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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM AREA OF CONCERN 698 (AOC 698) ZONE K NAVAL STATION ANNEX CNC CHARLESTON SC

2/7/2002

CH2M HILL

RFI REPORT ADDENDUM

Area of Concern 698, Zone K - Naval Station An

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

February 2002

Contract N62467-99-C-0960

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February 7, 2002

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

Re: RFI Report Addendum (Revision 0), AOC 698, Zone K, Naval Station Annex

Dear Mr. Scaturo:

Enclosed please find four sets of replacement pages which serve as Revision 1 of the RFI Report Addendum for AOC 698 in Zone K of the Charleston Naval Complex (CNC), Naval Station Annex. Below is a summary of the material enclosed with this letter:

- Revision 1 text to be replaced in the Revision 0 RFI Report Addendum for AOC 698, Zone K, submitted by CH2M-Jones in July 2001.
- New Appendix H divider page and material to be inserted in the back of the original Revision 0 RFI Report Addendum 3-ring binder.
- Revision 1 covers/spines and flysheets to be replaced in the original Revision 0 RFI Report Addendum 3-ring binder.

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 Vijaya Mylavarapu. Please contact her at 352/335-5877, extension 2224, if 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 698, Zone K - Naval Station Annex

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

February 2002

Revision 1
Contract N62467-99-C-0960
158814.ZK.PR.02

Certification Page for RFI Report Addendum (Revision 1) – AOC 698, Zone K, CNC Annex

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

South Carolina

Permit No. 21428

Dean Williamson

Dean Williamson, P.E.

2/6/2002

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
BHC	benzenehexachloride
BRAC	Base Realignment and Closure Act
BRC	background reference concentration
BTEX	benzene, toluene, ethylbenzene, and xylene
CA	corrective action
CMS	corrective measures study
CNC	Charleston Naval Complex
COC	contaminant of concern
COPC	contaminant of potential concern
DAF	dilution attenuation factor
DPT	direct-push technology
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
ft bls	feet below land surface
HE	heptachlor epoxide
HHRA	human health risk assessment
HI	hazard index
ILCR	incremental lifetime cancer risk
MCL	maximum contaminant level
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NAVBASE	Naval Base
NFA	no further action
NFI	no further investigation

ng/kg	nanograms per kilogram
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppb	part per billion
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SPLP	synthetic precipitation leaching procedure
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
TEQ	2,3,7,8-TCDD equivalent
TPH	total petroleum hydrocarbon
TPH-DRO	TPH- diesel range organics
ThQ	target hazard quotient
VOC	volatile organic compound
UST	underground storage tank

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) 698 in Zone K of the Naval Station Annex. The site is recommended for No Further Action (NFA). Figure 1-1 illustrates the location of Zone K in the Naval Station Annex.

1.1 Background

AOC 698 is comprised of Building 2508 at the Naval Station Annex, which houses four boilers that once supplied steam to various annex facilities. Figure 1-2 presents the location of Building 2508. Completed in 1955, the building was originally operated by the Air Force. In 1981, the Navy assumed ownership of the building. The building has been out of service for several years and is currently in poor condition. The building is designated as an AOC due to the lead-based paint that is peeling off the interior and exterior surfaces.

A 10,000-gallon fuel oil aboveground storage tank (AST) was formerly located on the northeast side of Building 2508. Original project plans indicated that the AST had been present since Building 2508 was constructed. A cement block secondary containment berm was added in the late 1970s. The containment berm and concrete tank supports are still present, although the tank was removed in the mid-1990s.

Materials of concern identified in the *Final Zone K RFI Work Plan* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1996) for AOC 698 were lead from the building and AST, and petroleum hydrocarbons in the area of the AST. The potential receptors of these

contaminants are current and future site users involved in excavation activities. The *Charleston Naval Annex Reuse Plan* (Wilbur Smith Associates, 1997) identifies the future use of this property as commercial/industrial.

To fulfill RFI objectives, soil was sampled to confirm whether any contamination resulted from onsite activities at AOC 698. The sampling event was conducted in accordance with the *Final Zone K RFI Work Plan* as reported in the *Zone K RFI Report, Revision 0* (EnSafe, 1999a), and as described in Section 4.0 of this report addendum.

1.2 Purpose of the RFI Report Addendum

This report addendum provides information about AOC 698 that documents the conclusions from the *Zone K RFI Report, Revision 0,* provides the results of some limited additional sampling performed after the RFI, and supports the RFI recommendation of NFA for AOC 698.

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

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

Information regarding these issues is provided in this 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 the site. At that time, a Statement of Basis will be prepared that will be 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 of the report and background information relating to the RFI Report Addendum.

2.0 Summary of RFI Conclusions for AOC 698 — Summarizes the conclusions from the RFI investigations and risk evaluations for AOC 698.

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

4.0 Summary of Additional Investigations — Summarizes information collected after completion of the RFI report.

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

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

7.0 Recommendations—Provides recommendations for proceeding with site closure.

8.0 References — Lists the references used in this document.

Appendix A contains analytical data from sampling subsequent to the RFI report.

Appendix B contains data validation summary reports for the data from sampling subsequent to the RFI report.

Appendix C contains Tables 10.9.1 through 10.9.4 (from the *Zone K RFI Report, Revision 0* [EnSafe, 1999a]).

Appendix D contains the well installation log for monitor well K698GW002 (formerly NBCK698002).

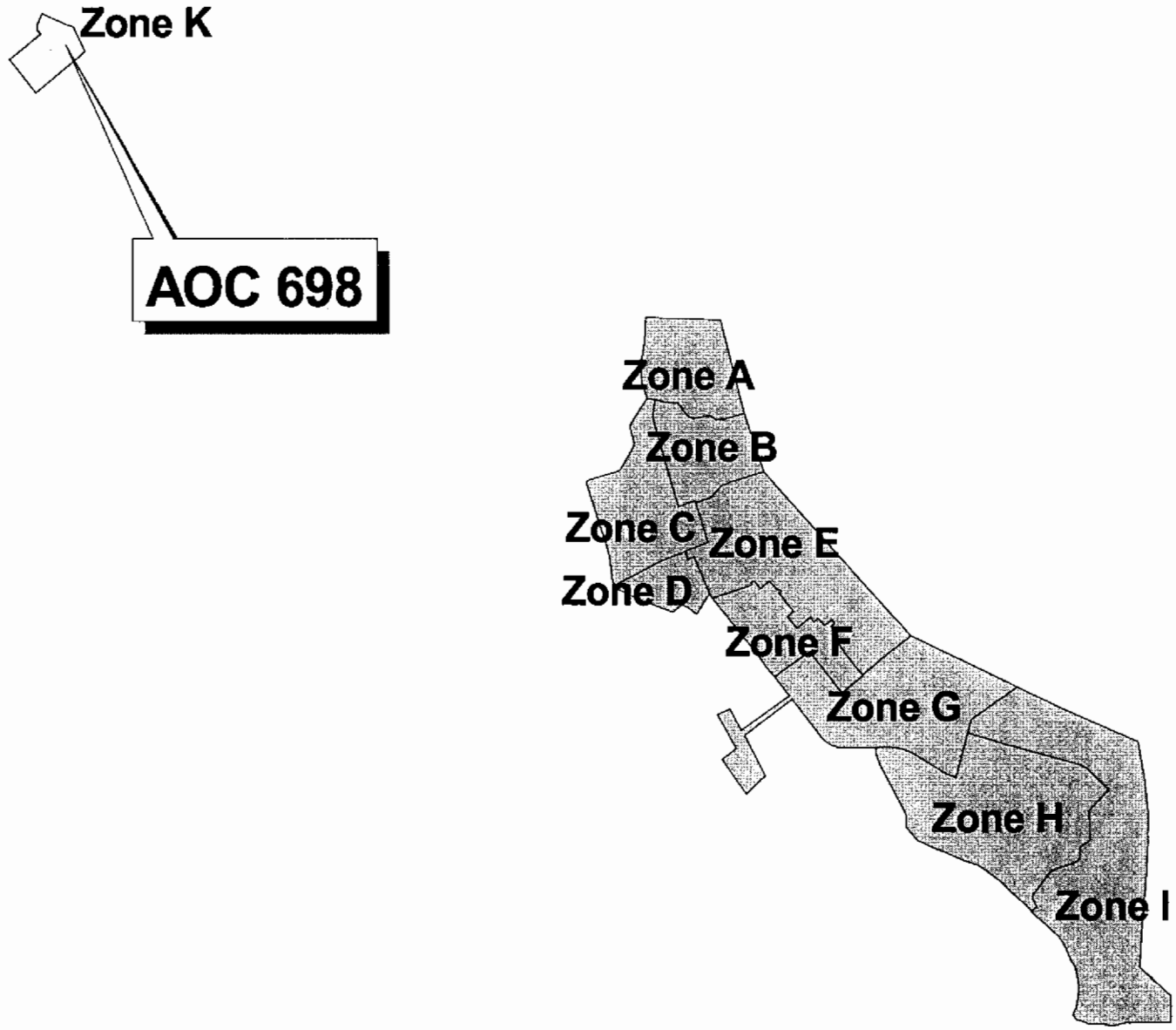
Appendix E contains RFI Figure 2.7, *Shallow Groundwater Potentiometric Contours.*

Appendix F contains responses to SCDHEC comments for this site from the *Zone K RFI Report, Revision 0* and the *Zone K RFI Work Plan Addendum* (EnSafe, 1999b).

Appendix G contains the letter from SCDHEC, dated October 22, 1997, which approves the closure action of the former fuel oil AST at Building 2508.

Appendix H contains site photographs of AOC 698, depicting current conditions following the removal of asphalt shingles noted around the site in November 2001.

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



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0 3000 6000 Feet

Figure 1-1
AOC 698 - Zone K
Zone Map
Charleston Naval Complex

CH2MHILL

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AOC Boundary
SWMU Boundary
Buildings

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Figure 1-2
AOC 698
Zone K
Charleston Naval Complex

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Section 2.0

2.0 Summary of RFI Conclusions for AOC 698

This section summarizes the results and conclusions from the soil and groundwater investigations conducted in the area of Building 2508, which were reported in the *Zone K RFI Report, Revision 0* (EnSafe, 1999a). Figure 2-1 presents the site features and RFI soil sample and monitor well locations. Figure 2-2 shows locations where groundwater samples were collected using direct-push technology (DPT) methods.

Three soil sampling events were conducted from December 1996 through January 1999 for the initial RFI. A total of 20 surface (0 to 1 feet below land surface [ft bls]) soil samples (K698001 through K698020) and 16 subsurface (3 to 5 ft bls) soil samples (K698001 through K698008 and K698013 through K698020) were collected. During the first sampling event, eight surface and subsurface soil samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. During the second sampling event, four surface soil samples were collected and analyzed for pesticides. In the third sampling event, eight surface and subsurface soil samples were collected and analyzed for VOCs, SVOCs, and pesticides. The RFI report presented the results of these soil tests and conclusions concerning contamination and risk, as summarized in Sections 2.1 and 2.2 of this report addendum. A further evaluation of COCs is provided in Section 5.0 of this report addendum.

One shallow groundwater monitor well (K698GW001) was installed adjacent to a fuel oil AST. Four sampling events were conducted between January 1997 and October 1997. A standard chemical suite (metals, VOCs, SVOCs, pesticides/polychlorinated biphenyls [PCBs]) plus total petroleum hydrocarbon (TPH) were analyzed on the first, second, and fourth set of monitor well groundwater samples. Only the standard chemical suite was analyzed on the third groundwater sampling event. In addition, six groundwater probe water samples were collected near the AST in February 1997 and analyzed for VOCs and TPHs.

Groundwater contamination conclusions from the RFI are summarized in Section 2.3 of this report addendum. A further evaluation of COCs is provided in Section 5.0.

2.1 Surface Soil

Screening criteria for surface soil consisted of U.S. Environmental Protection Agency (EPA) Region III residential risk-based concentrations (RBCs) (hazard index [HI]=0.1 for non-

carcinogens), soil screening levels (SSLs) (dilution attenuation factor [DAF] = 1 for VOCs, and 10 for all other chemicals), and Zone K-Naval Station Annex background reference concentrations (BRCs). The section describing the nature and extent of contamination in soil (10.9.2) of the *Zone K RFI Report, Revision 0* concludes that no VOCs were detected in surface soil. The RFI reported that several polycyclic aromatic hydrocarbons (PAHs) exceeded the benzo(a)pyrene equivalent (BEQ) RBC (87 micrograms per kilogram [µg/kg]) in one sample, dioxin exceeded its 2,3,7,8-TCDD equivalent (TEQ) RBC (4.3 nanograms per kilogram [ng/kg]) in one sample, heptachlor epoxide (HE) exceeded its RBC (70 µg/kg) in two samples, arsenic exceeded its RBC and BRC (0.43 milligrams per kilogram [mg/kg] and 3 mg/kg, respectively) in five samples, cadmium exceeded its RBC and BRC (3.9 mg/kg and 0.13 mg/kg, respectively) in one sample, and iron exceeded its RBC and BRC (2,300 mg/kg and 7,060 mg/kg, respectively) in one sample. No other organics or inorganics exceeded the screening criteria (residential RBCs, BRCs, and SSLs). Appendix C provides these data in Tables 10.9.1 through 10.9.4, as excerpts from the original RFI report.

The fate and transport section (10.9.5) of the *Zone K RFI Report, Revision 0* concludes that the soil-to-groundwater constituent migration pathway is invalid due to lack of contamination in groundwater and the fact that exceedances of SSL values were very limited. One organic compound, dieldrin, exceeded its groundwater protection SSL in surface soil; however, it was not detected in groundwater. Cadmium was detected at a concentration equal to its SSL at one surface location; however, it was not detected in subsurface soil or groundwater. No VOCs were detected in surface or subsurface soils at AOC 698. As a result, the soil–to-air migration pathway is not considered to be valid.

The human health risk assessment (HHRA) section (10.9.6.2) identified arsenic, BEQ, cadmium, and HE as COPCs in surface soil. BEQ, HE, and arsenic were identified as (surface) soil pathway COCs for future residents; BEQs and arsenic were identified as COCs for site workers (industrial land use scenario).

2.2 Subsurface Soil

Screening criteria for subsurface soil were SSLs (DAF = 1 for VOCs, and DAF=10 for all other chemicals) and Zone K-Naval Station Annex BRCs. The section that describes the nature and extent of contamination in soil (10.9.2) in the RFI report concludes that no VOCs, SVOCs, TPH-DRO, pesticides/PCBs, or inorganic chemicals were detected above the SSLs or Zone K subsurface soil BRCs.

In Section 10.9.5, the RFI report concludes there are no fate and transport issues associated with subsurface soil. No COPCs were identified for subsurface soil.

2.3 Groundwater

The screening criteria for groundwater samples consisted of maximum contaminant levels (MCLs), Zone K groundwater BRCs, and, for parameters that have no MCL, EPA Region III tap water RBCs. The discussion on the nature and extent of contamination in groundwater (Section 10.9.4), concludes that several VOC, SVOC, pesticide, TPH, and metal chemicals were detected in groundwater samples. The following four chemicals were identified as the possible COPCs found in well K698GW001:

- Benzene exceeded its tap water RBC (0.36 micrograms per liter [µg/L]) in all four sampling events (well K698GW001 is near the former AST location).
- The constituent 2-methylnaphthalene exceeded the tap water RBC (12 µg/L; no MCL listed) during the first and second sampling events.
- The constituents alpha- and delta-benzenehexachloride (BHC) were detected in all four sampling events, but exceeded their tap water RBCs in only one round each.
- Iron exceeded its tap water RBC and BRC (1,100 µg/L, and 300 µg/L, respectively) during the third and fourth sampling events.

All six groundwater DPT screening samples were analyzed for TPH and VOCs. Only the following detections were noted:

- Toluene was reported at an estimated concentration of 1(J) µg/L in K698GP002 and K698GP003 (the residential RBC is 75 µg/L for HI = 0.1, the MCL is 1,000 µg/L).
- Trichloroethene (TCE) was reported at an estimated concentration of 4(J) µg/L in K698GP006 (the residential RBC is 1.6 µg/L, the MCL is 5 µg/L).

Page 10.9.32 of the *Zone K RFI Report, Revision 0* states that the sample from K698GP006 was collected immediately after solvent plume samples for the SWMU 166 TCE plume investigation were collected. Because of the low concentration of TCE in K698GP006 and the absence of TCE in any other AOC 698 groundwater sample, its occurrence is potentially due to cross contamination from the SWMU 166 investigation. This site is located very close to the TCE plume being investigated as part of SWMU 166.

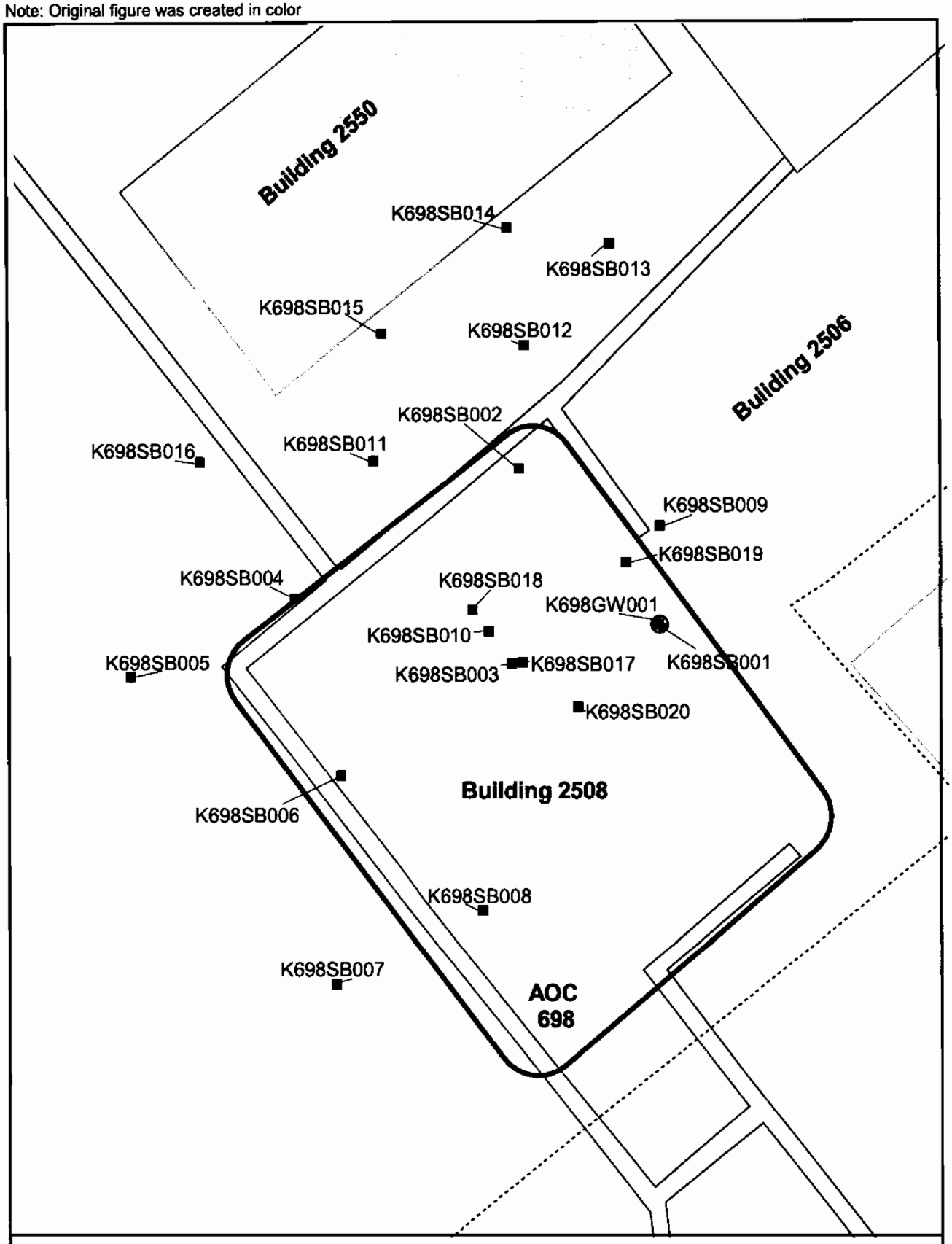
Appendix E, Figure 2.7, includes the potentiometric contour map for the shallow groundwater at AOC 698 and Zone K.

The fate and transport section of the RFI report (10.9.5) concluded that four organic groundwater constituents (benzene, 2-methylnaphthalene, alpha-BHC, and delta-BHC) exceeded their risk-based drinking water standards. Only benzene exceeded its MCL; 2-methylnaphthalene, alpha-BHC, and delta-BHC do not have MCLs, but exceeded their RBCs. These parameters were not recommended for further assessment due to limited spatial distribution for benzene and delta-BHC, as well as to a significant drop in detected concentrations of 2-methylnaphthalene and delta-BHC during the last two sampling events.

2.4 Summary of Risk Assessment from the RFI Report

The human health risk assessment (HHRA) identified arsenic, BEQs, and HE as COCs for surface soil based on an incremental lifetime cancer risk (ILCR) contribution of 6×10^{-5}, and a HI of <1.0 for future residents (unrestricted land use scenario). In addition, benzene, 2-methylnaphthalene, alpha-BHC, and delta-BHC were identified as COPCs in shallow groundwater based on a risk contribution of 3×10^{-5} to future residents' potable use of shallow groundwater at AOC 698. Risks to future workers were estimated at 1×10^{-5} from soils and 1×10^{-5} from groundwater. The HIs were well below a value of 1 from both soils and groundwater for a future worker. All the risks and the HI for both residents and workers are well within the acceptable range of 1 to 100 in a million, and the HI is well below a value of 1.0. Benzene, alpha-BHC, and delta-BHC in groundwater were identified as COCs based on their contribution to the ILCR projections under both residential and site worker scenarios, assuming a 1 in a million (10^{-6}) risk level is the target risk level. Of these COCs, benzene exceeded its MCL within the AST area, and the BHC concentrations were below the MCL for lindane (gamma-BHC). No MCLs exist for alpha- or delta-BHC.

