (TOTAL)	U	0.00	200	400	ug/kg	200					
Naphthalene		716	200	400	ug/kg	200					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	6540	13100	ug/kg	40.	DLW	02/18/97	1207	97846	2
Acenaphthylene	U	0.00	6540	13100	ug/kg	40.					
Anthracene	U	0.00	6540	13100	ug/kg	40.					
Benzo(a)anthracene	U	0.00	6540	13100	ug/kg	40.					
Benzo(a)pyrene	U	0.00	6540	13100	ug/kg	40.					
Benzo(b)fluoranthene	U	0.00	6540	13100	ug/kg	40.					
Benzo(ghi)perylene	U	0.00	6540	13100	ug/kg	40.					
Benzo(k)fluoranthene	U	0.00	6540	13100	ug/kg	40.					
Chrysene	U	0.00	6540	13100	ug/kg	40.					
Dibenzo(a,h)anthracene	U	0.00	6540	13100	ug/kg	40.					
Fluoranthene	U	0.00	6540	13100	ug/kg	40.					
Fluorene	U	0.00	6540	13100	ug/kg	40.					
Indeno(1,2,3-c,d)pyrene	U	0.00	6540	13100	ug/kg	40.					
Naphthalene	U	0.00	6540	13100	ug/kg	40.					
Phenanthrene	J	8370	6540	13100	ug/kg	40.					
Pyrene	U	0.00	6540	13100	ug/kg	40.					
Metals Analysis											
Mercury	J	0.0265	0.00209	0.200	mg/kg	1.0	CRB	02/17/97	1909	97838	N
Silver	U	-392	41.1	970	ug/kg	2.0	NRM	02/17/97	1632	97762	3
Arsenic		6680	268	970	ug/kg	2.0					

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00196 Report Date: February 21, 1997

Sample ID : SPORT0334-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		26900	24.0	970	ug/kg	2.0					
Cadmium	J	200	20.3	485	ug/kg	2.0	NRM	02/17/97	1632	97762	3
Chromium		32400	60.2	970	ug/kg	2.0					
Lead		24100	132	485	ug/kg	2.0					
Selenium		846	221	485	ug/kg	2.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		9040	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	MCS	02/14/97	1400	97846	5
Mercury	CRB	02/14/97	1530	97838	6
TRACE	CRB	02/13/97	1800	97762	7

Comments:

A dilution was required for Volatile Organics due to a high concentration of hydrocarbons. A dilution was required for Extractable Organics due to matrix interference.

As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	92.6	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	97.9	(63.4 - 136.)
Toluene-d8	BTEX-8260	93.7	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	92.6	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	97.9	(63.4 - 136.)
Toluene-d8	NAP-8260	93.7	(72.1 - 137.)

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 21, 1997

Sample ID	: SPORT0334-2
Lab ID	: 9702250-02
Matrix	: Soil
Date Collected	: 02/12/97
Date Received	: 02/12/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	02/13/97	1626	97753	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX-8260	101.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	97.8	(63.4 - 136.)
Toluene-d8	BTEX-8260	94.0	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	101.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	97.8	(63.4 - 136.)
Toluene-d8	NAP-8260	94.0	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 21, 1997

Sample ID : SPORT0334-3
Lab ID : 9702250-03
Matrix : GroundH2O
Date Collected : 02/12/97
Date Received : 02/12/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/l	1.0	JAC	02/14/97	1911	97891	1
Ethylbenzene	U	0.00	1.00	2.00	ug/l	1.0					
Toluene	U	0.00	1.00	2.00	ug/l	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/l	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/l	1.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	5.00	10.0	ug/l	1.0	JCB	02/18/97	2026	97783	2
Acenaphthylene	U	0.00	5.00	10.0	ug/l	1.0					
Anthracene	U	0.00	5.00	10.0	ug/l	1.0					
Benzo(a)anthracene	U	0.00	5.00	10.0	ug/l	1.0					
Benzo(a)pyrene	U	0.00	5.00	10.0	ug/l	1.0					
Benzo(b)fluoranthene	U	0.00	5.00	10.0	ug/l	1.0					
Benzo(ghi)perylene	U	0.00	5.00	10.0	ug/l	1.0					
Benzo(k)fluoranthene	U	0.00	5.00	10.0	ug/l	1.0					
Chrysene	U	0.00	5.00	10.0	ug/l	1.0					
Dibenzo(a,h)anthracene	U	0.00	5.00	10.0	ug/l	1.0					
Fluoranthene	U	0.00	5.00	10.0	ug/l	1.0					
Fluorene	U	0.00	5.00	10.0	ug/l	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	5.00	10.0	ug/l	1.0					
Naphthalene	U	0.00	5.00	10.0	ug/l	1.0					
Phenanthrene	U	0.00	5.00	10.0	ug/l	1.0					
Pyrene	U	0.00	5.00	10.0	ug/l	1.0					

The following prep procedures were performed:

C/MS Base/Neutral Compounds GWL 02/13/97 1700 97783 3

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: March 06, 1997

Sample ID : SPORT0352-1
Lab ID : 9702484-01
Matrix : Soil
Date Collected : 02/24/97
Date Received : 02/24/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	10.0	20.0	ug/kg	10.	SHJ	02/26/97	2229	98346	1
Ethylbenzene	U	0.00	10.0	20.0	ug/kg	10.					
Toluene	U	0.00	10.0	20.0	ug/kg	10.					
Xylenes (TOTAL)	U	0.00	10.0	20.0	ug/kg	10.					
Naphthalene		70.5	10.0	20.0	ug/kg	10.					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	16700	33300	ug/kg	100	RLC	03/03/97	1519	98284	2
Acenaphthylene	U	0.00	16700	33300	ug/kg	100					
Anthracene	U	0.00	16700	33300	ug/kg	100					
Benzo(a)anthracene	U	0.00	16700	33300	ug/kg	100					
Benzo(a)pyrene	U	0.00	16700	33300	ug/kg	100					
Benzo(b)fluoranthene	U	0.00	16700	33300	ug/kg	100					
Benzo(ghi)perylene	U	0.00	16700	33300	ug/kg	100					
Benzo(k)fluoranthene	U	0.00	16700	33300	ug/kg	100					
Chrysene	U	0.00	16700	33300	ug/kg	100					
Dibenzo(a,h)anthracene	U	0.00	16700	33300	ug/kg	100					
Fluoranthene	U	0.00	16700	33300	ug/kg	100					
Fluorene	U	0.00	16700	33300	ug/kg	100					
Indeno(1,2,3-c,d)pyrene	U	0.00	16700	33300	ug/kg	100					
Naphthalene	U	0.00	16700	33300	ug/kg	100					
Phenanthrene	U	11700	16700	33300	ug/kg	100					
Pyrene	U	0.00	16700	33300	ug/kg	100					
Metals Analysis											
Mercury	J	0.115	0.0192	0.200	mg/kg	1.0	RMJ	02/27/97	1258	98354	N
Silver	U	-88.7	20.6	500	ug/kg	1.0	MBL	02/27/97	1914	98252	3
Arsenic		1590	134	500	ug/kg	1.0					

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00196 Report Date: March 06, 1997

Sample ID : SPORT0352-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		34800	12.0	500	ug/kg	1.0					
Cadmium	J	29.0	10.1	250	ug/kg	1.0	MBL	02/27/97	1914	98252	3
Chromium		8060	30.1	500	ug/kg	1.0					
Lead		21900	66.1	250	ug/kg	1.0					
Selenium		276	111	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		7860	10.0	50.0	mg/kg	1.0	SLR	02/28/97	1100	98352	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	02/25/97	1800	98284	5
Mercury	CRB	02/26/97	1800	98354	6
TRACE	FGD	02/25/97	1830	98252	7

Comments:
A dilution was required for Volatile Organics due to a high concentration of hydrocarbons. A dilution was required for Extractable Organics due to matrix interference.

As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	82.0	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	115.	(63.4 - 136.)
Toluene-d8	BTEX-8260	102.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	82.0	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	115.	(63.4 - 136.)
Toluene-d8	NAP-8260	102.	(72.1 - 137.)

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Laboratory Certifications

STATE	GEL	EPI
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NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: March 06, 1997

Sample ID	: SPORT0352-2
Lab ID	: 9702484-02
Matrix	: Soil
Date Collected	: 02/24/97
Date Received	: 02/24/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	5.00	10.0	ug/kg	5.0	SHJ	02/26/97	2159	98346	1
Ethylbenzene	U	0.00	5.00	10.0	ug/kg	5.0					
Toluene	U	0.00	5.00	10.0	ug/kg	5.0					
Xylenes (TOTAL)	U	0.00	5.00	10.0	ug/kg	5.0					
Naphthalene		30.6	5.00	10.0	ug/kg	5.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	16500	33000	ug/kg	100	RLC	03/03/97	1550	98284	2
Acenaphthylene	U	0.00	16500	33000	ug/kg	100					
Anthracene	U	0.00	16500	33000	ug/kg	100					
Benzo(a)anthracene	U	0.00	16500	33000	ug/kg	100					
Benzo(a)pyrene	U	0.00	16500	33000	ug/kg	100					
Benzo(b)fluoranthene	U	12200	16500	33000	ug/kg	100					
Benzo(ghi)perylene	U	0.00	16500	33000	ug/kg	100					
Benzo(k)fluoranthene	U	0.00	16500	33000	ug/kg	100					
Chrysene	U	0.00	16500	33000	ug/kg	100					
Dibenzo(a,h)anthracene	U	0.00	16500	33000	ug/kg	100					
Fluoranthene	U	1910	16500	33000	ug/kg	100					
Fluorene	U	0.00	16500	33000	ug/kg	100					
Indeno(1,2,3-c,d)pyrene	U	0.00	16500	33000	ug/kg	100					
Naphthalene	U	0.00	16500	33000	ug/kg	100					
Phenanthrene	U	3630	16500	33000	ug/kg	100					
Pyrene	U	1720	16500	33000	ug/kg	100					
Metals Analysis											
Mercury		0.281	0.0186	0.200	mg/kg	1.0	RMJ	02/27/97	1300	98354	N
Silver	U	14.6	19.8	500	ug/kg	1.0	MBL	02/27/97	1948	98252	3
Arsenic		3370	129	500	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00196 Report Date: March 06, 1997

Sample ID : SPORT0352-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		35400	11.5	500	ug/kg	1.0					
Cadmium		425	9.76	250	ug/kg	1.0	MBL	02/27/97	1948	98252	3
Chromium		15400	29.0	500	ug/kg	1.0					
Lead		165000	63.7	250	ug/kg	1.0					
Selenium		396	106	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		870	10.0	50.0	mg/kg	1.0	SLR	02/28/97	1100	98352	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	02/25/97	1800	98284	5
Mercury	CRB	02/26/97	1800	98354	6
TRACE	FGD	02/25/97	1830	98252	7

Comments:

A dilution was required for Volatile Organics due to a high concentration of hydrocarbons. A dilution was required for Extractable Organics due to matrix interference.

As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	27.5*	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	113.	(63.4 - 136.)
Toluene-d8	BTEX-8260	102.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	27.5*	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	113.	(63.4 - 136.)
Toluene-d8	NAP-8260	102.	(72.1 - 137.)

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196 Report Date: March 06, 1997

Sample ID : SPORT0352-3
Lab ID : 9702484-03
Matrix : Soil
Date Collected : 02/24/97
Date Received : 02/24/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	2.00	4.00	ug/kg	2.0	SHJ	02/26/97	2030	98346	1
Ethylbenzene	U	0.00	2.00	4.00	ug/kg	2.0					
Toluene	U	0.00	2.00	4.00	ug/kg	2.0					
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/kg	2.0					
Naphthalene	U	0.00	2.00	4.00	ug/kg	2.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	1670	3330	ug/kg	10.	RLC	03/03/97	1622	98284	2
Acenaphthylene	U	0.00	1670	3330	ug/kg	10.					
Anthracene	U	0.00	1670	3330	ug/kg	10.					
Benzo(a)anthracene	U	0.00	1670	3330	ug/kg	10.					
Benzo(a)pyrene	U	0.00	1670	3330	ug/kg	10.					
Benzo(b)fluoranthene	U	0.00	1670	3330	ug/kg	10.					
Benzo(ghi)perylene	U	0.00	1670	3330	ug/kg	10.					
Benzo(k)fluoranthene	U	0.00	1670	3330	ug/kg	10.					
Chrysene	U	0.00	1670	3330	ug/kg	10.					
Dibenzo(a,h)anthracene	U	0.00	1670	3330	ug/kg	10.					
Fluoranthene	U	0.00	1670	3330	ug/kg	10.					
Fluorene	U	0.00	1670	3330	ug/kg	10.					
Indeno(1,2,3-c,d)pyrene	U	0.00	1670	3330	ug/kg	10.					
Naphthalene	U	0.00	1670	3330	ug/kg	10.					
Phenanthrene	U	0.00	1670	3330	ug/kg	10.					
Pyrene	U	0.00	1670	3330	ug/kg	10.					
Metals Analysis											
Mercury	J	0.113	0.0192	0.200	mg/kg	1.0	RMJ	02/27/97	1303	98354	N
Silver	U	-180	20.8	500	ug/kg	1.0	MBL	02/27/97	1924	98252	3
Arsenic		3320	135	500	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00196 Report Date: March 06, 1997

Sample ID : SPORT0352-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		18100	12.1	500	ug/kg	1.0					
Cadmium	J	141	10.2	250	ug/kg	1.0	MBL	02/27/97	1924	98252	3
Chromium		16800	30.4	500	ug/kg	1.0					
Lead		18700	66.8	250	ug/kg	1.0					
Selenium		405	112	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons	U	10.0	10.0	50.0	mg/kg	1.0	SLR	02/28/97	1100	98352	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	02/25/97	1800	98284	5
Mercury	CRB	02/26/97	1800	98354	6
TRACE	FGD	02/25/97	1830	98252	7

Comments:

A dilution was required for Volatile Organics due to a high concentration of hydrocarbons. A dilution was required for Extractable Organics due to matrix interference.

As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	35.9	(30.0 - 115.)
Nitrobenzene-d5	M610	71.9	(23.0 - 120.)
p-Terphenyl-d14	M610	95.8	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	119.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	117.	(63.4 - 136.)
Toluene-d8	BTEX-8260	96.5	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	119.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	117.	(63.4 - 136.)
Toluene-d8	NAP-8260	96.5	(72.1 - 137.)

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: March 06, 1997

Sample ID	: SPORT0352-4
Lab ID	: 9702484-04
Matrix	: Soil
Date Collected	: 02/24/97
Date Received	: 02/24/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	5.00	10.0	ug/kg	5.0	SHJ	02/26/97	2159	98346	1
Ethylbenzene	U	0.00	5.00	10.0	ug/kg	5.0					
Toluene	U	0.00	5.00	10.0	ug/kg	5.0					
Xylenes (TOTAL)	U	3.05	5.00	10.0	ug/kg	5.0					
Naphthalene		10.1	5.00	10.0	ug/kg	5.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	1670	3330	ug/kg	10.	RLC	03/03/97	1654	98284	2
Acenaphthylene	U	0.00	1670	3330	ug/kg	10.					
Anthracene	U	306	1670	3330	ug/kg	10.					
Benzo(a)anthracene	U	0.00	1670	3330	ug/kg	10.					
Benzo(a)pyrene	U	1070	1670	3330	ug/kg	10.					
Benzo(b)fluoranthene	J	2860	1670	3330	ug/kg	10.					
Benzo(ghi)perylene	U	599	1670	3330	ug/kg	10.					
Benzo(k)fluoranthene	U	0.00	1670	3330	ug/kg	10.					
Chrysene	U	1300	1670	3330	ug/kg	10.					
Dibenzo(a,h)anthracene	U	0.00	1670	3330	ug/kg	10.					
Fluoranthene	J	3000	1670	3330	ug/kg	10.					
Fluorene	U	0.00	1670	3330	ug/kg	10.					
Indeno(1,2,3-c,d)pyrene	U	1230	1670	3330	ug/kg	10.					
Naphthalene	U	0.00	1670	3330	ug/kg	10.					
Phenanthrene	J	1730	1670	3330	ug/kg	10.					
Pyrene	J	2360	1670	3330	ug/kg	10.					
Metals Analysis											
Mercury		32.2	0.894	1.49	mg/kg	50.	RMJ	02/27/97	1721	98354	N
Silver		668	19.6	500	ug/kg	1.0	MBL	02/27/97	1930	98252	3
Arsenic		5300	128	500	ug/kg	1.0					

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00196 Report Date: March 06, 1997

Sample ID : SPORT0352-4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		35400	11.4	500	ug/kg	1.0					
Cadmium		1160	9.68	250	ug/kg	1.0	MBL	02/27/97	1930	98252	3
Chromium		18000	28.8	500	ug/kg	1.0					
Lead		237000	63.1	250	ug/kg	1.0					
Selenium		305	106	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		180	10.0	50.0	mg/kg	1.0	SLR	02/28/97	1100	98352	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	02/25/97	1800	98284	5
Mercury	CRB	02/26/97	1800	98354	6
TRACE	FGD	02/25/97	1830	98252	7

Comments:
A dilution was required for Volatile Organics due to hydrocarbon interference. As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	35.9	(30.0 - 115.)
Nitrobenzene-d5	M610	65.9	(23.0 - 120.)
p-Terphenyl-d14	M610	97.8	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	122.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	110.	(63.4 - 136.)
Toluene-d8	BTEX-8260	97.1	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	122.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	110.	(63.4 - 136.)
Toluene-d8	NAP-8260	97.1	(72.1 - 137.)

