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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM AREA OF CONCERN 704 (AOC 704) ZONE E CNC CHARLESTON SC

8/5/2002

CH2M HILL

RFI REPORT ADDENDUM

Area of Concern 704. Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

August 2002

Contract N62467-99-C-0960

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August 5, 2002

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

Re: RFI Report Addendum (Revision 0) – AOC 704, Zone E

Dear Mr. Scaturo:

Enclosed are four copies of the RFI Report Addendum (Revision 0) for AOC 704 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 Kris Garcia. Please contact her at 770/604-9182, extension 476, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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

RFI REPORT ADDENDUM

Area of Concern 704, Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

August 2002

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

Certification Page for RFI Report Addendum (Revision 0) – AOC 704, 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.

7/24/2002

Date

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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
CA	Corrective action
CMS	Corrective measures study
CNC	Charleston Naval Complex
COC	Chemical of concern
COPC	Chemical of potential concern
CSI	Confirmatory sampling investigation
DAF	Dilution attenuation factor
DMP	Data Management Plan
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
ESDLOQCM	Environmental Services Division Laboratory Operations and Quality Control Manual
ESDSOPQAM	Environmental Services Division Standard Operating Procedures and Quality Assurance Manual
ft bls	Feet below land surface
GIS	Geographic information system
IM	Interim measure
HI	Hazard index
LUC	Land use control
MCL	Maximum contaminant level
MEK	Methyl ethyl ketone
µg/kg	Microgram per kilogram
mg/kg	Milligram per kilogram

Acronyms and Abbreviations, Continued

NAVBASE	Naval Base
NFA	No further action
OWS	Oil/water separator
PAH	Polycyclic aromatic hydrocarbon
QAP	Quality Assurance Plan
RBC	Risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SB	Soil boring
SCDHEC	South Carolina Department of Health and Environmental Control
SSL	Soil screening level
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TCE	Trichloroethene
UST	Underground storage tank
VOC	Volatile organic compound

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 Area of Concern (AOC) 704 in Zone E of the CNC. The site is recommended for No Further Action (NFA). The area of the CNC in which AOC 704 is located is zoned for industrial use (M-2). Figure 1-1 illustrates the location of AOC 704 within Zone E. Figure 1-2 is an aerial photograph of AOC 704 taken in 1997.

1.1 Background

1.1.1 Site History

AOC 704 consists of an asphalt surface west of Building 301B, which is located between Dry Docks Nos. 1 and 2. AOC 704 has paint spills from past painting operations on the nearby piers (see Figure 1-1). The exact painting dates are not known, but CNC personnel stated that painting operations began prior to 1973.

AOC 704 was not investigated at the time of the initial Zone E RFI field work performed during 1996 and 1997. A pre-field investigation visual site inspection was performed by CH2M-Jones personnel on July 11, 2001. The area of interest associated with AOC 704 is approximately a small depression in the asphalt that is approximately 5 feet (ft) x 5 ft. The area is characterized by localized paint stains consistent with overspraying and minor spills. The paint appeared to be old, desiccated, and limited to minor surface contact. There is no evidence that paint residues ever penetrated the asphalt material.

The material of concern at this unit is identified in the *Final Zone E RCRA Facility Assessment (RFA)* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) and includes only spilled paint. To fulfill the confirmatory sampling investigation (CSI) objectives for AOC 704, soil was sampled in accordance with the *RFI Addendum Sampling Plan: Uninvestigated Sites – Zone E, Revision 1* (CH2M-Jones, 2001) to evaluate whether any contamination resulted from onsite activities. The CSI sampling event for AOC 704 was conducted in April 2002. The site area is zoned for industrial use (M-2).

1.1.2 Summary of Interim Measures and UST/AST Removals at AOC 704

UST/AST Removals

There are no known or suspected underground storage tanks (USTs) or aboveground storage tanks (ASTs) associated with this site.

Interim Measures

No interim measures (IMs) have been conducted at the site.

1.2 Purpose of the RFI Report Addendum

This RFI Report Addendum provides information about AOC 704, including the results of the sampling performed for the CSI. The results of the CSI are presented to complete the nature and extent investigation to identify chemicals of potential concern (COPCs). Based on a review of these results, AOC 704 is recommended for No Further Action (NFA) status.

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 (LUCs) at the site

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

Provided that the information presented in this report is adequate to address these site closeout items, it is expected that the BCT will concur that NFA is appropriate for AOC 704. At that time, a Statement of Basis will be prepared and made available for public comment in accordance with SCDHEC policy. This will allow for public participation in the final remedy selection.

1.3 Report Organization

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

1.0 Introduction – Presents the purpose and background information relating to this RFI Report Addendum.

2.0 Site Setting – Summarizes the geologic and hydrogeologic setting of AOC 704.

3.0 Field Investigation and Data Validation – Summarizes the conclusions from the CSI field investigation and data validation for AOC 704.

4.0 COPC Screening – Describes the results from the comparison of analytical results to COPC screening criteria.

5.0 COPC/COC Refinement – Includes the evaluation of COPCs to determine whether they are defined as chemicals of concern (COCs) for AOC 704.

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

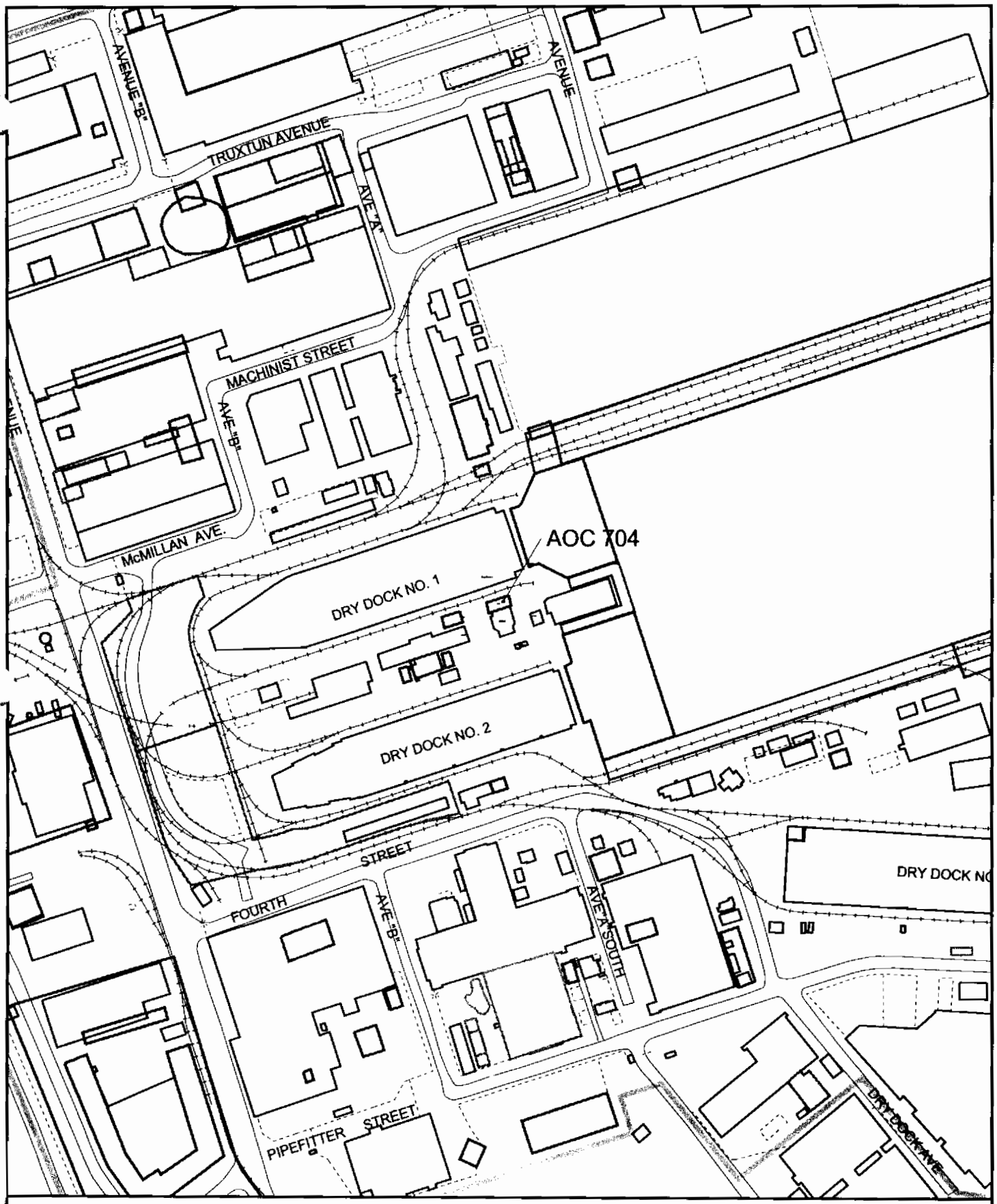
7.0 Conclusions and Recommendations – Summarizes the conclusions and recommendations of the CSI field investigation at AOC 704.

8.0 References – Lists the references used in this document.

Appendix A contains the analytical results for the samples collected at AOC 704.

Appendix B contains the data validation and summary report for the samples collected at AOC 704.

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



Fence
Railroads
Roads
AOC Boundary
SWMU Boundary
Buildings

N

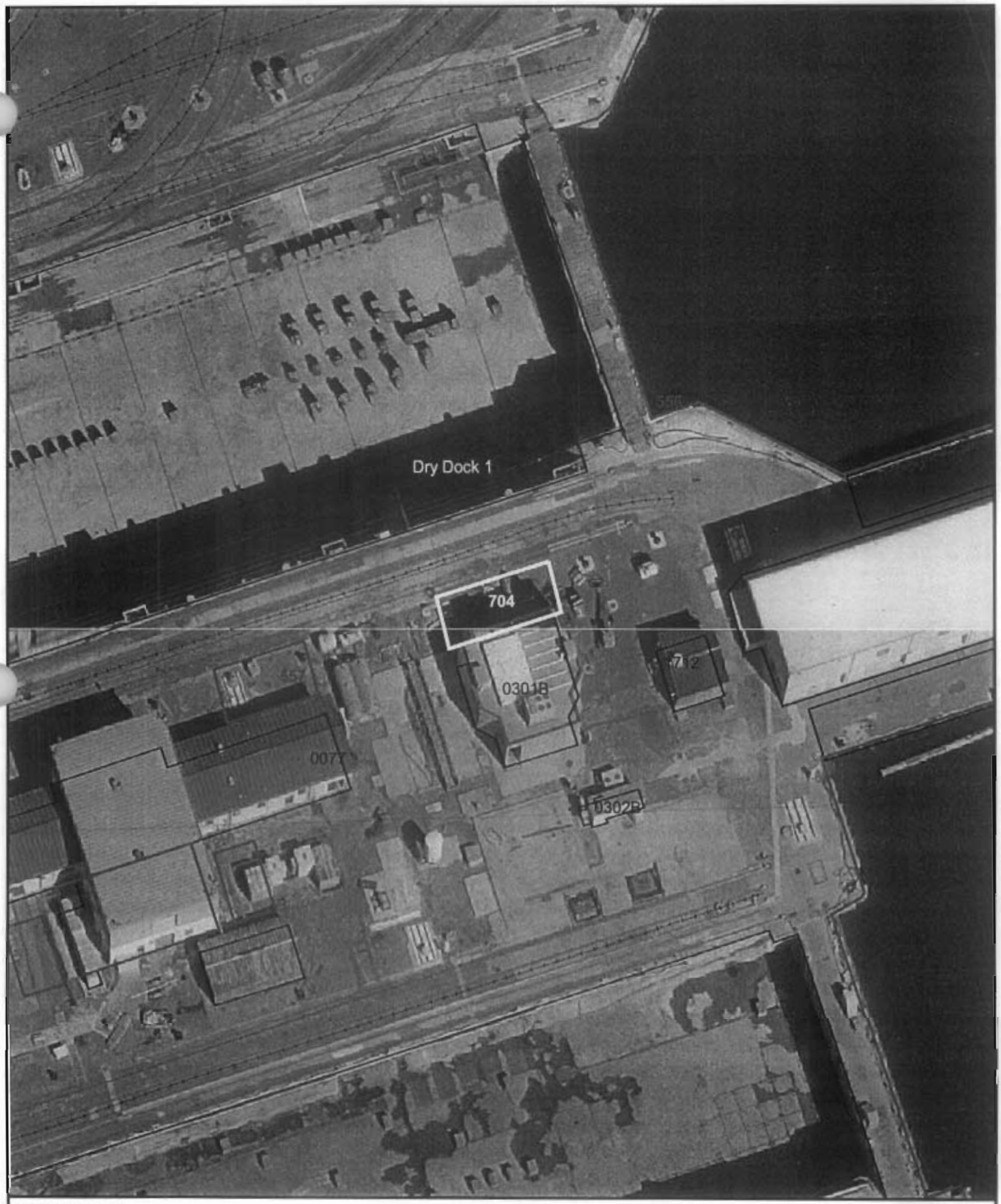
0 300 600 Feet

1 inch = 250 feet

Figure 1-1
Site Location Map
AOC 704, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\aoc704\aoc704.apr, Date: 11 Jul 2002 13:03, User: NMOUDRY, Figure 1-1



AOC 704
Railroads
Roads
Shoreline
AOC Boundary
Buildings

N

0 40 80 Feet

1 inch = 25 feet

Figure 1-2
Aerial Photo
AOC 704, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\aoc704\aoc704.apr, Date: 08 Apr 2002 8:47, User: NMCUDRY, Figure 1-2 Site Map

Section 2.0

2.0 Site Setting

The regional physiographic and geologic setting for the CNC area is described in the *Final Zone A RFI Report, Revision 0* (EnSafe/Allen & Hoshall, 1996). The regional hydrology and hydrogeology for the CNC area is also described in the Zone A RFI Report.