Note: Original figure was created in color



Soil Boring
Groundwater Monitoring Well
Fence
Roads
Pavement
Sidewalk
AOC Boundary
SWMU Boundary
Buildings

N

0 30 60 Feet

Figure 2-1
Site Map and Sample Location Plan
AOC 698, Zone K
Charleston Naval Complex

CH2MHILL

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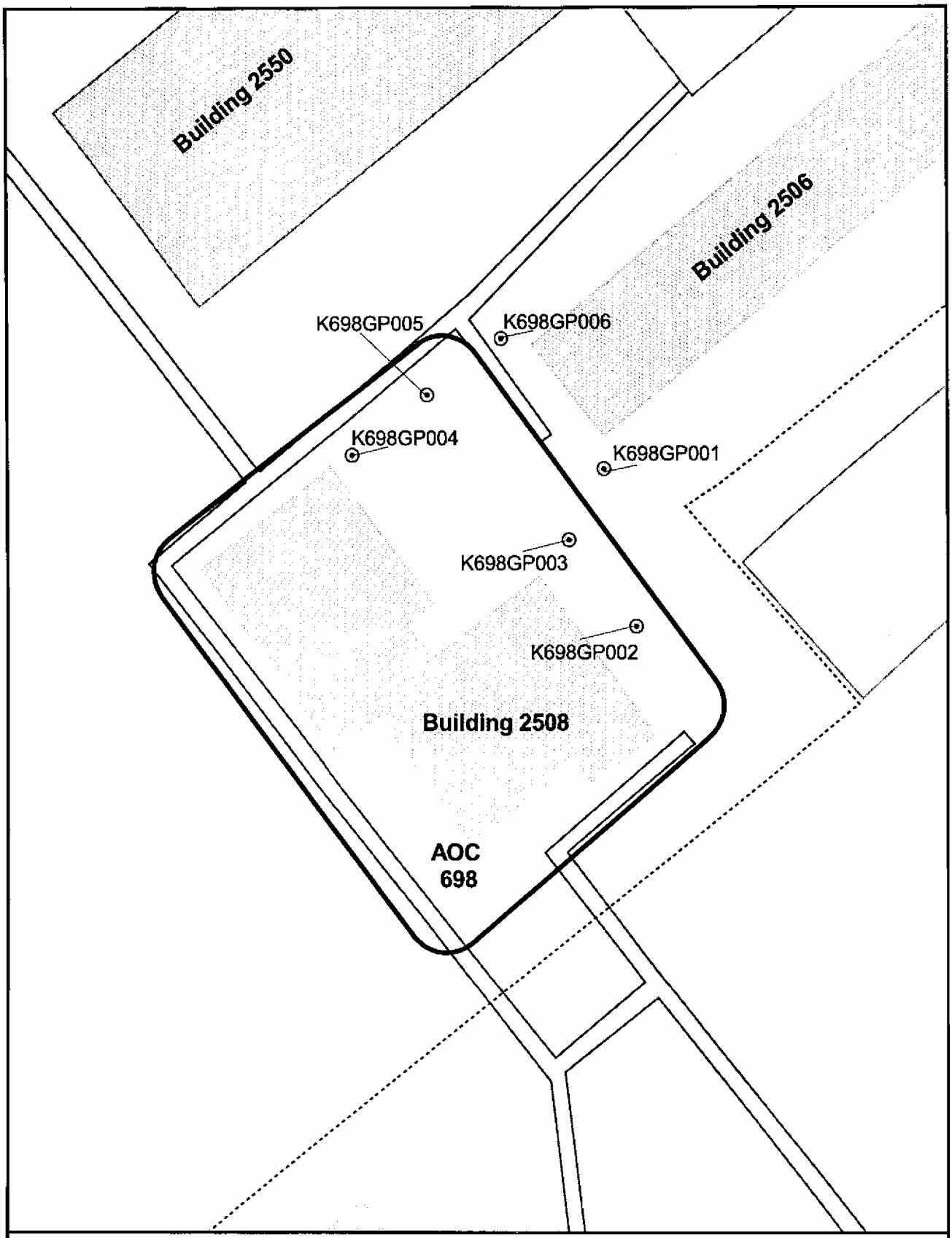

Direct Push Groundwater Samples
Fence
Pavement
Sidewalk
AOC Boundary
Buildings

N

0 30 60 Feet

Figure 2-2
Direct Push Groundwater Samples
AOC 698, Zone K
Charleston Naval Complex

CH2MHILL

Section 3.0

3.0 Interim Measures and UST/AST Removals

There is no record of interim measure activities or USTs at AOC 698.

The former fuel oil AST at Building 2508 was removed in a closure action documented by a closure report submitted to SCDHEC in May 1997. A letter from SCDHEC, dated October 22, 1997, approves the site closure activities for NFA. This letter is provided in Appendix G of this RFI Report Addendum.

Section 4.0

4.0 Summary of Additional Investigations

This section summarizes the results and conclusions from the additional RFI investigations planned and performed by EnSafe based on the *Final Zone K RFI Report Work Plan Addendum* (EnSafe, 1999b). These results have not yet been formally presented to SCDHEC.

During the latter part of 1999 and 2000, additional field activities were conducted subsequent to the completion of the *Zone K RFI Report, Revision 0* (EnSafe, 1999a). According to the *Final Zone K RFI Report Work Plan Addendum*, soil data gaps were identified and soil samples were collected to accomplish the following specific tasks:

- Assess leachable fractions by conducting synthetic precipitation leaching procedure (SPLP) tests for metals, VOCs, pesticides/PCBs, and SVOCs
- Further define the lateral extent of arsenic, BEQ, dioxins, and TPHs in surface soil
- Investigate the lateral extent of VOCs, SVOCs, metals, pesticides, and dioxins in groundwater in a downgradient direction from source wells at AOC 698

The data from the additional investigations are summarized in this section. Analytical data and the data validation report summaries are provided in Appendices A and B, respectively.

Additionally, six surface soil and three subsurface soil background samples were collected subsequent to this effort by CH2M-Jones to establish background BEQs, copper, and arsenic levels within Zone K-Naval Station Annex.

4.1 Soil Sampling and Analysis

During the additional investigations at AOC 698, soil samples were collected at 23 locations, as presented in Figure 4-1. Samples were analyzed for metals from surface and subsurface depths at 16 locations. Of these samples, SPLP metals tests were also run on three surface and three subsurface samples. Samples were analyzed for VOCs from surface and subsurface depths at four locations, for SVOCs at three locations, for pesticides/PCBs at one location, and for dioxins at four locations. One surface and one subsurface sample each were analyzed for SPLP VOCs, SPLP SVOCs, and SPLP pesticide/PCBs. The samples and corresponding analyses are summarized in Table 4-1.

Five original RFI sample stations (K698SB001, K698SB002, K698SB003, K698SB004, and K698SB020) were resampled during the additional investigation, and 18 new soil sample

stations (K698SB021 through K698SB036, K698SB042 and K698SB043) were sampled. Stations K698SB037 through K698SB041 were contingent locations and were not investigated. The locations of stations at which additional soil samples were collected are shown in Figure 4-1. Tables 4-2 through 4-5 present summary results of the detected analytes from these additional investigations of surface and subsurface soil.

The tables show all detections and compare them to appropriate screening criteria as follows:

- The screening criteria for surface soil are EPA Region III residential RBCs (at a target risk level of 1 in a million, and a target HI=0.1), SSLs (DAF=1 for VOCs and DAF=10 for all other chemicals), and BRCs (for Zone K-Naval Station Annex).
- The criteria for subsurface soil are SSLs (DAFs are the same as for surface soil) and BRCs (for Zone K-Naval Station Annex).

Detected concentrations that exceeded the screening criteria are bolded and outlined in boxes within the table. Appendix A provides the detailed analytical data for each sample.

The following subsections discuss exceedances noted in the tables. Further evaluation of these exceedances is provided in Section 5.0 of this report addendum.

4.1.1 Aluminum

The aluminum result from surface sample location K698SB025 (12,000 mg/kg) exceeded the RBC[1] at HI=0.1 (7,800 mg/kg) and BRC (11,200 mg/kg) [2]. No generic SSL[3] for aluminum is listed in the *EPA Soil Screening Guidance: Technical Background Document* (1996). No subsurface soil aluminum concentrations exceeded screening criteria.

4.1.2 Iron

The iron results from surface sample locations K698SB001 and K164SB025 (10,500 mg/kg and 9,000 mg/kg, respectively) exceeded the RBC (2,300 mg/kg; HI = 0.1) and BRC (7,060 mg/kg). No generic SSL for iron is listed in the *EPA Soil Screening Guidance: Technical Background Document*. No subsurface soil iron concentrations exceeded the screening criteria.

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[1] Residential RBCs were obtained from the EPA Region III, RBC Tables, 10/5/2000.

[2] BRCs per Section 5: Data Evaluation and Background (EnSafe, 1999a).

[3] Generic soil-to-groundwater SSLs (DAF = 10) are from the *EPA Soil Screening Guidance: Technical Background Document* (Table A-1), EPA/540/R-95/128. May 1996.

4.1.3 Lead

The lead concentration for surface sample location K698SB001 (972 mg/kg) exceeded the RBC (400 mg/kg), SSL, and BRC (39.6 mg/kg). The subsurface soil lead concentrations at this and other locations did not exceed leachability-based screening criteria. Lead as a COPC is discussed further in Section 5.0.

4.1.4 Thallium

One surface sample location (K698SB043: 0.56 mg/kg) reported thallium concentrations slightly above the residential RBC (HI = 0.1) (0.55 mg/kg) and the SSL (0.35 mg/kg) screening criteria. One subsurface sample location (K698SB042: 0.5 mg/kg) reported thallium concentrations above the SSL (0.35 mg/kg) screening criterion. There is no Zone K BRC available for thallium, as it was not detected in the background samples. Thallium as a COPC is discussed further in Section 5.0.

4.1.5 BEQ

Figure 4-2 shows the results of all samples tested for BEQs (during the RFI and additional tests). Two surface sample locations (K698SB020: 1.287 mg/kg and K698SB024: 1.406 mg/kg) and one subsurface sample location (K698SB024: 0.264 mg/kg) reported BEQ concentrations above the BRC (0.088 mg/kg) screening criterion. PAHs and BEQs are discussed further in Section 5.0.

4.1.6 TEQ

Dioxin compounds were detected in surface soil samples K698SB030 through K698SB033 as TEQ (K698SB030: 16.2 ng/kg, K698SB031: 6.8 ng/kg, K698SB032: 39.0 ng/kg, and K698SB033: 2.7 ng/kg) at concentrations on the same to one order of magnitude above the residential RBC (4.3 ng/kg). Detections in the subsurface were well below the screening criteria, at concentrations one order of magnitude below the residential RBC or lower. All detected values are below EPA's recommended Preliminary Remediation Goal (PRG) of 1 µg/kg, as stipulated in its technical memorandum *Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites* (OSWER Directive 9200.4-26 [EPA, 1998]). Based on this PRG, TEQs are not considered COCs at this site. However, they are included in Section 5.0 of this RFI Report Addendum for a focused risk-based discussion, as recommended by SCDHEC.

4.2 Groundwater Sampling and Analysis

An additional shallow monitor well (K698GW002) was installed downgradient of well K698GW001 after completion of the *Zone K RFI Report, Revision 0*, to determine the extent of VOCs, SVOCs, metals, pesticides, and dioxins detected in groundwater. The locations of this new well and the original RFI well are shown in Figure 4-1. A copy of the well installation log is provided in Appendix D. A potentiometric map showing location of RFI wells, groundwater elevation contours, and groundwater flow direction is provided as Appendix E. The interpreted groundwater flow direction at AOC 698 is from west to east-northeast.

There have been a total of six sampling events reported for monitor well K698GW001 (the first four are reported in the RFI report, the latter two in this report addendum), and two events for monitor well K698GW002 (also reported in this report addendum). The additional sampling reported herein includes a sampling event in December 1999 and analyses for VOCs, SVOCs, pesticides/PCBs, and metals, and in July 2000 for VOCs only. Samples and corresponding analyses are summarized in Table 4-1.

Tables 4-6 and 4-7 present summary results of the detected analytes from these additional investigations for groundwater. These tables show all detections and compare them to appropriate screening criteria as follows:

- MCLs from EPA Drinking Water Regulations
- EPA Region III tap water RBCs (at a target risk level of 1 in a million, and a target hazard quotient [ThQ]=0.1), for chemicals that do not have MCLs
- BRCs (Zone K-Naval Station Annex background)

Detected concentrations that exceed the screening criteria are bolded and outlined in boxes within the table. Appendix A provides the detailed analytical data for each sample.

The following sections discuss exceedances noted in the tables. Further evaluation of these exceedances is provided in Section 5.0.

4.2.1 Iron

Iron (3,030 µg/L) exceeded its secondary MCL (300 µg/L) and its residential tap water RBC (1,100 µg/L, HI=0.1) in one sampling event at monitor well K698GW001. Historical iron levels were above the BRC within this well, however the latest sampling event indicates a lowering trend in the iron levels in this well. Iron is one of the most common naturally occurring minerals and is believed to be of natural origin in this sample. Iron is addressed further in Section 5.0.

4.2.2 Benzene and Naphthalene

Benzene was detected in both sampling events at K698GW001, but only one result (31 µg/L) exceeded the MCL (5 µg/L). Naphthalene (8.2 µg/L) exceeded the tap water RBC (0.65 µg/L) in one sampling event and was not detected in the other. These two compounds are found in various petroleum products and fuels. Petroleum hydrocarbons are addressed further in Section 5.0.

4.2.3 Alpha-BHC

Alpha-BHC was detected once in K698GW002 at a concentration of 0.05 µg/L, which slightly exceeds the tap water RBC of 0.011 µg/L. Other groundwater analyses for this well and well K698GW001 did not indicate the presence of this compound in groundwater. This compound is addressed further in Section 5.0 of this report addendum.

4.3 Background Soil Sampling

Recent sampling was conducted in 2001 by CH2M-Jones to characterize anthropogenic background levels for PAHs and arsenic in Zone K of the Naval Station Annex. Six surface soil and three subsurface soil samples were collected as part of this background sampling effort. The arsenic concentrations in the recent background surface soil samples ranged from 1 to 92 mg/kg, with a mean concentration of 18 mg/kg, and two times the mean of 36 mg/kg. In the subsurface soil samples, background concentrations ranged from <1 to 6 mg/kg, with a mean concentration of 2.3 mg/kg, and two times the mean of 4.6 mg/kg.

The PAH samples had very few detections at low levels. The PAHs measured as BEQs in surface soil samples ranged from 0.041 to 0.050 mg/kg, with a mean concentration of 0.044 mg/kg, and two times the mean of 0.088 mg/kg. There were no subsurface BEQ detections in the background samples.

A preliminary summary of this data has been presented as a separate technical memorandum to the BCT.

TABLE 4-1
Complete Summary of RFI and Additional Sampling and Analyses
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

	Analytical Tests Completed								
Location K698_	**VOCs**	**SVOCs**	**Pest/PCB**	**Metals**	**SPLP Metals**	**SPLP VOCs**	**SPLP SVOCs**	**SPLP Pest/PCB**	**Dioxins**
SB001 RFI	SS,SB	SS,SB		SS,SB					
SB001 Add				SS,SB	SS,SB				
SB002 RFI	SS,SB	SS,SB		SS,SB					
SB002 Add	SS,SB		SS,SB			SS,SB		SS,SB	
SB003 RFI	SS,SB	SS,SB		SS,SB					
SB003 Add				SS,SB	SS,SB				
SB004 RFI	SS,SB	SS,SB		SS,SB					
SB004 Add				SS,SB	SS,SB				
SB005 RFI	SS,SB	SS,SB		SS,SB					
SB006 RFI	SS,SB	SS,SB		SS,SB					
SB007 RFI	SS,SB	SS,SB		SS,SB					
SB008 RFI	SS,SB	SS,SB		SS,SB					
SB009 RFI			SS						
SB010 RFI			SS						
SB011 RFI			SS						
SB012 RFI			SS						
SB013 RFI	SS,SB	SS,SB	SS,SB						
SB014 RFI	SS,SB	SS,SB	SS,SB						
SB015 RFI	SS,SB	SS,SB	SS,SB						
SB016 RFI	SS,SB	SS,SB	SS,SB						
SB017 RFI	SS,SB	SS,SB	SS,SB						
SB018 RFI	SS,SB	SS,SB	SS,SB						
SB019 RFI	SS,SB	SS,SB	SS,SB						
SB020 RFI	SS,SB	SS,SB	SS,SB						
SB020 Add		SS,SB					SS,SB		
SB021 Add				SS,SB					
SB022 Add				SS,SB					
SB023 Add		SS,SB		SS,SB					
SB024 Add		SS,SB							
SB025 Add				SS,SB					
SB026 Add				SS,SB					
SB027 Add				SS,SB					
SB028 Add				SS,SB					
SB029 Add				SS,SB					
SB030 Add	SS,SB								SS,SB
SB031 Add	SS,SB								SS,SB
SB032 Add	SS,SB								SS,SB
SB033 Add									SS,SB
SB034 Add				SS,SB					

TABLE 4-1
Complete Summary of RFI and Additional Sampling and Analyses
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

	Analytical Tests Completed								
Location K698_	**VOCs**	**SVOCs**	**Pest/PCB**	**Metals**	**SPLP Metals**	**SPLP VOCs**	**SPLP SVOCs**	**SPLP Pest/PCB**	**Dioxins**
SB035 Add				SS,SB					
SB036 Add				SS,SB					
SB042 Add				SS,SB					
SB043 Add				SS,SB					
GW001RFI	1,2,3,4	1[a],2[a],3,4[a]	1,2,3,4	1,2,3,4					
GW001Add	5,6	5	5	5					5
GW002Add	5,6	5	5	5					5

2/28/97 – K698GP001 through 006 tested for VOC, TPH.

[a] TPH in addition to SVOC

1 1/6/97 groundwater sample
2 4/18/97 groundwater sample
3 7/25/97 groundwater sample
4 10/23/97 groundwater sample
5 12/07/99 groundwater sample
6 07/20/2000 groundwater sample

Add additional sampling
RFI original sampling
SS surface soil sample
SB subsurface soil sample