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196 Report Date: March 06, 1997

Sample ID	: SPORT0352-5
Lab ID	: 9702484-05
Matrix	: Soil
Date Collected	: 02/24/97
Date Received	: 02/24/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	02/26/97	1524	98346	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX-8260	108.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	108.	(63.4 - 136.)
Toluene-d8	BTEX-8260	98.4	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	108.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	108.	(63.4 - 136.)
Toluene-d8	NAP-8260	98.4	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 16, 1997

Sample ID	: SPORT0411-1
Lab ID	: 9704187-01
Matrix	: Soil
Date Collected	: 04/08/97
Date Received	: 04/08/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	2.00	4.00	ug/kg	2.0	SHJ	04/10/97	1637	100454	1
Ethylbenzene	U	0.00	2.00	4.00	ug/kg	2.0					
Toluene	J	3.00	2.00	4.00	ug/kg	2.0					
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/kg	2.0					
Naphthalene	U	0.00	2.00	4.00	ug/kg	2.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	TCL	04/10/97	1729	100369	2
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	U	0.00	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene	U	0.00	165	330	ug/kg	1.0					
Pyrene	U	0.00	165	330	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.0470	0.0166	0.200	mg/kg	1.0	RMJ	04/11/97	1151	100459	N
Silver	J	22.5	20.4	500	ug/kg	1.0	MBL	04/11/97	1545	100375	3
Arsenic		3650	133	500	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00197 Report Date: April 16, 1997

Sample ID : SPORT0411-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		22900	11.9	500	ug/kg	1.0					
Cadmium		256	10.1	250	ug/kg	1.0	MBL	04/11/97	1545	100375	3
Chromium		15100	29.9	500	ug/kg	1.0					
Lead		11500	65.6	250	ug/kg	1.0					
Selenium		597	110	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		380	10.0	50.0	mg/kg	1.0	SLR	04/11/97	1100	100513	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	04/09/97	1700	100369	5
Mercury	CRB	04/10/97	1615	100459	6
TRACE	FGD	04/11/97	1530	100375	7

Comments:
Volatile Organics contained matrix interferences.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	76.4	(30.0 - 115.)
Nitrobenzene-d5	M610	43.0	(23.0 - 120.)
p-Terphenyl-d14	M610	91.6	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	128.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	103.	(63.4 - 136.)
Toluene-d8	BTEX-8260	113.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	128.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	103.	(63.4 - 136.)
Toluene-d8	NAP-8260	113.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 16, 1997

Sample ID : SPORT0411-2
Lab ID : 9704187-02
Matrix : Soil
Date Collected : 04/08/97
Date Received : 04/08/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	04/10/97	1456	100454	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.790	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	166	331	ug/kg	1.0	TCL	04/11/97	1729	100369	2
Acenaphthylene		602	166	331	ug/kg	1.0					
Anthracene		636	166	331	ug/kg	1.0					
Benzo(a)anthracene	J	182	166	331	ug/kg	1.0					
Benzo(a)pyrene		3090	166	331	ug/kg	1.0					
Benzo(b)fluoranthene		569	166	331	ug/kg	1.0					
Benzo(ghi)perylene		1570	166	331	ug/kg	1.0					
Benzo(k)fluoranthene		639	166	331	ug/kg	1.0					
Chrysene	J	202	166	331	ug/kg	1.0					
Dibenzo(a,h)anthracene		761	166	331	ug/kg	1.0					
Fluoranthene		1970	166	331	ug/kg	1.0					
Fluorene	U	0.00	166	331	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene		1570	166	331	ug/kg	1.0					
Naphthalene	U	0.00	166	331	ug/kg	1.0					
Phenanthrene		1500	166	331	ug/kg	1.0					
Pyrene		351	166	331	ug/kg	1.0					
Metals Analysis											
Mercury		0.312	0.0166	0.200	mg/kg	1.0	RMJ	04/11/97	1154	100459	N
Silver	J	221	21.0	500	ug/kg	1.0	MBL	04/11/97	1550	100375	3
Arsenic		5490	137	500	ug/kg	1.0					

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9704187-02

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00197 Report Date: April 16, 1997

Sample ID : SPORT0411-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		59500	12.2	500	ug/kg	1.0					
Cadmium		2820	10.3	250	ug/kg	1.0	MBL	04/11/97	1550	100375	3
Chromium		28700	30.7	500	ug/kg	1.0					
Lead		423000	67.5	250	ug/kg	1.0					
Selenium		514	113	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		310	10.0	50.0	mg/kg	1.0	SLR	04/11/97	1100	100513	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	04/09/97	1700	100369	5
Mercury	CRB	04/10/97	1615	100459	6
TRACE	FGD	04/11/97	1530	100375	7

Comments:
Volatile Organics contained matrix interferences.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	83.4	(30.0 - 115.)
Nitrobenzene-d5	M610	65.8	(23.0 - 120.)
p-Terphenyl-d14	M610	101.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	128.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	103.	(63.4 - 136.)
Toluene-d8	BTEX-8260	129.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	128.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	103.	(63.4 - 136.)
Toluene-d8	NAP-8260	129.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 16, 1997

Sample ID : SPORT0411-3
Lab ID : 9704187-03
Matrix : Soil
Date Collected : 04/08/97
Date Received : 04/08/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	2.00	4.00	ug/kg	2.0	SHJ	04/10/97	1710	100454	1
Ethylbenzene	U	0.00	2.00	4.00	ug/kg	2.0					
Toluene		4.38	2.00	4.00	ug/kg	2.0					
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/kg	2.0					
Naphthalene	U	0.00	2.00	4.00	ug/kg	2.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	331	662	ug/kg	2.0	TCL	04/11/97	1801	100369	2
Acenaphthylene	U	0.00	331	662	ug/kg	2.0					
Anthracene	U	0.00	331	662	ug/kg	2.0					
Benzo(a)anthracene		1180	331	662	ug/kg	2.0					
Benzo(a)pyrene		735	331	662	ug/kg	2.0					
Benzo(b)fluoranthene		1540	331	662	ug/kg	2.0					
Benzo(ghi)perylene	J	450	331	662	ug/kg	2.0					
Benzo(k)fluoranthene	U	0.00	331	662	ug/kg	2.0					
Chrysene		1130	331	662	ug/kg	2.0					
Dibenzo(a,h)anthracene	U	0.00	331	662	ug/kg	2.0					
Fluoranthene		1790	331	662	ug/kg	2.0					
Fluorene	J	357	331	662	ug/kg	2.0					
Indeno(1,2,3-c,d)pyrene	J	470	331	662	ug/kg	2.0					
Naphthalene	J	384	331	662	ug/kg	2.0					
Phenanthrene		2420	331	662	ug/kg	2.0					
Pyrene		2050	331	662	ug/kg	2.0					
Metals Analysis											
Mercury		5.35	0.0790	0.200	mg/kg	5.0	RMJ	04/11/97	1232	100459	N
Silver	J	203	20.6	500	ug/kg	1.0	MBL	04/11/97	1555	100375	3
Arsenic		6300	134	500	ug/kg	1.0					

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 16, 1997

Sample ID : SPORT0411-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		51200	12.0	500	ug/kg	1.0					
Cadmium		2010	10.1	250	ug/kg	1.0	MBL	04/11/97	1555	100375	3
Chromium		30100	30.1	500	ug/kg	1.0					
Lead		338000	66.1	250	ug/kg	1.0					
Selenium		621	111	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		450	10.0	50.0	mg/kg	1.0	SLR	04/11/97	1100	100513	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	04/09/97	1700	100369	5
Mercury	CRB	04/10/97	1615	100459	6
TRACE	FGD	04/11/97	1530	100375	7

Comments:
Volatile Organics contained matrix interferences.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	93.4	(30.0 - 115.)
Nitrobenzene-d5	M610	74.6	(23.0 - 120.)
p-Terphenyl-d14	M610	103.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	132.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	106.	(63.4 - 136.)
Toluene-d8	BTEX-8260	123.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	132.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	106.	(63.4 - 136.)
Toluene-d8	NAP-8260	123.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 16, 1997

Sample ID : SPORT0411-4
Lab ID : 9704187-04
Matrix : Soil
Date Collected : 04/08/97
Date Received : 04/08/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	04/11/97	1214	100454	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.760	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	166	331	ug/kg	1.0	TCL	04/11/97	1833	100369	2
Acenaphthylene	U	0.00	166	331	ug/kg	1.0					
Anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	331	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	166	331	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Chrysene	U	0.00	166	331	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	331	ug/kg	1.0					
Fluoranthene	U	0.00	166	331	ug/kg	1.0					
Fluorene	U	0.00	166	331	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	331	ug/kg	1.0					
Naphthalene	U	0.00	166	331	ug/kg	1.0					
Phenanthrene	U	0.00	166	331	ug/kg	1.0					
Pyrene	U	0.00	166	331	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.0240	0.0162	0.200	mg/kg	1.0	RMJ	04/11/97	1159	100459	N
Silver	U	-10.2	19.8	500	ug/kg	1.0	MBL	04/11/97	1600	100375	3
Arsenic		1480	129	500	ug/kg	1.0					

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STATE	GEL	EPI
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NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00197 Report Date: April 16, 1997

Sample ID : SPORT0411-4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		29200	11.5	500	ug/kg	1.0					
Cadmium	J	234	9.76	250	ug/kg	1.0	MBL	04/11/97	1600	100375	3
Chromium		3560	29.0	500	ug/kg	1.0					
Lead		27400	63.7	250	ug/kg	1.0					
Selenium	J	219	106	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		110	10.0	50.0	mg/kg	1.0	SLR	04/11/97	1100	100513	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	04/09/97	1700	100369	5
Mercury	CRB	04/10/97	1615	100459	6
TRACE	FGD	04/11/97	1530	100375	7

Comments:
Volatile Organics contained matrix interferences.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	70.6	(30.0 - 115.)
Nitrobenzene-d5	M610	51.1	(23.0 - 120.)
p-Terphenyl-d14	M610	101.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	125.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	99.8	(63.4 - 136.)
Toluene-d8	BTEX-8260	118.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	125.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	99.8	(63.4 - 136.)
Toluene-d8	NAP-8260	118.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 16, 1997

Sample ID	: SPORT0411-5
Lab ID	: 9704187-05
Matrix	: Soil
Date Collected	: 04/08/97
Date Received	: 04/08/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	04/10/97	1603	100454	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	164	330	ug/kg	1.0	TCL	04/11/97	1905	100369	2
Acenaphthylene	U	0.00	164	330	ug/kg	1.0					
Anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	164	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	164	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Chrysene	U	0.00	164	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	164	330	ug/kg	1.0					
Fluoranthene	U	0.00	164	330	ug/kg	1.0					
Fluorene	U	0.00	164	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	164	330	ug/kg	1.0					
Naphthalene	U	0.00	164	330	ug/kg	1.0					
Phenanthrene	U	0.00	164	330	ug/kg	1.0					
Pyrene	U	0.00	164	330	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.0427	0.0153	0.200	mg/kg	1.0	RMJ	04/11/97	1201	100459	N
Silver	U	-9.61	20.8	500	ug/kg	1.0	MBL	04/11/97	1605	100375	3
Arsenic		1480	135	500	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

cc: NPWC00197 Report Date: April 16, 1997

Sample ID : SPORT0411-5

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		28400	12.1	500	ug/kg	1.0					
Cadmium	J	237	10.2	250	ug/kg	1.0	MBL	04/11/97	1605	100375	3
Chromium		3500	30.4	500	ug/kg	1.0					
Lead		25900	66.8	250	ug/kg	1.0					
Selenium	J	201	112	250	ug/kg	1.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		290	10.0	50.0	mg/kg	1.0	SLR	04/11/97	1100	100513	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	GWL	04/09/97	1700	100369	5
Mercury	CRB	04/10/97	1615	100459	6
TRACE	FGD	04/11/97	1530	100375	7

Comments:
Volatile Organics contained matrix interferences.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	70.6	(30.0 - 115.)
Nitrobenzene-d5	M610	35.4	(23.0 - 120.)
p-Terphenyl-d14	M610	109.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	136.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	103.	(63.4 - 136.)
Toluene-d8	BTEX-8260	123.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	136.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	103.	(63.4 - 136.)
Toluene-d8	NAP-8260	123.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 14, 1997

Sample ID	: SPORT0411-6
Lab ID	: 9704187-06
Matrix	: Soil
Date Collected	: 04/08/97
Date Received	: 04/08/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX - 4 items											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	SHJ	04/10/97	1144	100454	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.770	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX-8260	101.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	101.	(63.4 - 136.)
Toluene-d8	BTEX-8260	107.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	101.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	101.	(63.4 - 136.)
Toluene-d8	NAP-8260	107.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260

GENERAL ENGINEERING LABORATORIES

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

cc: NPWC00197 Report Date: April 28, 1997

Sample ID	: SPORT0425-2
Lab ID	: 9704466-02
Matrix	: Soil
Date Collected	: 04/17/97
Date Received	: 04/18/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	BDG	04/20/97	1654	100954	1
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	J	218	165	330	ug/kg	1.0					
Benzo(a)anthracene		650	165	330	ug/kg	1.0					
Benzo(a)pyrene		957	165	330	ug/kg	1.0					
Benzo(b)fluoranthene		987	165	330	ug/kg	1.0					
Benzo(ghi)perylene		772	165	330	ug/kg	1.0					
Benzo(k)fluoranthene		620	165	330	ug/kg	1.0					
Chrysene		891	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	J	251	165	330	ug/kg	1.0					
Fluoranthene		1250	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene		809	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene		901	165	330	ug/kg	1.0					
Pyrene		1140	165	330	ug/kg	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	84.2	(30.0 - 115.)
Nitrobenzene-d5	M610	76.2	(23.0 - 120.)
p-Terphenyl-d14	M610	88.4	(37.3 - 128.)

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APPENDIX C

WASTE CHARACTERIZATION DATA

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: March 11, 1997

Sample ID	: SPORT0360-1
Lab ID	: 9702558-01
Matrix	: Soil
Date Collected	: 02/27/97
Date Received	: 02/27/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Silver	U	-0.590	0.358	2.50	mg/kg	1.0	JSS	03/10/97	1440	98884	1
Arsenic		19.5	1.93	13.8	mg/kg	1.0					
Barium		50.9	0.101	2.50	mg/kg	1.0					
Cadmium	J	0.696	0.151	2.50	mg/kg	1.0					
Chromium		15.4	0.193	2.50	mg/kg	1.0					
Lead		279	1.67	4.59	mg/kg	1.0					
Selenium	U	0.784	3.86	13.8	mg/kg	1.0					
Mercury		16.1	0.0322	0.322	mg/kg	10.	RMJ	02/28/97	1218	98428	N
General Chemistry											
Total Rec. Petro. Hydrocarbons		4710	10.0	50.0	mg/kg	1.0	SLR	02/28/97	1100	98352	2
Extractable Organic Halides	J	11.9	4.42	13.7	mg/kg	1.0	SJ	03/04/97	1538	98511	3

The following prep procedures were performed:

ICP	FGD	03/10/97	1800	98884	4
Mercury	CRB	02/27/97	2015	98428	5

M = Method	Method-Description
M 1	EPA 6010A
M 2	EPA 9071
M 3	GEL
M 4	EPA 3050
M 5	EPA 7471

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

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

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: March 06, 1997

Sample ID : SPORT0360-1
Lab ID : 9702558-02
Matrix : TCLP
Date Collected : 02/27/97
Date Received : 02/27/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Silver	U	-0.0123	0.00780	0.500	mg/l	1.0	JSS	03/03/97	1537	98471	1
Arsenic	U	-0.0865	0.0421	0.500	mg/l	1.0					
Barium	J	0.409	0.00220	10.0	mg/l	1.0					
Cadmium	J	0.0123	0.00330	0.100	mg/l	1.0					
Chromium	J	0.0237	0.00420	0.500	mg/l	1.0					
Lead	J	0.0594	0.0364	0.500	mg/l	1.0					
Selenium	U	-0.0630	0.0841	0.300	mg/l	1.0					
Mercury	J	0.00243	0.00100	0.0200	mg/l	1.0	RMJ	03/03/97	1351	98484	2

The following prep procedures were performed:

ICP	DVW	02/28/97	1920	98471	3
Mercury	CRB	02/28/97	1930	98484	4
TCLP Prep for Metals	JL	02/27/97	1500	98377	5

M = Method	Method-Description
M 1	EPA 6010A
M 2	EPA 7471
M 3	EPA 3005
M 4	EPA 7470
M 5	EPA 1311