2.1 Geologic Setting

Detailed descriptions of the Quaternary- and Tertiary-age sediments encountered during the Zone E RFI, along with a detailed discussion of the various lithologic units encountered in Zone E, are presented in Section 2.2.1 of the *Zone E RFI Report, Revision 0* (EnSafe, 1997).

Due to extensive surface soil disturbance at the CNC during its operational history, approximately the upper 5 ft of the subsurface are typically a mixture of artificial fill and native sediments. However, the extent of fill placement varies within Zone E. Areas where extensive excavations have been performed or where native soils may have been unsuitable for foundation support may have undergone more extensive fill placement. Detailed descriptions of the soil types encountered in Zone E are presented in Section 2.2.3.3 of the RFI report.

The area at AOC 704 is covered with asphalt and situated between the concrete walls of Dry Docks Nos. 1 and 2. During the field investigation, the asphalt was found to be approximately 6-inches thick. Immediately underlying the asphalt was soil of dark sand with clay and shell fragments.

A review of the historical maps from 1909 to the present indicates that the overall area has been subjected to a complex series of construction, demolition, and expansion activities over the years. Some type of structure has been present where Building 301B is located since the CNC was originally constructed. It also appears that the area has been covered with cement and/or asphalt for its operational history. Overall, the area in and around AOC 704 has existed fairly consistently as a service area for the dry docks with little or no modification during its history.

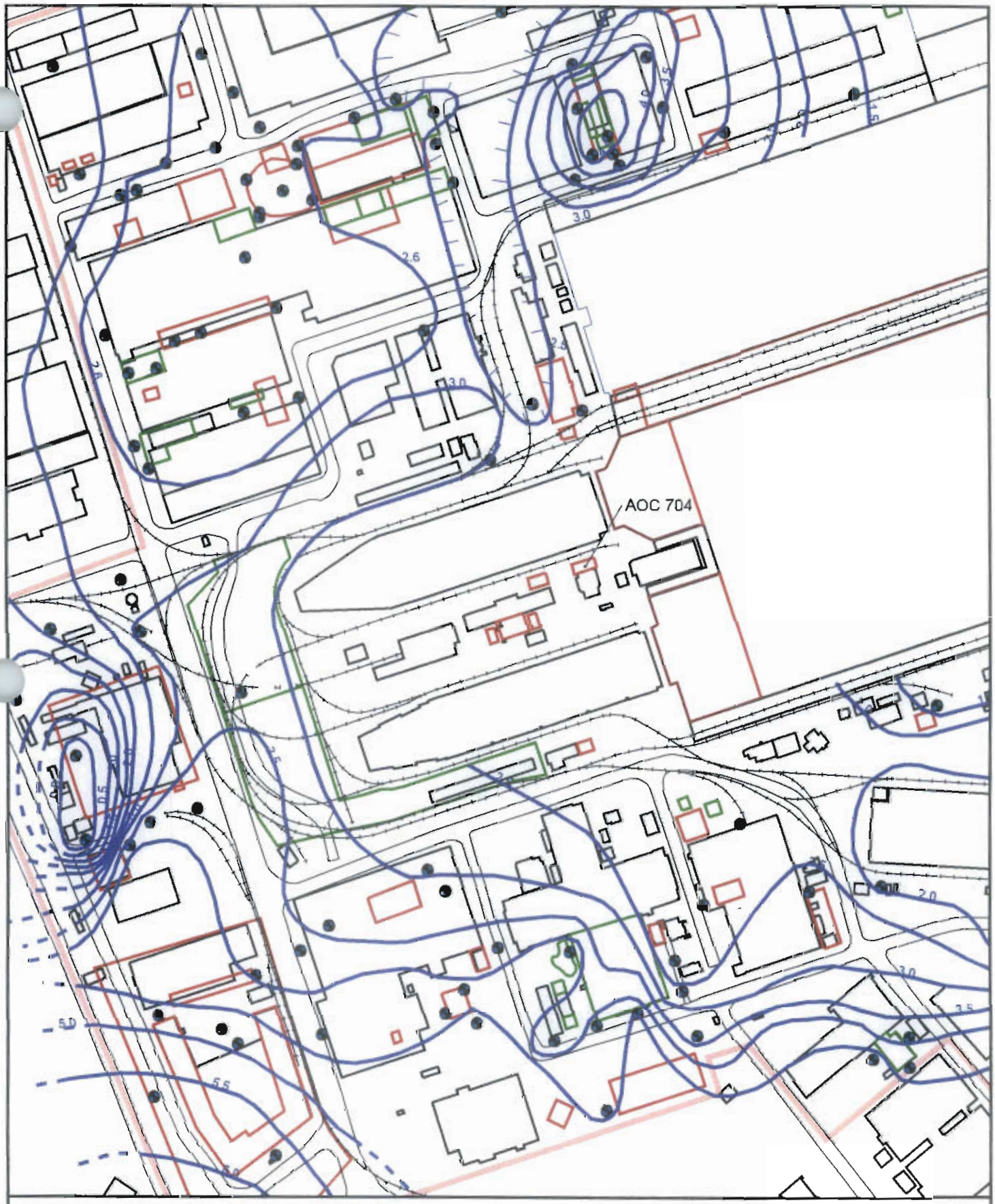
2.2 Hydrogeologic Setting

Based on information presented in Section 2.3 of the RFI report and a recent re-evaluation of the groundwater flow patterns in the area, it appears that the groundwater flow environment in Zone E is complex and is influenced by several factors:

- The eastern boundary of Zone E is the Cooper River, a regional groundwater discharge zone.
- The Cooper River is tidally influenced.
- A quay wall of sheet pilings and concrete lies along the waterfront; hydraulic integrity of the quay wall is largely unknown.
- The shallow subsurface has been heavily disturbed by anthropogenic activities related to industrial work within Zone E in the form of utilities, non-native fill material, support pilings, railroad lines, crane rails, etc.
- Geologic heterogeneity predominates the subsurface.

Detailed descriptions of the surficial aquifer, groundwater flow patterns, horizontal and vertical hydraulic gradients, horizontal hydraulic conductivities, grain-size distribution, and tidal influences are presented in Section 2.3 of the RFI report. The types of information, documentation and descriptions of various methodologies used in developing this information are also presented in Section 2.3 of the RFI report.

A recent shallow groundwater contour map has been developed for Zone E, using contemporaneous water level elevation data collected in April 2002 (see Figure 2-1). Based on the data, groundwater in the vicinity of AOC 704 appears to ultimately flow toward the Cooper River; however, there are be some strongly localized effects due to the presence of the concrete walls of the dry docks located to the north and south and by the concrete quay wall located to the east. These man-made structures control the northern, southern and eastern borders of the area. Depth to groundwater in the vicinity of AOC 704 is estimated to be approximately 6.5 to 7 ft bls.



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

N

0 200 400 Feet

1 inch = 250 feet

Figure 2-1
Shallow Groundwater Contours
AOC 704, Zone E
Charleston Naval Complex

CH2MHILL

Section 3.0

3.0 Field Investigation and Data Validation

3.1 Investigation Objectives

The sampling strategy for AOC 704, as described in the *RFI Addendum Sampling Plan: Uninvestigated Sites – Zone E, Revision 1* (CH2M-Jones, December 2001), was designed to collect sufficient environmental media data to accomplish the following:

- Characterize site conditions;
- Define the nature and extent of contamination, if any;
- Assess human health and ecological risk;
- Assess the need for additional investigation or corrective measures.

3.2 Sampling Procedures, Protocols, and Analyses

The sampling activities were performed in accordance with the Environmental Services Division *Standard Operating Procedures and Quality Assurance Manual* (ESDSOPQAM) (U.S. Environmental Protection Agency [EPA], 1996a); the *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994); the *RFI Addendum Sampling Plan: Uninvestigated Sites - Zone E, Revision 1* (CH2M-Jones, December 2001); and the *Charleston Naval Complex Project Team Notebook and Instructions, Revision 1A* (CH2M-Jones, December 2001).

3.2.1 Sample Identification

Media sampled during the CSI field investigation was limited to surface and subsurface soils. All samples collected during the CSI were labeled in accordance with the 10 character protocol established in the *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994) and provides a unique sample identification using the following format:

AAAbbCCCdd

- AAA = SWMU/AOC number
- bb = Environmental medium
- CCC = Location
- dd = Sample interval

3.2.2 Concrete/Asphalt Coring

Due to the placement of AOC 704 between two major structures (Dry Docks Nos. 1 and 2) and the proximity of the quay wall to the east at the edge of the Cooper River and its

elevation relative to the river, it was anticipated that the pavement could be up several feet thick. During the CSI field investigation, it was found that the thickness of the asphalt was approximately 6 inches and the soil beneath the concrete was accessible for sampling.

3.2.3 Soil Sampling

To evaluate the nature and extent of contaminants at AOC 704, two soil borings (SBs), identified as E704SB001 and E704SB002, were advanced by CH2M-Jones at the two locations shown on Figure 3-1. The two sampling locations were selected with a bias toward areas of concentrated paint stains, in accordance with the *RFI Addendum Sampling Plan: Uninvestigated Sites - Zone E, Revision 1* (CH2M-Jones, December 2001), and as approved by SCDHEC.

Stainless-steel hand augers were used to collect surface and subsurface soil samples from the 0-to-1-ft interval below the concrete/soil interface for the surface soil interval and the 3-to-5-ft interval below the concrete/soil interface for the subsurface soil interval. All samples were placed in appropriate containers, labeled, and stored on ice before being shipped to the laboratory for analysis. Proper custody procedures were maintained throughout the sampling and shipping process.

The completed sample auger holes were backfilled with excess cuttings and grouted. A bituminous cold patch was placed flush with the surface.

Each location was surveyed for positioning in the CNC geographic information system (GIS). Coordinate information is presented in Table 3-1.

3.2.4 Decontamination Procedures

All decontamination activities were conducted in accordance with the procedures outlined in the *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994) and the *RFI Addendum Sampling Plan: Uninvestigated Sites - Zone E, Revision 1* (CH2M-Jones, December 2001).

3.3 Soil Analytes

All soil samples collected as part of the AOC 704 CSI were analyzed for the following:

- Volatile organic compounds (VOCs) (EPA Method 8260B)
- Semivolatile organic compounds (SVOCs) (EPA Method 8270C)
- Metals (EPA Method SW 846, as appropriate)
- Pesticides (EPA Method 8081A)

The samples were sent via overnight carrier to an offsite laboratory, where they were analyzed on an expedited (7-day) turnaround time. All analytical results are presented in Appendix A.

3.4 Sample Analysis Protocols

Sample analyses were conducted consistent with the guidance in the EPA's *Test Methods for Evaluating Solid Waste, SW-846, Revision 4*, Office of Solid Waste and Emergency Response (SW846) (EPA, 1996b) and in the EPA Environmental Services Division *Laboratory Operations and Quality Control Manual* (ESDLOQCM) (EPA, 1997).

The analyses also followed the procedures provided in the approved *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994).

3.5 Data Verification and Validation

Data verification and validation practices were conducted consistent with Quality Assurance Plan (QAP) and the Data Management Plan (DMP) in the approved *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994) portion of the *Final Comprehensive RFI Work Plan* to verify that all information and data were valid and properly documented.

In addition, verification and validation procedures were also conducted consistent with the following guidelines:

- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1994a)
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994b)

The data validation summary report is presented in Appendix B.