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Aluminum	K698SB001	6,560	mg/kg	=	7,800	NL	11,200
	K698SB003	5,380		=			
	K698SB004	6,410		=			
	K698SB021	5,350		=			
	K698SB022	7,140		=			
	K698SB023	9,070		=			
	K698SB025	**12,000**		=			
	K698SB026	5,570		=			
	K698SB027	6,250		=			
	K698SB028	4,920		=			
	K698SB029	6,240		=			
	K698SB034	6,150		=			
	K698SB035	8,270		=			
	K698SB036	2,990		=			
	K698SB042	5,120		=			
	K698SB043	7,920		=			
Antimony	K698SB001	1.3	mg/kg	J	3.1	2.5	0.45
	K698SB003	0.24		J			
	K698SB004	0.47		J			
	K698SB021	0.5		J			
	K698SB022	0.44		J			
	K698SB027	0.34		J			
	K698SB028	0.32		J			
	K698SB043	0.41		J			
Arsenic	K698SB001	15.7	mg/kg	=	0.43C	14.5	35.9[c]
	K698SB003	3.7		=			
	K698SB004	3.1		=			
	K698SB021	1.9		=			
	K698SB022	5.2		=			
	K698SB023	1.5		=			
	K698SB025	4.1		=			
	K698SB026	1.5		=			
	K698SB027	2		=			
	K698SB028	1.5		=			
	K698SB029	1.2		=			
	K698SB034	2.6		=			
	K698SB035	1.8		=			
	K698SB036	2.5		=			
	K698SB042	1.6		=			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Arsenic	K698SB043	15.5	mg/kg	=	0.43C	14.5	35.9[c]
Barium	K698SB001	93.7	mg/kg	J	550	800	25.6
	K698SB003	14.7		J			
	K698SB004	14.4		J			
	K698SB021	22.8		=			
	K698SB022	32.2		=			
	K698SB023	15.7		=			
	K698SB025	17.1		=			
	K698SB026	9.4		=			
	K698SB027	29.5		=			
	K698SB028	20.9		=			
	K698SB029	14.4		=			
	K698SB034	15.4		=			
	K698SB035	17.1		=			
	K698SB036	12.9		=			
	K698SB042	26.5		=			
	K698SB043	34.6		=			
Beryllium	K698SB001	0.4	mg/kg	J	16	31.5	0.17
	K698SB003	0.04		J			
	K698SB004	0.03		J			
	K698SB021	0.07		J			
	K698SB022	0.11		J			
	K698SB023	0.16		J			
	K698SB025	0.1		J			
	K698SB026	0.04		J			
	K698SB027	0.11		J			
	K698SB028	0.05		J			
	K698SB029	0.05		J			
	K698SB034	0.12		J			
	K698SB035	0.23		J			
	K698SB042	0.2		J			
	K698SB043	0.37		J			
Cadmium	K698SB001	2.1	mg/kg	=	3.9	4	0.13
	K698SB004	0.23		J			
	K698SB021	0.15		J			
	K698SB022	0.09		J			
	K698SB027	0.12		J			
	K698SB028	0.06		J			
	K698SB034	0.12		J			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Cadmium	K698SB035	0.16	mg/kg	J	3.9	4	0.13
	K698SB036	0.25		J			
	K698SB042	0.19		J			
	K698SB043	0.62		J			
Calcium	K698SB001	30,000	mg/kg	=	NA	NA	NA
	K698SB004	1,470		=			
	K698SB021	3,390		J			
	K698SB022	5,960		J			
	K698SB023	5,610		J			
	K698SB025	509		J			
	K698SB026	341		J			
	K698SB027	2,040		J			
	K698SB028	1,300		J			
	K698SB029	959		J			
	K698SB034	723		=			
	K698SB035	26,800		=			
	K698SB036	6,140		=			
	K698SB042	52,700		=			
	K698SB043	21,500		=			
Chromium, Total	K698SB001	21.2	mg/kg	=	23	19	8.4
	K698SB003	7.3		=			
	K698SB004	6.7		=			
	K698SB021	5.8		=			
	K698SB022	6		=			
	K698SB023	9.2		=			
	K698SB025	11.7		=			
	K698SB026	4.5		=			
	K698SB027	7.8		=			
	K698SB028	4.8		=			
	K698SB029	5.6		=			
	K698SB034	5.9		=			
	K698SB035	7.1		=			
	K698SB036	3.9		=			
	K698SB042	4.5		=			
	K698SB043	12.5		=			
Cobalt	K698SB001	2.5	mg/kg	=			
	K698SB003	0.53		J			
	K698SB004	0.48		J			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Cobalt	K698SB021	0.43	mg/kg	J	470	NL	0.34
	K698SB022	0.56		J			
	K698SB023	1.9		=			
	K698SB025	0.95		J			
	K698SB026	0.24		J			
	K698SB027	0.77		J			
	K698SB028	0.36		J			
	K698SB029	0.3		J			
	K698SB034	0.44		J			
	K698SB035	0.93		J			
	K698SB036	0.27		J			
	K698SB042	0.62		J			
	K698SB043	3		=			
Copper	K698SB001	35.9	mg/kg	=	310	5,500[d]	2.1[c]
	K698SB003	2.9		=			
	K698SB004	3.8		=			
	K698SB021	2.5		=			
	K698SB022	4.4		=			
	K698SB023	1.3		J			
	K698SB025	1.5		J			
	K698SB026	1.3		J			
	K698SB027	3.7		=			
	K698SB028	3.1		=			
	K698SB029	2.3		=			
	K698SB034	2.3		J			
	K698SB036	5.1		J			
	K698SB042	1.4		J			
	K698SB043	15.1		=			
Iron	K698SB001	**10,500**	mg/kg	=	2,300	NL	7,060
	K698SB003	2,940		=			
	K698SB004	2,050		=			
	K698SB021	2,940		=			
	K698SB022	4,020		=			
	K698SB023	3,510		=			
	K698SB025	**9,000**		=			
	K698SB026	2,750		=			
	K698SB027	3,060		=			
	K698SB028	1,930		=			
	K698SB029	1,870		=			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Iron	K698SB034	3,340	mg/kg	=	2,300	NL	7,060
	K698SB035	2,880		=			
	K698SB036	2,070		=			
	K698SB042	2,950		=			
	K698SB043	5,450		=			
Lead	K698SB001	**972**	mg/kg	=	400[e]	400[f]	39.6
	K698SB003	27.5		=			
	K698SB004	57		=			
	K698SB021	35.7		=			
	K698SB022	15.7		=			
	K698SB023	7.2		=			
	K698SB025	12.8		=			
	K698SB026	7.8		=			
	K698SB027	77.5		=			
	K698SB028	54.7		=			
	K698SB029	38.7		=			
	K698SB034	23.9		=			
	K698SB035	19.3		=			
	K698SB036	24.4		=			
	K698SB042	11.2		=			
	K698SB043	56.6		=			
Magnesium	K698SB001	801	mg/kg	=	NA	NA	NA
	K698SB003	158		=			
	K698SB004	218		=			
	K698SB021	224		=			
	K698SB022	280		=			
	K698SB023	400		=			
	K698SB025	290		=			
	K698SB026	140		=			
	K698SB027	579		=			
	K698SB028	193		=			
	K698SB029	170		=			
	K698SB034	140		=			
	K698SB035	271		=			
	K698SB036	139		=			
	K698SB042	667		=			
	K698SB043	420		=			
	K698SB001	103		=			
	K698SB003	14.6		=			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Manganese	K698SB004	15.9	mg/kg	=	1,100	NL	26.4
	K698SB021	23.9		=			
	K698SB022	22.6		=			
	K698SB023	16.7		=			
	K698SB025	12.3		=			
	K698SB026	9.8		=			
	K698SB027	26		=			
	K698SB028	15.8		=			
	K698SB029	12		=			
	K698SB034	9.8		=			
	K698SB035	17.3		=			
	K698SB036	15.6		=			
	K698SB042	43.6		=			
	K698SB043	40.2		=			
Mercury	K698SB001	0.41	mg/kg	=	2.3[g]	1	NA
	K698SB003	0.07		=			
	K698SB004	0.07		=			
	K698SB021	0.06		=			
	K698SB022	0.04		=			
	K698SB023	0.02		=			
	K698SB025	0.03		=			
	K698SB026	0.04		=			
	K698SB027	0.08		=			
	K698SB028	0.06		=			
	K698SB029	0.05		=			
	K698SB034	0.06		=			
	K698SB035	0.12		J			
	K698SB036	0.08		J			
	K698SB042	0.05		=			
	K698SB043	0.1		=			
Nickel	K698SB001	8.7	mg/kg	=	160	65	1.7
	K698SB003	2.2		J			
	K698SB004	2.5		J			
	K698SB021	2.8		J			
	K698SB022	3.9		=			
	K698SB023	4.3		J			
	K698SB025	3.4		J			
	K698SB026	1.9		J			
	K698SB027	5.5		=			

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Nickel	K698SB028	2.6	mg/kg	J	160	65	1.7
	K698SB029	2.3		J			
	K698SB034	2		J			
	K698SB035	2.5		J			
	K698SB036	1.5		J			
	K698SB042	2.2		J			
	K698SB043	6		=			
Potassium	K698SB001	215	mg/kg	J	NA	NA	NA
	K698SB003	71.2		J			
	K698SB004	148		J			
	K698SB021	110		=			
	K698SB022	156		=			
	K698SB023	290		=			
	K698SB025	239		=			
	K698SB026	95.1		J			
	K698SB027	171		=			
	K698SB028	118		=			
	K698SB029	93		J			
	K698SB034	83.2		J			
	K698SB035	121		J			
	K698SB036	43.1		J			
	K698SB042	107		J			
	K698SB043	193		J			
Selenium	K698SB022	0.26	mg/kg	J	39	2.5	0.84
	K698SB027	0.4		J			
	K698SB035	0.43		J			
	K698SB042	0.53		J			
Silver	K698SB001	0.25	mg/kg	J	39	17	0.44
Sodium	K698SB023	141		=	NA	NA	NA
	K698SB034	250		J			
	K698SB035	327		J			
	K698SB036	191		J			
	K698SB042	308		J			
	K698SB043	485		=			
Thallium	K698SB043	**0.56**	mg/kg	J	0.55	0.35	NA
Tin (Sn)	K698SB043	4.3	mg/kg	J	470[a]	NL	19.4

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC
Vanadium	K698SB001	13.4	mg/kg	=	55	3,000	15.8
	K698SB003	7.9		=			
	K698SB004	7.4		=			
	K698SB021	8.9		=			
	K698SB022	11.1		=			
	K698SB023	11.6		=			
	K698SB025	20.5		=			
	K698SB026	8.6		=			
	K698SB027	8.6		=			
	K698SB028	6.4		=			
	K698SB029	7.9		=			
	K698SB034	8.7		=			
	K698SB035	11.1		=			
	K698SB036	5.8		=			
	K698SB042	7.9		=			
	K698SB043	14.5		=			
Zinc	K698SB001	738	mg/kg	=	2,300	6,000	14.8
	K698SB003	96.6		=			
	K698SB004	68.8		=			
	K698SB021	34.6		=			
	K698SB022	39.8		=			
	K698SB023	7.1		=			
	K698SB025	12.8		=			
	K698SB026	7.2		=			
	K698SB027	88.6		=			
	K698SB028	63.7		=			
	K698SB029	24.8		=			
	K698SB034	22.3		=			
	K698SB035	4.4		J			
	K698SB036	40.7		J			
	K698SB042	10.2		=			
	K698SB043	105		=			

All background values for Zone K are based on twice the mean of the grid sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report*, (EnSafe, 1999a).

Concentrations in bolded and outlined text exceeded the RBCs, SSLs, and the zone background screening criteria.

[a] Residential RBCs (HI=0.1 for noncarcinogens) were obtained from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/eaphome/search.html), unless otherwise noted.

[b] Generic soil-to-groundwater SSLs (DAF = 10) are from the EPA Soil Screening Guidance: Technical Background Document (Table A-1), EPA/540/R-95/128 (May 1996), unless otherwise noted.

TABLE 4-2
Additional Surface Soil Inorganic Analytical Results– Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	EPA Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]	Surface Soil BRC

[c] *Preliminary Results for Additional Background PAH Sampling from CNC Main Base Railroad Lines and Annex (Zone K)* (CH2M-Jones, May 3, 2001).

[d] Generic soil-to-groundwater SSLs (DAF = 10) taken from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/eaphome/search.html).

[e] The residential RBC for lead was obtained from the EPA Soil Screening Guidance: Technical Background Document, Appendix A (page A-5) EPA/540/R-95/128 (May 1996).

[f] Based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA, 1994).

[g] The residential RBC (ThQ=0.1) for mercury was obtained from the EPA Region III RBC Table document distributed on October 22, 1997.

=	Chemical is detected at the concentration shown.
BRC	Background reference concentration from Section 5 (EnSafe, 1999a) unless otherwise noted.
C	Carcinogen-residential RBC was used directly from the EPA Region III RBC Table, October 5, 2000.
HI	Hazard index
J	Chemical is detected at concentration below the method detection limit; concentration is not known.
NA	Not applicable/not available/not analyzed
NL	Not listed
RBC	Risk-based concentration
ThQ	Target hazard quotient

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Aluminum	K698SB021	6,800	mg/kg	=	NL	10,500
	K698SB022	4,130		=		
	K698SB023	5,900		=		
	K698SB025	6,120		=		
	K698SB026	5,440		=		
	K698SB027	7,430		=		
	K698SB028	5,780		=		
	K698SB029	6,450		=		
	K698SB034	3,490		=		
	K698SB035	2,970		=		
	K698SB036	5,550		=		
	K698SB042	7,160		=		
	K698SB043	5,190		=		
Antimony	K698SB022	0.35	mg/kg	J	2.5	NA
	K698SB025	0.37		J		
	K698SB026	0.41		J		
	K698SB027	0.23		J		
	K698SB029	0.2		J		
Arsenic	K698SB021	0.63	mg/kg	J	14.5	4.6[b]
	K698SB022	0.86		J		
	K698SB023	0.86		J		
	K698SB025	4.2		=		
	K698SB026	1.1		=		
	K698SB027	0.92		J		
	K698SB028	0.68		J		
	K698SB029	1.2		=		
	K698SB034	0.39		J		
	K698SB035	1.3		=		
	K698SB036	0.62		J		
	K698SB042	1.3		=		
	K698SB043	2.2		=		
Barium	K698SB021	6	mg/kg	=	800	6.83
	K698SB022	3.7		=		
	K698SB023	3.4		=		
	K698SB025	4.5		=		
	K698SB026	3.7		=		
	K698SB027	4.3		=		
	K698SB028	3.8		=		
	K698SB029	8.2		=		

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Barium	K698SB034	3	mg/kg	=	800	6.83
	K698SB035	1.8		=		
	K698SB036	3.7		=		
	K698SB042	4.4		=		
	K698SB043	4.9		=		
Beryllium	K698SB021	0.04	mg/kg	J	31.5	0.12
	K698SB022	0.03		J		
	K698SB023	0.03		J		
	K698SB025	0.03		J		
	K698SB026	0.03		J		
	K698SB027	0.03		J		
	K698SB028	0.04		J		
	K698SB029	0.03		J		
Cadmium	K698SB035	0.08	mg/kg	J	4	NA
	K698SB036	0.12		J		
	K698SB042	0.06		J		
	K698SB043	0.06		J		
Calcium	K698SB021	324	mg/kg	J	NA	NA
	K698SB022	625		J		
	K698SB023	205		J		
	K698SB025	229		J		
	K698SB026	28.1		J		
	K698SB027	123		J		
	K698SB028	169		J		
	K698SB029	228		J		
	K698SB034	95.5		J		
	K698SB035	565		=		
	K698SB036	247		J		
	K698SB042	1,180		=		
	K698SB043	731		=		
Chromium, Total	K698SB021	5.7	mg/kg	=	19	8.76
	K698SB022	4.1		=		
	K698SB023	5.8		=		
	K698SB025	6.6		=		
	K698SB026	5.4		=		
	K698SB027	6.6		=		
	K698SB028	7.5		=		

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Chromium, Total	K698SB029	6.4	mg/kg	=	19	8.76
	K698SB034	4.6		=		
	K698SB035	3.2		=		
	K698SB036	4.4		=		
	K698SB042	7.2		=		
	K698SB043	5.3		=		
Cobalt	K698SB021	0.35	mg/kg	J	990[c]	0.62
	K698SB022	0.29		J		
	K698SB023	0.33		J		
	K698SB025	0.34		J		
	K698SB026	0.28		J		
	K698SB027	0.4		J		
	K698SB028	0.44		J		
	K698SB029	0.21		J		
	K698SB034	0.29		J		
	K698SB035	0.26		J		
	K698SB036	0.23		J		
	K698SB042	0.28		J		
	K698SB043	0.39		J		
Copper	K698SB021	0.63	mg/kg	J	5,590[c]	1.2[b]
	K698SB022	0.32		J		
	K698SB023	0.23		J		
	K698SB025	0.27		J		
	K698SB026	0.19		J		
	K698SB027	0.2		J		
	K698SB028	0.45		J		
	K698SB029	0.5		J		
	K698SB034	0.56		J		
	K698SB042	0.78		J		
	K698SB043	0.9		J		
Iron	K698SB021	2,410	mg/kg	=	NL	5,130
	K698SB022	2,000		=		
	K698SB023	2,780		=		
	K698SB025	2,390		=		
	K698SB026	3,990		=		
	K698SB027	2,280		=		
	K698SB028	2,030		=		
	K698SB029	2,550		=		
	K698SB034	934		=		

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Iron	K698SB035	2,030	mg/kg	=	NL	5,130
	K698SB036	2,200		=		
	K698SB042	3,150		=		
	K698SB043	1,400		=		
Lead	K698SB021	4.2	mg/kg	=	400[d]	6.43
	K698SB022	3.4		=		
	K698SB023	2.9		=		
	K698SB025	3		=		
	K698SB026	3.7		=		
	K698SB027	3.3		=		
	K698SB028	4.7		=		
	K698SB029	5.1		=		
	K698SB034	3.5		=		
	K698SB035	2		=		
	K698SB036	2.9		=		
	K698SB042	3.4		=		
	K698SB043	5.2		=		
Magnesium	K698SB021	170	mg/kg	=	NA	NA
	K698SB022	94.6		=		
	K698SB023	104		=		
	K698SB025	147		=		
	K698SB026	99.2		=		
	K698SB027	123		=		
	K698SB028	99.9		=		
	K698SB029	167		=		
	K698SB034	68.6		=		
	K698SB035	27.7		=		
	K698SB036	81.3		=		
	K698SB042	104		=		
	K698SB043	108		=		
Manganese	K698SB021	8.1	mg/kg	=	NL	5.93
	K698SB022	6.9		=		
	K698SB023	4.3		=		
	K698SB025	4.7		=		
	K698SB026	4.7		=		
	K698SB027	8.4		=		
	K698SB028	7.2		=		
	K698SB029	9.9		=		
	K698SB034	2.8		=		

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Manganese	K698SB035	1.3	mg/kg	=	NL	5.93
	K698SB036	2.7		=		
	K698SB042	5.5		=		
	K698SB043	4		=		
Mercury	K698SB021	0.02	mg/kg	J	1	NA
	K698SB022	0.01		J		
	K698SB023	0.01		J		
	K698SB025	0.02		J		
	K698SB026	0.01		J		
	K698SB027	0.01		J		
	K698SB028	0.03		=		
	K698SB029	0.03		=		
	K698SB034	0.03		J		
	K698SB035	0.02		J		
	K698SB036	0.03		J		
	K698SB042	0.03		J		
	K698SB043	0.03		J		
Nickel	K698SB021	2.4	mg/kg	J	65	2.64
	K698SB022	2.1		J		
	K698SB023	2		J		
	K698SB025	2.3		J		
	K698SB026	1.9		J		
	K698SB027	2.8		J		
	K698SB028	2.8		J		
	K698SB029	1.9		J		
	K698SB034	1.4		J		
	K698SB035	2		J		
	K698SB036	1.9		J		
	K698SB042	2.1		J		
	K698SB043	2.1		J		
Potassium	K698SB021	108	mg/kg	=	NA	NA
	K698SB022	62		J		
	K698SB023	64.9		J		
	K698SB025	86.8		J		
	K698SB026	54.2		J		
	K698SB027	73.3		J		
	K698SB028	72.1		J		
	K698SB029	95.9		J		
	K698SB034	48.3		J		

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC
Potassium	K698SB035	18.6	mg/kg	J	NA	NA
	K698SB036	37.7		J		
	K698SB042	60.4		J		
	K698SB043	60.5		J		
Sodium	K698SB034	254	mg/kg	J	NA	NA
	K698SB035	192		J		
	K698SB036	188		J		
	K698SB042	256		J		
	K698SB043	230		J		
Thallium	K698SB042	**0.5**	mg/kg	J	0.35	NA
Vanadium	K698SB021	8.5	mg/kg	=	3,000	12.2
	K698SB022	6		=		
	K698SB023	7.4		=		
	K698SB025	9.1		=		
	K698SB026	7.7		=		
	K698SB027	11.7		=		
	K698SB028	6.8		=		
	K698SB029	9.7		=		
	K698SB034	3.7		=		
	K698SB035	4.2		=		
	K698SB036	7.1		=		
	K698SB042	12.5		=		
	K698SB043	5.3		=		
Zinc	K698SB034	2.9	mg/kg	=	6,000	NA
	K698SB035	3.2		J		
	K698SB036	3.1		J		
	K698SB042	3.3		=		
	K698SB043	6.9		=		

All background values for Zone K are based on twice the means of the grid sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report* (EnSafe, 1999a).

Concentrations in bolded and outlined text exceed the SSLs and the zone background screening criteria.

[a] Generic soil-to-groundwater SSLs (DAF = 10) are from the EPA Soil Screening Guidance: Technical Background Document (Table A-1), EPA/540/R-95/128 (May 1996), unless otherwise noted.

[b] *Preliminary Results for Additional Background PAH Sampling from CNC Main Base Railroad Lines and Annex (Zone K)* (CH2M-Jones, May 3, 2001).

[c] Where SSLs are not available from EPA Tables, EnSafe soil-to-groundwater SSLs are used based on the EPA Soil Screening Guidance: Technical Background Document, EPA/540/R-95/128 (May 1996).

[d] Based on the *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA, 1994).