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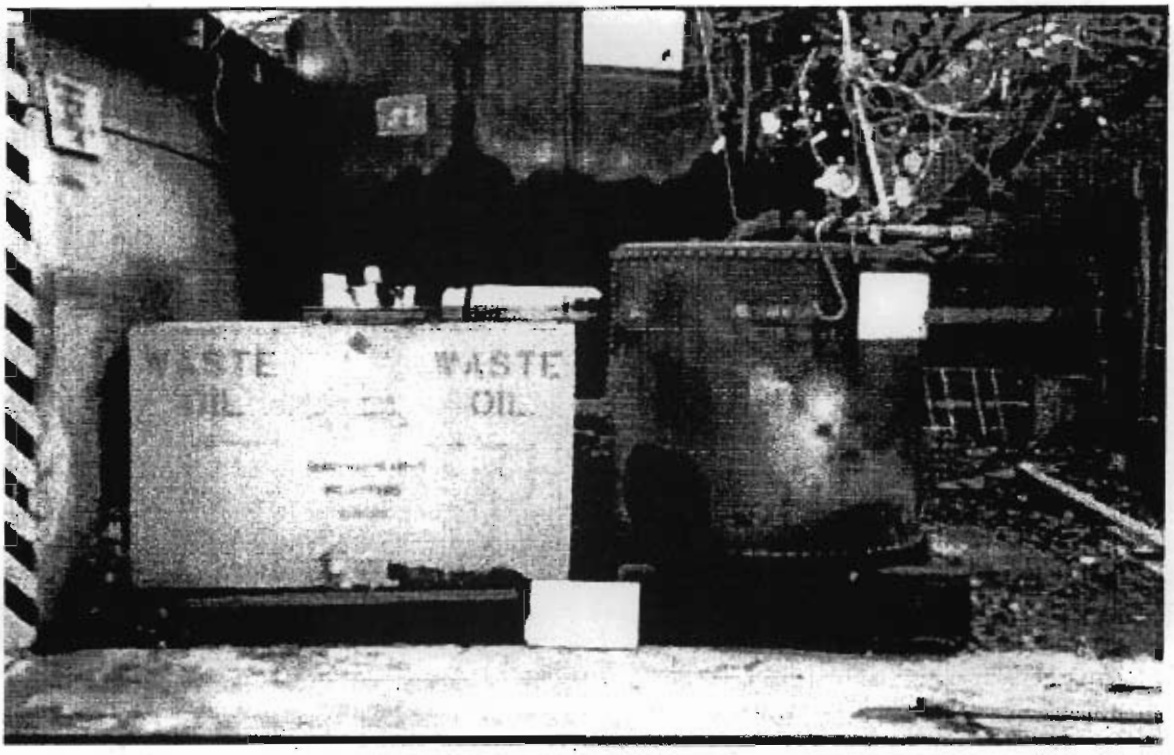
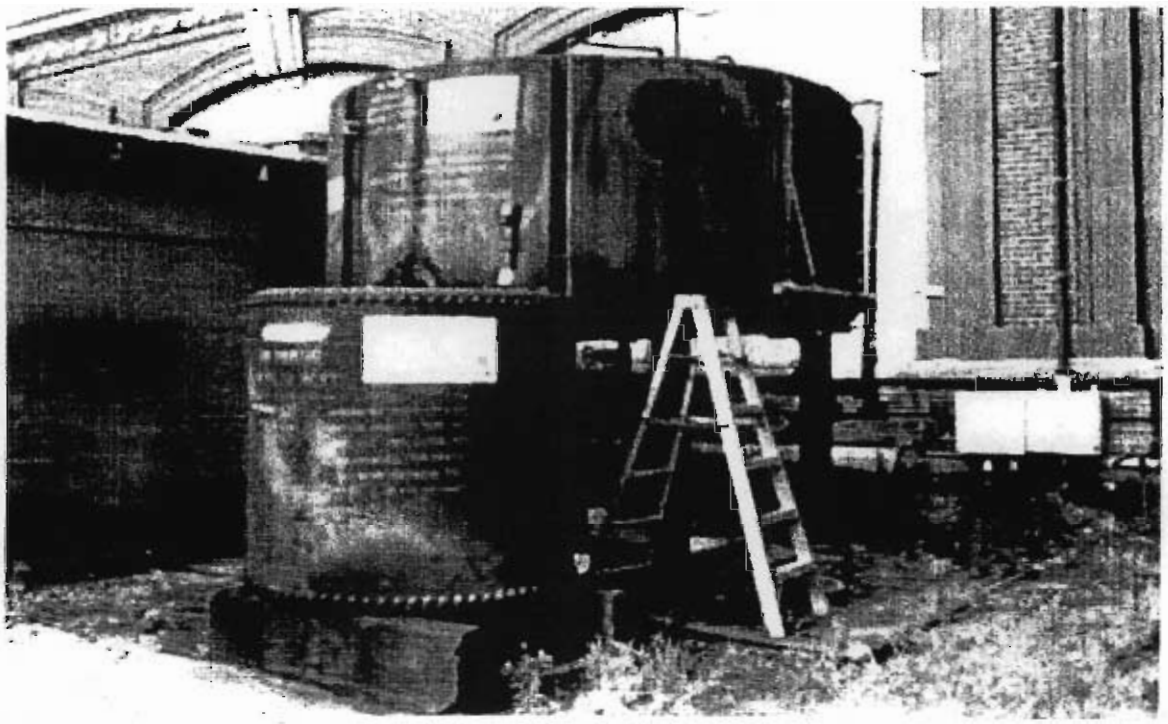
APPENDIX D

PHOTOGRAPHS



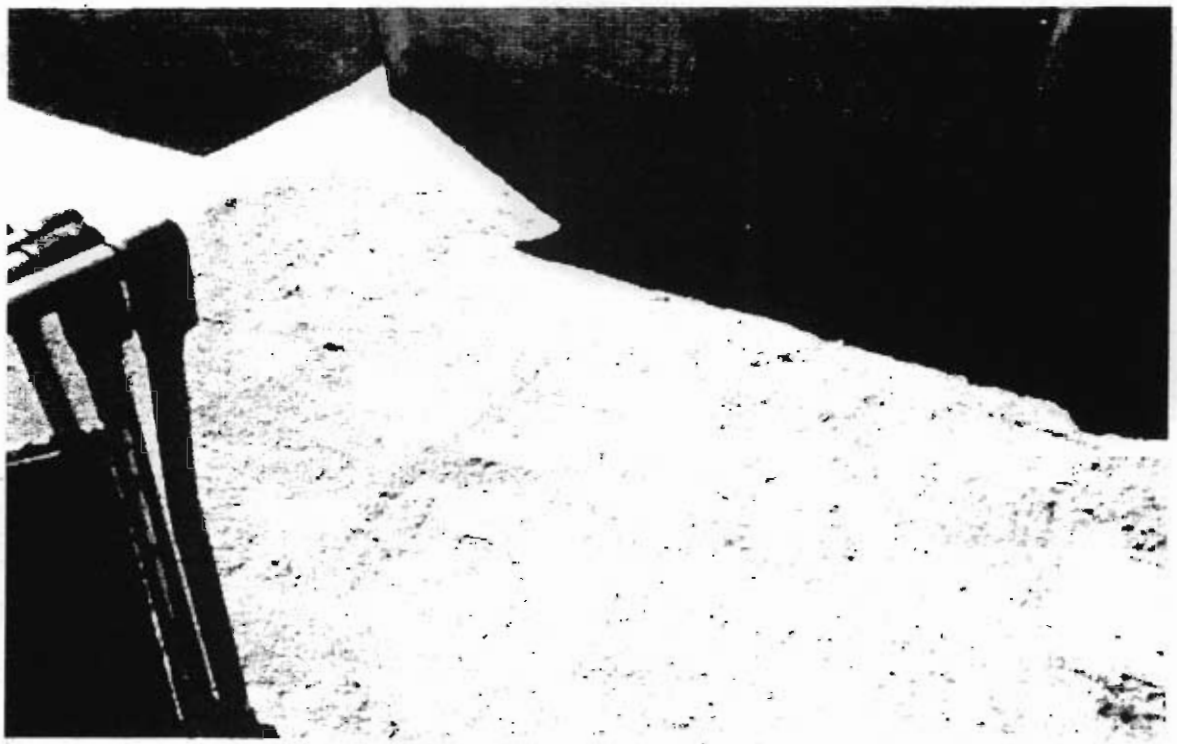
West view of site prior to tank removal.



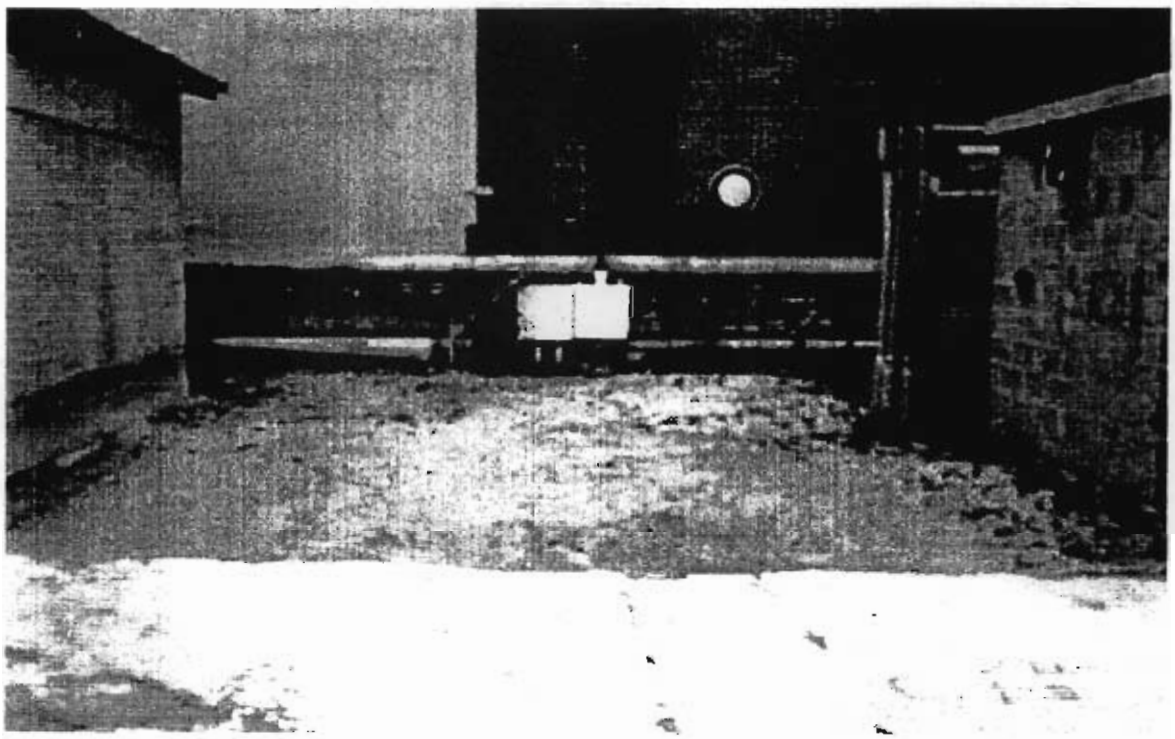
Southwest view of site after waste oil tank removal.

South view of site prior to excavation.

South view of site after excavation with the installation of Geo-texile-fabric ® prior to back filling.



East view of site after completion of excavation and restoration.



West view of site after completion of excavation and restoration.

Appendix D

Analytical Data Summary

	StationID	E083SB016		E083SB016		E083SB016	
	SampleID	083CB01601 (0-1ft)		083SB01601 (0-1ft)		083SB01602 (3-5ft)	
	DateCollected	11/14/2001 12:00 AM		11/14/2001 12:00 AM		11/14/2001 12:00 AM	
	DateAnalyzed	11/15/2001		11/15/2001		11/15/2001	
	SDGNumber	52026		52026		52026	
Parameter	**Units**						
Cyanide	MG/KG	1	U	1	U	1	U

	StationID	E083SB011		E083SB011		E083SB012		E083SB012	
	SampleID	083SB01101 (0-1ft)		083SB01102 (3-5ft)		083CB01202 (3-5ft)		083SB01201 (0-1ft)	
	DateCollected	11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM	
	DateAnalyzed	11/19/2001		11/19/2001		11/19/2001		11/19/2001	
	SDGNumber	52026		52026		52026		52026	
Parameter	**Units**								
Antimony	mg/kg	2.34	J	0.4	UJ	0.78	J	1.96	J
Copper	mg/kg	135	=	77.3	=	47.7	=	278	=
Lead	mg/kg	321	=	432	=	77.1	=	216	=

	StationID	E083SB012		E083SB013		E083SB013		E083SB014	
	SampleID	083SB01202 (3-5ft)		083SB01301 (0-1ft)		083SB01302 (3-5ft)		083SB01401 (0-1ft)	
	DateCollected	11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/14/2001 12:00 AM	
	DateAnalyzed	11/19/2001		11/19/2001		11/19/2001		11/19/2001	
	SDGNumber	52026		52026		52026		52026	
Parameter	**Units**								
Antimony	mg/kg	0.65	UJ	0.54	UJ	0.47	UJ	0.81	J
Copper	mg/kg	18.9	=	37.4	=	10.7	=	309	=
Lead	mg/kg	36	=	74.4	=	20.7	=	134	=

	StationID	E083SB014	
	SampleID	083SB01402 (3-5ft)	
	DateCollected	11/14/2001 12:00 AM	
	DateAnalyzed	11/19/2001	
	SDGNumber	52026	
Parameter	**Units**		
Antimony	mg/kg	0.86	J
Copper	mg/kg	108	=
Lead	mg/kg	76.8	=

	StationID		E083SB011		E083SB011		E083SB012		E083SB012	
	SampleID		083SB01101 (0-1ft)		083SB01102 (3-5ft)		083CB01202 (3-5ft)		083SB01201 (0-1ft)	
	DateCollected		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM	
	DateAnalyzed		11/21/2001		11/21/2001		11/21/2001		11/21/2001	
	SDGNumber		52026		52026		52026		52026	
Parameter	**Units**									
Naphthalene	ug/kg		354	J	131	J	19.6	J	5390	=
Acenaphthylene	ug/kg		59.4	J	98.8	J	13.2	J	188	J
Acenaphthene	ug/kg		241	J	113	J	53	J	2620	=
Fluorene	ug/kg		320	J	253	J	49.7	J	2950	=
Phenanthrene	ug/kg		2460	=	2460	=	771	=	26000	=
Anthracene	ug/kg		519	=	526	=	133	J	3530	=
Flouranthene	ug/kg		1560	=	1850	=	935	=	13200	=
Pyrene	ug/kg		1940	=	2220	=	1250	=	23300	=
Benzo(a)Anthracene	ug/kg		835	=	1010	=	550	=	7690	=
Chrysene	ug/kg		833	=	979	=	692	=	8400	=
Benzo(b)Fluoranthene	ug/kg		627	=	617	=	582	=	5080	=
Benzo(k)Fluoranthene	ug/kg		648	J	905	J	649	J	6350	J
Benzo(a)Pyrene	ug/kg		754	=	868	=	602	=	6220	=
Indeno(1,2,3-c,d)pyrene	ug/kg		393	J	422	J	347	J	3510	J
Dibenz(a,h)anthracene	ug/kg		451	U	458	U	376	U	357	UJ
Benzo(g,h,i)Perylene	ug/kg		389	J	403	J	391	=	3990	J
BEQs	ug/kg		1172.3		1311.9		945.1		8276.9	

	StationID		E083SB012		E083SB013		E083SB013		E083SB014	
	SampleID		083SB01202 (3-5ft)		083SB01301 (0-1ft)		083SB01302 (3-5ft)		083SB01401 (0-1ft)	
	DateCollected		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/13/2001 12:00 AM		11/14/2001 12:00 AM	
	DateAnalyzed		11/21/2001		11/21/2001		11/21/2001		11/21/2001	
	SDGNumber		52026		52026		52026		52026	
Parameter	**Units**									
Naphthalene	ug/kg		17	J	437	U	573	U	8.8	J
Acenaphthylene	ug/kg		10.4	J	437	U	573	U	8.2	J
Acenaphthene	ug/kg		35.2	J	10.4	J	573	U	18	J
Fluorene	ug/kg		33.3	J	9.8	J	573	U	22	J
Phenanthrene	ug/kg		522	=	141	J	573	U	569	=
Anthracene	ug/kg		80.7	J	26.5	J	573	U	146	J
Flouranthene	ug/kg		652	=	275	J	8.7	J	1770	=
Pyrene	ug/kg		810	=	380	J	17.9	J	2950	=
Benzo(a)Anthracene	ug/kg		363	J	170	J	573	U	1720	=
Chrysene	ug/kg		443	=	186	J	573	U	2050	=
Benzo(b)Fluoranthene	ug/kg		373	J	180	J	573	U	1420	=
Benzo(k)Fluoranthene	ug/kg		370	J	177	J	573	U	1760	J
Benzo(a)Pyrene	ug/kg		379	J	186	J	573	U	1570	=
Indeno(1,2,3-c,d)pyrene	ug/kg		242	J	109	J	573	U	876	J
Dibenz(a,h)anthracene	ug/kg		380	U	437	U	573	U	373	U
Benzo(g,h,i)Perylene	ug/kg		275	J	111	J	573	U	880	=
BEQs	ug/kg		670.9		452.4		662.1		2177.8	

	StationID		E083SB014		E083SB015		E083SB015	
	SampleID		083SB01402 (3-5ft)		083SB01501 (0-1ft)		083SB01502 (3-5ft)	
	DateCollected		11/14/2001 12:00 AM		11/14/2001 12:00 AM		11/14/2001 12:00 AM	
	DateAnalyzed		11/21/2001		11/21/2001		11/26/2001	
	SDGNumber		52026		52026		52026	
Parameter	**Units**							
Naphthalene	ug/kg		362	U	361	U	369	U
Acenaphthylene	ug/kg		362	U	361	U	369	U
Acenaphthene	ug/kg		362	U	361	U	8	J
Fluorene	ug/kg		3.3	J	361	U	4.8	J
Phenanthrene	ug/kg		84.6	J	361	U	100	J
Anthracene	ug/kg		16.5	J	361	U	14.3	J
Flouranthene	ug/kg		146	J	18.7	J	160	J
Pyrene	ug/kg		284	J	34.6	J	231	J
Benzo(a)Anthracene	ug/kg		120	J	14.6	J	106	J
Chrysene	ug/kg		174	J	361	U	133	J
Benzo(b)Fluoranthene	ug/kg		151	J	361	U	112	J
Benzo(k)Fluoranthene	ug/kg		142	J	361	U	129	J
Benzo(a)Pyrene	ug/kg		137	J	361	U	117	J
Indeno(1,2,3-c,d)pyrene	ug/kg		85.7	J	361	U	68.3	J
Dibenz(a,h)anthracene	ug/kg		362	U	361	U	369	U
Benzo(g,h,i)Perylene	ug/kg		42.2	J	361	U	76.9	J
BEQs	ug/kg		355.3		400.5		331.6	

Data Validation Summary - Charleston Naval Complex - Zone E, SWMU 83

TO: Sam Naik/CH2M HILL/ATL

FROM: Amy Juchem/CH2M HILL/GNA
Herb Kelly/CH2M HILL/GNA

DATE: June 6, 2002

The purpose of this memorandum is to present the results of the data validation process for the samples collected SWMU 83 in Zone E. The samples were collected on November 13 and 14, 2001.

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

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

Samples were submitted to General Engineering Laboratories, Inc., in Charleston, South Carolina, for the following analyses: SW-846 8270 Semivolatile Organic Compounds (SVOC), Metals following SW-846 6010 Series methodology, and SW-846 9012 Cyanide.

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

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

The following primary flags were used to qualify the data:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.

[J] Estimated. The analyte was present but the reported value may not be accurate or precise.

[U] Undetected. The analyte was analyzed for but not detected above the method detection limit.

[UJ] Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.

[R] Rejected. The data is not useable.