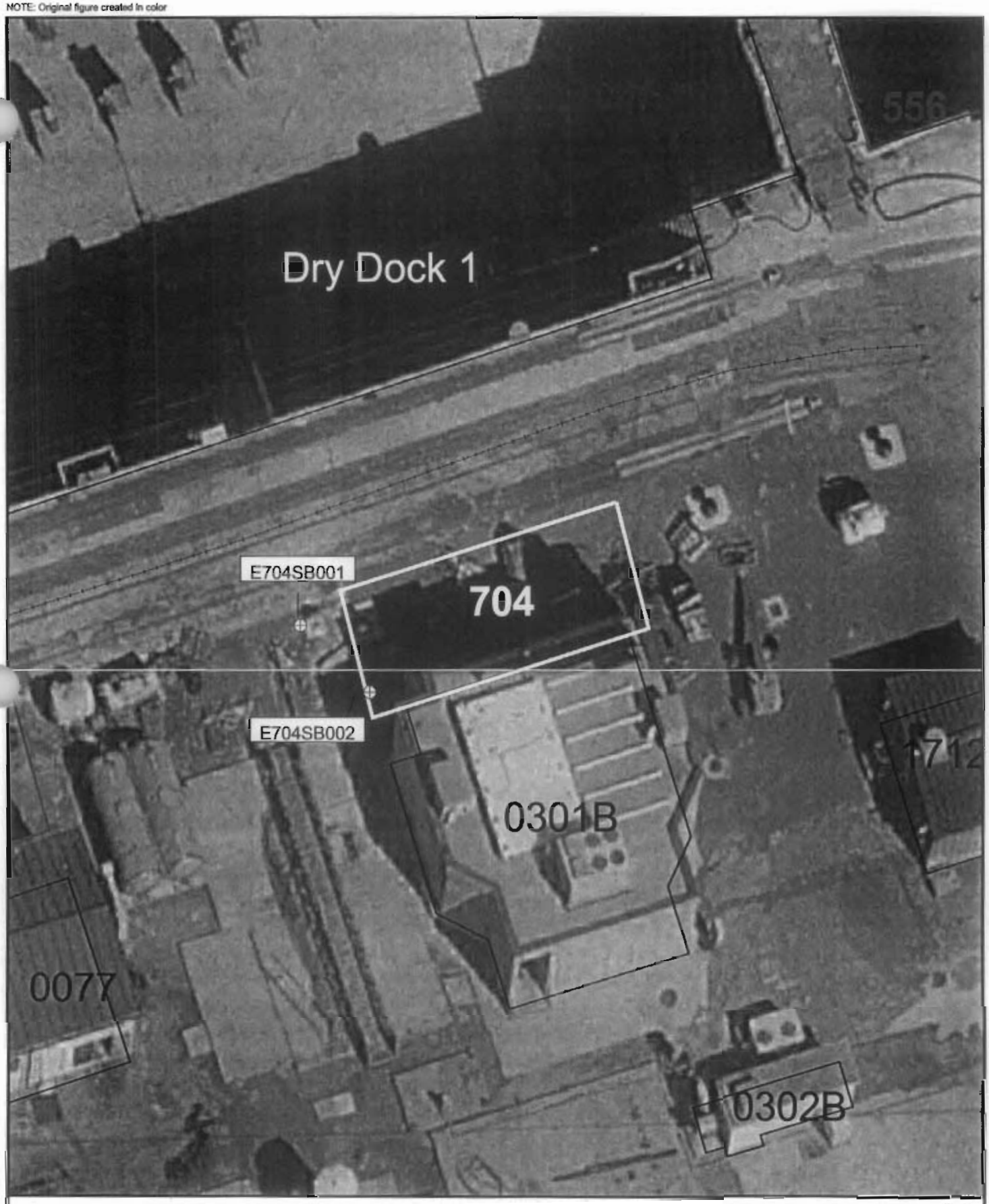
3.6 Data Management

Record-keeping and data management practices for both field data and analytical data were maintained consistent with the DMP in the approved *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994) to verify that all information and data were properly recorded and documented. Electronic data will be maintained in a database by CH2M-Jones for long-term data storage and management.

TABLE 3-1
Sampling Location Coordinates
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

New Sample ID	Northing	Easting
I704SB001	376,306.9	2,317,392.6
I704SB002	376,297.1	2,317,403.3

NOTE: Original figure created in color



⊕ Soil Boring
Railroads
Roads
AOC Boundary
SWMU Boundary
Buildings

N

0 20 40 Feet

1 inch = 20 feet

Figure 3-1
Surface and Subsurface Soil Sampling Locations
AOC 704, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\aoc704\aoc704.apr, Date: 11 Jul 2002 13:01, User: NMOUDRY, Figure 3-1

Section 4.0

4.0 COPC Screening

Data evaluation and COPC screening were conducted as agreed to by the BCT and as described in the *Charleston Naval Complex Project Team Notebook and Instructions, Revision 1A* (CH2M-Jones, December 2001).

This section discusses chemicals that were detected in surface and subsurface soils collected during the CSI sampling conducted at AOC 704 in April 2002.

4.1 Organic Constituents Detected in the Surface and Subsurface Soil Samples

The results of organic analyses on surface soil samples were compared to the EPA Region III residential and industrial risk-based concentrations (RBCs) using a hazard index (HI)=1 for carcinogens and an HI=0.1 for non-carcinogens. In addition, both the surface soil and subsurface soil results were screened against their respective generic soil screening levels (SSLs). If a generic SSL was not available, then the EPA Region III SSL values were used for screening. With both the generic SSLs and the EPA Region III SSLs, screening criteria were specified using a dilution attenuation factor (DAF)=1 for VOCs and a DAF=10 for non-VOCs.

4.1.1 VOCs in Surface and Subsurface Soils

Only one VOC (methyl ethyl ketone [MEK]) was detected in one of the two surface soil samples (see Table 4-1), but was not detected in the subsurface soil samples. Trichloroethene (TCE) was detected in one of the subsurface soil samples (see Table 4-2), but was not found in the surface soil. Based on a review of the data, only the TCE detected in the subsurface soil at AOC 704 was present at levels equal to its screening criteria. A detailed discussion of the TCE occurrence is presented below.

TCE

TCE was detected in one of the two subsurface soil samples at an estimated concentration of 4.3 J microgram per kilogram (µg/kg) (E704SB00101), but was not detected in either of the surface soil samples. The concentration in the subsurface soil slightly exceeded the SSL of 3 µg/kg (see Table 4-2). Therefore, TCE is considered to be a subsurface soil COPC at AOC 704 and is discussed further in Section 5.0.

4.1.2 SVOCs in Surface and Subsurface Soils

A total of two SVOCs were detected in the surface soil samples and none were detected in subsurface soil samples collected from beneath the asphalt cover at AOC 704 (see Table 4-3). One of the two SVOCs detected in surface soil was a polycyclic aromatic hydrocarbon (PAH) compounds. In screening the data, it was found that neither of the SVOCs detected at AOC 704 were present at levels exceeding the screening criteria (see Table 4-3).

In addition, the concentration of the single PAH detected in the surface soil sample was also evaluated as to its respective benzo[a]pyrene equivalent (BEQ). Based on the BEQ analysis, the PAH was below the respective sitewide reference concentrations of 1,304 µg/kg for surface soils.

For these reasons, no SVOCs were identified as COPCs for AOC 704.

4.1.3 Pesticides in Surface and Subsurface Soils

Four pesticides were detected in one of the two surface soil samples collected from beneath the pavement at AOC 704. All four pesticides (alpha-chlordane, gamma-chlordane, 4,4'-DDT, and heptachlor epoxide) were detected in the surface soil sample collected from 704SB001. Based on a review of the data, none of detected pesticides were found to exceed their respective screening criteria (see Table 4-4). No pesticides were detected in the subsurface soil samples collected from AOC 704.

Therefore, no pesticides were identified as COPCs for AOC 704.

4.2 Inorganic Constituents Detected in the Surface and Subsurface Soil Samples

Twenty inorganic constituents were detected in surface soil samples and 19 inorganic constituents were detected in subsurface soil samples collected at AOC 704 (see Tables 4-5 and 4-6). Based on a review of the data, no constituents were found to exceed their respective screening criteria. For this reason, no inorganic constituents were identified as COPCs in either surface soil or subsurface soil at AOC 704.

4.3 Data Evaluation Summary

TCE was identified as a COPC for subsurface soil. No other constituents were considered COPCs for either surface or subsurface soils. TCE is discussed further in Section 5.0.

TABLE 4-1
Volatile Organic Compounds Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	SSL (DAF=1)
Methyl ethyl ketone (2-Butanone)	704SB00101	E704SB001	0.0044	J	04/15/2002	120,000	4,700	0.4[a]
	704SB00201	E704SB002	0.013	UJ	04/15/2002			

All values are presented in units of milligrams per kilogram (mg/kg).
[a] EPA Region III generic SSL with a DAF=1, EPA Region III RBC Tables, October 2000.
J Estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
UJ Chemical was not detected and the detection limit is estimated.

TABLE 4-2
Volatile Organic Compounds Detected in Subsurface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	SSL (DAF=1))
Trichloroethene (TCE)	704SB00102	E704SB001	**0.0043**	J	04/15/2002	0.003
	704SB00202	E704SB002	0.0056	UJ	04/15/2002	

All values are presented in units of milligrams per kilogram (mg/kg).
Concentrations that are in bold text and outlined within the table indicate an exceedance of the screening criterion.

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

UJ Chemical was not detected and the detection limit is estimated.

TABLE 4-3
Semivolatile Organic Compounds Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	SSL (DAF=1)
bis(2-Ethylhexyl) Phthalate	704SB00101	E704SB001	0.15	J	04/15/2002	410	46	1,800
	704SB00201	E704SB002	0.4	U	04/15/2002			
Indeno(1,2,3-c,d)pyrene	704SB00201	E704SB002	0.4	U	04/15/2002	7.8	0.87	7
	704SB00101	E704SB001	0.25	J	04/15/2002			

All values are presented in units of milligrams per kilogram (mg/kg).
J Estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
U Chemical was not detected.

TABLE 4-4
Pesticide Compounds Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	SSL (DAF=1)
alpha-Chlordane	704SB00201	E704SB002	0.00048	J	04/15/2002	16	1.8	5
	704SB00101	E704SB001	0.0019	U	04/15/2002			
gamma-Chlordane	704SB00201	E704SB002	0.00065	J	04/15/2002	16	1.8	5
	704SB00101	E704SB001	0.0019	U	04/15/2002			
4,4'-DDT	704SB00201	E704SB002	0.0022	J	04/15/2002	17	1.9	16
	704SB00101	E704SB001	0.0037	UJ	04/15/2002			
Heptachlor Epoxide	704SB00101	E704SB001	0.00015	J	04/15/2002	0.63	0.07	0.35
	704SB00201	E704SB002	0.0019	U	04/15/2002			

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

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

U Chemical was not detected.

TABLE 4-5
Inorganic Constituents Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Concentration Range	SSL (DAF=10)
Aluminum	704SB00101	E704SB001	3,900	=	04/15/2002	200,000	7,800	261 – 20,500	NA
	704SB00201	E704SB002	2,900	=	04/15/2002				
Arsenic	704SB00101	E704SB001	3.6	=	04/15/2002	3.8	0.43	0.95 – 68	14.5
	704SB00201	E704SB002	4	=	04/15/2002				
Barium	704SB00101	E704SB001	10	J	04/15/2002	14,000	550	1.8 – 1,980	800
	704SB00201	E704SB002	10	J	04/15/2002				
Beryllium	704SB00101	E704SB001	0.19	J	04/15/2002	410	16	0.13 – 1.6	31.5
	704SB00201	E704SB002	0.22	J	04/15/2002				
Cadmium	704SB00101	E704SB001	0.4	J	04/15/2002	200	7.8	0.06 – 1.5	4
	704SB00201	E704SB002	0.44	J	04/15/2002				
Calcium	704SB00101	E704SB001	100,000	=	04/15/2002	NA	NA	167 – 182,000	NA
	704SB00201	E704SB002	140,000	=	04/15/2002				
Chromium, Total	704SB00101	E704SB001	24	=	04/15/2002	610	23	2.3 – 567	19
	704SB00201	E704SB002	29	=	04/15/2002				
Cobalt	704SB00101	E704SB001	0.72	J	04/15/2002	12,000	470	0.35 – 111	NA
	704SB00201	E704SB002	1.4	J	04/15/2002				
Copper	704SB00101	E704SB001	21	J	04/15/2002	8,200	310	0.47 – 866	5,500a
	704SB00201	E704SB002	7.5	J	04/15/2002				

TABLE 4-5
Inorganic Constituents Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Concentration Range	SSL (DAF=10)
Iron	704SB00101	E704SB001	3,200	=	04/15/2002	61,000	2,300	1,050 – 30,600	NA
	704SB00201	E704SB002	3,200	=	04/15/2002				
Lead	704SB00101	E704SB001	26	=	04/15/2002	1,218	400	1 – 400	400
	704SB00201	E704SB002	6.2	=	04/15/2002				
Magnesium	704SB00101	E704SB001	2,300	J	04/15/2002	NA	NA	31 – 14,800	NA
	704SB00201	E704SB002	2,500	J	04/15/2002				
Manganese	704SB00101	E704SB001	32	J	04/15/2002	4,100	160	0.93 – 508	475
	704SB00201	E704SB002	26	J	04/15/2002				
Mercury	704SB00101	E704SB001	0.26	J	04/15/2002	61	2.3	0.03 – 2.7	1
	704SB00201	E704SB002	0.064	J	04/15/2002				
Nickel	704SB00101	E704SB001	9.4	=	04/15/2002	4,100	160	0.6 – 72	65
	704SB00201	E704SB002	11	=	04/15/2002				
Potassium	704SB00101	E704SB001	560	J	04/15/2002	NA	NA	46 – 2,620	NA
	704SB00201	E704SB002	640	J	04/15/2002				
Selenium	704SB00101	E704SB001	1.1	=	04/15/2002	1,000	39	0.57 – 4	2.5
	704SB00201	E704SB002	0.77	J	04/15/2002				
Sodium	704SB00101	E704SB001	340	J	04/15/2002	NA	NA	12 – 28,200	NA
	704SB00201	E704SB002	480	J	04/15/2002				

TABLE 4-5
Inorganic Constituents Detected in Surface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	EPA Region III Industrial RBC	EPA Region III Residential RBC	Zone E Surface Soil Background Concentration Range	SSL (DAF=10)
Vanadium	704SB00101	E704SB001	15	=	04/15/2002	1,400	55	1.1 – 60	3,000
	704SB00201	E704SB002	15	=	04/15/2002				
Zinc	704SB00101	E704SB001	37	=	04/15/2002	61,000	2,300	1.9 – 855	6,000
	704SB00201	E704SB002	46	=	04/15/2002				

All values are presented in units of milligrams per kilogram (mg/kg).
NA Not applicable/not available.
[a] EPA Region III generic SSL with a DAF=10, EPA Region III RBC Tables, October 2000.
= Analyte was detected at the concentration reported.
J Estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
U Chemical was not detected.