TABLE 4-3
Additional Subsurface Soil Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF=10]	Subsurface Soil BRC

=	Chemical is detected at the concentration shown.
BRC	Background reference concentration from Section 5 (EnSafe, 1999a) unless otherwise noted.
DAF	Dilution attenuation factor
J	Chemical is detected at concentration below the method detection limit; concentration is not known.
NA	Not applicable/not available/not analyzed
NL	Not listed
SSL	Soil screening level

TABLE 4-4
Additional Surface Soil Organic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Region III Residential Soil RBC[a] (HI=0.1)	Soil-to-Groundwater SSL[b] [DAF=10]
2-methylnaphthalene	K698SB024	0.059	mg/kg	J	160	NL
Acetone	K698SB002	0.024	mg/kg	J	780	0.8[c]
Alpha-chlordane	K698SB002	0.019	mg/kg	=	1.8C	5
Anthracene	K698SB024	0.033	mg/kg	J	2,300	6,000
Benzo(a)anthracene	K698SB020	0.39	mg/kg	J	0.87C	1
	K698SB024	0.38		J		
Benzo(a)pyrene	K698SB020	0.91	mg/kg	=	0.087C	4
	K698SB024	0.84		=		
Benzo(b)fluoranthene	K698SB020	1.1	mg/kg	=	0.87C	2.5
	K698SB024	1.1		=		
Benzo(g,h,i)perylene	K698SB020	1	mg/kg	=	160	NL
	K698SB024	0.98		=		
Benzo(k)fluoranthene	K698SB020	0.83	mg/kg	=	8.7C	24.5
	K698SB024	1.1		=		
Chrysene	K698SB020	0.37	mg/kg	J	87C	80
	K698SB024	0.4		=		
Dibenz(a,h)anthracene	K698SB020	0.11	mg/kg	J	0.087C	1
	K698SB024	0.32		J		
Di-n-butyl phthalate	K698SB024	0.037	mg/kg	J	NL	NL
Endrin ketone	K698SB002	0.00091	mg/kg	J	NL	0.5
Fluoranthene	K698SB020	0.2	mg/kg	J	310	2,150
	K698SB024	0.17		J		
Gamma-chlordane	K698SB002	0.091	mg/kg	=	1.8C	5
Heptachlor epoxide	K698SB002	0.065	mg/kg	=	0.07C	0.35
Indeno(1,2,3-c,d)pyrene	K698SB020	1.1	mg/kg	=	0.87C	7
	K698SB024	0.87		=		
Naphthalene	K698SB024	0.038	mg/kg	J	160	4[c]
p,p'-DDE	K698SB002	0.001	mg/kg	J	1.9C	27
Phenanthrene	K698SB020	0.058	mg/kg	J	NL	NL
	K698SB024	0.1		J		
Pyrene	K698SB020	0.2	mg/kg	J	230	2,100
	K698SB024	0.19		J		

TABLE 4-4, CONTINUED
Additional Surface Soil Organic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Background Concentration CNC[d]
BEQ	K698SB020	**1.287**	mg/kg	0.088[d]
	K698SB024	**1.406**		

Parameter	Location	Concentration (ng/kg)	Qualifier	Region III Residential Soil RBC[a] (HI=0.1) (ng/kg)
123789-HxCDD	K698SB030	13.33	J	43
123678-HxCDD	K698SB030	18.97	=	43
123478-HxCDD	K698SB030	6.46	J	43
1234678-HpCDD	K698SB030	323.20	=	430
OCDD	K698SB030	2,665.42	=	4,300
12378-PeCDF	K698SB030	1.36	J	86
23478-PeCDF	K698SB030	1.50	=	8.6
123478-HxCDF	K698SB030	17.62	J	43
123678-HxCDF	K698SB030	8.76	J	43
234678-HxCDF	K698SB030	9.19	J	43
1234678-HpCDF	K698SB030	176.14	=	430
OCDF	K698SB030	292.34	=	4,300
1234678-HpCDD	K698SB031	48.81	=	430
OCDD	K698SB031	946.37	=	4,300
123478-HxCDF	K698SB031	**52.74**	J	43
1234678-HpCDF	K698SB031	10.06	=	430
OCDF	K698SB031	12.90	=	4,300
123789-HxCDD	K698SB032	23.98	J	43
123678-HxCDD	K698SB032	42.92	=	43
123478-HxCDD	K698SB032	6.68	J	43
1234678-HpCDD	K698SB032	**854.35**	=	430
OCDD	K698SB032	**8,127.43**	=	4,300
12378-PeCDF	K698SB032	2.04	J	86
23478-PeCDF	K698SB032	1.01	=	8.6
123478-HxCDF	K698SB032	**48.35**	J	43
123678-HxCDF	K698SB032	8.47	J	43
234678-HxCDF	K698SB032	19.77	=	43
1234678-HpCDF	K698SB032	**581.02**	=	430
OCDF	K698SB032	868.24	=	4,300
1234678-HpCDD	K698SB033	86.34	=	430
OCDD	K698SB033	970.27	=	4,300
123478-HxCDF	K698SB033	4.11	J	43

Parameter	Location	Concentration (ng/kg)	Qualifier	Region III Residential Soil RBC[a] (HI=0.1) (ng/kg)
1234678-HpCDF	K698SB033	40.03	=	430
OCDF	K698SB033	97.36	=	4,300

Parameter	Location	Concentration (ng/kg)	Region III Residential Soil RBC[a] (HI=0.1) (ng/kg)	Soil-to-Groundwater SSL[b] [DAF = 10] (ng/kg)
TEQ	K698SB030	**16.2**	4.3	4.3[e]
	K698SB031	**6.8**		
	K698SB032	**39.0**		
	K698SB033	2.7		

All background values for Zone K are based on twice the means of the grid sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report* (EnSafe, 1999a).

Concentrations in bolded and outlined text exceeded the RBCs or zone background screening criteria.

[a] Non-carcinogen-residential RBCs (HI = 0.1) are taken from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/epahome/search.html).

[b] Generic soil-to-groundwater SSLs (DAF = 10) are from the EPA Soil Screening Guidance: Technical Background Document (Table A-1), EPA/540/R-95/128 (May, 1996), unless otherwise noted.

[c] DAF = 1 (VOC)

[d] *Preliminary Results for Additional Background PAH Sampling from CNC Main Base Railroad Lines and Annex (Zone K)* (CH2M-Jones, May 3, 2001).

[e] 2,3,4,8-TCDD RBC (DAF = 10, carcinogen) from the EPA Region III SSL Table (October 5, 2000) (http://www.epa.gov/epahome/search.html).

= Chemical is detected at the concentration shown.
BEQ Benzo(a)pyrene equivalent
C Carcinogen-residential RBC was taken directly from the EPA Region III RBC Table (October 5, 2000).
DAF Dilution attenuation factor
HI Hazard index
J Chemical is detected at concentration below the method detection limit; the concentration is not known.
NA Not applicable/not available/not analyzed
NL Not listed
RBC Risk-based concentration
SSL Soil screening level
VOC Volatile organic compound

BEQ Calculation Procedure:

Equation 1: BEQ = Sum {PAH * TEF}
PAH = the concentration value to the seven target parameters (TP) listed below, or if there was no detection of the TP, half the TP detention limit is used.

TEF = Toxicity equivalency factor (TEF) listed below, relative to benzo(a)pyrene.
If there were no detections of all seven TP, then the BEQ = nondetect (ND).

PAH Target Parameters	TEF
Benzo(a)anthracene	0.1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1
Indeno(1,2,3-c,d)pyrene	0.1

TEQ Calculation Procedure

Equation 1: TEQ = Sum {Dioxin/Furan * TEF}
Dioxin/Furan = the concentration value of the seventeen target parameters (TP) listed below, or if there was no detection of the TP, half the TP detention limit is used.

TEF = Toxicity equivalency factor (TEF) listed below, relative to 2378-TCDD.
If there were no detections of all seventeen TP, then the TEQ = nondetect (ND).

Dioxin/Furan Target Parameters	TEF
2378-TCDD	1
12378-PeCDD	0.5
123789-HxCDD	0.1
123678-HxCDD	0.1
123478-HxCDD	0.1
1234678-HpCDD	0.01
OCDD	0.001
2378-TCDF	0.1
12378-PeCDF	0.05
23478-PeCDF	0.5
123478-HxCDF	0.1
123678-HxCDF	0.1
123789-HxCDF	0.1
234678-HxCDF	0.1
1234678-HpCDF	0.01
1234789-HpCDF	0.01
OCDF	0.001

TABLE 4-5
Additional Subsurface Soil Organic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Soil-to-Groundwater SSL[a] [DAF = 10]
Acetone	K698SB002	0.018	mg/kg	J	0.8[b]
Aldrin	K698SB002	0.00011	mg/kg	J	0.25
Alpha-chlordane	K698SB002	0.0012	mg/kg	J	5
Gamma-chlordane	K698SB002	0.0037	mg/kg	=	5
Heptachlor	K698SB002	0.00053	mg/kg	J	11.5
Heptachlor epoxide	K698SB002	0.0011	mg/kg	J	0.35
p,p'-DDE	K698SB002	0.00071	mg/kg	J	27
p,p'-DDT	K698SB002	0.0036	mg/kg	=	16
Benzo(a)pyrene	K698SB024	0.045	mg/kg	J	4
Benzo(b)fluoranthene	K698SB024	0.043	mg/kg	J	2.5
Benzo(g,h,i)perylene	K698SB024	0.069	mg/kg	J	NL
Benzo(k)fluoranthene	K698SB024	0.038	mg/kg	J	24.5
Indeno(1,2,3-c,d)pyrene	K698SB024	0.059	mg/kg	J	7

Parameter	Location	Concentration	Units	Background Concentration CNC[c]
BEQ	K698SB024	**0.264**	mg/kg	0.092

Parameter	Location	Concentration	Units	Qualifier
1234678-HpCDD	K698SB030	5.35500	ng/kg	=
OCDD		288.53100		=
1234678-HpCDF		1.96400		J
OCDF		6.09100		=
1234678-HpCDD	K698SB031	2.85700		J
OCDD		285.37000		=
123478-HxCDF		1.61000		J
1234678-HpCDD	K698SB032	5.26400		=
OCDD		113.16100		=
1234678-HpCDF		2.83600		=

Parameter	Location	Concentration	Units	Qualifier
OCDF		4.07500		=
OCDF	K698SB033	1.71800		=

Parameter	Location	Concentration	Units	Soil-to-Groundwater SSL[a] [DAF = 10]
TEQ	K698SB030	0.4	mg/kg	4.3[d]
	K698SB031	0.5		
	K698SB032	0.2		
	K698SB033	0.0017		

Concentrations in bolded and outlined text exceeded the zone background screening criteria.

[a] Generic soil-to-groundwater SSLs (DAF = 10) are from the EPA Soil Screening Guidance: Technical Background Document (Table A-1), EPA/540/R-95/128 (May, 1996), unless otherwise noted.

[b] DAF = 1 (VOC)

[c] *Preliminary Results for Additional Background PAH Sampling from CNC Main Base Railroad Lines and Annex (Zone K)* (CH2M-Jones, May 3, 2001).

[d] 2,3,4,8-TCDD RBC (DAF = 10, carcinogen) from the EPA Region III SSL Table (October 5, 2000) (http://www.epa.gov/epahome/search.html).

=	Chemical is detected at the concentration shown.
BEQ	Benzo(a)pyrene equivalent (see Table 3-4 for BEQ calculation procedure)
DAF	Dilution attenuation factor
J	Chemical is detected at the concentration below the method detection limit; concentration is not known.
NA	Not applicable/not available/not analyzed
NL	Not listed
SSL	Soil screening level
TEQ	2,3,7,8-TCDD equivalent (see Table 3-4 for TEQ calculation procedure)
VOC	volatile organic compound

TABLE 4-6
Additional Groundwater Inorganic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	12-07-99 Concentration	Units	Qualifier	Drinking Water MCL[a]	EPA Region III Tap Water RBC (ThQ = 0.1)[b]	BRC
Aluminum	K698GW001	341	µg/L	J	NL	3,700	471
	K698GW002	618		J			
Barium	K698GW001	14	µg/L	=	2,000	260	31.2
	K698GW002	17.8		=			
Calcium	K698GW001	27,300	µg/L	=	NA	NA	NA
	K698GW002	12,600		=			
Chromium, Total	K698GW002	0.89	µg/L	J	100	11	NA
Copper	K698GW001	1.6	µg/L	J	1,300	150	2.8
Iron	K698GW001	**3,030**	µg/L	=	NA	1,100	235
	K698GW002	121		=			
Magnesium	K698GW001	1,410	µg/L	=	NA	NA	NA
	K698GW002	230		J			
Manganese	K698GW001	3.3	µg/L	J	NL	73	9.3
	K698GW002	5.4		J			
Potassium	K698GW001	2,970	µg/L	=	NA	NA	NA
	K698GW002	823		J			
Sodium	K698GW001	4,470	µg/L	=	NA	NA	NA
	K698GW002	1,310		=			
Vanadium	K698GW001	3.8	µg/L	J	NL	26	0.8

All background values for Zone K are based on twice the means of the grid sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report* (EnSafe, 1999a).

Concentrations in bolded and outlined text exceeded the RBCs, MCLs, and zone background screening criteria.

[a]The MCL is from EPA Drinking Water Regulations (Summer 2000).

[b]RBCs were obtained from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/epahome/search.html).

= Chemical is detected at the concentration shown.

BRC Background reference concentration from Section 5 (EnSafe, 1999a).

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

MCL Maximum contaminant level: the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

NA Not applicable/not available/not analyzed

NL Not listed

RBC Risk-based concentration

ThQ Target hazard quotient

TABLE 4-7
Additional Groundwater Organic Analytical Results – Detections Only
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

Parameter	Location	Concentration	Units	Qualifier	Drinking Water MCL[a]	Region III Tap Water RBC (ThQ = 0.1)[b]
2-Methylnaphthalene	K698GW001	2.4	µg/L	J	NL	12
Alpha BHC (alpha hexachlorocyclohexane)	K698GW002	**0.05**[c]	µg/L	J	NL	0.011
Benzene	K698GW001	1.3	µg/L	=	5	0.32C
	K698GW001	**31**		J		
Chloroform	K698GW001	3.8	µg/L	J	80	0.15C
Dibenzofuran	K698GW001	1.2	µg/L	J	NL	24
Ethylbenzene	K698GW001	8	µg/L	=	700	130
	K698GW001	25		=		
Fluorene	K698GW001	1.6	µg/L	J	NL	24
Gamma BHC (lindane)	K698GW001	0.079	µg/L	J	0.2	NL
Naphthalene	K698GW001	**8.2**	µg/L	J	NL	0.65
Toluene	K698GW001	0.56	µg/L	J	1,000	75
Xylenes, Total	K698GW001	11	µg/L	=	10,000	1,200
	K698GW001	10		=		
OCDD	K698GW001	0.00003044	µg/L	J		
TEQ	K698GW001	0.00000003	µg/L		0.00003	0.00000045C

Concentrations in bolded and outlined text exceeded the MCLs and RBCs.

[a]The MCL is from EPA Drinking Water Regulations.

[b]Tap water RBCs (ThQ = 0.1 for noncarcinogen-residential) were obtained from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/epahome/search.html), unless otherwise noted.

[c]Alpha-BHC reported with a J flag at the detection limit level of 0.05 µg/L. However the field duplicate sample did not have detectable alpha-BHC.

= Chemical is detected at the concentration shown.

C Carcinogen-residential RBC was used directly from the EPA Region III RBC Table (October 5, 2000).

HI Hazard index

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

MCL Maximum contaminant level: the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

NA Not applicable/not available/not analyzed

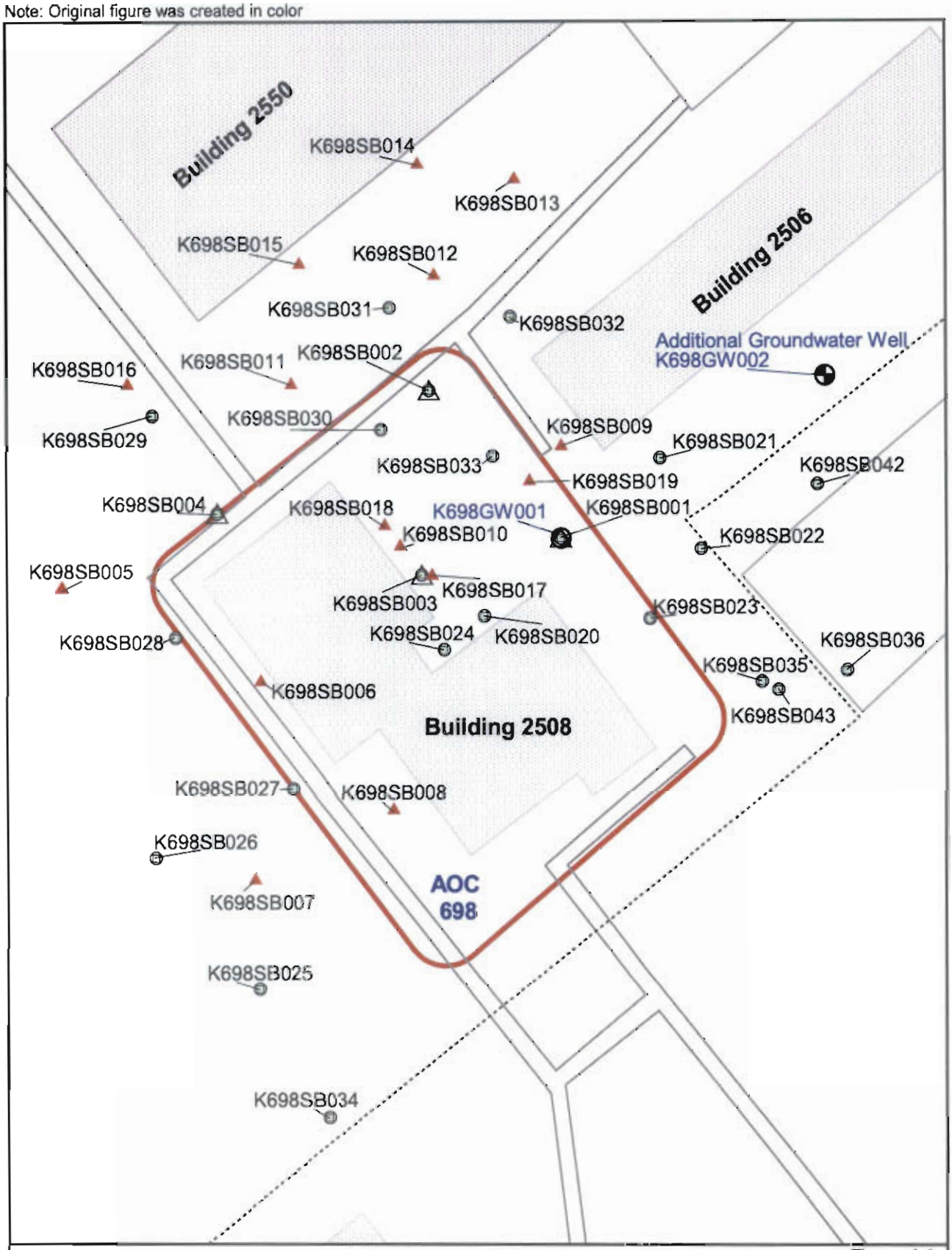
NL Not listed

RBC Risk-based concentration

TEQ 2,3,7,8-TCDD equivalent (see Table 4-4 for TEQ calculation procedure)

ThQ Target hazard quotient

Note: Original figure was created in color



Original RFI Boring + Additional Borings
Original RFI Boring (Samples 005 - 019)
Additional Subsurface Soil Sample = SB
Additional Surface Soil Sample = SS
Groundwater Well
Fence

Pavement
Sidewalk
AOC Boundary
Buildings

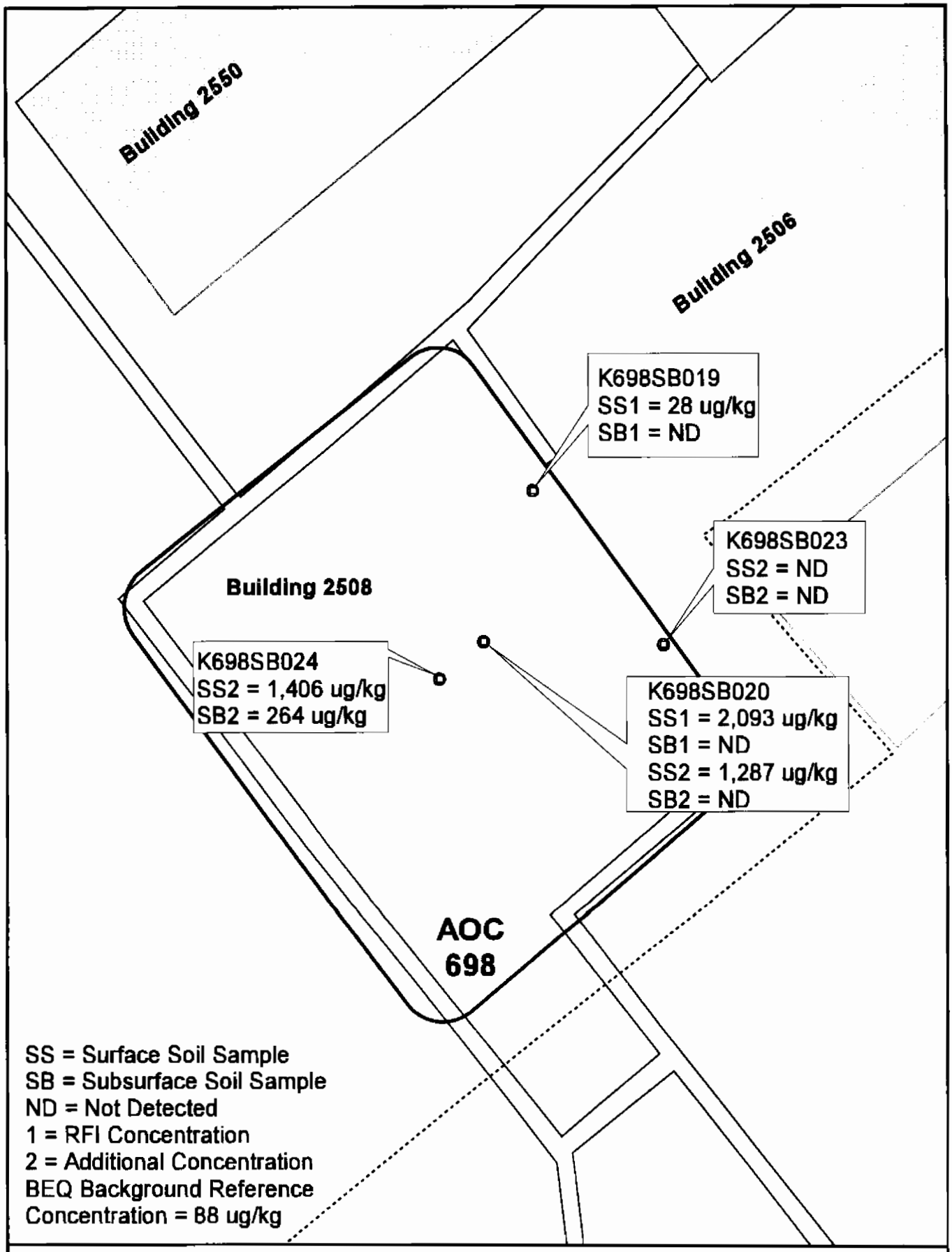
N

0 30 60 Feet

Figure 4-1
Additional Soil Boring and Monitoring Well Locations
AOC 698 - Zone K
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\cnc\projects\zone_k\aoc_698\aoc698b.apr, Date: 25 Jun 2001 16:33, User: ASWINFOR



Subsurface Soil Sample = SB
Background Surface Soil Sample = SS
Fence
Buildings
Pavement
Sidewalk

N

0 20 40 Feet

Figure 4-2
BEQ Results in Soil
AOC 698, Zone K
Charleston Naval Complex

Section 5.0

5.0 COPC/COC Refinement

The site was defined as an AOC only because of the lead-based paint used on the exterior of Building 2508. No RCRA-regulated activities were conducted at this site. There have been no reported releases of hazardous wastes or materials or disposal of wastes at this site.