Secondary Data Validation Qualifiers

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

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

SDG	Station ID	Sample ID	Lab Sample ID	Date Collected	Matrix	Sample Type	Upper Depth	Lower Depth	PAHs SW8270	Metals SW6010	Cyanide SW9012
52026	E083SB011	083SB01101	52026001	11/13/01	SO	N	0	1	X	X	
52026	E083SB011	083SB01101MS	1200109940	11/13/01	SO	MS	0	1		X	
52026	E083SB011	083SB01101SD	1200109941	11/13/01	SO	SD	0	1		X	
52026	E083SB011	083SB01102	52026002	11/13/01	SO	N	3	5	X	X	
52026	E083SB012	083SB01201	52026003	11/13/01	SO	N	0	1	X	X	
52026	E083SB012	083SB01201LR	52026003	11/13/01	SO	LR	0	1	X		
52026	E083SB012	083SB01202	52026004	11/13/01	SO	N	3	5	X	X	
52026	E083SB012	083CB01202	52026005	11/13/01	SO	FD	3	5	X	X	
52026	E083SB013	083SB01301	52026006	11/13/01	SO	N	0	1	X	X	
52026	E083SB013	083SB01302	52026007	11/13/01	SO	N	3	5	X	X	
52026	E083SB014	083SB01401	52026008	11/14/01	SO	N	0	1	X	X	
52026	E083SB014	083SB01402	52026009	11/14/01	SO	N	3	5	X	X	
52026	E083SB015	083SB01501	52026010	11/14/01	SO	N	0	1	X		
52026	E083SB015	083SB01502	52026011	11/14/01	SO	N	3	5	X		
52026	E083SB016	083SB01601	52026012	11/14/01	SO	N	0	1			X
52026	E083SB016	083SB01601LR	1200109870	11/14/01	SO	LR	0	1			X
52026	E083SB016	083SB01601MS	1200109871	11/14/01	SO	MS	0	1			X
52026	E083SB016	083SB01601SD	1200109872	11/14/01	SO	SD	0	1			X
52026	E083SB016	083CB01601	52026013	11/14/01	SO	FD	0	1			X
52026	E083SB016	083SB01602	52026014	11/14/01	SO	N	3	5			X
52026	LABQC	1200109800	1200109800		SQ	LB					X
52026	LABQC	1200109803	1200109803		SQ	BS					X
52026	LABQC	1200109938	1200109938		SQ	LB				X	

SDG	Station ID	Sample ID	Lab Sample ID	Date Collected	Matrix	Sample Type	Upper Depth	Lower Depth	PAHs SW8270	Metals SW6010	Cyanide SW9012
52026	LABQC	1200109939	1200109939		SQ	BS				X	
52026	LABQC	1200110096	1200110096		SQ	LB			X		
52026	LABQC	1200110097	1200110097		SQ	BS			X		
52027	FIELDQC	083EB011L1	52027001	11/14/01	WQ	EB			X	X	X
52027	FIELDQC	083EB011L1LR	1200110421	11/14/01	WQ	EB					X
52027	FIELDQC	083EB011L1MS	1200109914	11/14/01	WQ	MS				X	
52027	FIELDQC	083EB011L1SD	1200109915	11/14/01	WQ	SD				X	
52027	FIELDQC	083EB011L1MS	1200110424	11/14/01	WQ	MS					X
52027	FIELDQC	083EB011L1SD	1200110425	11/14/01	WQ	SD					X
52027	LABQC	1200109912	1200109912		WQ	LB				X	
52027	LABQC	1200109913	1200109913		WQ	BS				X	
52027	LABQC	1200110121	1200110121		WQ	LB			X		
52027	LABQC	1200110122	1200110122		WQ	BS			X		
52027	LABQC	1200110420	1200110420		WQ	LB					X
52027	LABQC	1200110426	1200110426		WQ	BS					X

MATRIX CODE

SO – Soil
SQ – Soil QC Samples
WQ - Water QC Samples

SAMPLE TYPE CODE

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

ANALYSIS CODE

PAHs - Polyaromatic Hydrocarbons

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 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.
- **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.
- **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.
- **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.
- **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.

Polyaromatic Hydrocarbons (PAHs) Analyses

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

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in Table 2.

TABLE 2
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: PAHs
Charleston Naval Complex, Zone E, SWMU 83, Charleston, SC

Instrument/Calibration Date	Analyte	%Relative Standard Deviation or R^2 (ICAL)/%Difference (CCAL)	Associated Samples
MSD8 – CCAL – 11/21/01, 10:25	Benzo(k)fluoranthene	16.9% high	52026001 – 52026003, 52026005 – 52026010
	Indeno(1,2,3-cd)pyrene	16.2% high	
MSD8 – CCAL – 11/26/01, 11:28	Benzo(k)fluoranthene	15.9% high	52026004, 52026011, 52026003-DL
MSD2 – CCAL – 11/27, 10:38	Indeno(1,2,3-cd)pyrene	16.0% high	52027001 (EB)
	Dibenzo(a,h)anthracene	16.9% high	
	Benzo(g,h,I)perylene	15.8% high	

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

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

Field Duplicate Samples

All Field Duplicate Samples were within acceptable quality control limits, except as noted in Table 3 below. No flags are applied due to Field Duplicate precision.

TABLE 3
Field Duplicate RPDs Out of QC Limits: PAHs
Charleston Naval Complex, Zone E, SWMU 83, Charleston, SC

SDG	Native / Field Duplicate Sample Set	Parameter	Native Concentration	Field Duplicate Concentration	RPD	RPD Limits
52026	52026004 / 52006005	Acenaphthene	35.2 ug/Kg	53 ug/Kg	40.36	35
52026	52026004 / 52006005	Fluorene	33.3 ug/Kg	49.7 ug/Kg	39.52	35
52026	52026004 / 52006005	Phenanthrene	522 ug/Kg	771 ug/Kg	38.52*	35
52026	52026004 / 52006005	Anthracene	80.7 ug/Kg	133 ug/Kg	48.95*	35
52026	52026004 / 52006005	Fluoranthene	652 ug/Kg	935 ug/Kg	35.66*	35
52026	52026004 / 52006005	Pyrene	810 ug/Kg	1250 ug/Kg	42.72*	35
52026	52026004 / 52006005	Benzo(a)anthracene	363 ug/Kg	550 ug/Kg	40.96*	35
52026	52026004 / 52006005	Chrysene	443 ug/Kg	692 ug/Kg	43.88*	35
52026	52026004 / 52006005	Benzo(b)fluoranthene	363 ug/Kg	582 ug/Kg	43.77*	35
52026	52026004 / 52006005	Benzo(k)fluoranthene	370 ug/Kg	649 ug/Kg	54.76*	35
52026	52026004 / 52006005	Benzo(a)pyrene	379 ug/Kg	602 ug/Kg	45.46*	35
52026	52026004 / 52006005	Indeno(1,2,3-cd)pyrene	242 ug/Kg	347 ug/Kg	35.65*	35

* - out of control limits

Internal Standard Area

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

- In sample 52026003, internal standards #5 and #6 had recoveries outside of QC limits, 38.6% low and 38% low respectively. The associated compounds were estimated, 'J' for detects and 'UJ' for non-detects.

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 4.

TABLE 4
Blank Contamination: Metals
Charleston Naval Complex, Zone E, SWMU 83, Charleston, SC

SDG	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units	Flag Concentrations
52026	CCB 11/17		CCB	Antimony	3.08	ug/L	0.77 mg/Kg
52026	CCB 11/19		CCB	Lead	2.13	ug/L	0.53 mg/Kg
52026	1200109938	1200109938	MB	Lead	0.55	ug/L	2.75 mg/Kg

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 – Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Laboratory Control Sample (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 5 below.

TABLE 5
MS/MSD and LCS Recoveries Out of QC Limits: Metals
Charleston Naval Complex, Zone E, SWMU 83, Charleston, SC

SDG	Sample	Parameter	Recovery	Recovery Limit	Associated Samples	Flag
52026	083SB01101MS/MSD	Antimony	28.6* / 31.0*	80-120	52026 – All	Detects-J, non-detects-UJ
52026	1200109939 LCS	Antimony	77.8*	80-120	52026 – 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 6 below. No flags are applied due to Field Duplicate precision.

TABLE 6
Field Duplicate RPDs Out of QC Limits: Metals
Charleston Naval Complex, Zone E, SWMU 83, Charleston, SC

SDG	Sample	Parameter	Native Concentration	Field Duplicate Concentration	RPD	RPD Limit
52026	52026004 / 52026005	Copper	18.9 ug/Kg	47.7 ug/Kg	86.5*	35
52026	52026004 / 52026005	Lead	36.0 ug/Kg	77.1 ug/Kg	72.7*	35
* - out of control limits						

General Chemistry Analyses

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

Blanks

- Cyanide was detected in equipment blank 083EB011L1 at 4.60 ug/L. All associated samples were non-detects; therefore, no flags were applied due to blank contamination.

Rejected Data

All of the rejected data listed in Attachment 1 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 83, 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 the analytical results. The validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process.

Attachment 1 - Changed Qualifiers and Results
Zone E, SWMU 83 - Data Validation

Parameter Class	SDG	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
SVOA	52026	083CB01202	52026005	SO	SW8270	BENZO(k)FLUORANTHENE	649	=	649	J	ug/kg	CC
SVOA	52026	083CB01202	52026005	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	347	J	347	J	ug/kg	CC
SVOA	52026	083SB01101	52026001	SO	SW8270	BENZO(k)FLUORANTHENE	648	=	648	J	ug/kg	CC
SVOA	52026	083SB01101	52026001	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	393	J	393	J	ug/kg	CC
SVOA	52026	083SB01102	52026002	SO	SW8270	BENZO(k)FLUORANTHENE	905	=	905	J	ug/kg	CC
SVOA	52026	083SB01102	52026002	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	422	J	422	J	ug/kg	CC
SVOA	52026	083SB01201	52026003	SO	SW8270	BENZO(a)ANTHRACENE	7370	E	7370	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	BENZO(a)PYRENE	5700	E	5700	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	BENZO(b)FLUORANTHENE	4540	E	4540	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	BENZO(g,h,i)PERYLENE	3990	=	3990	J	ug/kg	IS
SVOA	52026	083SB01201	52026003	SO	SW8270	BENZO(k)FLUORANTHENE	5430	E	5430	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	CHRYSENE	8400	E	8400	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	DIBENZ(a,h)ANTHRACENE	357	U	357	UJ	ug/kg	IS
SVOA	52026	083SB01201	52026003	SO	SW8270	FLUORANTHENE	12500	E	12500	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	3510	=	3510	J	ug/kg	CC, IS
SVOA	52026	083SB01201	52026003	SO	SW8270	NAPHTHALENE	5360	E	5360	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	PHENANTHRENE	30000	E	30000	R	ug/kg	LR
SVOA	52026	083SB01201	52026003	SO	SW8270	PYRENE	23600	E	23600	R	ug/kg	LR
SVOA	52026	083SB01201LR	52026003	SO	SW8270	ACENAPHTHENE	2710	JD	2710	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	ACENAPHTHYLENE	176	JD	176	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	ANTHRACENE	3980	D	3980	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	BENZO(g,h,i)PERYLENE	3560	JD	3560	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	BENZO(k)FLUORANTHENE	6350	D	6350	J	ug/kg	CC
SVOA	52026	083SB01201LR	52026003	SO	SW8270	DIBENZ(a,h)ANTHRACENE	3570	U	3570	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	FLUORENE	3060	JD	3060	R	ug/kg	DL
SVOA	52026	083SB01201LR	52026003	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	3160	JD	3160	R	ug/kg	DL
SVOA	52026	083SB01202	52026004	SO	SW8270	BENZO(k)FLUORANTHENE	370	J	370	J	ug/kg	CC

Attachment 1 - Changed Qualifiers and Results
Zone E, SWMU 83 - Data Validation

Parameter Class	SDG	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
SVOA	52026	083SB01301	52026006	SO	SW8270	BENZO(k)FLUORANTHENE	177	J	177	J	ug/kg	CC
SVOA	52026	083SB01301	52026006	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	109	J	109	J	ug/kg	CC
SVOA	52026	083SB01401	52026008	SO	SW8270	BENZO(k)FLUORANTHENE	1760	=	1760	J	ug/kg	CC
SVOA	52026	083SB01401	52026008	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	876	=	876	J	ug/kg	CC
SVOA	52026	083SB01402	52026009	SO	SW8270	BENZO(k)FLUORANTHENE	142	J	142	J	ug/kg	CC
SVOA	52026	083SB01402	52026009	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	85.7	J	85.7	J	ug/kg	CC
SVOA	52026	083SB01502	52026011	SO	SW8270	BENZO(k)FLUORANTHENE	129	J	129	J	ug/kg	CC
SVOA	52026	083SB01502	52026011	SO	SW8270	INDENO(1,2,3-c,d)PYRENE	68.3	J	68.3	J	ug/kg	CC
METAL	52026	083SB01101	52026001	SO	SW6010	ANTIMONY	2.34	N	2.34	J	mg/kg	MS, BS
METAL	52026	083SB01102	52026002	SO	SW6010	ANTIMONY	0.4	UN	0.4	UJ	mg/kg	MS, BS
METAL	52026	083SB01201	52026003	SO	SW6010	ANTIMONY	1.96	N	1.96	J	mg/kg	MS, BS
METAL	52026	083SB01202	52026004	SO	SW6010	ANTIMONY	0.65	BN	0.65	UJ	mg/kg	BL, MS, BS
METAL	52026	083CB01202	52026005	SO	SW6010	ANTIMONY	0.78	BN	0.78	J	mg/kg	MS, BS
METAL	52026	083SB01301	52026006	SO	SW6010	ANTIMONY	0.54	BN	0.54	UJ	mg/kg	BL, MS, BS
METAL	52026	083SB01302	52026007	SO	SW6010	ANTIMONY	0.47	UN	0.47	UJ	mg/kg	MS, BS
METAL	52026	083SB01401	52026008	SO	SW6010	ANTIMONY	0.81	BN	0.81	J	mg/kg	MS, BS
METAL	52026	083SB01402	52026009	SO	SW6010	ANTIMONY	0.86	BN	0.86	J	mg/kg	MS, BS

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: **ZE083-110801-01** page 1 of 2

Laboratory:	GEL, Charleston, SC
Project Name:	Charleston Navy Complex
Site Name:	Zone E, SWMU 83
Project Number:	
TAT:	21 day TAT
Project Manager:	Gary Foster/ATL/CCI
Level:	Level 3
Address:	GNV: 3011 SW Williston Rd., Gainesville, FL 32605
	CHS: 2470 Mall Dr. Suite B, N. Charleston, SC 29406
Send Report To:	see back of COC
EDD:	CNC format

Lab Batch/SDG:

	Sample ID (52026)	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	Metals (SW6010B) 1 - 4 ounce jar	Cyanide (SW9010) 1 - 8 ounce jar	SVOCs (SW8270C) 1 - 8 ounce jar	Metals (SW6010B) 1 - 0.5L HDPE, HNO3	Cyanide (SW9010) 1 - 1L HDPE, NaOH	SVOCs (SW8270C) 1 - 1L amber					Comments
001	083SB01101	E083SB011	0	1	11-13-01 1415	SO	2	X		X								
002	083SB01102	E083SB011	3	5	11-13-01 1425	SO	2	X		X								
003	083SB01201	E083SB012	0	1	11-13-01 1440	SO	2	X		X								
004	083SB01202	E083SB012	3	5	11-13-01 1450	SO	2	X		X								only enough
005	083CB01202	E083SB012	3	5	11-13-01 1450	SO	2	X		X								organic DI
006	083SB01301	E083SB013	0	1	11-13-01 1500	SO	2	X		X								water to
007	083SB01302	E083SB013	3	5	11-13-01 1510	SO	2	X		X								collect one 1L
008	083SB01401	E083SB014	0	1	11-14-01 0900	SO	2	X		X								Amber 8270
009	083SB01402	E083SB014	3	5	11-14-01 0915	SO	2	X		X								equipment blank
010	083SB01501	E083SB015	0	1	~~11-13-01~~ 11-14-01 0840	SO	1			X								
011	083SB01502	E083SB015	3	5	~~11-13-01~~ 11-14-01 0850	SO	1			X								
012	083SB01601	E083SB016	0	1	11-14-01 1305	SO	1		X									
013	083CB01601	E083SB016	0	1	11-14-01 1305	SO	1		X									RCRA
014	083SB01602	E083SB016	3	5	11-14-01 1320	SO	1		X									
201	083EB011L1	E083EB011			11-14-01 ~~1400~~ 1325 BC	SO	3				X	X	X					EB 52027
																		end of sampling
																		21 DAY

Sampled By: Brian Crawford Date/Time: 11-14-01 1605 Relinquished by: Date/Time

Additional Samplers:

Received By Lab: Paulette Mundell Date/Time: 11/14/01 1605 Relinquished by: Date/Time

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

Remarks: **Lists on last page of COC.** Temperature:

Rec Exceptions:

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083DB00202		083DB00202		083EB00202	
	DateCollected	12/18/1995		12/18/1995		12/18/1995	
	DateExtracted			12/19/1995			
	DateAnalyzed	12/27/1995		1/4/1996		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L			10	U		
Chloromethane	ug/Kg						
Chloromethane	ug/L	10	U			10	U
Vinyl chloride	ug/Kg						
Vinyl chloride	ug/L	10	U			10	U
Bromomethane	ug/Kg						
Bromomethane	ug/L	10	U			10	U
Chloroethane	ug/Kg						
Chloroethane	ug/L	10	U			10	U
1,1-Dichloroethene	ug/Kg						
1,1-Dichloroethene	ug/L	5	U			5	U
Acetone	ug/Kg						
Acetone	ug/L	10	U			10	U
Carbon Disulfide	ug/Kg						
Carbon Disulfide	ug/L	5	U			5	U
Methylene Chloride	ug/Kg						
Methylene Chloride	ug/L	5	U			5	U
1,1-Dichloroethane	ug/Kg						
1,1-Dichloroethane	ug/L	5	U			5	U
Vinyl acetate	ug/Kg						
Vinyl acetate	ug/L	10	U			10	U
Methyl ethyl ketone (2-Butanone)	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/L	10	U			10	U
1,2-Dichloroethene (total)	ug/Kg						
1,2-Dichloroethene (total)	ug/L	5	U			5	U
Chloroform	ug/Kg						
Chloroform	ug/L	5	J			5	J
1,1,1-Trichloroethane	ug/Kg						