TABLE 4-6
Inorganic Constituents Detected in Subsurface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	Zone E Surface Soil Background Concentration Range	SSL (DAF=10) (mg/kg)
Aluminum	704SB00102	E704SB001	6,000	=	04/15/2002	1,220 – 29,900	NA
	704SB00202	E704SB002	390	=	04/15/2002		
Arsenic	704SB00102	E704SB001	4.4	=	04/15/2002	0.86 – 26	14.5
	704SB00202	E704SB002	0.59	J	04/15/2002		
Barium	704SB00102	E704SB001	14	J	04/15/2002	6.1 – 91	800
	704SB00202	E704SB002	2.9	J	04/15/2002		
Beryllium	704SB00102	E704SB001	0.64	J	04/15/2002	0.15 – 1.6	31.5
	704SB00202	E704SB002	0.053	U	04/15/2002		
Cadmium	704SB00102	E704SB001	0.15	J	04/15/2002	0.13 – 0.96	4
	704SB00202	E704SB002	0.082	U	04/15/2002		
Calcium	704SB00102	E704SB001	14,000	=	04/15/2002	323 – 229,000	NA
	704SB00202	E704SB002	17,000	=	04/15/2002		
Chromium, Total	704SB00102	E704SB001	18	=	04/15/2002	1.6 – 75	19
	704SB00202	E704SB002	2	=	04/15/2002		
Cobalt	704SB00102	E704SB001	3.3	J	04/15/2002	0.41 – 15	NA
	704SB00202	E704SB002	0.18	U	04/15/2002		
Copper	704SB00102	E704SB001	4.1	J	04/15/2002	1.3 – 192	5,500[a]
	704SB00202	E704SB002	0.76	J	04/15/2002		
Iron	704SB00102	E704SB001	14,000	=	04/15/2002	924 – 35,800	NA
	704SB00202	E704SB002	500	=	04/15/2002		
Lead	704SB00102	E704SB001	7.6	=	04/15/2002	1.8 – 322	400
	704SB00202	E704SB002	1.1	=	04/15/2002		
Magnesium	704SB00102	E704SB001	3,200	J	04/15/2002	77 – 9,140	NA
	704SB00202	E704SB002	170	J	04/15/2002		
Manganese	704SB00102	E704SB001	140	J	04/15/2002	77 – 9,140	NA
	704SB00202	E704SB002	5.9	J	04/15/2002		
Mercury	704SB00102	E704SB001	0.011	J	04/15/2002	0.04 – 0.9	1
	704SB00202	E704SB002	0.049	J	04/15/2002		
Nickel	704SB00102	E704SB001	6.5	J	04/15/2002	0.85 – 20	65
	704SB00202	E704SB002	0.48	J	04/15/2002		

TABLE 4-6
Inorganic Constituents Detected in Subsurface Soil
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Concentration (mg/kg)	Qualifier	Date Sampled	Zone E Surface Soil Background Concentration Range	SSL (DAF=10) (mg/kg)
Potassium	704SB00102	E704SB001	1,500	=	04/15/2002	106 – 3,440	NA
	704SB00202	E704SB002	78	J	04/15/2002		
Sodium	704SB00102	E704SB001	120	J	04/15/2002	21 – 1,430	NA
	704SB00202	E704SB002	190	J	04/15/2002		
Vanadium	704SB00102	E704SB001	16	=	04/15/2002	1.6 – 71	3,000
	704SB00202	E704SB002	1.2	U	04/15/2002		
Zinc	704SB00102	E704SB001	25	=	04/15/2002	5.8 – 438	6,000
	704SB00202	E704SB002	1.8	J	04/15/2002		

All values are presented in units of milligrams per kilogram (mg/kg).
NA Not applicable/not available.
[a] EPA Region III generic SSL with a DAF=10, EPA Region III RBC Tables, October 2000.
= Analyte was detected at the concentration reported.
J Estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
U Chemical was not detected.

Section 5.0

5.0 COPC/COC Refinement

Based on an evaluation of the CSI analytical results for AOC 704, TCE was the only constituent identified as a COPC in subsurface soil. No COPCs were identified for surface soil. Screening of the detected concentrations against the current screening criteria adopted by the CNC BCT found that TCE in one surface soil sample (4.3 J µg/kg in E704SB00102) exceeded the 3 µg/kg SSL (DAF=1) for TCE. The nature of this exceedance and the relevance of TCE in subsurface soil at this site is discussed further below.

5.1 TCE in Soil

TCE was detected in only one of the two subsurface soil sample at an estimated concentration of 4.3 J µg/kg (E704SB00102), which slightly exceeded the SSL of 3 µg/kg (DAF=1). TCE was not detected in either of the surface soil samples.

The average concentration of TCE in the subsurface soil is 3.55 J µg/kg, which only slightly exceeds the SSL of 3 µg/kg (DAF=1) (using ½ of the analytical detection limit for samples with no detectable concentrations of TCE). The average TCE concentration in all soil samples (surface and subsurface) is 2.3 µg/kg, again using half the non-detect values. For these reasons, the TCE concentrations are adequately protective of groundwater. Both the reported detected concentration and the detection limits are estimated values.

In addition, the asphalt cover at AOC 704 provides a barrier to stormwater infiltration and reduces the potential to create leachate. For these reasons, TCE is not likely to migrate down into the groundwater and is not a considered a COC for AOC 704.

5.2 COC Summary

Based on review of the data, no COCs are identified for AOC 704.

Section 6.0

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The CSI investigation findings, as reported herein, satisfy the requirements of the RFI. Based on review of the data obtained from the CSI field investigation conducted in April 2002, the nature and extent of the COPCs has been adequately defined.

AOC 704 was not included in the *Zone E RFI Report, Revision 0* (EnSafe, 1997), thus there have been no RFI comments issued with respect to this unit. With submittal of this RFI Report Addendum, the RFI requirements are 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 maximum contaminant level (MCL), preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit. Groundwater is not a medium of concern at AOC 704. No additional evaluation of this issue is warranted.

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

The sanitary sewer investigation (SMWU 37) was designed to include segments of the sewer where releases of contamination were known or considered likely to have occurred. Investigations related to SWMU 37 were conducted in the vicinity in association with Building 77, which is located southwest of AOC 704. However, there is no known or suspected linkage between SWMU 37 and AOC 704. Further evaluation of this issue is not warranted.

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

Investigated segments of the storm sewer (AOC 699) were identified in the *Zone L RFI Report, Revision 0* (EnSafe, 1998). A stormwater line flows beneath AOC 704. The nearest manholes are located approximately 50 feet northwest and 65 feet southwest of AOC 704. The sections of the stormwater sewer system in the vicinity of the site were not investigated as part of the AOC 699 investigations. There are no data or information to suggest that AOC 704 has impacted the storm sewer system and groundwater is not a medium of concern at this site. Further investigation of a linkage between the storm sewer system and AOC 704 is not warranted.

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

Investigated segments of the CNC railroad lines (AOC 504) were identified in the *Zone L RFI Report, Revision 0* (EnSafe, 1998). No investigations related to AOC 504 were conducted at AOC 704.

There is an existing railroad line immediately northwest of AOC 704 that serves Dry Dock No. 1, which remains an active railroad line. Based on historical public works maps, this railroad line was proposed for construction in 1909, and was presumably constructed shortly there after. There is no known linkage between AOC 704 and the investigated railroad lines. 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 AOC 704 is the Cooper River, which lies approximately 125 feet to the east. There were no COCs identified for soil. Therefore, there are no migration pathways of concern. Further evaluation of this issue is not warranted.

6.7 Potential Contamination in Oil/Water Separators

There are no OWSs known to be associated with this site. In addition, there is no reference made to an OWS at this facility in the *Oil Water Separator Data* report (Department of the Navy, September 2000). Further evaluation of OWSs is not warranted.

6.8 Land Use Controls (LUCs)

There were no COCs identified under an unrestricted land use scenario during the risk-based screening of the data from AOC 704. Therefore, no land use restrictions are needed for AOC 704. This site is zoned M-2 (marine-industrial) and will likely be used for non-residential future land use.

Regardless, 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. Because there are no COCs at this particular site, no LUCs are necessary. The site is recommended for NFA status.

Section 7.0

7.0 Conclusions and Recommendations

AOC 704 consists of a concrete surface west of Building 301B, which is located between Dry Docks Nos. 1 and 2. AOC 704 has paint spills from past painting operations on the nearby piers (see Figure 1-1). The exact painting dates are not known, but CNC personnel stated that painting operations began prior to 1973. The material of concern at this unit is identified in the *Final Zone E RCRA Facility Assessment* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) and includes only spilled paint.

Evaluation of the data collected during the CSI is summarized in Section 4.0 and COPCs are discussed in Section 5.0. It was not necessary to conduct a site-specific human health or ecological risk assessment because no COCs were identified.

The conclusion for soils at AOC 704 is that there are no COCs identified for surface or subsurface soil. This site is zoned M-2 (marine-industrial) and will likely be designated for commercial/industrial future use. No actions are required to control exposures/risks under current or future unrestricted land use. This site is recommended for NFA.

The BCT has agreed that LUCs will be applied across the entire Zone E of the CNC. These LUCs are expected to include, at a minimum, restrictions limiting the future land use to non-residential activities. Because AOC 704 is located within Zone E, these LUCs will apply at this unit.

Section 8.0

8.0 References

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U.S. Environmental Protection Agency (EPA). *Soil Screening Guidance: Technical Background Document.* May 1996.

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U.S. Navy. *Oil Water Separator Data.* September 2000.

Appendix A

Appendix A-1
Volatile Organic Compound Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/19/2002		4/19/2002	
	DateAnalyzed	4/19/2002		4/19/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Chloromethane	ug/kg	10	UJ	13	UJ
Vinyl chloride	ug/kg	10	UJ	13	UJ
Bromomethane	ug/kg	10	UJ	13	UJ
Chloroethane	ug/kg	10	UJ	13	UJ
1,1-Dichloroethene	ug/kg	5.1	UJ	6.7	UJ
Acetone	ug/kg	33	UJ	13	UJ
Carbon Disulfide	ug/kg	5.1	UJ	6.7	UJ
Methylene Chloride	ug/kg	5.1	UJ	6.7	UJ
trans-1,2-Dichloroethene	ug/kg	5.1	UJ	6.7	UJ
1,1-Dichloroethane	ug/kg	5.1	UJ	6.7	UJ
Vinyl acetate	ug/kg	10	UJ	13	UJ
Methyl ethyl ketone (2-Butanone)	ug/kg	4.4	J	13	UJ
cis-1,2-Dichloroethylene	ug/kg	5.1	UJ	6.7	UJ
1,2-Dichloroethene (total)	ug/kg	5.1	UJ	6.7	UJ
Chloroform	ug/kg	5.1	UJ	6.7	UJ
1,1,1-Trichloroethane	ug/kg	5.1	UJ	6.7	UJ
Carbon Tetrachloride	ug/kg	5.1	UJ	6.7	UJ
1,2-Dichloroethane	ug/kg	5.1	UJ	6.7	UJ
Benzene	ug/kg	5.1	UJ	6.7	UJ
Trichloroethylene (TCE)	ug/kg	5.1	UJ	6.7	UJ
1,2-Dichloropropane	ug/kg	5.1	UJ	6.7	UJ
Bromodichloromethane	ug/kg	5.1	UJ	6.7	UJ
2-Chloroethyl vinyl ether	ug/kg	10	R	13	R
cis-1,3-Dichloropropene	ug/kg	5.1	UJ	6.7	UJ
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	10	UJ	13	UJ
Toluene	ug/kg	5.1	UJ	6.7	UJ
trans-1,3-Dichloropropene	ug/kg	5.1	UJ	6.7	UJ
1,1,2-Trichloroethane	ug/kg	5.1	UJ	6.7	UJ
2-Hexanone	ug/kg	10	UJ	13	UJ
Tetrachloroethylene (PCE)	ug/kg	5.1	UJ	6.7	UJ
Dibromochloromethane	ug/kg	5.1	UJ	6.7	UJ
Chlorobenzene	ug/kg	5.1	UJ	6.7	UJ
Ethylbenzene	ug/kg	5.1	UJ	6.7	UJ
m+p Xylene	ug/kg	5.1	UJ	6.7	UJ
o-Xylene	ug/kg	5.1	UJ	6.7	UJ
Xylenes, Total	ug/kg	5.1	UJ	6.7	UJ
Styrene	ug/kg	5.1	UJ	6.7	UJ
Bromoform	ug/kg	5.1	UJ	6.7	UJ
1,1,2,2-Tetrachloroethane	ug/kg	5.1	UJ	6.7	UJ
1,3-Dichlorobenzene	ug/kg	5.1	UJ	6.7	UJ
1,4-Dichlorobenzene	ug/kg	5.1	UJ	6.7	UJ
1,2-Dichlorobenzene	ug/kg	5.1	UJ	6.7	UJ
1,2,4-Trichlorobenzene	ug/kg	5.1	UJ	6.7	UJ
1,2,3-Trichlorobenzene	ug/kg	5.1	UJ	6.7	UJ