As stated earlier, this site is located adjacent to a former AST used to store petroleum fuel oils. Surface soil samples taken at the site showed lead above the BRC; only one sample showed lead above its residential RBC, as discussed below. Additionally, several non-site-related chemicals were detected in site surface soil and groundwater. The petroleum hydrocarbons detected in groundwater appear to be related to the former AST, as they were detected in the well located downgradient from this potential source area. Low-level concentrations of insecticides detected in groundwater (lindane and its isomers, alpha- and beta-BHC) are not from lead-based paint or other activities identified with the original AOC assignment. These are further discussed below in order to develop a pertinent list of COCs per medium.

Based on the RFI results (see Section 2.0 of this report addendum) and the additional sampling and testing conducted after completion of the *Zone K RFI Report, Revision 0* (EnSafe, 1999a) (see Section 4.0), aluminum, arsenic, cadmium, iron, lead, thallium, BEQs, and TEQs were identified as exceeding soil screening criteria in at least one location, and are therefore considered preliminary COPCs. These COPCs are further evaluated in the following sections to assess whether they are COCs. Tables 5-1 and 5-2 are provided to show combined data from the RFI and additional investigations for surface and subsurface soil results, respectively. Iron, petroleum hydrocarbons, and BHC isomers were identified as COPCs for groundwater.

5.1 Surface Soil

Table 5-1 presents the list of parameters above criteria at each surface soil sampling location from all the sampling events. Of the constituents identified, lead is the only site-related COPC (as discussed below). All other COPCs included in Table 5-1 are identified based on preliminary sample-specific exceedences of screening criteria; however, upon further evaluation, none of the surface soil COPCs qualified as COCs. The rationale is provided below for each of the COPCs.

5.1.1 Aluminum

Aluminum did not exceed its BRC of 11,200 in the RFI results, and exceeded it only once in the additional results (K698SB025: 12,000 mg/kg). However, the exceedance was marginal and was within the specific parameter background concentration ranges detected in Zone K-Naval Station Annex soils for aluminum (4,050 mg/kg to 8,320 mg/kg for surface soil, and 3,090 mg/kg to 12,000 mg/kg for subsurface soil). It is likely that the detected aluminum is part of the area background concentration. The detected concentration was below an RBC of 78,000 mg/kg (HI=1.0). Since no subsurface soil aluminum concentrations exceeded screening criteria, leachability is not a concern for this metal. Thus, aluminum is not considered a COC in surface soil and does not warrant further investigation or action at AOC 698.

5.1.2 Arsenic

As presented in Section 2.0 of this report addendum, arsenic was identified as a surface soil COC in the HHRA for industrial land use scenarios. However, arsenic did not exceed the revised BRC (35.9 mg/kg) developed based on recent additional sampling of background locations at the Naval Station Annex. Neither the RFI nor additional test results exceeded the new BRC for surface soil. No source areas of arsenic in soil were found at the site. All but three of the 24 results for site samples are less than 10 mg/kg, and the highest is 15.7 mg/kg. The arsenic concentration range of 1.2 to 15.7 mg/kg in site samples seems to be representative of regional or local background levels. These data suggest that AOC 698 activities did not contribute to releases of arsenic. Based on these considerations, arsenic is not considered a COC at this site, and does not warrant further investigation or action.

5.1.3 Cadmium

As presented in Section 2.0 of this report addendum, cadmium was identified as a surface soil COPC in the HHRA. Cadmium marginally exceeded the screening RBC of 3.9 mg/kg (HI=0.1) in surface soil at one location in the RFI results (K698SB003: 4 mg/kg), but presented no exceedances in the additional samples. The concentration reported at K698SB003 is well below the RBC of 39 mg/kg (HI=1). Because all other site samples were below the conservative screening value and because a significant source area contaminated with cadmium that could present a hazard is not present, cadmium is not considered a COC and does not warrant further investigation or action at AOC 698.

5.1.4 Iron

Iron exceeded its RBC of 2,300 mg/kg (HI=0.1) at one location in the RFI results (K698SB001: 7,160 mg/kg), and in two locations in the additional investigation at K164SB001 (10,500 mg/kg) and K164SB025 (9,000 mg/kg). However, the exceedances were marginal and are within the specific parameter background concentration range detected in soils at Zone K-Naval Station Annex for iron (560 mg/kg to 10,900 mg/kg). As all of the detected iron is within this background concentration range, it is likely that the detected iron is part of the area background concentration. Since no subsurface soil iron concentrations exceeded screening criteria, leaching to groundwater is not a concern. Thus, iron is not considered a COC in surface soil and does not warrant further investigation or action at AOC 698.

5.1.5 Lead

Lead is a COPC that is potentially related to AOC activities. It did not exceed its RBC of 400 mg/kg in any soil samples collected during the original RFI investigation, and exceeded the residential RBC and SSL in only one of the subsequent samples (i.e., a re-sampling of original boring location K698SB001: 972 mg/kg). This maximum detected lead was above the background lead concentrations, which range from 8.9 to 259 mg/kg. At this same location in the original RFI, the surface soil sample result was 119 mg/kg. The average concentration of lead for all site surface soil samples is 90 mg/kg, which is well below the screening level RBC and SSL of 400 mg/kg. Thus, though lead is slightly elevated above natural background concentration levels, it is not a human exposure or leaching concern. The subsurface soil lead concentrations did not exceed leachability based screening criteria, indicating lead leaching to groundwater is not a concern at this site. No significant source area of lead is present at this location. Thus lead is not considered a COC in surface soil and does not warrant further investigation or action at AOC 698.

5.1.6 Thallium

Samples collected during the original RFI were not analyzed for thallium, and in the additional tests, it was detected only once in surface soil at a concentration of 0.56 mg/kg, which is essentially the same as the screening RBC (0.55 mg/kg) at HI=0.1. The detected value is below the RBC value of 5.5 mg/kg at HI=1.0. Thallium was not detected in the 10 background samples in Zone K, thus, there is no BRC. However, because only a limited number of background samples (nine) were collected from Zone K, the entire data set for CNC surface soil was used for the comparison with the ranges of background values. When compared with the range of overall background values, the thallium concentration fell within the overall complex surface soil background thallium range (0.12 to 2.8 mg/kg). It is

likely that the detected thallium is part of the area background concentration, and is below the RBC at HI=1.0. Based on these considerations, and because a significant source area contaminated with thallium that could present a hazard is not present at the site, thallium is not considered a COC in surface soil and does not warrant further investigation or action at AOC 698.

5.1.7 Heptachlor Epoxide

As presented in Section 2.0 of this report addendum, HE was identified as a surface soil COC in the HHRA for future residential use scenarios. HE exceeded the residential RBC of 70 µg/kg, however it is below the industrial RBC of 630 µg/kg in surface soil at two locations in the original RFI results (K698SB002: 129 µg/kg and K698SB011: 140 µg/kg), and presented no exceedances in the subsequent sampling. Sample location K698SB002 was resampled for the additional investigation and the result of 65 µg/kg is half of the RFI result at that location and below the residential RBC. The detected HE is likely from historical land applications as part of the facility maintenance, and is not specific to activities related to AOC 698. Based on these considerations, HE is not considered a COC at this site.

5.1.8 BEQ

Two of the four tested surface soil locations exceeded the RBC for BEQs (K698SB020 and K698SB024). At location K698SB024, the subsurface result (264 µg/kg) exceeded the BRC of 92 µg/kg. These soil BEQ detections are located in a former loading dock area. In addition, the presence of asphalt shingles and tar paper in the sample collection locations were noted during a site walk-through by CH2M-Jones on May 24, 2001. These are potential sources of the PAH concentrations which are not related to the basis of site AOC status. The non-exceedance locations for BEQs (K698SB019 and K698SB023) are nearby but in a grassy area free of the source materials. They delineate the extent of BEQ exceedance as shown in Figure 4-2. The asphalt shingles noted around the site were removed in November 2001, and photographs of the current conditions at the site are included in Appendix H of this RFI Report Addendum. The site is an AOC on the basis of suspected lead-based paint on the exterior of the building. BEQs are not present in paint. Another potential source of these PAHs are the combustion operations from the boiler house activities. The area that appears to have elevated PAH levels is relatively small (approximately 10 by 20 feet), and as any tar-covered shingles previously present in the area were removed, does not constitute a significant source area. Based on these considerations, BEQ is not considered a soil COC at this site, and does not warrant further investigation or action at AOC 698.

5.1.9 TEQ

The surface soil TEQ results that exceeded the RBC (4.3 ng/kg) were 6.8, 11.9, 16.2, and 39.0 ng/kg, and all occurred in an area adjacent to an existing sidewalk. One nearby location did not exceed the RBC. A focused risk-based comparison to RBC values and estimates of risks (calculated by comparison with the RBC value and multiplying by target risk level of 1 in a million [0.000001]) yielded risks in the range of 1.6 to 9.1 x 10^{-6} for each of the four samples (see Table 5-4). The overall background dioxin intake from all sources (food, soil, air and water) ingestion contributes to 119 ng/day, of which 0.8 ng/day is from soil. Thus, only 0.67 percent of the total daily intake of dioxin is from soil (see Figure II-5, Volume 1, EPA 1994, *Estimating Exposure to Dioxin-Like Compounds*, Volumes 1-4, external review draft, June 1994). Extracting this informaiton, EPA implemented a policy of not evaluating soil-dioxin levels at sites with low-dioxin detections and no apparent dioxin sources/releases. Thus, EPA recommends a no action level of 1,000 ng/kg for soils under residential (unrestricted) land use. This policy is further described below.

An EPA memorandum entitled Approach for *Addressing Dioxin in Soil at CERCLA and RCRA Sites*, dated April 13, 1998, establishes "1 part per billion (ppb) as a cleanup level for dioxin in residential soils at Superfund and RCRA cleanup sites where dioxin is a principal contaminant of concern at the facility." EPA's recommended action level of 1 ppb is based on the ubiquitous presence of TEQs in the urban environment. This 1 ppb value is the typical "background" level for the TEQs. All the results at this site are below the 1 ppb (1,000 ng/kg) concentration. As a result, TEQ is not considered a COC, and CH2M-Jones does not recommend additional investigation activities for dioxin in the surface soil at AOC 698.

5.1.10 Summary

There are no COCs requiring further action in surface soil at AOC 698.

5.2 Subsurface Soil

There were no subsurface soil results exceeding screening criteria in the RFI. The minor exceedances from the additional sampling results are presented in Table 5-2 and discussed below.

5.2.1 Thallium

Samples collected during the original RFI were not analyzed for thallium, and in the additional tests, it was detected only once in subsurface soil at a concentration of 0.5J mg/kg

("J" indicates that the chemical is detected at a concentration below the method detection limit), which is slightly greater than the SSL (0.35 mg/kg). Thallium was not detected in background samples in Zone K, thus there is no BRC. However, because only a limited number of background samples (10) were collected from Zone K, the entire data set for CNC surface soil was used for the comparison with the ranges of background values. When compared with the range of overall background values, the thallium concentration falls within the overall complex subsurface soil background thallium range (0.36 to 1.9 mg/kg). Thallium was not detected in site groundwater. It is likely that the detected thallium in subsurface soil is part of the area background concentration. Thus, thallium is not considered a COC in subsurface soil and does not warrant further investigation or action at AOC 698.

5.2.2 BEQ

Based on the considerations discussed in section 5.1.8, BEQ in one subsurface soil sample does not warrant further investigation or action at AOC 698, and is not considered a COC at this site. In addition, the tar-containing roof shingles noted around the site have been removed as a precautionary measure.

5.2.3 Summary

The subsurface soil for AOC 698 does not have any COCs identified. Therefore, NFA is recommended for subsurface soil at AOC 698.

5.3 Groundwater

A risk assessment conducted during the RFI concluded that the majority of the risks from groundwater were associated with benzene and BHCs based on groundwater samples from well K698GW001, and that the final risk was within the acceptable risk range of 1 to 100 in a million.

Table 5-3 presents the combined exceedance data from the RFI and additional investigations for each respective parameter.

5.3.1 Iron

The three groundwater exceedances for iron occurred at different times in well K698GW001. The latest monitoring data from 1999 reported an iron concentration of 3,030 µg/L. Although greater than the tap water RBC (1,100 µg/L) at HI=0.1, this value is below 11,000 µg/L, which is based on an HI=1.0. Iron in the downgradient well was detected at 121 µg/L

in a normal sample and 122 µg/L in a duplicate sample. Iron is naturally occurring in groundwater in the area. The three background wells within Zone K were sampled three times, and each presented iron concentrations within the range of 64 to 6,250 µg/L. The well concentrations detected are within the range of background concentrations for iron. Thus, iron is not a health concern and is well within background levels. Therefore, iron is not considered a COC in groundwater at AOC 698.

5.3.2 BTEX and Other Petroleum Hydrocarbons

The benzene, 2-methylnaphthalene, and naphthalene detected in well K698GW001 are likely from the former AST activities and are not from AOC 698 lead-based paint. With the exception of benzene, the concentrations of the petroleum constituents detected in the source well are decreasing over time. The 2-methylnaphthalene was detected at a concentration of 2.4 µg/L during the 1999 sampling, however it is below the RBC of 12 µg/L (HI=0.1) and 120 µg/L (HI=1.0). Naphthalene was detected at 8.2 µg/L during the 1999 sampling, which is close to its RBC of 6.5 µg/L (HI=1.0). Benzene levels rose from 6 µg/L during the last sampling event in 1997, and 1.3 µg/L during the 1999 sampling event, to 31 µg/L in the 2000 sampling event. This increase may be due to residual soil contamination in the vicinity of the former AST. These COPCs have not been detected in downgradient well K698GW002.

Significant migration of these hydrocarbons in groundwater is not occurring. Because these COPCs are not associated with RCRA-related operations, the AST has been closed, and detected petroleum hydrocarbons are not migrating significantly, these chemicals are not considered COCs in the groundwater at AOC 698. If it is necessary to regulate the hydrocarbon contamination at this site, it should be transferred to the UST program, as these hydrocarbons are not regulated under RCRA.

5.3.3 Pesticides

Several pesticides were detected in monitor well K698GW001 and downgradient well K698GW002. Lindane (gamma-BHC) and its isomers (alpha- and delta–BHC) were the only pesticides detected in well K698GW001. They have likely occurred in the historical application of pesticides at the base to prevent insects such as termites. The delta-BHC was detected in the first RFI sampling event in the source well (K698GW001) at 0.21 µg/L. When compared to a carcinogenic RBC of 0.32 µg/L (for technical-BHC), the concentration is below the RBC. The subsequent three sampling events did not have detectable levels of delta-BHC. However, the fourth sampling event detected alpha-BHC, which is another isomer of lindane, at 0.15 µg/L, compared to a tap water RBC of 0.011 µg/L. The last

sampling event for this well that included pesticides (December 1999) detected only gamma-BHC (lindane) at a concentration of 0.079 J µg/L. This concentration exceeded its RBC of 0.052 µg/L but not its MCL of 0.2 µg/L. There are no MCLs for the other isomers, however, the MCL for lindane can be used for comparison purposes. None of the concentrations of the BHC isomers exceeded this MCL.

The downgradient well (K698GW002) reported alpha-BHC reported with a J flag at the detection limit level of 0.05 µg/L. However, a field duplicate sample for the same well in 1999 did not have detectable alpha-BHC. Because lindane is likely from the historical application of pesticides at the base, its detected levels are low, and significant migration in groundwater is not occurring, NFA is recommended for the BHC isomers at AOC 698.

5.3.4 Summary

Sampling results from the site wells K698GW001 and K698GW002 indicate that petroleum constituents have not and are not migrating off site. In source well K698GW001, concentrations of most constituents, with the exception of benzene, are decreasing with time. The levels of benzene indicate a slight increase in concentration in the source well. The downgradient well (K698GW002) analytical results indicate that it is free of any organic contamination.

Based on the above findings and conclusions, NFA is recommended for site groundwater.

TABLE 5-1
Surface Soil Analytical Results for COPCs Exceeding Screening Criteria
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

COPC	Location	Concentration: Original RFI	Concentration: 1999 RFI Addendum	Units	EPA Region III Residential Soil RBC[a] (HI=0.1)	Surface Soil BRC	COC? (Yes/No)
BEQ	K698SB020	2,093	1,287	µg/kg	87[b]	88[c]	No
	K698SB024		1,406				
TEQ	K698SB002	11.92		ng/kg	4.3	4.3[d]	No
	K698SB030		16.2				
	K698SB031		6.8				
	K698SB032		39.0				
Heptachlor Epoxide	K698SB002	129		µg/kg	70		No
	K698SB011	140					
Aluminum	K698SB032		12,000	mg/kg	7,800	11,200	No
Cadmium	K698SB003	4		mg/kg	3.9	0.13	No
Iron	K698SB001	7,160	10,500	mg/kg	2,300	7,060	No
	K698SB025		9,000				
Lead	K698SB001		972	mg/kg	400[e]	39.6	No
Thallium	K698SB043		0.56(J)	mg/kg	0.55	NA	No

[a] Residential RBCs (HI=0.1 for noncarcinogens) were obtained from the EPA Region III RBC Table (October 5, 2000) (http://www.epa.gov/eaphome/search.html), unless otherwise noted.

[b] Residential RBC for benzo(a)pyrene in the reference cited in footnote "a" above.

[c] *Preliminary Results for Additional Background PAH Sampling from CNC Main Base Railroad Lines and Annex (Zone K)* (CH2M-Jones, May 3, 2001).

[d] 2,3,4,8-TCDD RBC (DAF = 10, carcinogen) from the EPA Region III SSL Table (October 5, 2000) (http://www.epa.gov/epahome/search.html).

[e] Residential RBC for lead was obtained from the EPA Soil Screening Guidance: Technical Background Document, Appendix A (page A-5) EPA/540/R-95/128 (May 1996).

All background values for Zone K-Annex are based on twice the mean of the sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report* (EnSafe, 1999a). Also, see footnote "c" above.

BEQ Benzo(a)pyrene equivalent (see Table 4-4 for BEQ calculation procedure)

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

HI Hazard index

NA Not applicable/not available/not analyzed

RBC Risk-based concentration

TEQ 2,3,7,8 TCDD equivalent

TABLE 5-2
Subsurface Soil Analytical Results for COPCs Exceeding Screening Criteria
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

COPC	Location	Concentration: Original RFI	Concentration: 1999 RFI Addendum	Units	Soil-to-Groundwater SSL[a] (DAF=10)	Subsurface Soil BRC	COC? (Yes/No)
BEQ	K698SB024		264	µg/kg	NA	92	No
Thallium	K698SB042		0.5J	mg/kg	0.35	NA	No

All background values for Zone K-Naval Station Annex are based on twice the mean of the sample concentrations, as described in Section 5, Data Evaluation and Background Comparison, of the *Zone K RFI Report* (EnSafe, 1999a).

[a] Generic soil-to-groundwater SSLs (DAF = 10) from the EPA Soil Screening Guidance: Technical Background Document (Table A-1), EPA/540/R-95/128 (May 1996), unless otherwise noted.

DAF Dilution attenuation factor

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

NA Not applicable/not available/not analyzed

SSL Soil screening level

TABLE 5-3
Groundwater Analytical Results for COPCs Exceeding Screening Criteria
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

		Concentration µg/L									
		Original RFI				1999 RFI Addendum					
COPC	Location	1/6/97	4/18/97	7/25/97	10/23/97	12/07/99	7/20/00	Drinking Water MCL[a] (µg/L)	EPA Region III Tap Water RBC (ThQ = 0.1)[b] (µg/L)	Groundwater BRC (µg/L)	COC? Yes/No
Benzene	K698GW001	5	16	7	6	1.3(J)	31	5	0.32	NA	No[d]
	K698GW002	NS	NS	NS	NS	ND	ND				
2-Methyl naphthalene	K698GW001	26	29	9	11	2.4(J)	NT	NL	12	NA	No
	K698GW002	NS	NS	NS	NS	ND	NT				
Naphthalene	K698GW001	37	27	12	20	8.2(J)	NT	NL	0.65	NA	No
	K698GW002	NS	NS	NS	NS	ND	NT				
alpha-BHC	K698GW001	ND	ND	ND	0.15	ND	NT	0.2[e]	0.011	NA	No
	K698GW002	NS	NS	NS	NS	0.05(J)	NT				
delta-BHC	K698GW001	0.21	ND	ND	ND	ND	NT	0.2[e]	0.037	NA	No
	K698GW002	NS	NS	NS	NS	ND	NT				
gamma-BHC	K698GW001	ND	ND	ND	ND	0.079(J)	NT	0.2	0.052	NA	No
	K698GW002	NS	NS	NS	NS	ND	NT				
Iron	K698GW001	119	ND	13,200	10,900	3,030	NT	300[c]	1,100	93 – 68,000	No
	K698GW002	NS	NS	NS	NS	121	NT				

[a] The MCL is from EPA Drinking Water Regulations, Summer 2000.

TABLE 5-3
Groundwater Analytical Results for COPCs Exceeding Screening Criteria
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

		Concentration µg/L									
		Original RFI				1999 RFI Addendum					
COPC	Location	1/6/97	4/18/97	7/25/97	10/23/97	12/07/99	7/20/00	Drinking Water MCL[a] (µg/L)	EPA Region III Tap Water RBC (ThQ = 0.1)[b] (µg/L)	Groundwater BRC (µg/L)	COC? Yes/No

[b] RBCs were obtained from the EPA Region III RBC Table, 10/5/2000 (http://www.epa.gov/epahome/search.html).