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083EB00202		083TB00402		083TB00502	
	DateCollected	12/18/1995		12/14/1995		12/18/1995	
	DateExtracted	12/19/1995					
	DateAnalyzed	1/4/1996		12/22/1995		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L	10	U				
Chloromethane	ug/Kg						
Chloromethane	ug/L			10	U	10	U
Vinyl chloride	ug/Kg						
Vinyl chloride	ug/L			10	U	10	U
Bromomethane	ug/Kg						
Bromomethane	ug/L			10	U	10	U
Chloroethane	ug/Kg						
Chloroethane	ug/L			10	U	10	U
1,1-Dichloroethene	ug/Kg						
1,1-Dichloroethene	ug/L			5	U	5	U
Acetone	ug/Kg						
Acetone	ug/L			10	U	10	U
Carbon Disulfide	ug/Kg						
Carbon Disulfide	ug/L			5	U	5	U
Methylene Chloride	ug/Kg						
Methylene Chloride	ug/L			5	U	5	U
1,1-Dichloroethane	ug/Kg						
1,1-Dichloroethane	ug/L			5	U	5	U
Vinyl acetate	ug/Kg						
Vinyl acetate	ug/L			10	U	10	U
Methyl ethyl ketone (2-Butanone)	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/L			10	U	10	U
1,2-Dichloroethene (total)	ug/Kg						
1,2-Dichloroethene (total)	ug/L			5	U	5	U
Chloroform	ug/Kg						
Chloroform	ug/L			5	U	5	U
1,1,1-Trichloroethane	ug/Kg						

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083TB00602		084TB00101		084TB00802	
	DateCollected	12/19/1995		11/29/1995		5/24/1996	
	DateExtracted						
	DateAnalyzed	12/27/1995		12/4/1995		5/29/1996	
	SDGNumber	24364		24170		25722	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg						
Chloromethane	ug/L	10	U	10	U	10	U
Vinyl chloride	ug/Kg						
Vinyl chloride	ug/L	10	U	10	U	10	U
Bromomethane	ug/Kg						
Bromomethane	ug/L	10	U	10	U	10	U
Chloroethane	ug/Kg						
Chloroethane	ug/L	10	U	10	U	10	U
1,1-Dichloroethene	ug/Kg						
1,1-Dichloroethene	ug/L	5	U	5	U	5	U
Acetone	ug/Kg						
Acetone	ug/L	10	U	10	U	10	U
Carbon Disulfide	ug/Kg						
Carbon Disulfide	ug/L	5	U	5	U	5	U
Methylene Chloride	ug/Kg						
Methylene Chloride	ug/L	5	U	2	J	5	U
1,1-Dichloroethane	ug/Kg						
1,1-Dichloroethane	ug/L	5	U	5	U	5	U
Vinyl acetate	ug/Kg						
Vinyl acetate	ug/L	10	U	10	U	10	U
Methyl ethyl ketone (2-Butanone)	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/L	10	U	10	U	10	U
1,2-Dichloroethene (total)	ug/Kg						
1,2-Dichloroethene (total)	ug/L	5	U	5	U	5	U
Chloroform	ug/Kg						
Chloroform	ug/L	5	U	5	U	5	U
1,1,1-Trichloroethane	ug/Kg						

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572201		BLK0572219		BLK0572220	
	DateCollected						
	DateExtracted	5/23/1996		5/29/1996		5/30/1996	
	DateAnalyzed	6/3/1996		6/3/1996		6/4/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg	330	U				
1,2,4-Trichlorobenzene	ug/Kg	330	U	330	U	330	U
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg						
Chloromethane	ug/L						
Vinyl chloride	ug/Kg						
Vinyl chloride	ug/L						
Bromomethane	ug/Kg						
Bromomethane	ug/L						
Chloroethane	ug/Kg						
Chloroethane	ug/L						
1,1-Dichloroethene	ug/Kg						
1,1-Dichloroethene	ug/L						
Acetone	ug/Kg						
Acetone	ug/L						
Carbon Disulfide	ug/Kg						
Carbon Disulfide	ug/L						
Methylene Chloride	ug/Kg						
Methylene Chloride	ug/L						
1,1-Dichloroethane	ug/Kg						
1,1-Dichloroethane	ug/L						
Vinyl acetate	ug/Kg						
Vinyl acetate	ug/L						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/L						
1,2-Dichloroethene (total)	ug/Kg						
1,2-Dichloroethene (total)	ug/L						
Chloroform	ug/Kg						
Chloroform	ug/L						
1,1,1-Trichloroethane	ug/Kg						

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572221		BLK0572222		BLK0572223	
	DateCollected						
	DateExtracted	6/1/1996					
	DateAnalyzed	6/7/1996		5/29/1996		5/29/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg	660	U				
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg					10	U
Chloromethane	ug/L			10	U		
Vinyl chloride	ug/Kg					10	U
Vinyl chloride	ug/L			10	U		
Bromomethane	ug/Kg					10	U
Bromomethane	ug/L			10	U		
Chloroethane	ug/Kg					10	U
Chloroethane	ug/L			10	U		
1,1-Dichloroethene	ug/Kg					5	U
1,1-Dichloroethene	ug/L			5	U		
Acetone	ug/Kg					10	U
Acetone	ug/L			10	U		
Carbon Disulfide	ug/Kg					5	U
Carbon Disulfide	ug/L			5	U		
Methylene Chloride	ug/Kg					5	U
Methylene Chloride	ug/L			5	U		
1,1-Dichloroethane	ug/Kg					5	U
1,1-Dichloroethane	ug/L			5	U		
Vinyl acetate	ug/Kg					10	U
Vinyl acetate	ug/L			10	U		
Methyl ethyl ketone (2-Butanone)	ug/Kg					10	U
Methyl ethyl ketone (2-Butanone)	ug/L			10	U		
1,2-Dichloroethene (total)	ug/Kg					5	U
1,2-Dichloroethene (total)	ug/L			5	U		
Chloroform	ug/Kg					5	U
Chloroform	ug/L			5	U		
1,1,1-Trichloroethane	ug/Kg					5	U

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417001		SBL0417001		SBL0417003	
	DateCollected						
	DateExtracted	12/1/1995		12/1/1995		12/1/1995	
	DateAnalyzed	12/6/1995		12/7/1995		12/7/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg			660	U		
1,2,4-Trichlorobenzene	ug/Kg	660	U	660	U	660	U
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg						
Chloromethane	ug/L						
Vinyl chloride	ug/Kg						
Vinyl chloride	ug/L						
Bromomethane	ug/Kg						
Bromomethane	ug/L						
Chloroethane	ug/Kg						
Chloroethane	ug/L						
1,1-Dichloroethene	ug/Kg						
1,1-Dichloroethene	ug/L						
Acetone	ug/Kg						
Acetone	ug/L						
Carbon Disulfide	ug/Kg						
Carbon Disulfide	ug/L						
Methylene Chloride	ug/Kg						
Methylene Chloride	ug/L						
1,1-Dichloroethane	ug/Kg						
1,1-Dichloroethane	ug/L						
Vinyl acetate	ug/Kg						
Vinyl acetate	ug/L						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/L						
1,2-Dichloroethene (total)	ug/Kg						
1,2-Dichloroethene (total)	ug/L						
Chloroform	ug/Kg						
Chloroform	ug/L						
1,1,1-Trichloroethane	ug/Kg						

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417005		SBL0436401		VBL0326501	
	DateCollected						
	DateExtracted	11/30/1995		12/20/1995			
	DateAnalyzed	12/7/1995		1/2/1996		12/19/1995	
	SDGNumber	24170		24364		24326	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg	660	U	660	U		
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg					10	U
Chloromethane	ug/L						
Vinyl chloride	ug/Kg					10	U
Vinyl chloride	ug/L						
Bromomethane	ug/Kg					10	U
Bromomethane	ug/L						
Chloroethane	ug/Kg					10	U
Chloroethane	ug/L						
1,1-Dichloroethene	ug/Kg					5	U
1,1-Dichloroethene	ug/L						
Acetone	ug/Kg					10	U
Acetone	ug/L						
Carbon Disulfide	ug/Kg					5	U
Carbon Disulfide	ug/L						
Methylene Chloride	ug/Kg					5	U
Methylene Chloride	ug/L						
1,1-Dichloroethane	ug/Kg					5	U
1,1-Dichloroethane	ug/L						
Vinyl acetate	ug/Kg					10	U
Vinyl acetate	ug/L						
Methyl ethyl ketone (2-Butanone)	ug/Kg					10	U
Methyl ethyl ketone (2-Butanone)	ug/L						
1,2-Dichloroethene (total)	ug/Kg					5	U
1,2-Dichloroethene (total)	ug/L						
Chloroform	ug/Kg					5	U
Chloroform	ug/L						
1,1,1-Trichloroethane	ug/Kg					5	U

Analytical Data S. .iary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326502		VBL0326503		VBL0326504	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/20/1995		12/21/1995		12/22/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg	10	U	10	U	1200	U
Chloromethane	ug/L						
Vinyl chloride	ug/Kg	10	U	10	U	1200	U
Vinyl chloride	ug/L						
Bromomethane	ug/Kg	10	U	10	U	1200	U
Bromomethane	ug/L						
Chloroethane	ug/Kg	10	U	10	U	1200	U
Chloroethane	ug/L						
1,1-Dichloroethene	ug/Kg	5	U	5	U	620	U
1,1-Dichloroethene	ug/L						
Acetone	ug/Kg	10	U	10	U	1200	U
Acetone	ug/L						
Carbon Disulfide	ug/Kg	5	U	5	U	620	U
Carbon Disulfide	ug/L						
Methylene Chloride	ug/Kg	5	U	5	U	620	U
Methylene Chloride	ug/L						
1,1-Dichloroethane	ug/Kg	5	U	5	U	620	U
1,1-Dichloroethane	ug/L						
Vinyl acetate	ug/Kg	10	U	10	U	1200	U
Vinyl acetate	ug/L						
Methyl ethyl ketone (2-Butanone)	ug/Kg	10	U	10	U	1200	U
Methyl ethyl ketone (2-Butanone)	ug/L						
1,2-Dichloroethene (total)	ug/Kg	5	U	5	U	620	U
1,2-Dichloroethene (total)	ug/L						
Chloroform	ug/Kg	5	U	5	U	620	U
Chloroform	ug/L						
1,1,1-Trichloroethane	ug/Kg	5	U	5	U	620	U

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326505		VBL0326506		VBL0417001	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/4/1995	
	SDGNumber	24326		24326		24170	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg					10	U
Chloromethane	ug/L	10	U	10	U		
Vinyl chloride	ug/Kg					10	U
Vinyl chloride	ug/L	10	U	10	U		
Bromomethane	ug/Kg					10	U
Bromomethane	ug/L	10	U	10	U		
Chloroethane	ug/Kg					10	U
Chloroethane	ug/L	10	U	10	U		
1,1-Dichloroethene	ug/Kg					5	U
1,1-Dichloroethene	ug/L	5	U	5	U		
Acetone	ug/Kg					10	U
Acetone	ug/L	10	U	10	U		
Carbon Disulfide	ug/Kg					5	U
Carbon Disulfide	ug/L	5	U	5	U		
Methylene Chloride	ug/Kg					5	U
Methylene Chloride	ug/L	5	U	5	U		
1,1-Dichloroethane	ug/Kg					5	U
1,1-Dichloroethane	ug/L	5	U	5	U		
Vinyl acetate	ug/Kg					10	U
Vinyl acetate	ug/L	10	U	10	U		
Methyl ethyl ketone (2-Butanone)	ug/Kg					10	U
Methyl ethyl ketone (2-Butanone)	ug/L	10	U	10	U		
1,2-Dichloroethene (total)	ug/Kg					5	U
1,2-Dichloroethene (total)	ug/L	5	U	5	U		
Chloroform	ug/Kg					5	U
Chloroform	ug/L	5	U	5	U		
1,1,1-Trichloroethane	ug/Kg					5	U

Analytical Data . .mary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417002		VBL0417003		VBL0417004	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/4/1995		12/5/1995		12/6/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg			10	U	10	U
Chloromethane	ug/L	10	U				
Vinyl chloride	ug/Kg			10	U	10	U
Vinyl chloride	ug/L	10	U				
Bromomethane	ug/Kg			10	U	10	U
Bromomethane	ug/L	10	U				
Chloroethane	ug/Kg			10	U	10	U
Chloroethane	ug/L	10	U				
1,1-Dichloroethene	ug/Kg			5	U	5	U
1,1-Dichloroethene	ug/L	5	U				
Acetone	ug/Kg			10	U	10	U
Acetone	ug/L	10	U				
Carbon Disulfide	ug/Kg			5	U	5	U
Carbon Disulfide	ug/L	5	U				
Methylene Chloride	ug/Kg			5	U	5	U
Methylene Chloride	ug/L	5	U				
1,1-Dichloroethane	ug/Kg			5	U	5	U
1,1-Dichloroethane	ug/L	5	U				
Vinyl acetate	ug/Kg			10	U	10	U
Vinyl acetate	ug/L	10	U				
Methyl ethyl ketone (2-Butanone)	ug/Kg			10	U	10	U
Methyl ethyl ketone (2-Butanone)	ug/L	10	U				
1,2-Dichloroethene (total)	ug/Kg			5	U	5	U
1,2-Dichloroethene (total)	ug/L	5	U				
Chloroform	ug/Kg			5	U	5	U
Chloroform	ug/L	5	U				
1,1,1-Trichloroethane	ug/Kg			5	U	5	U

Analytical Data Su. ..ary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417005		VBL0436401		VBL0436402	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/6/1995		12/22/1995		12/22/1995	
	SDGNumber	24170		24364		24364	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg			10	U	10	U
Chloromethane	ug/L	10	U				
Vinyl chloride	ug/Kg			10	U	10	U
Vinyl chloride	ug/L	10	U				
Bromomethane	ug/Kg			10	U	10	U
Bromomethane	ug/L	10	U				
Chloroethane	ug/Kg			10	U	10	U
Chloroethane	ug/L	10	U				
1,1-Dichloroethene	ug/Kg			5	U	5	U
1,1-Dichloroethene	ug/L	5	U				
Acetone	ug/Kg			10	U	10	U
Acetone	ug/L	10	U				
Carbon Disulfide	ug/Kg			5	U	5	U
Carbon Disulfide	ug/L	5	U				
Methylene Chloride	ug/Kg			5	U	5	U
Methylene Chloride	ug/L	5	U				
1,1-Dichloroethane	ug/Kg			5	U	5	U
1,1-Dichloroethane	ug/L	5	U				
Vinyl acetate	ug/Kg			10	U	10	U
Vinyl acetate	ug/L	10	U				
Methyl ethyl ketone (2-Butanone)	ug/Kg			10	U	10	U
Methyl ethyl ketone (2-Butanone)	ug/L	10	U				
1,2-Dichloroethene (total)	ug/Kg			5	U	5	U
1,2-Dichloroethene (total)	ug/L	5	U				
Chloroform	ug/Kg			5	U	5	U
Chloroform	ug/L	5	U				
1,1,1-Trichloroethane	ug/Kg			5	U	5	U

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0436403		VBL0436404		VBL0436405	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/27/1995	
	SDGNumber	24364		24364		24364	
Parameter	**Units**						
1,2-Dibromo-3-chloropropane	ug/Kg						
1,2,4-Trichlorobenzene	ug/Kg						
1,2,4-Trichlorobenzene	ug/L						
Chloromethane	ug/Kg	1200	U	1200	U		
Chloromethane	ug/L					10	U
Vinyl chloride	ug/Kg	1200	U	1200	U		
Vinyl chloride	ug/L					10	U
Bromomethane	ug/Kg	1200	U	1200	U		
Bromomethane	ug/L					10	U
Chloroethane	ug/Kg	1200	U	1200	U		
Chloroethane	ug/L					10	U
1,1-Dichloroethene	ug/Kg	620	U	620	U		
1,1-Dichloroethene	ug/L					5	U
Acetone	ug/Kg	1200	U	1200	U		
Acetone	ug/L					10	U
Carbon Disulfide	ug/Kg	620	U	620	U		
Carbon Disulfide	ug/L					5	U
Methylene Chloride	ug/Kg	620	U	620	U		
Methylene Chloride	ug/L					5	U
1,1-Dichloroethane	ug/Kg	620	U	620	U		
1,1-Dichloroethane	ug/L					5	U
Vinyl acetate	ug/Kg	1200	U	1200	U		
Vinyl acetate	ug/L					10	U
Methyl ethyl ketone (2-Butanone)	ug/Kg	1200	U	1200	U		
Methyl ethyl ketone (2-Butanone)	ug/L					10	U
1,2-Dichloroethene (total)	ug/Kg	620	U	620	U		
1,2-Dichloroethene (total)	ug/L					5	U
Chloroform	ug/Kg	620	U	620	U		
Chloroform	ug/L					5	U
1,1,1-Trichloroethane	ug/Kg	620	U	620	U		

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083DB00202		083DB00202		083EB00202	
	DateCollected	12/18/1995		12/18/1995		12/18/1995	
	DateExtracted			12/19/1995			
	DateAnalyzed	12/27/1995		1/4/1996		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L	5	U			5	U
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L	5	U			5	U
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L	5	U			5	U
Benzene	ug/Kg						
Benzene	ug/L	5	U			5	U
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L	5	U			5	U
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L	5	U			5	U
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L	5	U			5	U
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L	10	U			10	U
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L	5	U			5	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U			10	U
Toluene	ug/Kg						
Toluene	ug/L	5	U			5	U
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L	5	U			5	U
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L	5	U			5	U
2-Hexanone	ug/Kg						
2-Hexanone	ug/L	10	U			10	U
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L	5	U			5	U
Dibromochloromethane	ug/Kg						

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083EB00202		083TB00402		083TB00502	
	DateCollected	12/18/1995		12/14/1995		12/18/1995	
	DateExtracted	12/19/1995					
	DateAnalyzed	1/4/1996		12/22/1995		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L			5	U	5	U
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L			5	U	5	U
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L			5	U	5	U
Benzene	ug/Kg						
Benzene	ug/L			5	U	5	U
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L			5	U	5	U
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L			5	U	5	U
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L			5	U	5	U
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L			10	U	10	U
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L			5	U	5	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L			10	U	10	U
Toluene	ug/Kg						
Toluene	ug/L			5	U	5	U
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L			5	U	5	U
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L			5	U	5	U
2-Hexanone	ug/Kg						
2-Hexanone	ug/L			10	U	10	U
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L			5	U	5	U
Dibromochloromethane	ug/Kg						