Appendix A-1
Semi-volatile Organic Compound Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/22/2002		4/22/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
N-Nitrosodiphenylamine	ug/kg	370	U	400	U
Phenol	ug/kg	370	U	400	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	370	U	400	U
Bis(2-Chloroisopropyl)Ether	ug/kg	370	U	400	U
2-Chlorophenol	ug/kg	370	U	400	U
1,4-Dichlorobenzene	ug/kg	370	U	400	U
Benzyl alcohol	ug/kg	370	U	400	U
1,2-Dichlorobenzene	ug/kg	370	U	400	U
1,3-Dichlorobenzene	ug/kg	370	U	400	U
2-Methylphenol (o-Cresol)	ug/kg	370	U	400	U
N-Nitrosodi-n-propylamine	ug/kg	370	U	400	U
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	370	U	400	U
Hexachloroethane	ug/kg	370	U	400	U
Nitrobenzene	ug/kg	370	U	400	U
Isophorone	ug/kg	370	U	400	U
2-Nitrophenol	ug/kg	370	U	400	U
2,4-Dimethylphenol	ug/kg	370	U	400	U
bis(2-Chloroethoxy) Methane	ug/kg	370	U	400	U
2,4-Dichlorophenol	ug/kg	370	U	400	U
Benzoic acid	ug/kg	1800	UJ	1900	UJ
1,2,4-Trichlorobenzene	ug/kg	370	U	400	U
Naphthalene	ug/kg	370	U	400	U
4-Chloroaniline	ug/kg	370	U	400	U
Hexachlorobutadiene	ug/kg	370	U	400	U
4-Chloro-3-methylphenol	ug/kg	370	U	400	U
2-Methylnaphthalene	ug/kg	370	U	400	U
Hexachlorocyclopentadiene	ug/kg	370	U	400	U
2,4,6-Trichlorophenol	ug/kg	370	U	400	U
2,4,5-Trichlorophenol	ug/kg	1800	U	1900	U
2-Chloronaphthalene	ug/kg	370	U	400	U
2-Nitroaniline	ug/kg	1800	U	1900	U
3-Nitroaniline	ug/kg	1800	U	1900	U
Dimethyl Phthalate	ug/kg	370	U	400	U
2,6-Dinitrotoluene	ug/kg	370	U	400	U
Acenaphthylene	ug/kg	370	U	400	U
Acenaphthene	ug/kg	370	U	400	U
2,4-Dinitrophenol	ug/kg	1800	U	1900	U
Dibenzofuran	ug/kg	370	U	400	U
2,4-Dinitrotoluene	ug/kg	370	U	400	U
Diethyl Phthalate	ug/kg	370	U	400	U
4-Nitrophenol	ug/kg	1800	U	1900	U

Appendix A-1
Semi-volatile Organic Compound Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/22/2002		4/22/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Fluorene	ug/kg	370	U	400	U
4-Chlorophenyl Phenyl Ether	ug/kg	370	U	400	U
4,6-Dinitro-2-methylphenol	ug/kg	1800	U	1900	U
4-Nitroaniline	ug/kg	1800	U	1900	U
4-Bromophenyl Phenyl Ether	ug/kg	370	U	400	U
Hexachlorobenzene	ug/kg	370	U	400	U
Pentachlorophenol	ug/kg	1800	U	1900	U
Phenanthrene	ug/kg	370	U	400	U
Anthracene	ug/kg	370	U	400	U
Di-n-butyl Phthalate	ug/kg	370	U	400	U
Fluoranthene	ug/kg	370	U	400	U
Pyrene	ug/kg	370	U	400	U
Benzyl Butyl Phthalate	ug/kg	370	U	400	U
Benzo(a)Anthracene	ug/kg	370	U	400	U
3,3'-Dichlorobenzidine	ug/kg	730	U	800	U
Chrysene	ug/kg	370	U	400	U
bis(2-Ethylhexyl) Phthalate	ug/kg	150	J	400	U
Di-n-octylphthalate	ug/kg	370	U	400	U
Benzo(b)Fluoranthene	ug/kg	370	UJ	400	UJ
Benzo(k)Fluoranthene	ug/kg	370	U	400	U
Benzo(a)Pyrene	ug/kg	370	U	400	U
Indeno(1,2,3-c,d)pyrene	ug/kg	250	J	400	U
Dibenz(a,h)anthracene	ug/kg	370	U	400	U
Benzo(g,h,i)Perylene	ug/kg	370	U	400	U
Carbazole	ug/kg	370	U	400	U

Appendix A-1
Pesticide Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/20/2002		4/20/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Aldrin	ug/kg	1.4	U	1.6	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/kg	1.4	U	1.6	U
Alpha-chlordane	ug/kg	0.48	J	1.6	UJ
Beta BHC (Beta Hexachlorocyclohexane)	ug/kg	1.4	U	1.6	U
Chlordane	ug/kg	14	U	16	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/kg	1.4	U	1.6	U
Dieldrin	ug/kg	2.8	U	3	U
Endosulfan I	ug/kg	1.4	U	1.6	U
Endosulfan II	ug/kg	2.8	U	3	U
Endosulfan Sulfate	ug/kg	2.8	U	3	U
Endrin Aldehyde	ug/kg	2.8	U	3	U
Endrin Ketone	ug/kg	2.8	U	3	U
Endrin	ug/kg	2.8	U	3	U
Gamma BHC (Lindane)	ug/kg	1.4	U	1.6	U
Gamma-chlordane	ug/kg	0.65	J	1.6	U
Heptachlor Epoxide	ug/kg	0.15	J	1.6	U
Heptachlor	ug/kg	1.4	U	1.6	U
Methoxychlor	ug/kg	14	U	16	U
p,p'-DDD	ug/kg	2.8	U	3	U
p,p'-DDE	ug/kg	2.8	U	3	U
p,p'-DDT	ug/kg	2.2	J	3	UJ
Toxaphene	ug/kg	92	U	100	U

Appendix A-1
PCB Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/20/2002		4/20/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
PCB-1016 (Arochlor 1016)	ug/kg	37	U	40	U
PCB-1221 (Arochlor 1221)	ug/kg	37	U	40	U
PCB-1232 (Arochlor 1232)	ug/kg	37	U	40	U
PCB-1242 (Arochlor 1242)	ug/kg	37	U	40	U
PCB-1248 (Arochlor 1248)	ug/kg	37	U	40	U
PCB-1254 (Arochlor 1254)	ug/kg	74	U	81	U
PCB-1260 (Arochlor 1260)	ug/kg	74	U	81	U

Appendix A-1
Inorganic Analytical Results - Surface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00101 (0-1ft)		704SB00201 (0-1ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/19/2002		4/19/2002	
	DateAnalyzed	4/23/2002		4/23/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Aluminum	mg/kg	3900	=	2900	=
Antimony	mg/kg	0.56	UJ	0.81	UJ
Arsenic	mg/kg	3.6	=	4	=
Barium	mg/kg	10	J	10	J
Beryllium	mg/kg	0.19	J	0.22	J
Cadmium	mg/kg	0.4	J	0.44	J
Calcium	mg/kg	100000	=	140000	=
Chromium, Total	mg/kg	24	=	29	=
Cobalt	mg/kg	0.72	J	1.4	J
Copper	mg/kg	21	J	7.5	J
Iron	mg/kg	3200	=	3200	=
Lead	mg/kg	26	=	6.2	=
Magnesium	mg/kg	2300	J	2500	J
Manganese	mg/kg	32	J	26	J
Nickel	mg/kg	9.4	=	11	=
Potassium	mg/kg	560	J	640	J
Selenium	mg/kg	1.1	=	0.77	J
Silver	mg/kg	0.19	U	0.21	U
Sodium	mg/kg	340	J	480	J
Thallium	mg/kg	0.58	U	0.62	U
Vanadium	mg/kg	15	=	15	=
Zinc	mg/kg	37	=	46	=
Mercury*	mg/kg	0.26	J	0.064	J

*Collected 4/15/2002. Extracted 4/18/2002. 704SB00101analyzed 4/22/2002 and 707SB002 analyzed 4/23/2002.

Appendix A-2
Volatile Organic Compound Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/22/2002		4/19/2002	
	DateAnalyzed	4/22/2002		4/19/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Chloromethane	ug/kg	14	UJ	11	UJ
Vinyl chloride	ug/kg	14	UJ	11	UJ
Bromomethane	ug/kg	14	UJ	11	UJ
Chloroethane	ug/kg	14	UJ	11	UJ
1,1-Dichloroethene	ug/kg	7.2	UJ	5.6	UJ
Acetone	ug/kg	14	UJ	11	UJ
Carbon Disulfide	ug/kg	7.2	UJ	5.6	UJ
Methylene Chloride	ug/kg	7.2	UJ	5.6	UJ
trans-1,2-Dichloroethene	ug/kg	7.2	UJ	5.6	UJ
1,1-Dichloroethane	ug/kg	7.2	UJ	5.6	UJ
Vinyl acetate	ug/kg	14	UJ	11	UJ
Methyl ethyl ketone (2-Butanone)	ug/kg	14	UJ	11	UJ
cis-1,2-Dichloroethylene	ug/kg	7.2	UJ	5.6	UJ
1,2-Dichloroethene (total)	ug/kg	7.2	UJ	5.6	UJ
Chloroform	ug/kg	7.2	UJ	5.6	UJ
1,1,1-Trichloroethane	ug/kg	7.2	UJ	5.6	UJ
Carbon Tetrachloride	ug/kg	7.2	UJ	5.6	UJ
1,2-Dichloroethane	ug/kg	7.2	UJ	5.6	UJ
Benzene	ug/kg	7.2	UJ	5.6	UJ
Trichloroethylene (TCE)	ug/kg	4.3	J	5.6	UJ
1,2-Dichloropropane	ug/kg	7.2	UJ	5.6	UJ
Bromodichloromethane	ug/kg	7.2	UJ	5.6	UJ
2-Chloroethyl vinyl ether	ug/kg	14	R	11	R
cis-1,3-Dichloropropene	ug/kg	7.2	UJ	5.6	UJ
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	14	UJ	11	UJ
Toluene	ug/kg	7.2	UJ	5.6	UJ
trans-1,3-Dichloropropene	ug/kg	7.2	UJ	5.6	UJ
1,1,2-Trichloroethane	ug/kg	7.2	UJ	5.6	UJ
2-Hexanone	ug/kg	14	UJ	11	UJ
Tetrachloroethylene (PCE)	ug/kg	7.2	UJ	5.6	UJ
Dibromochloromethane	ug/kg	7.2	UJ	5.6	UJ
Chlorobenzene	ug/kg	7.2	UJ	5.6	UJ
Ethylbenzene	ug/kg	7.2	UJ	5.6	UJ
m+p Xylene	ug/kg	7.2	UJ	5.6	UJ
o-Xylene	ug/kg	7.2	UJ	5.6	UJ
Xylenes, Total	ug/kg	7.2	UJ	5.6	UJ
Styrene	ug/kg	7.2	UJ	5.6	UJ
Bromoform	ug/kg	7.2	UJ	5.6	UJ
1,1,2,2-Tetrachloroethane	ug/kg	7.2	UJ	5.6	UJ
1,3-Dichlorobenzene	ug/kg	7.2	UJ	5.6	UJ
1,4-Dichlorobenzene	ug/kg	7.2	UJ	5.6	UJ
1,2-Dichlorobenzene	ug/kg	7.2	UJ	5.6	UJ
1,2,4-Trichlorobenzene	ug/kg	7.2	UJ	5.6	UJ
1,2,3-Trichlorobenzene	ug/kg	7.2	UJ	5.6	UJ