[c] Secondary MCL, reference footnote a.

[d] Addressed by the storage tank program and not related to AOC 698.

[e] MCL for gamma-BHC (lindane) was used.

= indicates that the chemical is detected at the concentration shown.

(J) indicates that the chemical is detected at a concentration below the method detection limit; the concentration is not known.

NA not applicable/not available/not analyzed

ND not detected
NL not listed

NS not sampled; well was not installed at time of sampling

NT not tested

MCL Maximum Contaminant Level; the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RBC risk-based concentration

ThQ target hazard quotient

Note: All background values for Zone K are based on twice the means of the grid sample concentrations, as described in the *Zone K RFI Report*, Section 5 – Data Evaluation and Background Comparison.

TABLE 5-4
Focused Risk Evaluation for TEQs at AOC 698
RFI Report Addendum, AOC 698, Zone K-Naval Station Annex

COPC	Location	Concentration (ng/kg)	EPA Region III Residential Soil RBC* (ng/kg)	Cancer risk
TEQ	K698SB002	11.92	4.3	2.8E-06
	K698SB030	16.2		3.8E-06
	K698SB031	6.8		1.6E-06
	K698SB032	39		9.1E-06
Mean AOC 698 TEQ Concentration		18.48	4.3	4.3E-06
Background soil level*		13.7	4.3	3.2E-06

* - Values from EPA 1994, *Estimating Exposure to Dioxin-Like Compounds*, Volumes 1-4, external review draft, June 1994.

Section 6.0

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone K RFI Report, Revision 0* (EnSafe, 1999a) addressed SWMUs/AOCs within the Naval Annex, including AOC 698. At the conclusion of the RFI report, the BCT did not consider the investigation to be complete for this site, and the subsequent *Final Zone K RFI Report Work Plan Addendum* (EnSafe, 1999b) proposed additional sampling. As presented and discussed in Section 4.0 of this report addendum, the additional testing has completed the delineation (nature and extent) of contamination. The RFI is considered to be complete.

The CH2M-Jones *Zone K RFI Report Work Plan Addendum* (2000) and the Zone K-Naval Station Annex Scoping Meeting held on September 6, 2000, both concluded that no additional samples would be collected at AOC 698. These data and the responses to SCDHEC comments confirm that additional soil or groundwater samples are not required. A copy of the responses to SCDHEC comments on the *Zone K RFI Report* and *Final Zone K RFI Work Plan Addendum* for this site are provided as Appendix F.

6.2 Presence of Inorganics in Groundwater

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

The RFI determined that the soil-to-groundwater pathway is not significant. The subsequent investigation detected minor SSL exceedances of arsenic, iron, and thallium in site soils as discussed in Section 3.0, but these are within the background range and do not represent source areas. In six groundwater sampling events and inorganic analyses collected from monitor wells K698GW001 and K698GW002, only iron was detected above screening levels, but these detections were within the Zone K background range for iron in groundwater. As a result, the soil-to-groundwater pathway is considered invalid at this site, and further groundwater investigation for inorganics is not warranted.

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

Because of the location of this site at the Naval Annex, there is no potential linkage to SWMU 37, which is located at the Charleston Naval Shipyard. Furthermore, there are no COCs that could migrate from the site.

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

Because of the location of this site at the Naval Annex, no linkage to AOC 699, the storm sewer at the Charleston Naval Shipyard, is possible. In addition, because there were no COCs identified in groundwater or soil, COC migration is not a concern at this site.

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

No railroad lines are present at the Naval Annex, so further evaluation of a potential linkage between AOC 504 and the subject site is not necessary.

6.6 Potential Migration Pathways to Surface Water Bodies at the CNC

The nearest named surface water body to AOC 698 is Filbin Creek, which is located more than 3,000 feet to the southeast.

Due to the fact that the additional investigation found no significant exceedances in soils, and that the nearest water-receiving body is 3,000 feet to the southeast, surface water runoff from AOC 698 would not be an ecological concern at Filbin Creek. Thus, further evaluation of a potential pathway for contaminant migration via stormwater runoff is not warranted.

There were no chemicals found in soil at AOC 698 at concentrations that would indicate a potential soil-to-groundwater pathway. Therefore, further evaluation of the potential migration of contaminated groundwater to a surface water body is not warranted.

6.7 Potential Contamination in Oil/Water Separators (OWSs)

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

Neither the RFA nor the RFI refer to the presence or possible presence of an OWS at AOC 698. In addition, there is no visual evidence of an OWS at this site. Therefore, further evaluation of this issue at AOC 698 is not warranted.

In addition, there is no reference made in the basewide OWS report prepared by the Navy in Y2000 to an OWS at this facility.

6.8 Land Use Control Management Plan

No COCs were identified in any media at AOC 698. The *Charleston Naval Annex Reuse Plan* (Wilbur Smith Associates, 1997) indicated that light industrial distribution/mixed uses are planned for this site. Thus, land use controls are not necessary at AOC 698.

Section 7.0

7.0 Recommendations

AOC 698 consists of Building 2508 at the Naval Annex, which houses four inactive boilers that once supplied steam to various annex facilities. The boilers have been out of service for several years and the building is in poor condition. The building is designated as an AOC due to lead-based paint that is peeling off of the interior and exterior surfaces. A fuel oil AST was formerly located on the northeast side of Building 2508. A cement block secondary containment berm and concrete tank supports are still present, although the tank was removed in the mid-1990s, and has been clean-closed by the Navy.

According to the evaluation of data collected during the RFI and additional investigations, the exceedances of criteria by chemicals in soil and groundwater are either attributable to the background, limited to single or few minor occurrences, do not present human exposure or leaching concerns, or are related to historic activities not associated with AOC 698.

Based on the lack of significant contamination, CH2M-Jones recommends this site for NFA. Once the BCT concurs that NFA is appropriate for the site, a Statement of Basis will be prepared that will be made available for public comment in accordance with SCDHEC policy. This will allow for public participation in the final remedy selection.

Section 8.0

8.0 References

CH2M-Jones. *Zone K RFI Report Work Plan Addendum*. 2000.

EnSafe Inc. *Zone K RFI Report, NAVBASE Charleston*. Revision 0. June 11, 1999a.

EnSafe Inc. *Zone K RFI Report Work Plan Addendum, NAVBASE Charleston*. November 16, 1999b.

EnSafe/Allen & Hoshall. *Final Zone K RFI Work Plan, NAVBASE Charleston*. September 1996.

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

U.S. Environmental Protection Agency. Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites. Technical Memorandum. April 13, 1998.

Wilbur Smith Associates. *Charleston Naval Annex Reuse Plan*. 1997.

Appendix A

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	Station ID	K698GW001		K698GW001		K698GW001	
	SampleID	698G000110		698GW00105		698GW00105	
	DateCollected	07/20/2000		12/07/1999		12/07/1999	
	DateAnalyzed	8/3/00		12/15/99		12/17/99	
	SDGNumber	CNC08		NBCK12		NBCK12	
Parameter	**Units**						
BENZENE	ug/l	31	=	1.3	J		
CHLOROMETHANE	UG/L	10	U	10	U		
NAPHTHALENE	UG/L					8.2	J
TOLUENE	UG/L	0.56	J	5	U		
VINYL CHLORIDE	UG/L	10	U	10	U		
BROMOMETHANE	UG/L	10	U	10	U		
ETHYLBENZENE	UG/L	25	=	8	=		
CHLOROETHANE	UG/L	10	U	10	U		
1,1-DICHLOROETHENE	UG/L	5	U	5	U		
METHYLENE CHLORIDE	UG/L	5	U	10	U		
XYLENES, TOTAL	UG/L	10	=	11	=		
1,1-DICHLOROETHANE	UG/L	5	U	5	U		
CHLOROFORM	ug/l	3.8	J	5	U		
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U		
CARBON TETRACHLORIDE	UG/L	5	U	5	U		
1,2-DICHLOROETHANE	UG/L	5	U	5	U		
TRICHLOROETHYLENE (TCE)	UG/L	5	U	5	U		
1,2-DICHLOROPROPANE	UG/L	5	U	5	U		
BROMODICHLOROMETHANE	ug/l	5	U	5	U		
DIBROMOCHLOROMETHANE	ug/l	5	UJ				
1,1,2-TRICHLOROETHANE	UG/L	5	U	5	U		
TETRACHLOROETHYLENE(PCE)	ug/l	5	U	5	U		
DIBROMOCHLOROMETHANE	UG/L			5	U		
CHLOROBENZENE	ug/l	5	U	5	U		
STYRENE	UG/L	5	U	5	U		
BROMOFORM	UG/L	5	UJ	5	U		
1,1,2,2-TETRACHLOROETHANE	UG/L	5	UJ	5	U		
ACETONE	UG/L	10	U	50	U		
CARBON DISULFIDE	UG/L	5	U	5	U		
Vinyl acetate	UG/L	10	UJ	10	U		
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	10	UJ	25	U		
2-Chloroethyl vinyl ether	UG/L	10	U	50	U		
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	10	U	25	U		
cis-1,3-DICHLOROPROPENE	ug/l	5	U	5	U		
trans-1,3-DICHLOROPROPENE	ug/l	5	U	5	U		
2-HEXANONE	UG/L	10	U	25	U		
1,2-Dichloroethene (total)	UG/L	5	U	5	U		

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

06/28/2001

	Station ID	K698GW002		K698GW002		K698GW002	
	SampleID	698G000210		698GW00201		698GW00201	
	DateCollected	07/20/2000		12/07/1999		12/07/1999	
	DateAnalyzed	8/3/00		12/14/99		12/17/99	
	SDGNumber	CNC08		NBCK12		NBCK12	
Parameter	**Units**						
BENZENE	ug/l	5	U	5	U		
CHLOROMETHANE	UG/L	10	U	10	U		
NAPHTHALENE	UG/L					10	U
TOLUENE	UG/L	5	U	5	U		
VINYL CHLORIDE	UG/L	10	U	10	U		
BROMOMETHANE	UG/L	10	U	10	U		
ETHYLBENZENE	UG/L	5	U	5	U		
CHLOROETHANE	UG/L	10	U	10	U		
1,1-DICHLOROETHENE	UG/L	5	U	5	U		
METHYLENE CHLORIDE	UG/L	5	U	10	U		
XYLENES, TOTAL	UG/L	5	U	10	U		
1,1-DICHLOROETHANE	UG/L	5	U	5	U		
CHLOROFORM	ug/l	5	U	5	U		
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U		
CARBON TETRACHLORIDE	UG/L	5	U	5	U		
1,2-DICHLOROETHANE	UG/L	5	U	5	U		
TRICHLOROETHYLENE (TCE)	UG/L	5	U	5	U		
1,2-DICHLOROPROPANE	UG/L	5	U	5	U		
BROMODICHLOROMETHANE	ug/l	5	U	5	U		
DIBROMOCHLOROMETHANE	ug/l	5	UJ				
1,1,2-TRICHLOROETHANE	UG/L	5	U	5	U		
TETRACHLOROETHYLENE(PCE)	ug/l	5	U	5	U		
DIBROMOCHLOROMETHANE	UG/L			5	U		
CHLOROBENZENE	ug/l	5	U	5	U		
STYRENE	UG/L	5	UJ	5	U		
BROMOFORM	UG/L	5	UJ	5	U		
1,1,2,2-TETRACHLOROETHANE	UG/L	5	U	5	U		
ACETONE	UG/L	10	U	50	U		
CARBON DISULFIDE	UG/L	5	U	5	U		
Vinyl acetate	UG/L	10	UJ	10	U		
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	10	UJ	25	U		
2-Chloroethyl vinyl ether	UG/L	10	U	50	U		
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	10	U	25	U		
cis-1,3-DICHLOROPROPENE	ug/l	5	U	5	U		
trans-1,3-DICHLOROPROPENE	ug/l	5	U	5	U		
2-HEXANONE	UG/L	10	U	25	U		
1,2-Dichloroethene (total)	UG/L	5	U	5	U		

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	Station ID	K698GW002		K698GW002	
	SampleID	698HW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999	
	DateAnalyzed	12/14/99		12/17/99	
	SDGNumber	NBCK12		NBCK12	
Parameter	**Units**				
BENZENE	ug/l	5	U		
CHLOROMETHANE	UG/L	10	U		
NAPHTHALENE	UG/L			10	U
TOLUENE	UG/L	5	U		
VINYL CHLORIDE	UG/L	10	U		
BROMOMETHANE	UG/L	10	U		
ETHYLBENZENE	UG/L	5	U		
CHLOROETHANE	UG/L	10	U		
1,1-DICHLOROETHENE	UG/L	5	U		
METHYLENE CHLORIDE	UG/L	10	U		
XYLENES, TOTAL	UG/L	10	U		
1,1-DICHLOROETHANE	UG/L	5	U		
CHLOROFORM	ug/l	5	U		
1,1,1-TRICHLOROETHANE	UG/L	5	U		
CARBON TETRACHLORIDE	UG/L	5	U		
1,2-DICHLOROETHANE	UG/L	5	U		
TRICHLOROETHYLENE (TCE)	UG/L	5	U		
1,2-DICHLOROPROPANE	UG/L	5	U		
BROMODICHLOROMETHANE	ug/l	5	U		
DIBROMOCHLOROMETHANE	ug/l				
1,1,2-TRICHLOROETHANE	UG/L	5	U		
TETRACHLOROETHYLENE(PCE)	ug/l	5	U		
DIBROMOCHLOROMETHANE	UG/L	5	U		
CHLOROBENZENE	ug/l	5	U		
STYRENE	UG/L	5	U		
BROMOFORM	UG/L	5	U		
1,1,2,2-TETRACHLOROETHANE	UG/L	5	U		
ACETONE	UG/L	50	U		
CARBON DISULFIDE	UG/L	5	U		
Vinyl acetate	UG/L	10	U		
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	25	U		
2-Chloroethyl vinyl ether	UG/L	50	U		
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	25	U		
cis-1,3-DICHLOROPROPENE	ug/l	5	U		
trans-1,3-DICHLOROPROPENE	ug/l	5	U		
2-HEXANONE	UG/L	25	U		
1,2-Dichloroethene (total)	UG/L	5	U		

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/17/99		12/17/99		12/17/99	
	SDGNumber	NBCK12		NBCK12		NBCK12	
Parameter	**Units**						
2,2'-OXYBIS(1-CHLORO)PROPANE	UG/L	10	U	10	U	10	U
2-METHYLNAPHTHALENE	UG/L	2.4	J	10	U	10	U
2-METHYLPHENOL (o-CRESOL)	UG/L	10	U	10	U	10	U
3-Methylphenol (m-Cresol)	UG/L	10	U	10	U	10	U
Diphenylamine	UG/L	10	U	10	U	10	U
N-Nitrosodimethylamine	UG/L	10	U	10	U	10	U
PHENOL	UG/L	10	U	10	U	10	U
ACENAPHTHYLENE	UG/L	10	U	10	U	10	U
bis(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	UG/L	10	U	10	U	10	U
2-CHLOROPHENOL	UG/L	10	U	10	U	10	U
ACENAPHTHENE	UG/L	10	U	10	U	10	U
1,3-DICHLOROBENZENE	UG/L	10	U	10	U	10	U
FLUORENE	UG/L	1.6	J	10	U	10	U
1,4-DICHLOROBENZENE	UG/L	10	U	10	U	10	U
PHENANTHRENE	UG/L	10	U	10	U	10	U
ANTHRACENE	UG/L	10	U	10	U	10	U
Benzyl alcohol	UG/L	10	U	10	U	10	U
FLUORANTHENE	UG/L	10	U	10	U	10	U
1,2-DICHLOROBENZENE	UG/L	10	U	10	U	10	U
PYRENE	UG/L	10	U	10	U	10	U
BENZO(a)ANTHRACENE	UG/L	10	U	10	U	10	U
CHRYSENE	UG/L	10	U	10	U	10	U
BENZO(b)FLUORANTHENE	UG/L	10	U	10	U	10	U
N-NITROSODI-n-PROPYLAMINE	UG/L	10	U	10	U	10	U
BENZO(k)FLUORANTHENE	UG/L	10	U	10	U	10	U
BENZO(a)PYRENE	UG/L	10	U	10	U	10	U
HEXACHLOROETHANE	UG/L	10	U	10	U	10	U
INDENO(1,2,3-c,d)PYRENE	UG/L	10	U	10	U	10	U
NITROBENZENE	UG/L	10	U	10	U	10	U
DIBENZ(a,h)ANTHRACENE	UG/L	10	U	10	U	10	U
ISOPHORONE	UG/L	10	U	10	U	10	U
2-NITROPHENOL	UG/L	10	U	10	U	10	U
BENZO(g,h,i)PERYLENE	UG/L	10	U	10	U	10	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/17/99		12/17/99		12/17/99	
	SDGNumber	NBCK12		NBCK12		NBCK12	
Parameter	**Units**						
2,4-DIMETHYLPHENOL	UG/L	10	U	10	U	10	U
bis(2-CHLOROETHOXY) METHANE	UG/L	10	U	10	U	10	U
Benzoic acid	UG/L	50	U	50	U	50	U
2,4-DICHLOROPHENOL	UG/L	10	U	10	U	10	U
1,2,4-TRICHLOROBENZENE	UG/L	10	U	10	U	10	U
4-CHLOROANILINE	UG/L	20	U	20	U	20	U
HEXACHLOROBUTADIENE	UG/L	10	U	10	U	10	U
4-CHLORO-3-METHYLPHENOL	UG/L	10	U	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	UG/L	10	U	10	U	10	U
2,4,6-TRICHLOROPHENOL	UG/L	10	U	10	U	10	U
2,4,5-TRICHLOROPHENOL	UG/L	10	U	10	U	10	U
2-CHLORONAPHTHALENE	UG/L	10	U	10	U	10	U
2-NITROANILINE	UG/L	50	U	50	U	50	U
2,6-DINITROTOLUENE	UG/L	10	U	10	U	10	U
3-NITROANILINE	UG/L	50	U	50	U	50	U
2,4-DINITROPHENOL	UG/L	50	U	50	U	50	U
DIBENZOFURAN	UG/L	1.2	J	10	U	10	U
4-NITROPHENOL	UG/L	50	U	50	U	50	U
2,4-DINITROTOLUENE	UG/L	10	U	10	U	10	U
DIMETHYL PHTHALATE	UG/L	10	U	10	U	10	U
DIETHYL PHTHALATE	UG/L	10	U	10	U	10	U
4-CHLOROPHENYL PHENYL ETHER	UG/L	10	U	10	U	10	U
4-NITROANILINE	UG/L	50	U	50	U	50	U
4,6-DINITRO-2-METHYLPHENOL	UG/L	50	U	50	U	50	U
4-BROMOPHENYL PHENYL ETHER	UG/L	10	U	10	U	10	U
HEXACHLOROBENZENE	UG/L	10	U	10	U	10	U
PENTACHLOROPHENOL	UG/L	50	U	50	U	50	U
DI-n-BUTYL PHTHALATE	UG/L	10	U	10	U	10	U
BENZYL BUTYL PHTHALATE	UG/L	10	U	10	U	10	U
3,3'-DICHLOROBENZIDINE	UG/L	20	U	20	U	20	U
bis(2-ETHYLHEXYL) PHTHALATE	UG/L	10	U	10	U	10	U
DI-n-OCTYLPHTHALATE	UG/L	10	U	10	U	10	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/14/99		12/14/99		12/14/99	
	SDGNumber	NBCK12		NBCK12		NBCK12	
Parameter	**Units**						
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	UG/L	0.05	UJ	0.05	J	0.05	U
GAMMA BHC (LINDANE)	UG/L	0.079	J	0.05	UJ	0.05	U
BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	UG/L	0.05	UJ	0.05	UJ	0.05	U
HEPTACHLOR	UG/L	0.05	UJ	0.05	UJ	0.05	U
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	UG/L	0.084	U	0.05	UJ	0.05	U
ALDRIN	UG/L	0.05	UJ	0.05	UJ	0.05	U
HEPTACHLOR EPOXIDE	UG/L	0.05	UJ	0.05	UJ	0.05	U
GAMMA-CHLORDANE	UG/L	0.05	UJ	0.05	UJ	0.05	U
ALPHA-CHLORDANE	UG/L	0.05	UJ	0.05	UJ	0.05	U
ENDOSULFAN I	UG/L	0.05	UJ	0.05	UJ	0.05	U
p,p'-DDE	UG/L	0.1	UJ	0.1	UJ	0.1	U
DIELDRIN	UG/L	0.1	UJ	0.1	UJ	0.1	U
ENDRIN	UG/L	0.1	UJ	0.1	UJ	0.1	U
p,p'-DDD	UG/L	0.1	UJ	0.1	UJ	0.1	U
ENDOSULFAN II	UG/L	0.1	UJ	0.1	UJ	0.1	U
p,p'-DDT	UG/L	0.1	UJ	0.1	UJ	0.1	U
ENDRIN ALDEHYDE	UG/L	0.1	UJ	0.1	UJ	0.1	U
ENDOSULFAN SULFATE	UG/L	0.1	UJ	0.1	UJ	0.1	U
METHOXYCHLOR	UG/L	0.5	UJ	0.5	UJ	0.5	U
ENDRIN KETONE	UG/L	0.1	UJ	0.1	UJ	0.1	U
TOXAPHENE	UG/L	5	UJ	5	UJ	5	U