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083TB00602		084TB00101		084TB00802	
	DateCollected	12/19/1995		11/29/1995		5/24/1996	
	DateExtracted						
	DateAnalyzed	12/27/1995		12/4/1995		5/29/1996	
	SDGNumber	24364		24170		25722	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L	5	U	5	U	5	U
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L	5	U	5	U	5	U
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L	5	U	5	U	5	U
Benzene	ug/Kg						
Benzene	ug/L	5	U	5	U	5	U
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L	5	U	5	U	5	U
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L	5	U	5	U	5	U
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L	5	U	5	U	5	U
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L	10	U	10	U	10	U
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L	5	U	5	U	5	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U	10	U	10	U
Toluene	ug/Kg						
Toluene	ug/L	5	U	5	U	5	U
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L	5	U	5	U	5	U
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L	5	U	5	U	5	U
2-Hexanone	ug/Kg						
2-Hexanone	ug/L	10	U	10	U	10	U
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L	5	U	5	U	5	U
Dibromochloromethane	ug/Kg						

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572201		BLK0572219		BLK0572220	
	DateCollected						
	DateExtracted	5/23/1996		5/29/1996		5/30/1996	
	DateAnalyzed	6/3/1996		6/3/1996		6/4/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L						
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L						
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L						
Benzene	ug/Kg						
Benzene	ug/L						
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L						
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L						
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L						
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L						
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L						
Toluene	ug/Kg						
Toluene	ug/L						
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L						
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L						
2-Hexanone	ug/Kg						
2-Hexanone	ug/L						
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L						
Dibromochloromethane	ug/Kg						

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572221		BLK0572222		BLK0572223	
	DateCollected						
	DateExtracted	6/1/1996					
	DateAnalyzed	6/7/1996		5/29/1996		5/29/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L			5	U		
Carbon Tetrachloride	ug/Kg					5	U
Carbon Tetrachloride	ug/L			5	U		
1,2-Dichloroethane	ug/Kg					5	U
1,2-Dichloroethane	ug/L			5	U		
Benzene	ug/Kg					5	U
Benzene	ug/L			5	U		
Trichloroethylene (TCE)	ug/Kg					5	U
Trichloroethylene (TCE)	ug/L			5	U		
1,2-Dichloropropane	ug/Kg					5	U
1,2-Dichloropropane	ug/L			5	U		
Bromodichloromethane	ug/Kg					5	U
Bromodichloromethane	ug/L			5	U		
2-Chloroethyl vinyl ether	ug/Kg					10	U
2-Chloroethyl vinyl ether	ug/L			10	U		
cis-1,3-Dichloropropene	ug/Kg					5	U
cis-1,3-Dichloropropene	ug/L			5	U		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg					10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L			10	U		
Toluene	ug/Kg					5	U
Toluene	ug/L			5	U		
trans-1,3-Dichloropropene	ug/Kg					5	U
trans-1,3-Dichloropropene	ug/L			5	U		
1,1,2-Trichloroethane	ug/Kg					5	U
1,1,2-Trichloroethane	ug/L			5	U		
2-Hexanone	ug/Kg					10	U
2-Hexanone	ug/L			10	U		
Tetrachloroethylene (PCE)	ug/Kg					5	U
Tetrachloroethylene (PCE)	ug/L			5	U		
Dibromochloromethane	ug/Kg					5	U

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0326501		SBL0326502		SBL0326503	
	DateCollected						
	DateExtracted	12/16/1995		12/19/1995		12/19/1995	
	DateAnalyzed	12/22/1995		12/26/1995		1/4/1996	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L						
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L						
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L						
Benzene	ug/Kg						
Benzene	ug/L						
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L						
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L						
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L						
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L						
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L						
Toluene	ug/Kg						
Toluene	ug/L						
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L						
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L						
2-Hexanone	ug/Kg						
2-Hexanone	ug/L						
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L						
Dibromochloromethane	ug/Kg						

Analytical Data S[illegible]nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417001		SBL0417001		SBL0417003	
	DateCollected						
	DateExtracted	12/1/1995		12/1/1995		12/1/1995	
	DateAnalyzed	12/6/1995		12/7/1995		12/7/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L						
Carbon Tetrachloride	ug/Kg						
Carbon Tetrachloride	ug/L						
1,2-Dichloroethane	ug/Kg						
1,2-Dichloroethane	ug/L						
Benzene	ug/Kg						
Benzene	ug/L						
Trichloroethylene (TCE)	ug/Kg						
Trichloroethylene (TCE)	ug/L						
1,2-Dichloropropane	ug/Kg						
1,2-Dichloropropane	ug/L						
Bromodichloromethane	ug/Kg						
Bromodichloromethane	ug/L						
2-Chloroethyl vinyl ether	ug/Kg						
2-Chloroethyl vinyl ether	ug/L						
cis-1,3-Dichloropropene	ug/Kg						
cis-1,3-Dichloropropene	ug/L						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L						
Toluene	ug/Kg						
Toluene	ug/L						
trans-1,3-Dichloropropene	ug/Kg						
trans-1,3-Dichloropropene	ug/L						
1,1,2-Trichloroethane	ug/Kg						
1,1,2-Trichloroethane	ug/L						
2-Hexanone	ug/Kg						
2-Hexanone	ug/L						
Tetrachloroethylene (PCE)	ug/Kg						
Tetrachloroethylene (PCE)	ug/L						
Dibromochloromethane	ug/Kg						

Analytical Data . .mary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417005		SBL0436401		VBL0326501	
	DateCollected						
	DateExtracted	11/30/1995		12/20/1995			
	DateAnalyzed	12/7/1995		1/2/1996		12/19/1995	
	SDGNumber	24170		24364		24326	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L						
Carbon Tetrachloride	ug/Kg					5	U
Carbon Tetrachloride	ug/L						
1,2-Dichloroethane	ug/Kg					5	U
1,2-Dichloroethane	ug/L						
Benzene	ug/Kg					5	U
Benzene	ug/L						
Trichloroethylene (TCE)	ug/Kg					5	U
Trichloroethylene (TCE)	ug/L						
1,2-Dichloropropane	ug/Kg					5	U
1,2-Dichloropropane	ug/L						
Bromodichloromethane	ug/Kg					5	U
Bromodichloromethane	ug/L						
2-Chloroethyl vinyl ether	ug/Kg					10	U
2-Chloroethyl vinyl ether	ug/L						
cis-1,3-Dichloropropene	ug/Kg					5	U
cis-1,3-Dichloropropene	ug/L						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg					10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L						
Toluene	ug/Kg					5	U
Toluene	ug/L						
trans-1,3-Dichloropropene	ug/Kg					5	U
trans-1,3-Dichloropropene	ug/L						
1,1,2-Trichloroethane	ug/Kg					5	U
1,1,2-Trichloroethane	ug/L						
2-Hexanone	ug/Kg					10	U
2-Hexanone	ug/L						
Tetrachloroethylene (PCE)	ug/Kg					5	U
Tetrachloroethylene (PCE)	ug/L						
Dibromochloromethane	ug/Kg					5	U

Analytical Data S. .iary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326502		VBL0326503		VBL0326504	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/20/1995		12/21/1995		12/22/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L						
Carbon Tetrachloride	ug/Kg	5	U	5	U	620	U
Carbon Tetrachloride	ug/L						
1,2-Dichloroethane	ug/Kg	5	U	5	U	620	U
1,2-Dichloroethane	ug/L						
Benzene	ug/Kg	5	U	5	U	620	U
Benzene	ug/L						
Trichloroethylene (TCE)	ug/Kg	5	U	5	U	620	U
Trichloroethylene (TCE)	ug/L						
1,2-Dichloropropane	ug/Kg	5	U	5	U	620	U
1,2-Dichloropropane	ug/L						
Bromodichloromethane	ug/Kg	5	U	5	U	620	U
Bromodichloromethane	ug/L						
2-Chloroethyl vinyl ether	ug/Kg	10	U	10	U	1200	U
2-Chloroethyl vinyl ether	ug/L						
cis-1,3-Dichloropropene	ug/Kg	5	U	5	U	620	U
cis-1,3-Dichloropropene	ug/L						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg	10	U	10	U	1200	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L						
Toluene	ug/Kg	5	U	5	U	620	U
Toluene	ug/L						
trans-1,3-Dichloropropene	ug/Kg	5	U	5	U	620	U
trans-1,3-Dichloropropene	ug/L						
1,1,2-Trichloroethane	ug/Kg	5	U	5	U	620	U
1,1,2-Trichloroethane	ug/L						
2-Hexanone	ug/Kg	10	U	10	U	1200	U
2-Hexanone	ug/L						
Tetrachloroethylene (PCE)	ug/Kg	5	U	5	U	620	U
Tetrachloroethylene (PCE)	ug/L						
Dibromochloromethane	ug/Kg	5	U	5	U	620	U

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326505		VBL0326506		VBL0417001	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/4/1995	
	SDGNumber	24326		24326		24170	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L	5	U	5	U		
Carbon Tetrachloride	ug/Kg					5	U
Carbon Tetrachloride	ug/L	5	U	5	U		
1,2-Dichloroethane	ug/Kg					5	U
1,2-Dichloroethane	ug/L	5	U	5	U		
Benzene	ug/Kg					5	U
Benzene	ug/L	5	U	5	U		
Trichloroethylene (TCE)	ug/Kg					5	U
Trichloroethylene (TCE)	ug/L	5	U	5	U		
1,2-Dichloropropane	ug/Kg					5	U
1,2-Dichloropropane	ug/L	5	U	5	U		
Bromodichloromethane	ug/Kg					5	U
Bromodichloromethane	ug/L	5	U	5	U		
2-Chloroethyl vinyl ether	ug/Kg					10	U
2-Chloroethyl vinyl ether	ug/L	10	U	10	U		
cis-1,3-Dichloropropene	ug/Kg					5	U
cis-1,3-Dichloropropene	ug/L	5	U	5	U		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg					10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U	10	U		
Toluene	ug/Kg					5	U
Toluene	ug/L	5	U	5	U		
trans-1,3-Dichloropropene	ug/Kg					5	U
trans-1,3-Dichloropropene	ug/L	5	U	5	U		
1,1,2-Trichloroethane	ug/Kg					5	U
1,1,2-Trichloroethane	ug/L	5	U	5	U		
2-Hexanone	ug/Kg					10	U
2-Hexanone	ug/L	10	U	10	U		
Tetrachloroethylene (PCE)	ug/Kg					5	U
Tetrachloroethylene (PCE)	ug/L	5	U	5	U		
Dibromochloromethane	ug/Kg					5	U

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417002		VBL0417003		VBL0417004	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/4/1995		12/5/1995		12/6/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L	5	U				
Carbon Tetrachloride	ug/Kg			5	U	5	U
Carbon Tetrachloride	ug/L	5	U				
1,2-Dichloroethane	ug/Kg			5	U	5	U
1,2-Dichloroethane	ug/L	5	U				
Benzene	ug/Kg			5	U	5	U
Benzene	ug/L	5	U				
Trichloroethylene (TCE)	ug/Kg			5	U	5	U
Trichloroethylene (TCE)	ug/L	5	U				
1,2-Dichloropropane	ug/Kg			5	U	5	U
1,2-Dichloropropane	ug/L	5	U				
Bromodichloromethane	ug/Kg			5	U	5	U
Bromodichloromethane	ug/L	5	U				
2-Chloroethyl vinyl ether	ug/Kg			10	U	10	U
2-Chloroethyl vinyl ether	ug/L	10	U				
cis-1,3-Dichloropropene	ug/Kg			5	U	5	U
cis-1,3-Dichloropropene	ug/L	5	U				
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg			10	U	10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U				
Toluene	ug/Kg			5	U	5	U
Toluene	ug/L	5	U				
trans-1,3-Dichloropropene	ug/Kg			5	U	5	U
trans-1,3-Dichloropropene	ug/L	5	U				
1,1,2-Trichloroethane	ug/Kg			5	U	5	U
1,1,2-Trichloroethane	ug/L	5	U				
2-Hexanone	ug/Kg			10	U	10	U
2-Hexanone	ug/L	10	U				
Tetrachloroethylene (PCE)	ug/Kg			5	U	5	U
Tetrachloroethylene (PCE)	ug/L	5	U				
Dibromochloromethane	ug/Kg			5	U	5	U

Analytical Data S[illegible]nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417005		VBL0436401		VBL0436402	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/6/1995		12/22/1995		12/22/1995	
	SDGNumber	24170		24364		24364	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L	5	U				
Carbon Tetrachloride	ug/Kg			5	U	5	U
Carbon Tetrachloride	ug/L	5	U				
1,2-Dichloroethane	ug/Kg			5	U	5	U
1,2-Dichloroethane	ug/L	5	U				
Benzene	ug/Kg			5	U	5	U
Benzene	ug/L	5	U				
Trichloroethylene (TCE)	ug/Kg			5	U	5	U
Trichloroethylene (TCE)	ug/L	5	U				
1,2-Dichloropropane	ug/Kg			5	U	5	U
1,2-Dichloropropane	ug/L	5	U				
Bromodichloromethane	ug/Kg			5	U	5	U
Bromodichloromethane	ug/L	5	U				
2-Chloroethyl vinyl ether	ug/Kg			10	U	10	U
2-Chloroethyl vinyl ether	ug/L	10	U				
cis-1,3-Dichloropropene	ug/Kg			5	U	5	U
cis-1,3-Dichloropropene	ug/L	5	U				
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg			10	U	10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U				
Toluene	ug/Kg			5	U	5	U
Toluene	ug/L	5	U				
trans-1,3-Dichloropropene	ug/Kg			5	U	5	U
trans-1,3-Dichloropropene	ug/L	5	U				
1,1,2-Trichloroethane	ug/Kg			5	U	5	U
1,1,2-Trichloroethane	ug/L	5	U				
2-Hexanone	ug/Kg			10	U	10	U
2-Hexanone	ug/L	10	U				
Tetrachloroethylene (PCE)	ug/Kg			5	U	5	U
Tetrachloroethylene (PCE)	ug/L	5	U				
Dibromochloromethane	ug/Kg			5	U	5	U

Analytical Data S .ıary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0436403		VBL0436404		VBL0436405	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/27/1995	
	SDGNumber	24364		24364		24364	
Parameter	**Units**						
1,1,1-Trichloroethane	ug/L					5	U
Carbon Tetrachloride	ug/Kg	620	U	620	U		
Carbon Tetrachloride	ug/L					5	U
1,2-Dichloroethane	ug/Kg	620	U	620	U		
1,2-Dichloroethane	ug/L					5	U
Benzene	ug/Kg	620	U	620	U		
Benzene	ug/L					5	U
Trichloroethylene (TCE)	ug/Kg	620	U	620	U		
Trichloroethylene (TCE)	ug/L					5	U
1,2-Dichloropropane	ug/Kg	620	U	620	U		
1,2-Dichloropropane	ug/L					5	U
Bromodichloromethane	ug/Kg	620	U	620	U		
Bromodichloromethane	ug/L					5	U
2-Chloroethyl vinyl ether	ug/Kg	1200	U	1200	U		
2-Chloroethyl vinyl ether	ug/L					10	U
cis-1,3-Dichloropropene	ug/Kg	620	U	620	U		
cis-1,3-Dichloropropene	ug/L					5	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg	1200	U	1200	U		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L					10	U
Toluene	ug/Kg	620	U	620	U		
Toluene	ug/L					5	U
trans-1,3-Dichloropropene	ug/Kg	620	U	620	U		
trans-1,3-Dichloropropene	ug/L					5	U
1,1,2-Trichloroethane	ug/Kg	620	U	620	U		
1,1,2-Trichloroethane	ug/L					5	U
2-Hexanone	ug/Kg	1200	U	1200	U		
2-Hexanone	ug/L					10	U
Tetrachloroethylene (PCE)	ug/Kg	620	U	620	U		
Tetrachloroethylene (PCE)	ug/L					5	U
Dibromochloromethane	ug/Kg	620	U	620	U		

Analytical Data S. .ıary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083DB00202		083DB00202		083EB00202	
	DateCollected	12/18/1995		12/18/1995		12/18/1995	
	DateExtracted			12/19/1995			
	DateAnalyzed	12/27/1995		1/4/1996		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
Dibromochloromethane	ug/L	5	U			5	U
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L	5	U			5	U
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L	5	U			5	U
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L	5	U			5	U
Styrene	ug/Kg						
Styrene	ug/L	5	U			5	U
Bromoform	ug/Kg						
Bromoform	ug/L	5	U			5	U
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L	5	U			5	U

Analytical Data S. .nary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083EB00202		083TB00402		083TB00502	
	DateCollected	12/18/1995		12/14/1995		12/18/1995	
	DateExtracted	12/19/1995					
	DateAnalyzed	1/4/1996		12/22/1995		12/27/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
Dibromochloromethane	ug/L			5	U	5	U
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L			5	U	5	U
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L			5	U	5	U
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L			5	U	5	U
Styrene	ug/Kg						
Styrene	ug/L			5	U	5	U
Bromoform	ug/Kg						
Bromoform	ug/L			5	U	5	U
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L			5	U	5	U

Analytical Data Summary

	StationID	FIELDQC		FIELDQC		FIELDQC	
	SampleID	083TB00602		084TB00101		084TB00802	
	DateCollected	12/19/1995		11/29/1995		5/24/1996	
	DateExtracted						
	DateAnalyzed	12/27/1995		12/4/1995		5/29/1996	
	SDGNumber	24364		24170		25722	
Parameter	**Units**						
Dibromochloromethane	ug/L	5	U	5	U	5	U
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L	5	U	5	U	5	U
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L	5	U	5	U	5	U
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L	5	U	5	U	5	U
Styrene	ug/Kg						
Styrene	ug/L	5	U	5	U	5	U
Bromoform	ug/Kg						
Bromoform	ug/L	5	U	5	U	5	U
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L	5	U	5	U	5	U