Appendix A-2
Semi-volatile Organic Compound Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/22/2002		4/22/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
N-Nitrosodiphenylamine	ug/kg	490	U	340	U
Phenol	ug/kg	490	U	340	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	490	U	340	U
Bis(2-Chloroisopropyl)Ether	ug/kg	490	U	340	U
2-Chlorophenol	ug/kg	490	U	340	U
1,4-Dichlorobenzene	ug/kg	490	U	340	U
Benzyl alcohol	ug/kg	490	U	340	U
1,2-Dichlorobenzene	ug/kg	490	U	340	U
1,3-Dichlorobenzene	ug/kg	490	U	340	U
2-Methylphenol (o-Cresol)	ug/kg	490	U	340	U
N-Nitrosodi-n-propylamine	ug/kg	490	U	340	U
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	490	U	340	U
Hexachloroethane	ug/kg	490	U	340	U
Nitrobenzene	ug/kg	490	U	340	U
Isophorone	ug/kg	490	U	340	U
2-Nitrophenol	ug/kg	490	U	340	U
2,4-Dimethylphenol	ug/kg	490	U	340	U
bis(2-Chloroethoxy) Methane	ug/kg	490	U	340	U
2,4-Dichlorophenol	ug/kg	490	U	340	U
Benzoic acid	ug/kg	2400	UJ	1600	UJ
1,2,4-Trichlorobenzene	ug/kg	490	U	340	U
Naphthalene	ug/kg	490	U	340	U
4-Chloroaniline	ug/kg	490	U	340	U
Hexachlorobutadiene	ug/kg	490	U	340	U
4-Chloro-3-methylphenol	ug/kg	490	U	340	U
2-Methylnaphthalene	ug/kg	490	U	340	U
Hexachlorocyclopentadiene	ug/kg	490	U	340	U
2,4,6-Trichlorophenol	ug/kg	490	U	340	U
2,4,5-Trichlorophenol	ug/kg	2400	U	1600	U
2-Chloronaphthalene	ug/kg	490	U	340	U
2-Nitroaniline	ug/kg	2400	U	1600	U
3-Nitroaniline	ug/kg	2400	U	1600	U
Dimethyl Phthalate	ug/kg	490	U	340	U
2,6-Dinitrotoluene	ug/kg	490	U	340	U
Acenaphthylene	ug/kg	490	U	340	U
Acenaphthene	ug/kg	490	U	340	U
2,4-Dinitrophenol	ug/kg	2400	U	1600	U
Dibenzofuran	ug/kg	490	U	340	U
2,4-Dinitrotoluene	ug/kg	490	U	340	U
Diethyl Phthalate	ug/kg	490	U	340	U
4-Nitrophenol	ug/kg	2400	U	1600	U
Fluorene	ug/kg	490	U	340	U
4-Chlorophenyl Phenyl Ether	ug/kg	490	U	340	U
4,6-Dinitro-2-methylphenol	ug/kg	2400	U	1600	U

Appendix A-2
Semi-volatile Organic Compound Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/22/2002		4/22/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
4-Nitroaniline	ug/kg	2400	U	1600	U
4-Bromophenyl Phenyl Ether	ug/kg	490	U	340	U
Hexachlorobenzene	ug/kg	490	U	340	U
Pentachlorophenol	ug/kg	2400	U	1600	U
Phenanthrene	ug/kg	490	U	340	U
Anthracene	ug/kg	490	U	340	U
Di-n-butyl Phthalate	ug/kg	490	U	340	U
Fluoranthene	ug/kg	490	U	340	U
Pyrene	ug/kg	490	U	340	U
Benzyl Butyl Phthalate	ug/kg	490	U	340	U
Benzo(a)Anthracene	ug/kg	490	U	340	U
3,3'-Dichlorobenzidine	ug/kg	980	U	680	U
Chrysene	ug/kg	490	U	340	U
bis(2-Ethylhexyl) Phthalate	ug/kg	490	U	340	U
Di-n-octylphthalate	ug/kg	490	U	340	U
Benzo(b)Fluoranthene	ug/kg	490	UJ	340	UJ
Benzo(k)Fluoranthene	ug/kg	490	U	340	U
Benzo(a)Pyrene	ug/kg	490	U	340	U
Indeno(1,2,3-c,d)pyrene	ug/kg	490	U	340	U
Dibenz(a,h)anthracene	ug/kg	490	U	340	U
Benzo(g,h,i)Perylene	ug/kg	490	U	340	U
Carbazole	ug/kg	490	U	340	U

Appendix A-2
Pesticide Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/20/2002		4/20/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Aldrin	ug/kg	1.9	U	1.3	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/kg	1.9	U	1.3	U
Alpha-chlordane	ug/kg	1.9	UJ	1.3	UJ
Beta BHC (Beta Hexachlorocyclohexane)	ug/kg	1.9	U	1.3	U
Chlordane	ug/kg	19	U	13	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/kg	1.9	U	1.3	U
Dieldrin	ug/kg	3.7	U	2.6	U
Endosulfan I	ug/kg	1.9	U	1.3	U
Endosulfan II	ug/kg	3.7	U	2.6	U
Endosulfan Sulfate	ug/kg	3.7	U	2.6	U
Endrin Aldehyde	ug/kg	3.7	U	2.6	U
Endrin Ketone	ug/kg	3.7	U	2.6	U
Endrin	ug/kg	3.7	U	2.6	U
Gamma BHC (Lindane)	ug/kg	1.9	U	1.3	U
Gamma-chlordane	ug/kg	1.9	U	1.3	U
Heptachlor Epoxide	ug/kg	1.9	U	1.3	U
Heptachlor	ug/kg	1.9	U	1.3	U
Methoxychlor	ug/kg	19	U	13	U
p,p'-DDD	ug/kg	3.7	U	2.6	U
p,p'-DDE	ug/kg	3.7	U	2.6	U
p,p'-DDT	ug/kg	3.7	UJ	2.6	UJ
Toxaphene	ug/kg	120	U	86	U

Appendix A-2
PCB Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/18/2002		4/18/2002	
	DateAnalyzed	4/20/2002		4/20/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
PCB-1016 (Arochlor 1016)	ug/kg	49	U	34	U
PCB-1221 (Arochlor 1221)	ug/kg	49	U	34	U
PCB-1232 (Arochlor 1232)	ug/kg	49	U	34	U
PCB-1242 (Arochlor 1242)	ug/kg	49	U	34	U
PCB-1248 (Arochlor 1248)	ug/kg	49	U	34	U
PCB-1254 (Arochlor 1254)	ug/kg	100	U	69	U
PCB-1260 (Arochlor 1260)	ug/kg	100	U	69	U

Appendix A-2
Inorganic Analytical Results - Subsurface Soil Samples
RFI Report Addendum, AOC 704, Zone E, Charleston Naval Complex

	StationID	E704SB001		E704SB002	
	SampleID	704SB00102 (3-5ft)		704SB00202 (3-5ft)	
	DateCollected	4/15/2002		4/15/2002	
	DateExtracted	4/19/2002		4/19/2002	
	DateAnalyzed	4/23/2002		4/23/2002	
	SDGNumber	CNC95		CNC95	
Parameter	**Units**				
Aluminum	mg/kg	6000	=	390	=
Antimony	mg/kg	0.68	UJ	0.47	UJ
Arsenic	mg/kg	4.4	=	0.59	J
Barium	mg/kg	14	J	2.9	J
Beryllium	mg/kg	0.64	J	0.053	U
Cadmium	mg/kg	0.15	J	0.082	U
Calcium	mg/kg	14000	=	17000	=
Chromium, Total	mg/kg	18	=	2	=
Cobalt	mg/kg	3.3	J	0.18	U
Copper	mg/kg	4.1	J	0.76	J
Iron	mg/kg	14000	=	500	=
Lead	mg/kg	7.6	=	1.1	=
Magnesium	mg/kg	3200	J	170	J
Manganese	mg/kg	140	J	5.9	J
Nickel	mg/kg	6.5	J	0.48	J
Potassium	mg/kg	1500	=	78	J
Selenium	mg/kg	0.58	U	0.4	U
Silver	mg/kg	0.26	U	0.18	U
Sodium	mg/kg	120	J	190	J
Thallium	mg/kg	0.77	U	0.53	U
Vanadium	mg/kg	16	=	1.2	U
Zinc	mg/kg	25	=	1.8	J
Mercury*	mg/kg	0.011	J	0.049	J

*Collected 4/15/2002. Extracted 4/18/2002. analyzed 4/20/2002.

Appendix B

Data Validation Summary - Charleston Naval Complex - Zone E, AOC 704

TO: Kris Garcia/CH2M HILL/ATL

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

DATE: July 29, 2002

The purpose of this memorandum is to present the results of the data validation process for the samples collected at AOC 704 in Zone E. The samples were collected on April 15, 2002.

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

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

Samples were submitted to Severn Trent Services, STL Savannah Laboratories, Inc., in Savannah, Georgia, for the following analyses: SW-846 8260 Volatile Organic Compounds (VOC), SW-846 8270 Semivolatile Organic Compounds (SVOC),), SW-846 8081A Organochlorine Pesticides and Polychlorinated Biphenyls, Metals following SW-846 6010/7000 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	VOC SW8260B	SVOC SW8270C	Pest SW8081A	PCBs SW8081A	Metals SW6010B	Mercury SW7471A	Cyanide SW9012A
CNC95	E704SB001	704SB00101	S242647*14	04/15/02	SO	N	0	1	X	X	X	X	X	X	
CNC95	E704SB001	704SB00102	S242647*15	04/15/02	SO	N	3	5	X	X	X	X	X	X	
CNC95	E704SB001	704SB00102RE	S242647*15*RE	04/15/02	SO	LR	3	5				X			
CNC95	E704SB002	704SB00201	S242647*16	04/15/02	SO	N	0	1	X	X	X	X	X	X	
CNC95	E704SB002	704SB00202	S242647*17	04/15/02	SO	N	3	5	X	X	X	X	X	X	
CNC95	FIELDQC	704EB001M1	S242647*20	04/15/02	WG	EB			X	X	X	X	X	X	
CNC95	FIELDQC	704TB001M1	S242647*22	04/15/02	WG	TB			X						
CNC95	LABQC	4264723LB	S242647*23		SQ	LB			X	X	X	X	X	X	X
CNC95	LABQC	4264724BS	S242647*24		SQ	BS			X	X	X	X	X	X	X
CNC95	LABQC	4264737LB	S242647*37		WQ	LB			X	X	X	X	X	X	X
CNC95	LABQC	4264738BS	S242647*38		WQ	BS			X	X	X	X	X	X	X
CNC95	LABQC	4264744LB	S242647*44		SQ	LB			X						
CNC95	LABQC	4264745BS	S242647*45		SQ	BS			X						
CNC95	LABQC	4264747LB	S242647*47		SQ	LB					X	X			
CNC95	LABQC	4264748BS	S242647*48		SQ	BS					X	X			

ATRIX CODE

I – Soil
I – Soil QC Samples
Q - Water QC Samples

MPLE TYPE CODE

- Blank Spike
- Equipment Blank
– Trip Blank
- Field Duplicate
Native Sample
– Laboratory Replicate
- Laboratory Blank

ALYSIS CODE

IC - Volatile Organic Compounds
OC - Semivolatile Organic Compounds
st - Pesticides
Bs - Polychlorinated Biphenyls

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, trip 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.

- **Confirmation** – If GCMS methodology is not initially used for analysis, SW-846 method 8000 requires confirmation when the composition of samples is not well characterized. Therefore, even when the identification has been confirmed on a dissimilar column or detector, the agreement of the quantitative results on both columns is evaluated. For Pesticide and PCB analyses covered in this report, confirmation was performed using a dissimilar analytical column. The laboratory analyzed samples with a gas chromatograph (GC) utilizing simultaneous primary and confirmation data acquisition. Per SW-86 method 8000, a criteria of 40% Relative Percent Difference (RPD) was used as the acceptance limit.

Volatile Organic Compounds (VOC) Analyses

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

Holding Times

Samples S242647*14 - 17 were prepped outside of the 48 hour encore holding time due to the holding of samples in the field for 24 hours. Detect compounds were qualified "J", and non-detected compounds qualified "UJ".

Blanks

The VOC target parameters detected in blank samples are listed in Table 2.

TABLE 2
Blank Contamination: VOCs
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	Method BLK	1L0419MB	MB	Acetone	6.3	µg/Kg	<63.0 µg/Kg
CNC95	Method BLK	1L0422MB	MB	Acetone	9.2	µg/Kg	<92.0 µg/Kg
				2-Butanone	4.1	µg/Kg	<41.0 µg/Kg
CNC95	S242647*20	704EB001M1	EB	Acetone	4.4	µg/Kg	<44.0 µg/Kg

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

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

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

Recoveries – Surrogate, MS/MSD, and LCS

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 3 below.

TABLE 3
Surrogate and LCS Recoveries Out of QC Limits: VOCs
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	704SB00101	Toluene-d8	82*	84-138	S242647*14	No Flags Applied
CNC95	1L0419MBLCS	Bromomethane	146*	70-130	S242647*14, 16, 17	Detects-J, non-detects-UJ
		Acetone	69*	70-130		
		Carbon Disulfide	54*	70-130		
CNC95	1L0419MBLCS	2-Chloroethylvinylether	0*	70-130	S242647*14, 16, 17	Detects and non-detects - R
CNC95	1L0421MBLCS	Acetone	67*	70-130	S242647*20, 22	No Flags Applied (EB, TB)
		1,2,4-Trichlorobenzene	132*	70-130		
		1,2,3-Trichlorobenzene	138*	70-130		
		2-Chloroethylvinlyether	0*	70-130		
CNC95	1L0422MBLCS	Bromomethane	220*	70-130	S242647*15	Detects-J, non-detects-UJ
		Acetone	46*	70-130		
		Carbon Disulfide	60*	70-130		
		Vinyl Acetate	59*	70-130		
		2-Butanone	63*	70-130		
		1,2,3-Trichlorobenzene	52*	70-130		
		1,2,4-Trichlorobenzene	52*	70-130		
		1,3-Dichlorobenzene	68*	70-130		
		1,4-Dichlorobenzene	64*	70-130		
CNC95	1L0422MBLCS	2-Chloroethylvinlyether	0*	70-130	S242647*15	Detects and non-detects - R

* - out of control limits

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in Table 4.