Analytical .ta Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/14/99		12/14/99		12/14/99	
	SDGNumber	NBCK12		NBCK12		NBCK12	
Parameter	**Units**						
PCB-1016 (AROCHLOR 1016)	UG/L	1	UJ	1	UJ	1	U
PCB-1221 (AROCHLOR 1221)	UG/L	2	UJ	2	UJ	2	U
PCB-1232 (AROCHLOR 1232)	UG/L	1	UJ	1	UJ	1	U
PCB-1242 (AROCHLOR 1242)	UG/L	1	UJ	1	UJ	1	U
PCB-1248 (AROCHLOR 1248)	UG/L	1	UJ	1	UJ	1	U
PCB-1254 (AROCHLOR 1254)	UG/L	1	UJ	1	UJ	1	U
PCB-1260 (AROCHLOR 1260)	UG/L	1	UJ	1	UJ	1	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/15/99		12/15/99		12/15/99	
	SDGNumber	NBCK12		NBCK12		NBCK12	
Parameter	**Units**						
ALUMINUM	UG/L	341	J	618	J	565	J
ANTIMONY	UG/L	2.4	U	2.4	U	2.4	U
ARSENIC	UG/L	3.3	U	3.3	U	3.3	U
BARIUM	UG/L	14	=	17.8	=	18.6	=
BERYLLIUM	UG/L	0.1	U	0.1	U	0.1	U
CADMIUM	UG/L	0.4	U	0.4	U	0.4	U
CALCIUM	UG/L	27300	=	12600	=	12900	=
CHROMIUM, TOTAL	UG/L	0.5	U	0.89	J	0.5	U
COBALT	UG/L	0.5	U	0.5	U	0.56	J
COPPER	UG/L	1.6	J	0.8	U	1	J
IRON	UG/L	3030	=	121	=	122	=
LEAD	UG/L	2.3	U	1.3	U	2.8	U
MAGNESIUM	UG/L	1410	=	230	J	258	J
MANGANESE	UG/L	3.3	J	5.4	J	6	J
MERCURY	UG/L	0.1	U	0.1	U	0.1	U
NICKEL	UG/L	1.2	U	1.2	U	1.2	U
POTASSIUM	UG/L	2970	=	823	J	894	J
SELENIUM	UG/L	3.6	U	3.6	U	3.6	U
SILVER	UG/L	0.7	U	0.7	U	0.7	U
SODIUM	UG/L	4470	=	1310	=	1540	=
THALLIUM	UG/L	3.2	U	3.2	U	3.2	U
Tin (Sn)	UG/L	2.9	U	2.9	U	2.9	U
VANADIUM	UG/L	3.8	J	0.7	U	0.7	U
ZINC	UG/L	1.5	U	1.4	U	1.6	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698GW001		K698GW002		K698GW002	
	SampleID	698GW00105		698GW00201		698HW00201	
	DateCollected	12/07/1999		12/07/1999		12/07/1999	
	DateAnalyzed	12/15/99		12/15/99		12/15/99	
	SDGNumber	41368		41368		41368	
Parameter	**Units**						
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	PG/L	20.185	U	13.025	U	23.841	U
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	PG/L	9.161	U	6.132	U	5.47	U
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	PG/L	12.901	U	8.635	U	7.704	U
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	PG/L	19.709	U	25.995	U	24.457	U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	PG/L	9.484	U	15.171	U	12.978	U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	PG/L	13.27	U	17.502	U	16.466	U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	PG/L	7.112	U	11.378	U	9.733	U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	PG/L	15.211	U	20.063	U	18.876	U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	PG/L	11.259	U	18.012	U	15.408	U
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	PG/L	21.861	U	26.398	U	21.885	U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	PG/L	14.399	U	13.248	U	13.037	U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	PG/L	8.316	U	13.303	U	11.38	U
2,3,4,7,8-PENTACHLORODIBENZOFURAN	PG/L	14.558	U	13.394	U	13.181	U
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	PG/L	10.588	U	18.05	U	13.397	U
2,3,7,8-TETRACHLORODIBENZOFURAN	PG/L	13.041	U	9.645	U	12.682	U
OCTACHLORODIBENZO-p-DIOXIN	PG/L	30.441	J	12.45	U	15.533	U
OCTACHLORODIBENZOFURAN	PG/L	12.539	U	13.171	U	15.374	U
Total Hepta-Dioxins	PG/L	20.185	U	13.025	U	23.841	U
Total Hepta-Furans	PG/L	9.161	U	6.132	U	5.47	U
Total Hexa-Dioxins	PG/L	13.27	U	17.502	U	16.466	U
Total Hexa-Furans	PG/L	7.112	U	11.378	U	9.733	U
Total Penta-Dioxins	PG/L	21.861	U	26.398	U	21.885	U
Total Penta-Furans	PG/L	14.558	U	13.394	U	13.181	U
Total Tetra-Dioxins	PG/L	10.588	U	18.05	U	13.397	U
Total Tetra-Furans	PG/L	13.041	U	9.645	U	12.682	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB030		K698SB030		K698SB030	
	SampleID	698CB03001 (0-1ft)		698SB03001 (0-1ft)		698SB03002 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/3/99		12/3/99		12/3/99	
	SDGNumber	41189		41189		41189	
Parameter	**Units**						
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	NG/KG	453.986	=	323.204	=	5.355	=
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	187.404	=	176.138	=	1.964	J
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	4.462	=	4.455	U	0.801	U
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	NG/KG	8.742	=	6.464	J	1.199	U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	15.821	J	17.623	J	0.353	U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	21.683	=	18.97	=	0.808	U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	3.772	J	8.755	J	0.265	U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	22.584	J	13.331	J	0.926	U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	5.405	U	2.257	U	0.419	U
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	NG/KG	2.98	J	5.817	U	1.496	U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	2.821	J	1.361	J	0.329	U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	9.797	J	9.187	J	0.309	U
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	1.467	=	1.498	=	0.333	U
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	NG/KG	0.51	U	0.647	U	0.407	U
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	1.688	=	1.264	U	0.181	U
OCTACHLORODIBENZO-p-DIOXIN	NG/KG	3158.38	=	2665.418	=	288.531	=
OCTACHLORODIBENZOFURAN	NG/KG	298.075	=	292.337	=	6.091	=
Total Hepta-Dioxins	NG/KG	829.454	=	577.744	=	10.559	=
Total Hepta-Furans	NG/KG	191.867	=	176.138	=	0.569	U
Total Hexa-Dioxins	NG/KG	53.008	=	46.126	=	0.808	U
Total Hexa-Furans	NG/KG	248.789	=	255.167	=	0.46	=
Total Penta-Dioxins	NG/KG	2.98	U	5.817	U	1.496	U
Total Penta-Furans	NG/KG	169.78	=	130.233	=	0.333	U
Total Tetra-Dioxins	NG/KG	0.51	U	0.647	U	0.407	U
Total Tetra-Furans	NG/KG	13.159	=	2.289	=	0.181	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB031		K698SB031		K698SB032	
	SampleID	698SB03101 (0-1ft)		698SB03102 (3-5ft)		698SB03201 (0-1ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/3/99		12/3/99		12/3/99	
	SDGNumber	41189		41189		41189	
Parameter	**Units**						
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	NG/KG	48.808	=	2.857	J	854.346	=
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	10.062	=	0.451	U	581.025	=
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	3.415	U	0.635	U	10.334	U
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	NG/KG	1.122	U	1.326	U	6.682	J
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	52.735	J	1.61	J	48.349	J
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	0.755	U	0.893	U	42.916	=
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	3.686	U	0.498	U	8.469	J
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	0.866	U	1.023	U	23.977	J
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	5.835	U	0.788	U	3.423	U
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	NG/KG	1.702	U	2.498	U	1.741	U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	0.642	U	0.46	U	2.04	J
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	4.31	U	0.582	U	19.764	=
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	0.649	U	0.465	U	1.008	=
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	NG/KG	0.314	U	0.536	U	0.733	U
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	0.798	U	0.391	U	0.458	U
OCTACHLORODIBENZO-p-DIOXIN	NG/KG	946.368	=	285.37	=	8127.426	=
OCTACHLORODIBENZOFURAN	NG/KG	12.9	=	0.737	U	868.242	=
Total Hepta-Dioxins	NG/KG	101.12	=	0.514	U	1467.091	=
Total Hepta-Furans	NG/KG	10.062	=	0.451	U	581.025	=
Total Hexa-Dioxins	NG/KG	0.755	U	0.893	U	196.04	=
Total Hexa-Furans	NG/KG	3.686	U	0.498	U	536.877	=
Total Penta-Dioxins	NG/KG	1.702	U	2.498	U	1.741	U
Total Penta-Furans	NG/KG	15.935	=	0.465	U	208.339	=
Total Tetra-Dioxins	NG/KG	0.314	U	0.536	U	0.733	U
Total Tetra-Furans	NG/KG	0.798	U	0.391	U	10.406	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB032		K698SB033		K698SB033	
	SampleID	698SB03202 (3-5ft)		698SB03301 (0-1ft)		698SB03302 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/3/99		12/2/99		12/10/99	
	SDGNumber	41189		41189		41189	
Parameter	**Units**						
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	NG/KG	5.264	=	86.343	=	3.025	U
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	2.836	=	40.033	=	0.784	U
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	0.925	U	0.933	U	0.614	U
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	NG/KG	1.199	U	1.126	U	0.584	U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	0.573	U	4.11	J	0.499	U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	0.807	U	0.758	U	0.393	U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	0.429	U	1.523	U	0.375	U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	0.925	U	0.869	U	0.451	U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	0.68	U	2.41	U	0.593	U
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	NG/KG	1.877	U	1.676	U	0.62	U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	0.537	U	0.484	U	0.252	U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	0.502	U	1.78	U	0.438	U
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	0.543	U	0.489	U	0.255	U
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	NG/KG	0.385	U	0.555	U	0.436	U
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	0.247	U	0.475	U	0.42	U
OCTACHLORODIBENZO-p-DIOXIN	NG/KG	113.161	=	970.271	=	42.254	U
OCTACHLORODIBENZOFURAN	NG/KG	4.075	=	97.355	=	1.718	=
Total Hepta-Dioxins	NG/KG	10.173	=	160.441	=	3.084	=
Total Hepta-Furans	NG/KG	2.836	=	40.033	=	1.419	=
Total Hexa-Dioxins	NG/KG	0.807	U	7.457	=	0.393	U
Total Hexa-Furans	NG/KG	0.394	=	28.363	=	0.375	U
Total Penta-Dioxins	NG/KG	1.877	U	1.676	U	0.62	U
Total Penta-Furans	NG/KG	0.543	U	11.804	=	0.255	U
Total Tetra-Dioxins	NG/KG	0.385	U	0.555	U	0.436	U
Total Tetra-Furans	NG/KG	0.247	U	0.475	U	0.42	U

	StationID	K698SB001		K698SB001		K698SB002		K698SB002	
	SampleID	698SB001T1 (0-1ft)		698SB001T2 (3-5ft)		698SB002T1 (0-1ft)		698SB002T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99		10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	Units								
TOTAL ORGANIC CARBON	MG/KG	28000	=	800	=	11000	=	1200	=

	StationID	K698SB003		K698SB003		K698SB004		K698SB004	
	SampleID	698SB003T1 (0-1ft)		698SB003T2 (3-5ft)		698CB004T1 (0-1ft)		698SB004T1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99		10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	Units								
TOTAL ORGANIC CARBON	MG/KG	7400	=	1400	=	10000	=	11000	=

	StationID	K698SB004		K698SB020		K698SB020	
	SampleID	698SB004T2 (3-5ft)		698SB020T1 (0-1ft)		698SB020T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03		NCBK03	
Parameter	Units						
TOTAL ORGANIC CARBON	MG/KG	1600	=	170000	=	4000	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB002		K698SB002		K698SB020		K698SB020	
	SampleID	698SB002T1 (0-1ft)		698SB002T2 (3-5ft)		698SB020T1 (0-1ft)		698SB020T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/18/99		10/18/99		10/19/99		10/19/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	**Units**								
BENZENE	UG/KG	6.6	U	6.3	U				
CHLOROMETHANE	UG/KG	13	U	13	U				
NAPHTHALENE	UG/KG					410	U	360	U
TOLUENE	UG/KG	6.6	U	6.3	U				
VINYL CHLORIDE	UG/KG	13	U	13	U				
BROMOMETHANE	UG/KG	13	U	13	U				
ETHYLBENZENE	UG/KG	6.6	U	6.3	U				
CHLOROETHANE	UG/KG	13	U	13	U				
1,1-DICHLOROETHENE	UG/KG	6.6	U	6.3	U				
METHYLENE CHLORIDE	UG/KG	6.6	U	6.3	U				
XYLENES, TOTAL	UG/KG	13	U	13	U				
1,1-DICHLOROETHANE	UG/KG	6.6	U	6.3	U				
CHLOROFORM	UG/KG	6.6	U	6.3	U				
1,1,1-TRICHLOROETHANE	UG/KG	6.6	U	6.3	U				
CARBON TETRACHLORIDE	UG/KG	6.6	U	6.3	U				
1,2-DICHLOROETHANE	UG/KG	6.6	U	6.3	U				
TRICHLOROETHYLENE (TCE)	UG/KG	6.6	U	6.3	U				
1,2-DICHLOROPROPANE	UG/KG	6.6	U	6.3	U				
BROMODICHLOROMETHANE	UG/KG	6.6	U	6.3	U				
1,1,2-TRICHLOROETHANE	UG/KG	6.6	U	6.3	U				
TETRACHLOROETHYLENE(PCE)	UG/KG	6.6	U	6.3	U				
DIBROMOCHLOROMETHANE	UG/KG	6.6	U	6.3	U				
CHLOROBENZENE	UG/KG	6.6	U	6.3	U				
STYRENE	UG/KG	6.6	U	6.3	U				
BROMOFORM	UG/KG	6.6	U	6.3	U				
1,1,2,2-TETRACHLOROETHANE	UG/KG	6.6	U	6.3	U				
ACETONE	UG/KG	24	J	18	J				
CARBON DISULFIDE	UG/KG	6.6	U	6.3	U				
Vinyl acetate	UG/KG	13	U	13	U				
METHYL ETHYL KETONE (2-BUTANONE)	UG/KG	33	U	32	U				
2-Chloroethyl vinyl ether	UG/KG	66	UJ	63	UJ				
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/KG	33	U	32	U				
cis-1,3-DICHLOROPROPENE	UG/KG	6.6	U	6.3	U				
trans-1,3-DICHLOROPROPENE	UG/KG	6.6	U	6.3	U				
2-HEXANONE	UG/KG	33	U	32	U				
1,2-Dichloroethene (total)	UG/KG	6.6	U	6.3	U				

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB023		K698SB023		K698SB023		K698SB024	
	SampleID	698CB02301 (0-1ft)		698SB02301 (0-1ft)		698SB02302 (3-5ft)		698SB02401 (0-1ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/7/99		12/7/99		12/7/99		12/7/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	**Units**								
BENZENE	UG/KG								
CHLOROMETHANE	UG/KG								
NAPHTHALENE	UG/KG	360	U	360	U	350	U	38	J
TOLUENE	UG/KG								
VINYL CHLORIDE	UG/KG								
BROMOMETHANE	UG/KG								
ETHYLBENZENE	UG/KG								
CHLOROETHANE	UG/KG								
1,1-DICHLOROETHENE	UG/KG								
METHYLENE CHLORIDE	UG/KG								
XYLENES, TOTAL	UG/KG								
1,1-DICHLOROETHANE	UG/KG								
CHLOROFORM	UG/KG								
1,1,1-TRICHLOROETHANE	UG/KG								
CARBON TETRACHLORIDE	UG/KG								
1,2-DICHLOROETHANE	UG/KG								
TRICHLOROETHYLENE (TCE)	UG/KG								
1,2-DICHLOROPROPANE	UG/KG								
BROMODICHLOROMETHANE	UG/KG								
1,1,2-TRICHLOROETHANE	UG/KG								
TETRACHLOROETHYLENE(PCE)	UG/KG								
DIBROMOCHLOROMETHANE	UG/KG								
CHLOROBENZENE	UG/KG								
STYRENE	UG/KG								
BROMOFORM	UG/KG								
1,1,2,2-TETRACHLOROETHANE	UG/KG								
ACETONE	UG/KG								
CARBON DISULFIDE	UG/KG								
Vinyl acetate	UG/KG								
METHYL ETHYL KETONE (2-BUTANONE)	UG/KG								
2-Chloroethyl vinyl ether	UG/KG								
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/KG								
cis-1,3-DICHLOROPROPENE	UG/KG								
trans-1,3-DICHLOROPROPENE	UG/KG								
2-HEXANONE	UG/KG								
1,2-Dichloroethene (total)	UG/KG								

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB024		K698SB030		K698SB030		K698SB030	
	SampleID	698SB02402 (3-5ft)		698CB03001 (0-1ft)		698SB03001 (0-1ft)		698SB03002 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/7/99		12/2/99		12/2/99		12/2/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	**Units**								
BENZENE	UG/KG			5.7	U	5.9	U	5.3	U
CHLOROMETHANE	UG/KG			11	U	12	U	11	U
NAPHTHALENE	UG/KG	380	U						
TOLUENE	UG/KG			5.7	U	5.9	U	5.3	U
VINYL CHLORIDE	UG/KG			11	U	12	U	11	U
BROMOMETHANE	UG/KG			11	U	12	U	11	U
ETHYLBENZENE	UG/KG			5.7	U	5.9	U	5.3	U
CHLOROETHANE	UG/KG			11	U	12	U	11	U
1,1-DICHLOROETHENE	UG/KG			5.7	U	5.9	U	5.3	U
METHYLENE CHLORIDE	UG/KG			5.7	U	5.9	U	5.3	U
XYLENES, TOTAL	UG/KG			11	U	12	U	11	U
1,1-DICHLOROETHANE	UG/KG			5.7	U	5.9	U	5.3	U
CHLOROFORM	UG/KG			5.7	U	5.9	U	5.3	U
1,1,1-TRICHLOROETHANE	UG/KG			5.7	U	5.9	U	5.3	U
CARBON TETRACHLORIDE	UG/KG			5.7	U	5.9	U	5.3	U
1,2-DICHLOROETHANE	UG/KG			5.7	U	5.9	U	5.3	U
TRICHLOROETHYLENE (TCE)	UG/KG			5.7	U	5.9	U	5.3	U
1,2-DICHLOROPROPANE	UG/KG			5.7	U	5.9	U	5.3	U
BROMODICHLOROMETHANE	UG/KG			5.7	U	5.9	U	5.3	U
1,1,2-TRICHLOROETHANE	UG/KG			5.7	U	5.9	U	5.3	U
TETRACHLOROETHYLENE(PCE)	UG/KG			5.7	U	5.9	U	5.3	U
DIBROMOCHLOROMETHANE	UG/KG			5.7	U	5.9	U	5.3	U
CHLOROBENZENE	UG/KG			5.7	U	5.9	U	5.3	U
STYRENE	UG/KG			5.7	U	5.9	U	5.3	U
BROMOFORM	UG/KG			5.7	U	5.9	U	5.3	U
1,1,2,2-TETRACHLOROETHANE	UG/KG			5.7	U	5.9	U	5.3	U
ACETONE	UG/KG			58	U	59	U	53	U
CARBON DISULFIDE	UG/KG			5.7	U	5.9	U	5.3	U
Vinyl acetate	UG/KG			11	U	12	U	11	U
METHYL ETHYL KETONE (2-BUTANONE)	UG/KG			28	U	30	U	26	U
2-Chloroethyl vinyl ether	UG/KG			57	U	59	U	53	U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/KG			28	U	30	U	26	U
cis-1,3-DICHLOROPROPENE	UG/KG			5.7	U	5.9	U	5.3	U
trans-1,3-DICHLOROPROPENE	UG/KG			5.7	U	5.9	U	5.3	U
2-HEXANONE	UG/KG			28	U	30	U	26	U
1,2-Dichloroethene (total)	UG/KG			5.7	U	5.9	U	5.3	U