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572201		BLK0572219		BLK0572220	
	DateCollected						
	DateExtracted	5/23/1996		5/29/1996		5/30/1996	
	DateAnalyzed	6/3/1996		6/3/1996		6/4/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
Dibromochloromethane	ug/L						
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L						
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L						
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L						
Styrene	ug/Kg						
Styrene	ug/L						
Bromoform	ug/Kg						
Bromoform	ug/L						
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L						

Analytical Data Summary

	StationID	LABQC		LABQC		LABQC	
	SampleID	BLK0572221		BLK0572222		BLK0572223	
	DateCollected						
	DateExtracted	6/1/1996					
	DateAnalyzed	6/7/1996		5/29/1996		5/29/1996	
	SDGNumber	25722		25722		25722	
Parameter	**Units**						
Dibromochloromethane	ug/L			5	U		
Chlorobenzene	ug/Kg					5	U
Chlorobenzene	ug/L			5	U		
Ethylbenzene	ug/Kg					5	U
Ethylbenzene	ug/L			5	U		
Xylenes, Total	ug/Kg					5	U
Xylenes, Total	ug/L			5	U		
Styrene	ug/Kg					5	U
Styrene	ug/L			5	U		
Bromoform	ug/Kg					5	U
Bromoform	ug/L			5	U		
1,1,2,2-Tetrachloroethane	ug/Kg					5	U
1,1,2,2-Tetrachloroethane	ug/L			5	U		

Analytical Data S nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0326501		SBL0326502		SBL0326503	
	DateCollected						
	DateExtracted	12/16/1995		12/19/1995		12/19/1995	
	DateAnalyzed	12/22/1995		12/26/1995		1/4/1996	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
Dibromochloromethane	ug/L						
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L						
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L						
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L						
Styrene	ug/Kg						
Styrene	ug/L						
Bromoform	ug/Kg						
Bromoform	ug/L						
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L						

Analytical Data . nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417001		SBL0417001		SBL0417003	
	DateCollected						
	DateExtracted	12/1/1995		12/1/1995		12/1/1995	
	DateAnalyzed	12/6/1995		12/7/1995		12/7/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
Dibromochloromethane	ug/L						
Chlorobenzene	ug/Kg						
Chlorobenzene	ug/L						
Ethylbenzene	ug/Kg						
Ethylbenzene	ug/L						
Xylenes, Total	ug/Kg						
Xylenes, Total	ug/L						
Styrene	ug/Kg						
Styrene	ug/L						
Bromoform	ug/Kg						
Bromoform	ug/L						
1,1,2,2-Tetrachloroethane	ug/Kg						
1,1,2,2-Tetrachloroethane	ug/L						

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	SBL0417005		SBL0436401		VBL0326501	
	DateCollected						
	DateExtracted	11/30/1995		12/20/1995			
	DateAnalyzed	12/7/1995		1/2/1996		12/19/1995	
	SDGNumber	24170		24364		24326	
Parameter	**Units**						
Dibromochloromethane	ug/L						
Chlorobenzene	ug/Kg					5	U
Chlorobenzene	ug/L						
Ethylbenzene	ug/Kg					5	U
Ethylbenzene	ug/L						
Xylenes, Total	ug/Kg					5	U
Xylenes, Total	ug/L						
Styrene	ug/Kg					5	U
Styrene	ug/L						
Bromoform	ug/Kg					5	U
Bromoform	ug/L						
1,1,2,2-Tetrachloroethane	ug/Kg					5	U
1,1,2,2-Tetrachloroethane	ug/L						

Analytical Data S .mary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326502		VBL0326503		VBL0326504	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/20/1995		12/21/1995		12/22/1995	
	SDGNumber	24326		24326		24326	
Parameter	**Units**						
Dibromochloromethane	ug/L						
Chlorobenzene	ug/Kg	5	U	5	U	620	U
Chlorobenzene	ug/L						
Ethylbenzene	ug/Kg	5	U	5	U	620	U
Ethylbenzene	ug/L						
Xylenes, Total	ug/Kg	5	U	5	U	620	U
Xylenes, Total	ug/L						
Styrene	ug/Kg	5	U	5	U	620	U
Styrene	ug/L						
Bromoform	ug/Kg	5	U	5	U	620	U
Bromoform	ug/L						
1,1,2,2-Tetrachloroethane	ug/Kg	5	U	5	U	620	U
1,1,2,2-Tetrachloroethane	ug/L						

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0326505		VBL0326506		VBL0417001	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/4/1995	
	SDGNumber	24326		24326		24170	
Parameter	**Units**						
Dibromochloromethane	ug/L	5	U	5	U		
Chlorobenzene	ug/Kg					5	U
Chlorobenzene	ug/L	5	U	5	U		
Ethylbenzene	ug/Kg					5	U
Ethylbenzene	ug/L	5	U	5	U		
Xylenes, Total	ug/Kg					5	U
Xylenes, Total	ug/L	5	U	5	U		
Styrene	ug/Kg					5	U
Styrene	ug/L	5	U	5	U		
Bromoform	ug/Kg					5	U
Bromoform	ug/L	5	U	5	U		
1,1,2,2-Tetrachloroethane	ug/Kg					5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U	5	U		

Analytical Data S .iary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417002		VBL0417003		VBL0417004	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/4/1995		12/5/1995		12/6/1995	
	SDGNumber	24170		24170		24170	
Parameter	**Units**						
Dibromochloromethane	ug/L	5	U				
Chlorobenzene	ug/Kg			5	U	5	U
Chlorobenzene	ug/L	5	U				
Ethylbenzene	ug/Kg			5	U	5	U
Ethylbenzene	ug/L	5	U				
Xylenes, Total	ug/Kg			5	U	5	U
Xylenes, Total	ug/L	5	U				
Styrene	ug/Kg			5	U	5	U
Styrene	ug/L	5	U				
Bromoform	ug/Kg			5	U	5	U
Bromoform	ug/L	5	U				
1,1,2,2-Tetrachloroethane	ug/Kg			5	U	5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U				

Analytical Data S .nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0417005		VBL0436401		VBL0436402	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/6/1995		12/22/1995		12/22/1995	
	SDGNumber	24170		24364		24364	
Parameter	**Units**						
Dibromochloromethane	ug/L	5	U				
Chlorobenzene	ug/Kg			5	U	5	U
Chlorobenzene	ug/L	5	U				
Ethylbenzene	ug/Kg			5	U	5	U
Ethylbenzene	ug/L	5	U				
Xylenes, Total	ug/Kg			5	U	5	U
Xylenes, Total	ug/L	5	U				
Styrene	ug/Kg			5	U	5	U
Styrene	ug/L	5	U				
Bromoform	ug/Kg			5	U	5	U
Bromoform	ug/L	5	U				
1,1,2,2-Tetrachloroethane	ug/Kg			5	U	5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U				

Analytical Data S[illegible]nary

	StationID	LABQC		LABQC		LABQC	
	SampleID	VBL0436403		VBL0436404		VBL0436405	
	DateCollected						
	DateExtracted						
	DateAnalyzed	12/22/1995		12/27/1995		12/27/1995	
	SDGNumber	24364		24364		24364	
Parameter	**Units**						
Dibromochloromethane	ug/L					5	U
Chlorobenzene	ug/Kg	620	U	620	U		
Chlorobenzene	ug/L					5	U
Ethylbenzene	ug/Kg	620	U	620	U		
Ethylbenzene	ug/L					5	U
Xylenes, Total	ug/Kg	620	U	620	U		
Xylenes, Total	ug/L					5	U
Styrene	ug/Kg	620	U	620	U		
Styrene	ug/L					5	U
Bromoform	ug/Kg	620	U	620	U		
Bromoform	ug/L					5	U
1,1,2,2-Tetrachloroethane	ug/Kg	620	U	620	U		
1,1,2,2-Tetrachloroethane	ug/L					5	U

Appendix E

Data

Chemical: Antimony
Media: Soil
Site: SWMU 83/84/AOC574
Units: ug/kg
Date: 06/24/2002

☑ Use 1/2 DL for Nondetects

Anavalue	ProjQual	1/2 Detect Limit	Detected
0.5	UJ	0.23	FALSE
0.5	UJ	0.235	FALSE
0.5	UJ	0.24	FALSE
0.5	UJ	0.23	FALSE
0.5	UJ	0.23	FALSE
0.5	U	0.23	FALSE
3.7	J	3.7	TRUE
0.4	UJ	0.22	FALSE
3.4	UJ	1.7	FALSE
0.6	J	0.59	TRUE
0.4	UJ	0.22	FALSE
2.1	J	2.1	TRUE
1.6	J	1.6	TRUE
0.6	J	0.6	TRUE
0.4	UJ	0.215	FALSE
10.7	J	10.7	TRUE
0.9	J	0.86	TRUE
3.5	UJ	1.75	FALSE
1.4	UJ	0.7	FALSE
5.0	J	5	TRUE
9.1	J	9.1	TRUE
0.9	J	0.93	TRUE
3.0	J	3	TRUE
10.7	J	10.7	TRUE
2.9	J	2.9	TRUE
7.1	J	7.1	TRUE
7.5	J	7.5	TRUE
0.6	J	0.6	TRUE
2.34	J	2.34	TRUE
1.96	J	1.96	TRUE
0.54	UJ	0.27	FALSE
0.81	J	0.81	TRUE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE

POPULATION IS BEST DESCRIBED AS:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

Hypothesis #1	Result	Accept Both Hypotheses?	
H_O: The population distribution is normal	**Reject**	FALSE	*Then:*
H_A: The population distribution is not normal	**Accept**		*Therefore:*

Hypothesis #2		Reject Both Hypotheses?
H_O: The population distribution is lognormal	**Reject**	**TRUE**
H_A: The population distribution is not lognormal	**Accept**	**!! NONPARAMETRIC UCL95 CALCULATED !!**

Data:

x_i	ln x_i	$x_{(n-i+1)} - x_{(i)}$	ln $x_{(n-i+1)}$ - ln $x_{(i)}$	a_{n-i+1}	n	k	d_{normal}	d_{log}	W_{normal}	W_{log}	$W_{\alpha=0.05}$
0	-1.5	10	3.9	0.4188	32	16	308.2840	55.3787	0.7196	0.8963	0.9300
0	-1.4	10	3.9	0.2898							
0	-1.4	9	3.7	0.2462							
0	-1.5	7	3.5	0.2141							
0	-1.5	6.9	3.4	0.1878							
0.2	-1.5	4.8	3.1	0.1651							
3.7	1.3	3.5	2.8	0.1449							
0.2	-1.5	2.8	2.5	0.1265							
1.7	0.5	2.7	2.5	0.1093							
0.6	-0.5	2.1	2.2	0.0931							
0.2	-1.5	1.5	1.3	0.0777							
2.1	0.7	1.4	1.2	0.0629							
1.6	0.5	1.2	1.1	0.0485							
0.6	-0.51	1.0	0.9	0.0344							
0.2	-1.54	0.8	0.7	0.0206							
10.7	2.37	0.1	0.08	0.0068							
0.9	-0.15	-0.1	-0.08								
1.8	0.56	-0.8	-0.68								
0.7	-0.36	-1.0	-0.89								
5.0	1.61	-1.15	-1.07								
9.1	2.21	-1.36	-1.18								
0.9	-0.07	-2	-1								
3.0	1.099	-2	-2								
10.7	2	-2.66E+00	-2.49E+00								
2.9	1.06	-2.77E+00	-2.55E+00								
7.1	1.96	-3.47E+00	-2.78E+00								
7.50	2.01E+00	-4.77E+00	-3.08E+00								
0.6	-0.51	-6.87E+00	-3.43E+00								
2.3	0.85	-7.27E+00	-3.48E+00								
2.0	1	-8.88E+00	-3.72E+00								
0.27	-1.31E+00	-1.05E+01	-3.88E+00								
0.81	-2.11E-01	-1.05E+01	-3.91E+00								

Population Distribution:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

UCL95 Calculation

Normal		**Lognormal**	
Mean (x) =	2.5	Mean (y) =	0.09
Standard Deviation (s_x) =	3.2	Standard Deviation (s_y) =	1.3
Number of samples (n) =	32	Number of samples (n) =	32
Student t-statistic (t) =	1.6853	H-statistic (H) =	2.58785
$UCL95_{normal}$ =	3.4	$UCL95_{lognormal}$	5.0

Nonparametric

Frequency of Nondetection Equal or Greater than 50%:		FALSE
Number of samples (n) =	32	
$Z_{0.95}$ =	1.96	
M =	23	
X (23) =	2.34	
$UCL95_{nonparametric}$ =	2.34	

UTL CALCULATION:

Untransformed mean (x)	2.657188		
Log transformed mean (y)	0.09		
Std Dev (s_x)	3.153513		
Std Dev (s_y)	1.336566		
Number of samples (n)	32		
t-statistic ($t_{v,1-\alpha}$)	1.6853		
Tolerance factor (k)	2.1876	1.71143024	(<-Calculated K)

Population Distribution:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

UTL normal	9.555812
UTL lognormal	20.35423

		Minimum coverage (%)	Average coverage (%)
UTL nonparametric	11	74.1	91.5

Summary

Statistic	
N	32
Detects	19
FOD	59%
Mean of Detect	3.8
Min of Detect	0.59
Max of Detect	11

Mean (arithmetic)	2.7
Mean (geometric)	1.1

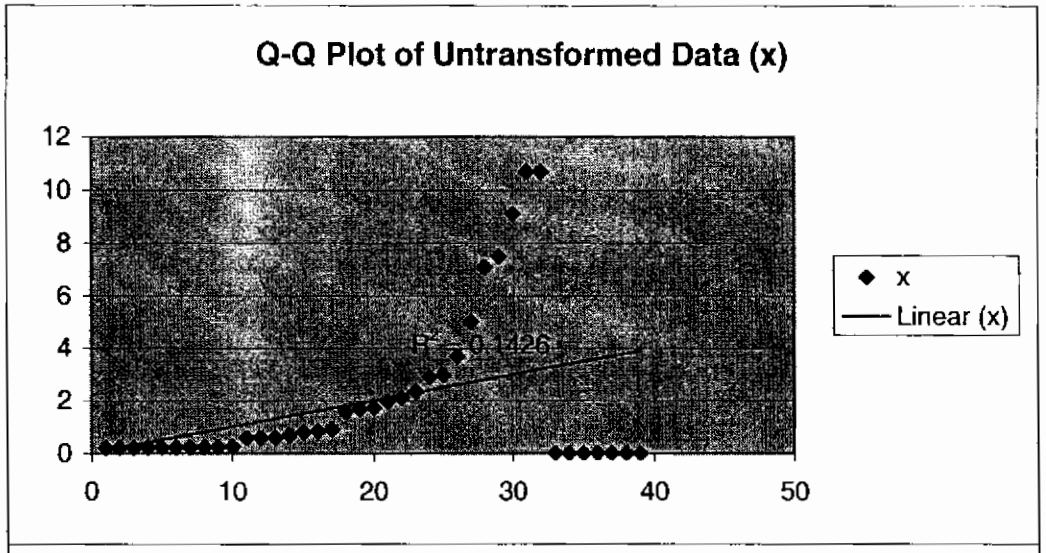
UCL95 Normal	3.4
UCL95 Lognormal	5.0
UCL95 Nonparametric	2.34

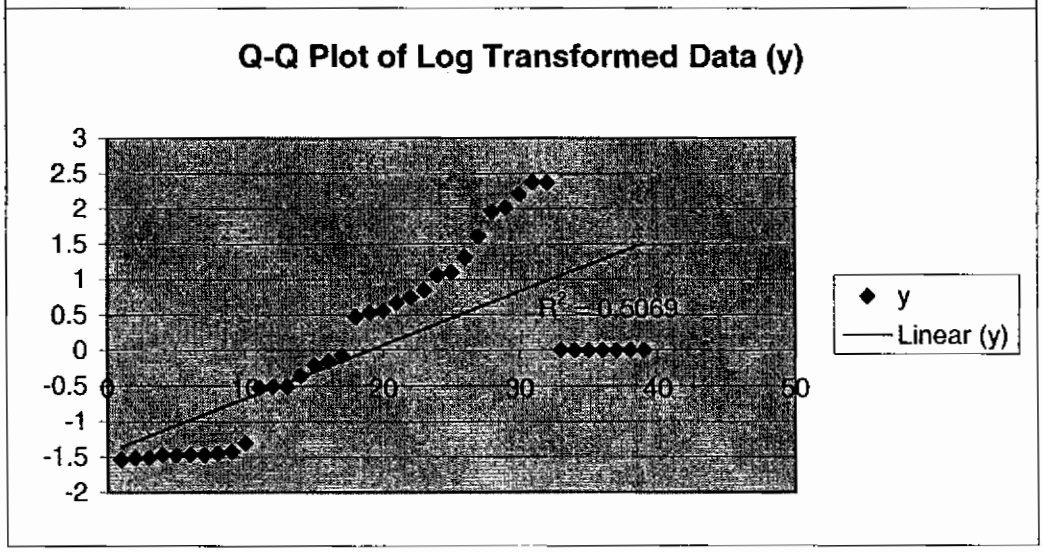
UTL95 Normal	9.555812
UTL95 Lognormal	20.35423
UTL95 Nonparametric	11

Information	
Chemical:	Antimony
Media:	Soil
Site:	SWMU 83/84/AOC574
Units:	ug/kg
Date:	37431

Population is best described as:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

Notes:
1. If population does not fit normal or lognormal distribution, check Q-Q plots and W-test values. The population may be close enough to one of those distributions to subjectively select a normal or lognormal distribution.
2. If the selected UCL95 exceeds the Max Detect, the Max Detect should be chosen as the EPC.
3. Nonparametric methods are generally robust, but using a distribution free measure of a population (UTL nonparametric or UCL nonparametric) to make site decisions should be approached with some caution, especially when sample sizes (n) is small or there are 50 to 90% nondetection.
4. If there is >90% nondetection, it is generally impossible to caclulate a UTL or UCL with any level of confidence.