TABLE 4
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: VOC
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]
MSL5972-ICAL-04/10/02, 15:16	Bromomethane	R^2=0.986	CNC95 - All
	2-Chloroethylvinylether	41.2%	
MSL5972-ICAL-04/10/02, 15:16	1,2,4-Trichlorobenzene	43.4%	CNC95 - All
MSL5972-ICAL-04/10/02, 15:16	1,2,3-Trichlorobenzene	49.4%	CNC95 - All
MSL5972-CCAL-04/19/02, 08:05	Bromomethane	60.8% high	S242647*14, 16, 17
	Carbon Disulfide	44.8% low	
	1,4-Dichlorobenzene	22.4% low	
	1,2,4-Trichlorobenzene	38.0% low	
	1,2,3-Trichlorobenzene	34.1% low	
MSL5972-CCAL-04/21/02, 14:33	Chloromethane	20.3% low	S242647*20, 22
	Bromomethane	25.0% low	
	Acetone	21.3% low	
	1,2,4-Trichlorobenzene	49.8% high	
	1,2,3-Trichlorobenzene	49.5% high	
MSL5972-CCAL-04/22/02, 10:14	Chloromethane	30.3% low	S242647*15
	Bromomethane	56.8% high	
	Acetone	37.1% low	
	Vinyl Acetate	34.3% low	
	2-Butanone	24.5% low	
	1,1,1-Trichloroethane	20.1% low	
	1,2-Dichloroethane	21.2% low	

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

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

Semivolatile Organic Compounds (SVOC) Analyses

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

Recoveries – Surrogate, MS/MSD, and LCS

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 5 below.

TABLE 5
LCS Recoveries Out of QC Limits: SVOC
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	0418C-DMBLCS	4-Nitrophenol	82*	10-80	S242647*20	No Flags (EB)
* - out of control limits						

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as noted in Table 6 below.

TABLE 6
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: SVOC
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]
MSD5973-ICAL-04/09/02, 22:27	Benzoic Acid	R^2=0.988	CNC95 - All
	Benzo (b) Fluoranthene	15.1%	
MSD5973-CCAL-04/22/02, 07:15	Benzoic Acid	47.3% high	S242647*14-17, 20
	2,4-Dinitrophenol	28.7% high	

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

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

Organochlorine Pesticide / Polychlorinated Biphenyls (PCBs) Analyses

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

Recoveries – Surrogate, MS/MSD, and LCS

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 7 below.

TABLE 7
Surrogate and LCS Recoveries Out of QC Limits: Organochlorine Pesticides/PCBs
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	704SB00101	Tetrachloro-m-xylene	54* / 56*	60-150	S242647*14	No Flags Applied
		Decachlorobiphenyl	67 / 49*	60-150		
CNC95	704SB00102	Tetrachloro-m-xylene	48* / 48*	60-150	S242647*15	No Flags Applied
		Decachlorobiphenyl	56* / 52*	60-150		
CNC95	704SB00102RE	Tetrachloro-m-xylene	40* / 40*	60-150	S242647*15* RE	No Flags Applied
		Decachlorobiphenyl	52* / 40*	60-150		
CNC95	704SB00201	Tetrachloro-m-xylene	55* / 55*	60-150	S242647*16	No Flags Applied
CNC95	704SB00202	Tetrachloro-m-xylene	55* / 54*	60-150	S242647*17	No Flags Applied
		Decachlorobiphenyl	70 / 55*	60-150		

* - out of control limits

Initial and Continuing Calibration Criteria

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

TABLE 8
Initial and Continuing Calibration Criteria Exceptions: Organochlorine Pesticides/PCBs
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

Instrument/ Calibration Date	Analyte	Percent Difference (%D)	Associated Samples
SGIECD1-CCAL-04/19/02, 12:17	Endrin Aldehyde	17.3 / 11.2 high	S242647*20 (EB)
	Methoxychlor	23.1 / 5.2 high	
	Endrin Ketone	19.6 / 6.7 high	
	Heptachlor	3.9 / 20.1 high	
SGIECD1 – CCAL – 04/20/02, 00:20	Endrin Aldehyde	22.6 / 11.7 high	S242647*14-17, S242647*20
	Methoxychlor	18.6 / 0.3 high	
	Endrin Ketone	21.7 / 8.6 high	
	Heptachlor	0.9 / 22.6 high	
SGIECD1 – CCAL – 04/20/02, 12:04	Delta-BHC	20.7 / 27.3 high	S242647*14-17
	Alpha-Chlordane	18.3 low / 2.3 high	
	4,4'-DDD	33.0 / 36.8 high	
	Endosulfan II	22.2 / 16.8 high	
	4,4'-DDT	18.8 / 21.3 low	
	Endosulfan Sulfate	18.9 / 8.9 high	
	Endrin Ketone	27.6 / 52.5 high	
	Endrin Aldehyde	12.8 / 19.5 high	

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

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

Second Column Confirmation

The second column confirmation percent difference (%D) for some detected parameters, exceeded the 40 %D criteria. Those results were flagged "J", as estimated. The laboratory reported the lower of the two concentrations. The individual samples and specific compounds that were flagged are listed in Table 9 below.

TABLE 9
Second Column Confirmation out of Criteria: Organochlorine Pesticides/PCBs
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

CNC95	704SB00101	S242647*14	Heptachlor Epoxide
CNC95	704SB00101	S242647*14	Alpha Chlordane

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 10.

TABLE 10
Blank Contamination: Metals
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	CCB		CCB	Antimony	5.19	ug/L	2.595 mg/Kg
				Barium	2.8	ug/L	1.4 mg/Kg
				Chromium	2.81	ug/L	1.405 mg/Kg
				Manganese	3.16	ug/L	1.58 mg/Kg
				Thallium	10.0	ug/L	5.0 mg/Kg
				Vanadium	2.63	ug/L	1.90 mg/Kg
CNC95	S242647*20	704EB001M1	EB	Copper	0.00094	mg/L	0.47 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 11 below.

TABLE 11
MS/MSD Recoveries Out of QC Limits: Metals
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	188SB00301MS/MSD	Antimony	52* / 53*	80-120	CNC95 - All	Detects-J, non-detects-UJ
		Magnesium	30* / -19*	80-120	CNC95 - All	Detects-J, non-detects-UJ
		Manganese	123* / 84	80-120	CNC95 - All	Detects-J
		Copper	100 / 122*	80-120	CNC95 - All	Detects-J
		Sodium	81 / 77*	80-120	CNC95 - All	Detects-J, non-detects-UJ
		Mercury	78* / 89	80-120	CNC95 - All	Detects-J, non-detects-UJ
* - out of control limits						

General Chemistry Analyses

The QA/QC parameters for the General Chemistry analyses for all of the samples were within acceptable control limits.

Rejected Data

The majority of rejected data were associated with re-runs and dilutions (you can only have a single valid result per parameter per sample). However, there were selected results for was 2-Chloroethyl vinyl ether qualified as "R", rejected, due to associated QC parameters out of criteria. This compound is very reactive and is not detected under acidic conditions, such as those used in preservation of field samples. The rejected data are summarized in Table 12 below.

TABLE 12
Data Qualification Summary: Rejected Data
Charleston Naval Complex, Zone E, AOC 704, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CNC95	S242647*14	704SB00101	N	VOA		2-Chloroethyl vinyl ether	10	ug/kg	UJ	R	BS
CNC95	S242647*15	704SB00102	N	VOA		2-Chloroethyl vinyl ether	14	ug/kg	UJ	R	BS
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1254	100	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1248	49	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1242	49	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1232	49	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1016	49	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1260	100	ug/kg	U	R	RE
CNC95	S242647*15*RE	704SB00102RE	LR	PCB	RE	AROCHLOR 1221	49	ug/kg	U	R	RE
CNC95	S242647*16	704SB00201	N	VOA		2-Chloroethyl vinyl ether	13	ug/kg	UJ	R	BS
CNC95	S242647*17	704SB00202	N	VOA		2-Chloroethyl vinyl ether	11	ug/kg	UJ	R	BS

Conclusion

A review of the analytical data submitted regarding the investigation of Zone E, AOC 704, 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, with the exception of the rejected data for 2-Chloroethyl vinyl ether, it did not affect data usability for those specific results.

The validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process.

Attachment 1 - Chan d Qualifiers and Results
Zone AOC 704

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,1,1-TRICHLOROETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,1,2,2-TETRACHLOROETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,1,2-TRICHLOROETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,1-DICHLOROETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,1-DICHLOROETHENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2,3-Trichlorobenzene	5.1	U	5.1	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2,4-TRICHLOROBENZENE	5.1	U	5.1	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2-DICHLOROBENZENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2-DICHLOROETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2-Dichloroethene (total)	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,2-DICHLOROPROPANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,3-DICHLOROBENZENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	1,4-DICHLOROBENZENE	5.1	U	5.1	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	2-BUTANONE (MEK)	4.4	J	4.4	J	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	2-Chloroethyl vinyl ether	10	U	10	R	ug/kg	BS
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	2-HEXANONE	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	4-METHYL-2-PENTANONE (MIBK)	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	ACETONE	33	=	33	UJ	ug/kg	BL, HT, BS
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	BENZENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	BROMODICHLOROMETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	BROMOFORM	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	BROMOMETHANE	10	U	10	UJ	ug/kg	HT, IC
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CARBON DISULFIDE	5.1	U	5.1	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CARBON TETRACHLORIDE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CHLOROBENZENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CHLOROETHANE	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CHLOROFORM	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	CHLOROMETHANE	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	cis-1,2-DICHLOROETHYLENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	cis-1,3-DICHLOROPROPENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	DIBROMOCHLOROMETHANE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	ETHYLBENZENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	m+p Xylene	5.1	U	5.1	UJ	ug/kg	HT

Attachment 1 - Changed Qualifiers and Results
Zone E - AOC 704

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	METHYLENE CHLORIDE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	o-Xylene	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	STYRENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	TETRACHLOROETHYLENE(PCE)	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	TOLUENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	trans-1,2-DICHLOROETHENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	trans-1,3-DICHLOROPROPENE	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	TRICHLOROETHYLENE (TCE)	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	Vinyl acetate	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	VINYL CHLORIDE	10	U	10	UJ	ug/kg	HT
CNC95	VOA	704SB00101	S242647*14	SO	SW8260B	XYLENES, TOTAL	5.1	U	5.1	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,1,1-TRICHLOROETHANE	7.2	U	7.2	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,1,2,2-TETRACHLOROETHANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,1,2-TRICHLOROETHANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,1-DICHLOROETHANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,1-DICHLOROETHENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2,3-Trichlorobenzene	7.2	U	7.2	UJ	ug/kg	HT, IC, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2,4-TRICHLOROBENZENE	7.2	U	7.2	UJ	ug/kg	HT, IC, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2-DICHLOROBENZENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2-DICHLOROETHANE	7.2	U	7.2	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2-Dichloroethene (total)	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,2-DICHLOROPROPANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,3-DICHLOROBENZENE	7.2	U	7.2	UJ	ug/kg	HT, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	1,4-DICHLOROBENZENE	7.2	U	7.2	UJ	ug/kg	HT, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	2-BUTANONE (MEK)	14	U	14	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	2-Chloroethyl vinyl ether	14	U	14	R	ug/kg	BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	2-HEXANONE	14	U	14	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	4-METHYL-2-PENTANONE (MIBK)	14	U	14	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	ACETONE	14	U	14	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	BENZENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	BROMODICHLOROMETHANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	BROMOFORM	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	BROMOMETHANE	14	U	14	UJ	ug/kg	HT, IC

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CARBON DISULFIDE	7.2	U	7.2	UJ	ug/kg	HT, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CARBON TETRACHLORIDE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CHLOROBENZENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CHLOROETHANE	14	U	14	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CHLOROFORM	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	CHLOROMETHANE	14	U	14	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	cis-1,2-DICHLOROETHYLENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	cis-1,3-DICHLOROPROPENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	DIBROMOCHLOROMETHANE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	ETHYLBENZENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	m+p Xylene	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	METHYLENE CHLORIDE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	o-Xylene	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	STYRENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	TETRACHLOROETHYLENE(PCE)	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	TOLUENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	trans-1,2-DICHLOROETHENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	trans-1,3-DICHLOROPROPENE	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	TRICHLOROETHYLENE (TCE)	4.3	J	4.3	J	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	Vinyl acetate	14	U	14	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	VINYL CHLORIDE	14	U	14	UJ	ug/kg	HT
CNC95	VOA	704SB00102	S242647*15	SO	SW8260B	XYLENES, TOTAL	7.2	U	7.2	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,1,1-TRICHLOROETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,1,2,2-TETRACHLOROETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,1,2-TRICHLOROETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,1-DICHLOROETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,1-DICHLOROETHENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2,3-Trichlorobenzene	6.7	U	6.7	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2,4-TRICHLOROBENZENE	6.7	U	6.7	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2-DICHLOROBENZENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2-DICHLOROETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2-Dichloroethene (total)	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,2-DICHLOROPROPANE	6.7	U	6.7	UJ	ug/kg	HT