Q-Q Plot of Untransformed Data (x)
12
10
8
6
4
2
0
0
10
20
30
40
50
R² = 0.1426
x
Linear (x)


Q-Q Plot of Log Transformed Data (y)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
R² = 0.5069
y
Linear (y)

Data

Chemical: Copper
Media: Soil
Site: SWMU 83/84/AOC574
Units: ug/kg
Date: 06/24/2002

☑ Use 1/2 DL for Nondetects

Anavalue	ProjQual	1/2 Detect Limit	Detected
107.0	=	107	TRUE
136.0	=	136	TRUE
5.0	=	5	TRUE
18.3	=	18.3	TRUE
142.0	=	142	TRUE
8.0	=	8	TRUE
243.0	=	243	TRUE
22.7	=	22.7	TRUE
439.0	J	439	TRUE
16.3	=	16.3	TRUE
4.2	J	4.2	TRUE
332.0	J	332	TRUE
476.0	J	476	TRUE
90.4	J	90.4	TRUE
6.9	J	6.9	TRUE
942.0	=	942	TRUE
9.1	=	9.1	TRUE
10.1	J	10.1	TRUE
1,180.0	=	1180	TRUE
868.0	=	868	TRUE
1,260.0	=	1260	TRUE
292.0	=	292	TRUE
610.0	=	610	TRUE
729.0	=	729	TRUE
602.0	=	602	TRUE
631.0	=	631	TRUE
933.0	=	933	TRUE
20.4	=	20.4	TRUE
135	=	135	TRUE
278	=	278	TRUE
37.4	=	37.4	TRUE
309	=	309	TRUE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE
			FALSE

POPULATION IS BEST DESCRIBED AS:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

Hypothesis #1	Result	Accept Both Hypotheses?	
H_O: The population distribution is normal	**Reject**	FALSE	*Then:*
H_A: The population distribution is not normal	**Accept**		*Therefore:*

Hypothesis #2		Reject Both Hypotheses?
H_O: The population distribution is lognormal	**Reject**	**TRUE**
H_A: The population distribution is not lognormal	**Accept**	**!! NONPARAMETRIC UCL95 CALCULATED !!**

Data:

x_i	$\ln x_i$	$x_{(n-i+1)} - x_{(i)}$	$\ln x_{(n-i+1)} - \ln x_{(i)}$	a_{n-i+1}	n	k	d_{normal}	d_{log}	W_{normal}	W_{log}	$W_{\alpha=0.05}$
107	4.7	1256	5.7	0.4188	32	16	########	106.3941	0.8337	0.8953	0.9300
136	4.9	1175	5.5	0.2898							
5	1.6	935	4.9	0.2462							
18	2.9	925	4.8	0.2141							
142	5.0	858.9	4.6	0.1878							
8.0	2.1	718.9	4.3	0.1651							
243.0	5.5	614.7	3.7	0.1449							
22.7	3.1	591.7	3.5	0.1265							
439.0	6.1	581.6	3.4	0.1093							
16.3	2.8	453.3	3.0	0.0931							
4.2	1.4	401.6	2.5	0.0777							
332.0	5.8	241.6	1.3	0.0629							
476.0	6.2	202.0	1.1	0.0485							
90.4	4.50	157.0	0.8	0.0344							
6.9	1.93	142.0	0.7	0.0206							
942.0	6.85	101.0	0.54	0.0068							
9.1	2.21	-101.0	-0.54								
10.1	2.31	-142.0	-0.71								
1180.0	7.07	-157.0	-0.77								
868.0	6.77	-202.00	-1.06								
1260.0	7.14	-241.60	-1.30								
292.0	5.68	-402	-2								
610.0	6.413	-453	-3								
729.0	7	-5.82E+02	-3.38E+00								
602.0	6.40	-5.92E+02	-3.51E+00								
631.0	6.45	-6.15E+02	-3.66E+00								
933.00	6.84E+00	-7.19E+02	-4.28E+00								
20.4	3.02	-8.59E+02	-4.56E+00								
135.0	4.91	-9.25E+02	-4.76E+00								
278.0	6	-9.35E+02	-4.92E+00								
37.40	3.62E+00	-1.18E+03	-5.46E+00								
309.00	5.73E+00	-1.26E+03	-5.70E+00								

Population Distribution:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

UCL95 Calculation

Normal		**Lognormal**	
Mean (x) =	340.4	Mean (y) =	4.75
Standard Deviation (s_x) =	375.6	Standard Deviation (s_y) =	1.9
Number of samples (n) =	32	Number of samples (n) =	32
Student t-statistic (t) =	1.6853	H-statistic (H) =	3.21185
$UCL95_{normal}$ =	452.3	$UCL95_{lognormal}$	1877.1

Nonparametric

Frequency of Nondetection Equal or Greater than 50%:	FALSE
Number of samples (n) =	32
$Z_{0.95}$ =	1.96
M =	23
X (23) =	476
$UCL95_{nonparametric}$ =	476

UTL CALCULATION:

Untransformed mean (x)	340.4	
Log transformed mean (y)	4.75	
Std Dev (s_x)	375.622	
Std Dev (s_y)	1.852584	
Number of samples (n)	32	
t-statistic ($t_{v,1-\alpha}$)	1.6853	
Tolerance factor (k)	2.1876	1.71143024 (<-Calculated K)

Population Distribution:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

UTL normal	1162.111
UTL lognormal	6670.59

		Minimum coverage (%)	Average coverage (%)
UTL nonparametric	1260	94.2	99.9

Summary

Statistic	
N	32
Detects	32
FOD	100%
Mean of Detect	340.4
Min of Detect	4.20
Max of Detect	1260

Mean (arithmetic)	340.4
Mean (geometric)	115.9

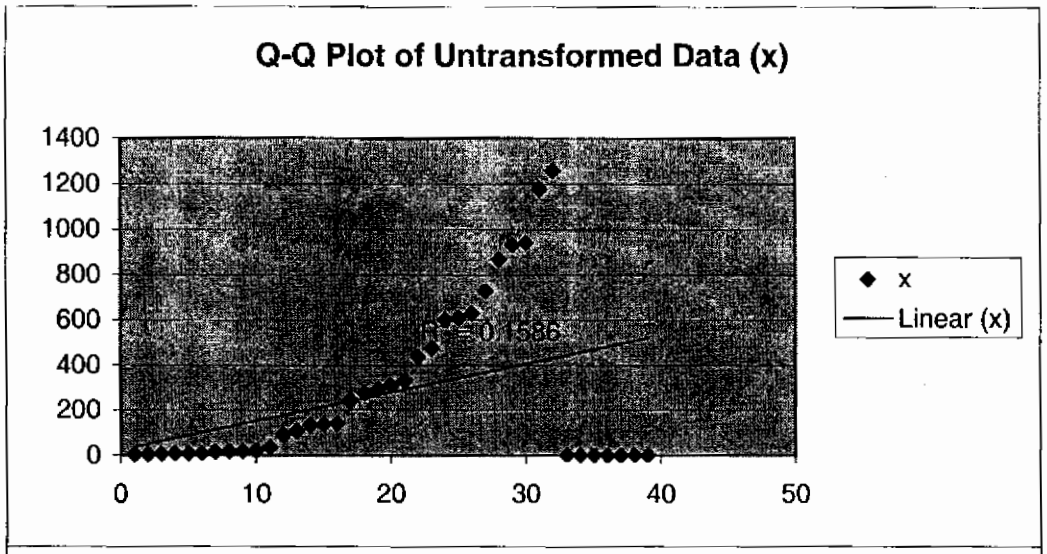
UCL95 Normal	452.3	
UCL95 Lognormal	1877.1	Exceeds Max Detect
UCL95 Nonparametric	476	

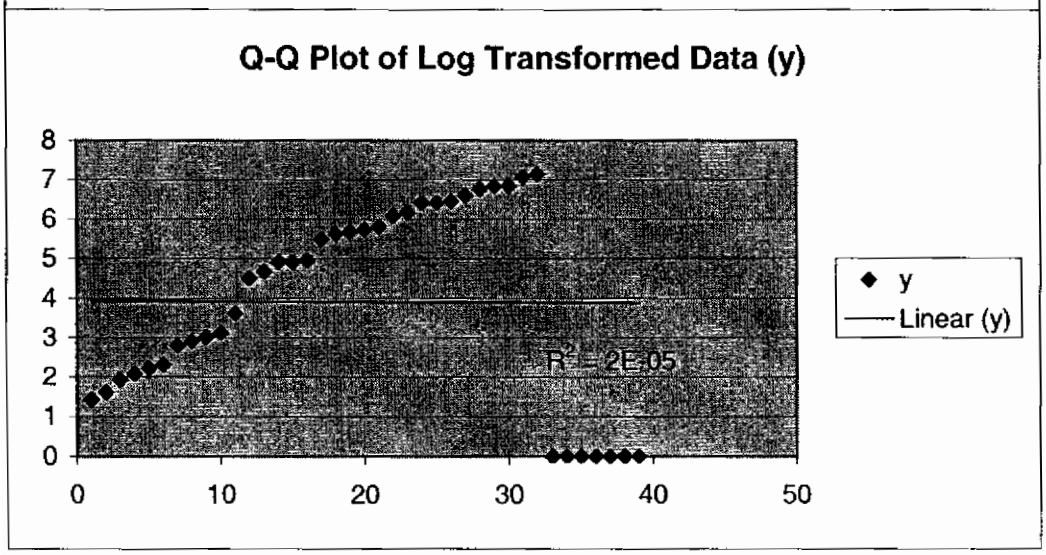
UTL95 Normal	1162.111
UTL95 Lognormal	6670.59
UTL95 Nonparametric	1260

Information	
Chemical:	Copper
Media:	Soil
Site:	SWMU 83/84/AOC574
Units:	ug/kg
Date:	37431

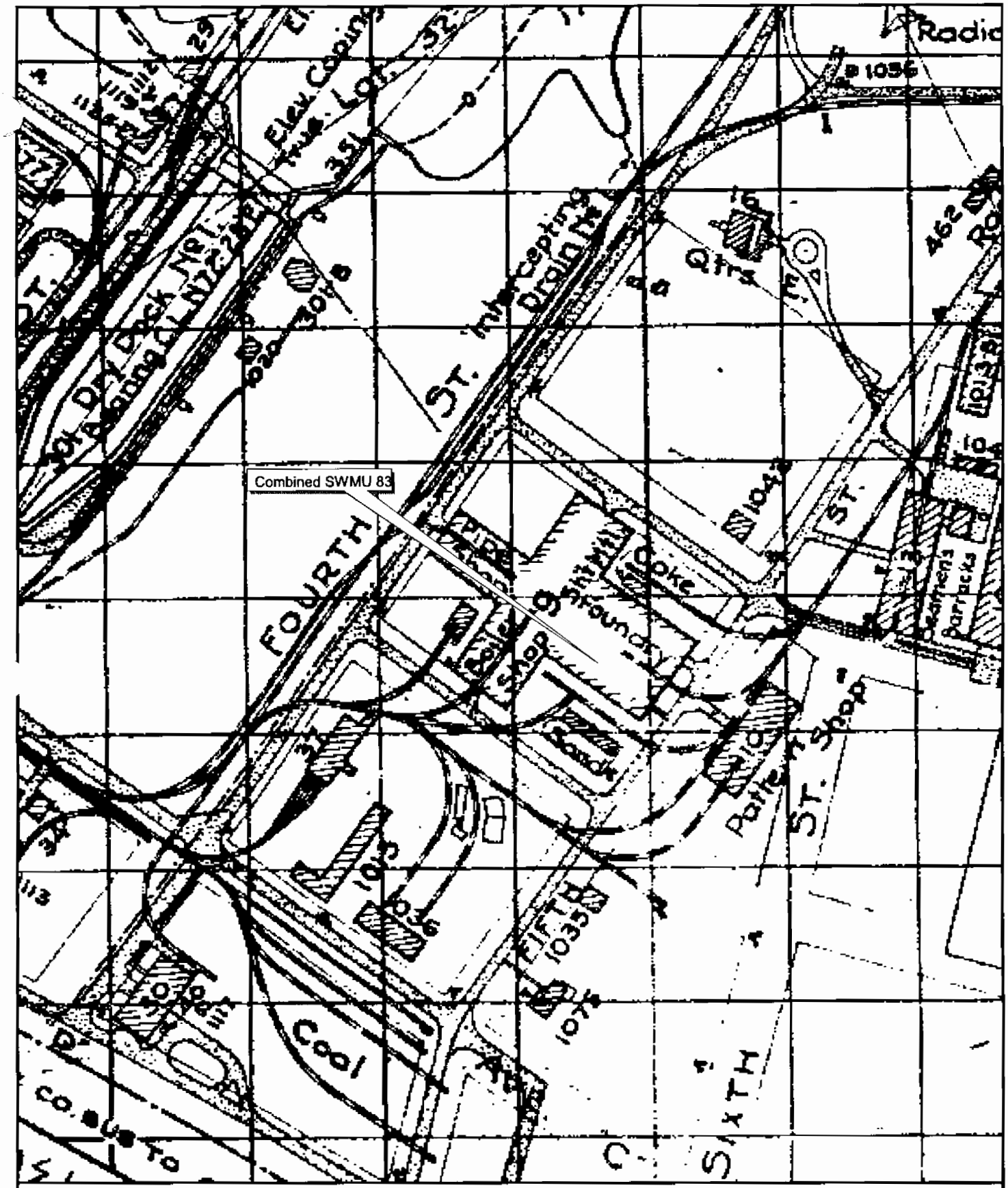
Population is best described as:
DOES NOT FIT NORMAL OR LOGNORMAL DISTRIBUTION

Notes:
1. If population does not fit normal or lognormal distribution, check Q-Q plots and W-test values. The population may be close enough to one of those distributions to subjectively select a normal or lognormal distribution.
2. If the selected UCL95 exceeds the Max Detect, the Max Detect should be chosen as the EPC.
3. Nonparametric methods are generally robust, but using a distribution free measure of a population (UTL nonparametric or UCL nonparametric) to make site decisions should be approached with some caution, especially when sample sizes (n) is small or there are 50 to 90% nondetection.
4. If there is >90% nondetection, it is generally impossible to caclulate a UTL or UCL with any level of confidence.


Q-Q Plot of Untransformed Data (x)
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
R² = 0.1586
x
Linear (x)


Q-Q Plot of Log Transformed Data (y)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
R² = 2E-05
y
Linear (y)

Appendix F



Historic Railroad Lines

N

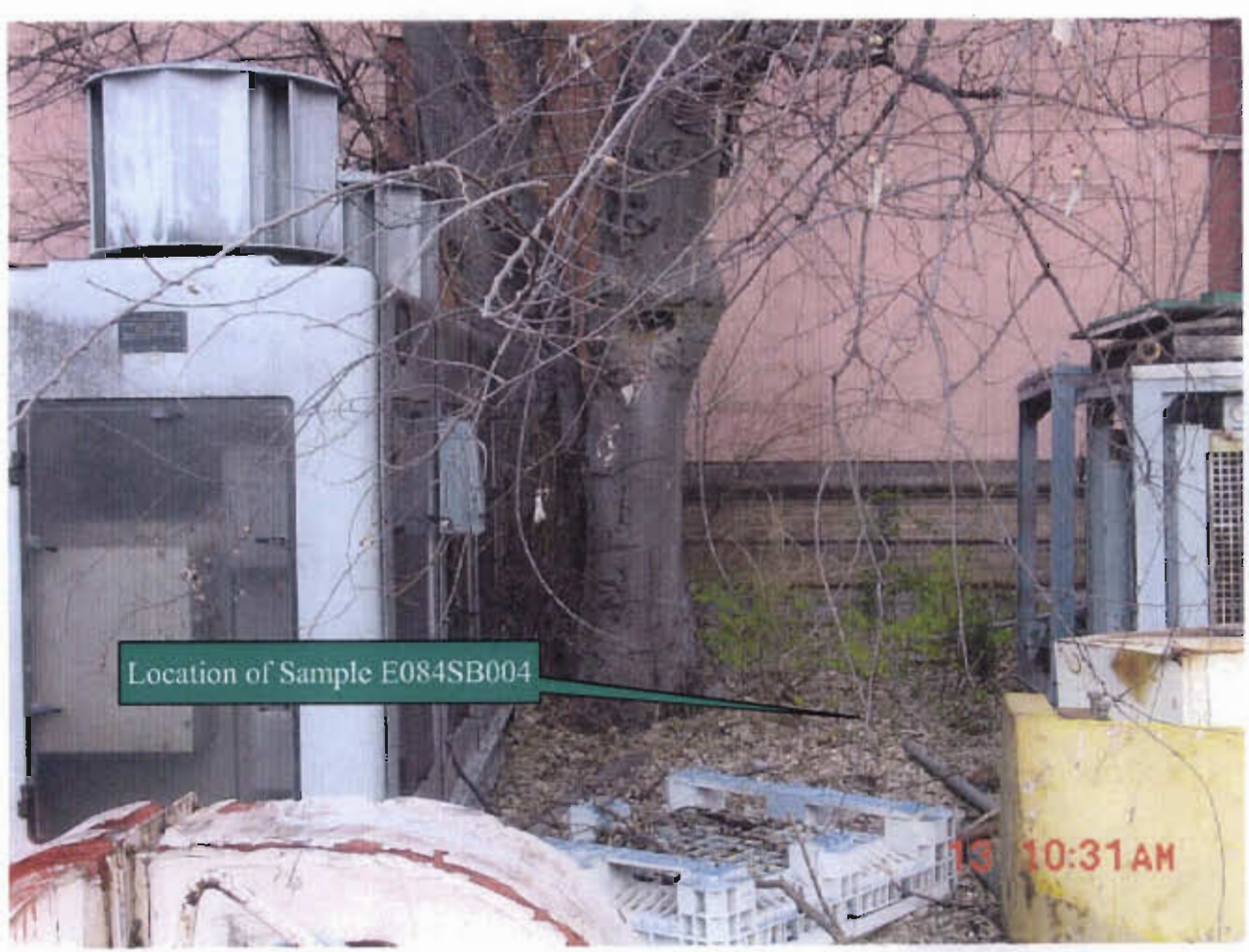
Figure F-1
Historic Railroad Lines near Combined SWMU 83
Zone E
Charleston Naval Complex

Source: US Navy Public Works Map, June 30, 1935, h606-38(a)

CH2MHILL

File Path: c:\18gis\projects\zone_e\swmu 83-cnc-egis.apr, Date: 05 Jul 2002 11:43, User: TWILEY

Appendix G



Site Photograph No. 1

Site Photograph No. 2

Site Photograph No. 3