Attachment 1 - Changed Qualifiers and Results
Zone E - AOC 704

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,3-DICHLOROBENZENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	1,4-DICHLOROBENZENE	6.7	U	6.7	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	2-BUTANONE (MEK)	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	2-Chloroethyl vinyl ether	13	U	13	R	ug/kg	BS
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	2-HEXANONE	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	4-METHYL-2-PENTANONE (MIBK)	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	ACETONE	7.2	J	13	UJ	ug/kg	BL, HT, BS
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	BENZENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	BROMODICHLOROMETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	BROMOFORM	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	BROMOMETHANE	13	U	13	UJ	ug/kg	HT, IC
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CARBON DISULFIDE	6.7	U	6.7	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CARBON TETRACHLORIDE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CHLOROBENZENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CHLOROETHANE	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CHLOROFORM	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	CHLOROMETHANE	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	cis-1,2-DICHLOROETHYLENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	cis-1,3-DICHLOROPROPENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	DIBROMOCHLOROMETHANE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	ETHYLBENZENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	m+p Xylene	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	METHYLENE CHLORIDE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	o-Xylene	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	STYRENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	TETRACHLOROETHYLENE(PCE)	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	TOLUENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	trans-1,2-DICHLOROETHENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	trans-1,3-DICHLOROPROPENE	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	TRICHLOROETHYLENE (TCE)	6.7	U	6.7	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	Vinyl acetate	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	VINYL CHLORIDE	13	U	13	UJ	ug/kg	HT
CNC95	VOA	704SB00201	S242647*16	SO	SW8260B	XYLENES, TOTAL	6.7	U	6.7	UJ	ug/kg	HT

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,1,1-TRICHLOROETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,1,2,2-TETRACHLOROETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,1,2-TRICHLOROETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,1-DICHLOROETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,1-DICHLOROETHENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2,3-Trichlorobenzene	5.6	U	5.6	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2,4-TRICHLOROBENZENE	5.6	U	5.6	UJ	ug/kg	HT, IC, CC
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2-DICHLOROBENZENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2-DICHLOROETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2-Dichloroethene (total)	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,2-DICHLOROPROPANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,3-DICHLOROBENZENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	1,4-DICHLOROBENZENE	5.6	U	5.6	UJ	ug/kg	HT, CC
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	2-BUTANONE (MEK)	11	U	11	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	2-Chloroethyl vinyl ether	11	U	11	R	ug/kg	BS
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	2-HEXANONE	11	U	11	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	4-METHYL-2-PENTANONE (MIBK)	11	U	11	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	ACETONE	11	U	11	UJ	ug/kg	HT, BS
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	BENZENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	BROMODICHLOROMETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	BROMOFORM	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	BROMOMETHANE	11	U	11	UJ	ug/kg	HT, IC
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CARBON DISULFIDE	5.6	U	5.6	UJ	ug/kg	HT, CC, BS
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CARBON TETRACHLORIDE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CHLOROBENZENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CHLOROETHANE	11	U	11	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CHLOROFORM	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	CHLOROMETHANE	11	U	11	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	cis-1,2-DICHLOROETHYLENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	cis-1,3-DICHLOROPROPENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	DIBROMOCHLOROMETHANE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	ETHYLBENZENE	5.6	U	5.6	UJ	ug/kg	HT
CNC95	VOA	704SB00202	S242647*17	SO	SW8260B	m+p Xylene	5.6	U	5.6	UJ	ug/kg	HT

Attachment 1 - Changed Qualifiers and Results
Zone E - AOC 704

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	METHYLENE CHLORIDE	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	o-Xylene	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	STYRENE	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	TETRACHLOROETHYLENE(PCE)	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	TOLUENE	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	trans-1,2-DICHLOROETHENE	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	trans-1,3-DICHLOROPROPENE	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	TRICHLOROETHYLENE (TCE)	5.6	U	5.6	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	Vinyl acetate	11	U	11	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	VINYL CHLORIDE	11	U	11	UJ	ug/kg	HT
NC95	VOA	704SB00202	S242647*17	SO	SW8260B	XYLENES, TOTAL	5.6	U	5.6	UJ	ug/kg	HT
NC95	SVOA	704SB00101	S242647*14	SO	SW8270C	BENZO(b)FLUORANTHENE	370	U	370	UJ	ug/kg	IC
NC95	SVOA	704SB00101	S242647*14	SO	SW8270C	Benzoic acid	1800	U	1800	UJ	ug/kg	IC
NC95	SVOA	704SB00102	S242647*15	SO	SW8270C	BENZO(b)FLUORANTHENE	490	U	490	UJ	ug/kg	IC
NC95	SVOA	704SB00102	S242647*15	SO	SW8270C	Benzoic acid	2400	U	2400	UJ	ug/kg	IC
NC95	SVOA	704SB00201	S242647*16	SO	SW8270C	BENZO(b)FLUORANTHENE	400	U	400	UJ	ug/kg	IC
NC95	SVOA	704SB00201	S242647*16	SO	SW8270C	Benzoic acid	1900	U	1900	UJ	ug/kg	IC
NC95	SVOA	704SB00202	S242647*17	SO	SW8270C	BENZO(b)FLUORANTHENE	340	U	340	UJ	ug/kg	IC
NC95	SVOA	704SB00202	S242647*17	SO	SW8270C	Benzoic acid	1600	U	1600	UJ	ug/kg	IC
NC95	PEST	704SB00101	S242647*14	SO	SW8081	Heptachlor epoxide	0.15	J	0.15	J	ug/kg	2C
NC95	PEST	704SB00101	S242647*14	SO	SW8081	alpha-Chlordane	0.48	J	0.48	J	ug/kg	2C, CC
NC95	PEST	704SB00101	S242647*14	SO	SW8081	4,4'-DDT	2.2	J	2.2	J	ug/kg	CC
NC95	PEST	704SB00102	S242647*15	SO	SW8081	alpha-Chlordane	1.9	U	1.9	UJ	ug/kg	CC
NC95	PEST	704SB00102	S242647*15	SO	SW8081	4,4'-DDT	3.7	U	3.7	UJ	ug/kg	CC
NC95	PEST	704SB00201	S242647*16	SO	SW8081	alpha-Chlordane	1.6	U	1.6	UJ	ug/kg	CC
NC95	PEST	704SB00201	S242647*16	SO	SW8081	4,4'-DDT	3	U	3	UJ	ug/kg	CC
NC95	PEST	704SB00202	S242647*17	SO	SW8081	alpha-Chlordane	1.3	U	1.3	UJ	ug/kg	CC
NC95	PEST	704SB00202	S242647*17	SO	SW8081	4,4'-DDT	2.6	U	2.6	UJ	ug/kg	CC
NC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1016	49	U	49	R	ug/kg	RE
NC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1221	49	U	49	R	ug/kg	RE
NC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1232	49	U	49	R	ug/kg	RE
NC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1242	49	U	49	R	ug/kg	RE
NC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1248	49	U	49	R	ug/kg	RE

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1254	100	U	100	R	ug/kg	RE
CNC95	PCB	704SB00102RE	S242647*15*RE	SO	SW8082	AROCHLOR 1260	100	U	100	R	ug/kg	RE
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	ANTIMONY	0.56	J	0.56	UJ	mg/kg	BL,MS
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	BARIUM	10	J	10	J	mg/kg	IB
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	BERYLLIUM	0.19	J	0.19	J	mg/kg	IB
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	CADMIUM	0.4	J	0.4	J	mg/kg	IB
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	COBALT	0.72	J	0.72	J	mg/kg	IB
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	COPPER	21	=	21	J	mg/kg	MS
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	MAGNESIUM	2300	=	2300	J	mg/kg	MS
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	MANGANESE	32	=	32	J	mg/kg	MS
CNC95	METAL	704SB00101	S242647*14	SO	SW7471A	MERCURY	0.26	=	0.26	J	mg/kg	MS
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	POTASSIUM	560	J	560	J	mg/kg	IB
CNC95	METAL	704SB00101	S242647*14	SO	SW6010B	SODIUM	340	J	340	J	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	ANTIMONY	0.68	U	0.68	UJ	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	BARIUM	14	J	14	J	mg/kg	IB
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	BERYLLIUM	0.64	J	0.64	J	mg/kg	IB
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	CADMIUM	0.15	J	0.15	J	mg/kg	IB
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	COBALT	3.3	J	3.3	J	mg/kg	IB
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	COPPER	4.1	J	4.1	J	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	MAGNESIUM	3200	=	3200	J	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	MANGANESE	140	=	140	J	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW7471A	MERCURY	0.011	J	0.011	J	mg/kg	MS
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	NICKEL	6.5	J	6.5	J	mg/kg	IB
CNC95	METAL	704SB00102	S242647*15	SO	SW6010B	SODIUM	120	J	120	J	mg/kg	MS
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	ANTIMONY	0.81	J	0.81	UJ	mg/kg	BL,MS
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	BARIUM	10	J	10	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	BERYLLIUM	0.22	J	0.22	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	CADMIUM	0.44	J	0.44	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	COBALT	1.4	J	1.4	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	COPPER	7.5	=	7.5	J	mg/kg	MS
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	MAGNESIUM	2500	=	2500	J	mg/kg	MS
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	MANGANESE	26	=	26	J	mg/kg	MS
CNC95	METAL	704SB00201	S242647*16	SO	SW7471A	MERCURY	0.064	J	0.064	J	mg/kg	MS

Attachment 1 - Changed Qualifiers and Results
Zone E - AOC 704

SDG	Parameter Class	Sample ID	Lab Sample ID	Matrix	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	POTASSIUM	640	J	640	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	SELENIUM	0.77	J	0.77	J	mg/kg	IB
CNC95	METAL	704SB00201	S242647*16	SO	SW6010B	SODIUM	480	J	480	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	ANTIMONY	0.47	U	0.47	UJ	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	ARSENIC	0.59	J	0.59	J	mg/kg	IB
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	BARIUM	2.9	J	2.9	J	mg/kg	IB
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	COPPER	0.76	J	0.76	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	MAGNESIUM	170	J	170	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	MANGANESE	5.9	=	5.9	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW7471A	MERCURY	0.049	J	0.049	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	NICKEL	0.48	J	0.48	J	mg/kg	IB
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	POTASSIUM	78	J	78	J	mg/kg	IB
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	SODIUM	190	J	190	J	mg/kg	MS
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	VANADIUM	1.2	J	1.2	U	mg/kg	BL
CNC95	METAL	704SB00202	S242647*17	SO	SW6010B	ZINC	1.8	J	1.8	J	mg/kg	IB

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZE704-040402-01 page 2

Laboratory: STL

Project Name: Charleston Navy Complex

Site Name: Zone E, AOC 704

Project Number: 158814.PM.04

TAT: 7 day

Project Manager:

QA Level: 3

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

ATL: 115 Perimeter Center Place NE, Suite 700, Atlanta, GA 30346-1278

Send Report To: see last page of COC

EDD: CNC format

Lab Batch/SDG: CNC95

Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	VOCs (SW8260B) 3 - 5g Encore & 1 2 ounce jar	SVOCs (SW8270C) 1 - 8 ounce jar	PCBs (SW8082)	Metals (SW6010B/7000) 1 - 4 ounce jar		VOCs (SW8260B) 3 - 40mL vial, HCl	SVOCs (SW8270C) 2 - 1L amber	PCBs (SW8082) 2 - 1L amber	Metals (SW6010B/7000) 1 - 250mL HDPE, HNO3		Comments
704SB00101	E704SB001	~~4-15-02~~ AB	0	1	4-15-02/1410	SO	6	X	X	X	X						4	SINGLES
704SB00102	E704SB001		3	5	4-15-02/1420	SO	6	X	X	X	X							COMPOSITE
704SB00201	E704SB002		0	1	4-15-02/1430	SO	6	X	X	X	X							
704SB00202	E704SB002		3	5	4-15-02/1440	SO	6	X	X	X	X						4	RCRA
704EB001M1	E704EB001				4-15-02/1445	SQ	8						X	X	X	X		EB
704TB001M1	E704TB001				LAB supplied	SQ	3						X					TB

Sampled By: Andrew O'Connor / Brian (Masford) Date/Time: 4-15-02

Relinquished by: Date/Time

Additional Samplers: A. Stokes

Received By Lab: Date/Time

Relinquished by: Date/Time

Received By: Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Remarks:

Temperature:

Receipt Exceptions:

VOCs (SW8260B)
standard CNC VOC list

SVOCs (SW8270C)
standard CNC SVOC list

Pesticides (SW8081)
standard CNC Pesticide list

PCBs (SW8082)
standard CNC PCB list

Metals (SW6010B)
standard CNC metals list

Reports
Herb Kelly/GNV - 1 hardcopy, 1 CD
Tom Beisel/ATL - 1 CD
Brian Crawford/JAJ - 1 CD

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3011 SW Williston Rd
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Fax: (352) 271 - 4811

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JAJones - Brian Crawford and Jed Heames
CH2M-Jones, LLC
Charleston Naval Complex
1849 Avenue F
North Charleston, SC 29405

Recei xceptions: _____