Analytica. .ta Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB031		K698SB031		K698SB032		K698SB032	
	SampleID	698SB03101 (0-1ft)		698SB03102 (3-5ft)		698SB03201 (0-1ft)		698SB03202 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/2/99		12/2/99		12/2/99		12/2/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	**Units**								
BENZENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
CHLOROMETHANE	UG/KG	11	U	11	U	11	U	11	U
NAPHTHALENE	UG/KG								
TOLUENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
VINYL CHLORIDE	UG/KG	11	U	11	U	11	U	11	U
BROMOMETHANE	UG/KG	11	U	11	U	11	U	11	U
ETHYLBENZENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
CHLOROETHANE	UG/KG	11	U	11	U	11	U	11	U
1,1-DICHLOROETHENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
METHYLENE CHLORIDE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
XYLENES, TOTAL	UG/KG	11	U	11	U	11	U	11	U
1,1-DICHLOROETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
CHLOROFORM	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
1,1,1-TRICHLOROETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
CARBON TETRACHLORIDE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
1,2-DICHLOROETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
TRICHLOROETHYLENE (TCE)	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
1,2-DICHLOROPROPANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
BROMODICHLOROMETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
1,1,2-TRICHLOROETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
TETRACHLOROETHYLENE(PCE)	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
DIBROMOCHLOROMETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
CHLOROBENZENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
STYRENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
BROMOFORM	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
1,1,2,2-TETRACHLOROETHANE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
ACETONE	UG/KG	120	U	55	U	57	U	57	U
CARBON DISULFIDE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
Vinyl acetate	UG/KG	11	U	11	U	11	U	11	U
METHYL ETHYL KETONE (2-BUTANONE)	UG/KG	28	U	28	U	28	U	28	U
2-Chloroethyl vinyl ether	UG/KG	56	U	55	U	57	U	57	U
METHYL ISOBUTYL KETONE (4-METHYL-2 PENTANONE)	UG/KG	28	U	28	U	28	U	28	U
cis-1,3-DICHLOROPROPENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
trans-1,3-DICHLOROPROPENE	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U
2-HEXANONE	UG/KG	28	U	28	U	28	U	28	U
1,2-Dichloroethene (total)	UG/KG	5.6	U	5.5	U	5.7	U	5.7	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB002		K698SB002	
	SampleID	698SB002S1 (0-1ft)		698SB002S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/29/99		10/29/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
1,1,1-TRICHLOROETHANE, SPLP	UG/L	5	U	5	U
1,1,2,2-TETRACHLOROETHANE, SPLP	UG/L	5	U	5	U
1,1,2-TRICHLOROETHANE, SPLP	UG/L	5	U	5	U
1,1-DICHLOROETHANE, SPLP	UG/L	5	U	5	U
1,1-DICHLOROETHENE, SPLP	UG/L	5	U	5	U
1,2-DICHLOROETHANE, SPLP	UG/L	5	U	5	U
1,2-Dichloroethene (total), SPLP	UG/L	5	U	5	U
1,2-DICHLOROPROPANE, SPLP	UG/L	5	U	5	U
2-Chloroethyl vinyl ether, SPLP	UG/L	50	R	50	R
2-HEXANONE, SPLP	UG/L	25	U	25	U
ACETONE, SPLP	UG/L	22	J	50	R
BENZENE, SPLP	UG/L	5	U	5	U
BROMODICHLOROMETHANE, SPLP	UG/L	5	U	5	U
BROMOFORM, SPLP	UG/L	5	U	5	U
BROMOMETHANE, SPLP	UG/L	10	U	10	U
CARBON DISULFIDE, SPLP	UG/L	5	U	5	U
CARBON TETRACHLORIDE, SPLP	UG/L	5	U	5	U
CHLOROBENZENE, SPLP	UG/L	5	U	5	U
CHLOROETHANE, SPLP	UG/L	10	U	10	U
CHLOROFORM, SPLP	UG/L	5	U	5	U
CHLOROMETHANE, SPLP	UG/L	10	U	10	U
cis-1,3-DICHLOROPROPENE, SPLP	UG/L	5	U	5	U
DIBROMOCHLOROMETHANE, SPLP	UG/L	5	U	5	U
METHYL ETHYL KETONE (2-BUTANONE), SPLP	UG/L	25	U	25	U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE), S	UG/L	25	U	25	U
METHYLENE CHLORIDE, SPLP	UG/L	5	U	5	U
STYRENE, SPLP	UG/L	5	U	5	U
TETRACHLOROETHYLENE(PCE), SPLP	UG/L	5	U	5	U
trans-1,3-DICHLOROPROPENE, SPLP	UG/L	5	U	5	U
TRICHLOROETHYLENE (TCE), SPLP	UG/L	5	U	5	U
Vinyl acetate, SPLP	UG/L	10	U	10	U
VINYL CHLORIDE, SPLP	UG/L	10	U	10	U
NAPHTHALENE, SPLP	UG/L				
TOLUENE, SPLP	UG/L	0.63	J	5	U
ETHYLBENZENE, SPLP	UG/L	5	U	5	U
XYLENES, TOTAL, SPLP	UG/L	10	U	10	U

Analytica. _ta Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020	
	SampleID	698SB020S1 (0-1ft)		698SB020S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
1,1,1-TRICHLOROETHANE, SPLP	UG/L				
1,1,2,2-TETRACHLOROETHANE, SPLP	UG/L				
1,1,2-TRICHLOROETHANE, SPLP	UG/L				
1,1-DICHLOROETHANE, SPLP	UG/L				
1,1-DICHLOROETHENE, SPLP	UG/L				
1,2-DICHLOROETHANE, SPLP	UG/L				
1,2-Dichloroethene (total), SPLP	UG/L				
1,2-DICHLOROPROPANE, SPLP	UG/L				
2-Chloroethyl vinyl ether, SPLP	UG/L				
2-HEXANONE, SPLP	UG/L				
ACETONE, SPLP	UG/L				
BENZENE, SPLP	UG/L				
BROMODICHLOROMETHANE, SPLP	UG/L				
BROMOFORM, SPLP	UG/L				
BROMOMETHANE, SPLP	UG/L				
CARBON DISULFIDE, SPLP	UG/L				
CARBON TETRACHLORIDE, SPLP	UG/L				
CHLOROBENZENE, SPLP	UG/L				
CHLOROETHANE, SPLP	UG/L				
CHLOROFORM, SPLP	UG/L				
CHLOROMETHANE, SPLP	UG/L				
cis-1,3-DICHLOROPROPENE, SPLP	UG/L				
DIBROMOCHLOROMETHANE, SPLP	UG/L				
METHYL ETHYL KETONE (2-BUTANONE), SPLP	UG/L				
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE), S	UG/L				
METHYLENE CHLORIDE, SPLP	UG/L				
STYRENE, SPLP	UG/L				
TETRACHLOROETHYLENE(PCE), SPLP	UG/L				
trans-1,3-DICHLOROPROPENE, SPLP	UG/L				
TRICHLOROETHYLENE (TCE), SPLP	UG/L				
Vinyl acetate, SPLP	UG/L				
VINYL CHLORIDE, SPLP	UG/L				
NAPHTHALENE, SPLP	UG/L	10	U	10	U
TOLUENE, SPLP	UG/L				
ETHYLBENZENE, SPLP	UG/L				
XYLENES, TOTAL, SPLP	UG/L				

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020		K698SB023		K698SB023	
	SampleID	698SB020T1 (0-1ft)		698SB020T2 (3-5ft)		698CB02301 (0-1ft)		698SB02301 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		11/19/1999		11/19/1999	
	DateAnalyzed	10/19/99		10/19/99		12/7/99		12/7/99	
	SDGNumber	NCBK03		NCBK03		NBCK09		NBCK09	
Parameter	**Units**								
2,2'-OXYBIS(1-CHLORO)PROPANE	UG/KG	410	U	360	U	360	U	360	U
2-METHYLNAPHTHALENE	UG/KG	410	U	360	U	360	U	360	U
2-METHYLPHENOL (o-CRESOL)	UG/KG	410	U	360	U	360	U	360	U
3-Methylphenol (m-Cresol)	UG/KG	410	U	360	U	360	U	360	U
Benzidine	UG/KG	3300	U	3000	U				
Diphenylamine	UG/KG	410	U	360	U	360	U	360	U
N-Nitrosodimethylamine	UG/KG	410	U	360	U	360	U	360	U
PHENOL	UG/KG	410	U	360	U	360	U	360	U
ACENAPHTHYLENE	UG/KG	410	U	360	U	360	U	360	U
bis(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	UG/KG	410	U	360	U	360	U	360	U
2-CHLOROPHENOL	UG/KG	410	U	360	U	360	U	360	U
ACENAPHTHENE	UG/KG	410	U	360	U	360	U	360	U
1,3-DICHLOROBENZENE	UG/KG	410	U	360	U	360	U	360	U
FLUORENE	UG/KG	410	U	360	U	360	U	360	U
1,4-DICHLOROBENZENE	UG/KG	410	U	360	U	360	U	360	U
PHENANTHRENE	UG/KG	58	J	360	U	360	U	360	U
ANTHRACENE	UG/KG	410	U	360	U	360	U	360	U
Benzyl alcohol	UG/KG	410	U	360	U	360	U	360	U
FLUORANTHENE	UG/KG	200	J	360	U	360	U	360	U
1,2-DICHLOROBENZENE	UG/KG	410	U	360	U	360	U	360	U
PYRENE	UG/KG	200	J	360	U	360	U	360	U
BENZO(a)ANTHRACENE	UG/KG	390	J	360	U	360	U	360	U
CHRYSENE	UG/KG	370	J	360	U	360	U	360	U
BENZO(b)FLUORANTHENE	UG/KG	1100	=	360	U	360	U	360	U
N-NITROSODI-n-PROPYLAMINE	UG/KG	410	U	360	U	360	U	360	U
4-METHYLPHENOL (p-CRESOL)	UG/KG								
BENZO(k)FLUORANTHENE	UG/KG	830	=	360	U	360	U	360	U
BENZO(a)PYRENE	UG/KG	910	=	360	U	360	U	360	U
HEXACHLOROETHANE	UG/KG	410	U	360	U	360	U	360	U

	StationID	K698SB023		K698SB024		K698SB024	
	SampleID	698SB02302 (3-5ft)		698SB02401 (0-1ft)		698SB02402 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/7/99		12/7/99		12/7/99	
	SDGNumber	NBCK09		NBCK09		NBCK09	
Parameter	Units						
2,2'-OXYBIS(1-CHLORO)PROPANE	UG/KG	350	U	390	U	380	U
2-METHYLNAPHTHALENE	UG/KG	350	U	59	J	380	U
2-METHYLPHENOL (o-CRESOL)	UG/KG	350	U	390	U	380	U
3-Methylphenol (m-Cresol)	UG/KG	350	U	390	U	380	U
Benzidine	UG/KG						
Diphenylamine	UG/KG	350	U	390	U	380	U
N-Nitrosodimethylamine	UG/KG	350	U	390	U	380	U
PHENOL	UG/KG	350	U	390	U	380	U
ACENAPHTHYLENE	UG/KG	350	U	390	U	380	U
bis(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	UG/KG	350	U	390	U	380	U
2-CHLOROPHENOL	UG/KG	350	U	390	U	380	U
ACENAPHTHENE	UG/KG	350	U	390	U	380	U
1,3-DICHLOROBENZENE	UG/KG	350	U	390	U	380	U
FLUORENE	UG/KG	350	U	390	U	380	U
1,4-DICHLOROBENZENE	UG/KG	350	U	390	U	380	U
PHENANTHRENE	UG/KG	350	U	100	J	380	U
ANTHRACENE	UG/KG	350	U	33	J	380	U
Benzyl alcohol	UG/KG	350	U	390	U	380	U
FLUORANTHENE	UG/KG	350	U	170	J	380	U
1,2-DICHLOROBENZENE	UG/KG	350	U	390	U	380	U
PYRENE	UG/KG	350	U	190	J	380	U
BENZO(a)ANTHRACENE	UG/KG	350	U	380	J	380	U
CHRYSENE	UG/KG	350	U	400	=	380	U
BENZO(b)FLUORANTHENE	UG/KG	350	U	1100	=	43	J
N-NITROSODI-n-PROPYLAMINE	UG/KG	350	U	390	U	380	U
4-METHYLPHENOL (p-CRESOL)	UG/KG						
BENZO(k)FLUORANTHENE	UG/KG	350	U	1100	=	38	J
BENZO(a)PYRENE	UG/KG	350	U	840	=	45	J
HEXACHLOROETHANE	UG/KG	350	U	390	U	380	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020		K698SB023		K698SB023	
	SampleID	698SB020T1 (0-1ft)		698SB020T2 (3-5ft)		698CB02301 (0-1ft)		698SB02301 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		11/19/1999		11/19/1999	
	DateAnalyzed	10/19/99		10/19/99		12/7/99		12/7/99	
	SDGNumber	NCBK03		NCBK03		NBCK09		NBCK09	
Parameter	**Units**								
INDENO(1,2,3-c,d)PYRENE	UG/KG	1100	=	360	U	360	U	360	U
NITROBENZENE	UG/KG	410	U	360	U	360	U	360	U
DIBENZ(a,h)ANTHRACENE	UG/KG	110	J	360	U	360	U	360	U
ISOPHORONE	UG/KG	410	U	360	U	360	U	360	U
2-NITROPHENOL	UG/KG	410	U	360	U	360	U	360	U
BENZO(g,h,i)PERYLENE	UG/KG	1000	=	360	U	360	U	360	U
2,4-DIMETHYLPHENOL	UG/KG	410	U	360	U	360	U	360	U
bis(2-CHLOROETHOXY) METHANE	UG/KG	410	U	360	U	360	U	360	U
Benzoic acid	UG/KG	2100	U	1900	U	1800	U	1900	U
2,4-DICHLOROPHENOL	UG/KG	410	U	360	U	360	U	360	U
1,2,4-TRICHLOROBENZENE	UG/KG	410	U	360	U	360	U	360	U
4-CHLOROANILINE	UG/KG	810	U	720	U	720	U	730	U
HEXACHLOROBUTADIENE	UG/KG	410	U	360	U	360	U	360	U
4-CHLORO-3-METHYLPHENOL	UG/KG	410	U	360	U	360	U	360	U
HEXACHLOROCYCLOPENTADIENE	UG/KG	410	U	360	U	360	U	360	U
2,4,6-TRICHLOROPHENOL	UG/KG	410	U	360	U	360	U	360	U
2,4,5-TRICHLOROPHENOL	UG/KG	410	U	360	U	360	U	360	U
2-CHLORONAPHTHALENE	UG/KG	410	U	360	U	360	U	360	U
2-NITROANILINE	UG/KG	2100	U	1900	U	1800	U	1900	U
2,6-DINITROTOLUENE	UG/KG	410	U	360	U	360	U	360	U
3-NITROANILINE	UG/KG	2100	U	1900	U	1800	U	1900	U
2,4-DINITROPHENOL	UG/KG	2100	UJ	1900	UJ	1800	U	1900	U
DIBENZOFURAN	UG/KG	410	U	360	U	360	U	360	U
4-NITROPHENOL	UG/KG	2100	U	1900	U	1800	U	1900	U
2,4-DINITROTOLUENE	UG/KG	410	U	360	U	360	U	360	U
DIMETHYL PHTHALATE	UG/KG	410	U	360	U	360	U	360	U
DIETHYL PHTHALATE	UG/KG	410	U	360	U	360	U	360	U
4-CHLOROPHENYL PHENYL ETHER	UG/KG	410	U	360	U	360	U	360	U
4-NITROANILINE	UG/KG	2100	U	1900	U	1800	U	1900	U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	2100	U	1900	U	1800	U	1900	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB023		K698SB024		K698SB024	
	SampleID	698SB02302 (3-5ft)		698SB02401 (0-1ft)		698SB02402 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/7/99		12/7/99		12/7/99	
	SDGNumber	NBCK09		NBCK09		NBCK09	
Parameter	**Units**						
INDENO(1,2,3-c,d)PYRENE	UG/KG	350	U	870	=	59	J
NITROBENZENE	UG/KG	350	U	390	U	380	U
DIBENZ(a,h)ANTHRACENE	UG/KG	350	U	320	J	380	U
ISOPHORONE	UG/KG	350	U	390	U	380	U
2-NITROPHENOL	UG/KG	350	U	390	U	380	U
BENZO(g,h,i)PERYLENE	UG/KG	350	U	980	=	69	J
2,4-DIMETHYLPHENOL	UG/KG	350	U	390	U	380	U
bis(2-CHLOROETHOXY) METHANE	UG/KG	350	U	390	U	380	U
Benzoic acid	UG/KG	1800	U	2000	U	1900	U
2,4-DICHLOROPHENOL	UG/KG	350	U	390	U	380	U
1,2,4-TRICHLOROBENZENE	UG/KG	350	U	390	U	380	U
4-CHLOROANILINE	UG/KG	700	U	780	U	750	U
HEXACHLOROBUTADIENE	UG/KG	350	U	390	U	380	U
4-CHLORO-3-METHYLPHENOL	UG/KG	350	U	390	U	380	U
HEXACHLOROCYCLOPENTADIENE	UG/KG	350	U	390	U	380	U
2,4,6-TRICHLOROPHENOL	UG/KG	350	U	390	U	380	U
2,4,5-TRICHLOROPHENOL	UG/KG	350	U	390	U	380	U
2-CHLORONAPHTHALENE	UG/KG	350	U	390	U	380	U
2-NITROANILINE	UG/KG	1800	U	2000	U	1900	U
2,6-DINITROTOLUENE	UG/KG	350	U	390	U	380	U
3-NITROANILINE	UG/KG	1800	U	2000	U	1900	U
2,4-DINITROPHENOL	UG/KG	1800	U	2000	U	1900	U
DIBENZOFURAN	UG/KG	350	U	390	U	380	U
4-NITROPHENOL	UG/KG	1800	U	2000	U	1900	U
2,4-DINITROTOLUENE	UG/KG	350	U	390	U	380	U
DIMETHYL PHTHALATE	UG/KG	350	U	390	U	380	U
DIETHYL PHTHALATE	UG/KG	350	U	390	U	380	U
4-CHLOROPHENYL PHENYL ETHER	UG/KG	350	U	390	U	380	U
4-NITROANILINE	UG/KG	1800	U	2000	U	1900	U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	1800	U	2000	U	1900	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020		K698SB023		K698SB023	
	SampleID	698SB020T1 (0-1ft)		698SB020T2 (3-5ft)		698CB02301 (0-1ft)		698SB02301 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		11/19/1999		11/19/1999	
	DateAnalyzed	10/19/99		10/19/99		12/7/99		12/7/99	
	SDGNumber	NCBK03		NCBK03		NBCK09		NBCK09	
Parameter	**Units**								
N-NITROSODIPHENYLAMINE	UG/KG								
4-BROMOPHENYL PHENYL ETHER	UG/KG	410	U	360	U	360	U	360	U
HEXACHLOROBENZENE	UG/KG	410	U	360	U	360	U	360	U
PENTACHLOROPHENOL	UG/KG	2100	U	1900	U	1800	U	1900	U
DI-n-BUTYL PHTHALATE	UG/KG	410	U	360	U	360	U	360	U
BENZYL BUTYL PHTHALATE	UG/KG	410	U	360	U	360	U	360	U
3,3'-DICHLOROBENZIDINE	UG/KG	810	U	720	U	720	U	730	U
bis(2-ETHYLHEXYL) PHTHALATE	UG/KG	410	U	360	U	360	U	360	U
DI-n-OCTYLPHTHALATE	UG/KG	410	U	360	U	360	U	360	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB023		K698SB024		K698SB024	
	SampleID	698SB02302 (3-5ft)		698SB02401 (0-1ft)		698SB02402 (3-5ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/7/99		12/7/99		12/7/99	
	SDGNumber	NBCK09		NBCK09		NBCK09	
Parameter	**Units**						
N-NITROSODIPHENYLAMINE	UG/KG						
4-BROMOPHENYL PHENYL ETHER	UG/KG	350	U	390	U	380	U
HEXACHLOROBENZENE	UG/KG	350	U	390	U	380	U
PENTACHLOROPHENOL	UG/KG	1800	U	2000	U	1900	U
DI-n-BUTYL PHTHALATE	UG/KG	350	U	37	J	380	U
BENZYL BUTYL PHTHALATE	UG/KG	350	U	390	U	380	U
3,3'-DICHLOROBENZIDINE	UG/KG	700	U	780	U	750	U
bis(2-ETHYLHEXYL) PHTHALATE	UG/KG	350	U	390	U	380	U
DI-n-OCTYLPHTHALATE	UG/KG	350	U	390	U	380	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020	
	SampleID	698SB020S1 (0-1ft)		698SB020S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
1,2,4-TRICHLOROBENZENE, SPLP	UG/L	10	U	10	U
1,2-DICHLOROBENZENE, SPLP	UG/L	10	U	10	U
1,3-DICHLOROBENZENE, SPLP	UG/L	10	U	10	U
1,4-DICHLOROBENZENE, SPLP	UG/L	10	U	10	U
2,2'-OXYBIS(1-CHLORO)PROPANE, SPLP	UG/L	10	U	10	U
2,4,5-TRICHLOROPHENOL, SPLP	UG/L	10	U	10	U
2,4,6-TRICHLOROPHENOL, SPLP	UG/L	10	U	10	U
2,4-DICHLOROPHENOL, SPLP	UG/L	10	U	10	U
2,4-DIMETHYLPHENOL, SPLP	UG/L	10	U	10	U
2,4-DINITROPHENOL, SPLP	UG/L	50	U	50	U
2,4-DINITROTOLUENE, SPLP	UG/L	10	U	10	U
2,6-DINITROTOLUENE, SPLP	UG/L	10	U	10	U
2-CHLORONAPHTHALENE, SPLP	UG/L	10	U	10	U
2-CHLOROPHENOL, SPLP	UG/L	10	U	10	U
2-METHYLNAPHTHALENE, SPLP	UG/L	10	U	10	U
2-METHYLPHENOL (o-CRESOL), SPLP	UG/L	10	U	10	U
2-NITROANILINE, SPLP	UG/L	50	U	50	U
2-NITROPHENOL, SPLP	UG/L	10	U	10	U
3,3'-DICHLOROBENZIDINE, SPLP	UG/L	20	U	20	U
3-Methylphenol (m-Cresol), SPLP	UG/L	10	U	10	U
3-NITROANILINE, SPLP	UG/L	50	U	50	U
4,6-DINITRO-2-METHYLPHENOL, SPLP	UG/L	50	U	50	U
4-BROMOPHENYL PHENYL ETHER, SPLP	UG/L	10	U	10	U
4-CHLORO-3-METHYLPHENOL, SPLP	UG/L	10	U	10	U
4-CHLOROANILINE, SPLP	UG/L	20	U	20	U
4-CHLOROPHENYL PHENYL ETHER, SPLP	UG/L	10	U	10	U
4-NITROANILINE, SPLP	UG/L	50	U	50	U
4-NITROPHENOL, SPLP	UG/L	50	U	50	U
Benzoic acid, SPLP	UG/L	50	U	50	U
Benzyl alcohol, SPLP	UG/L	10	U	10	U
BENZYL BUTYL PHTHALATE, SPLP	UG/L	10	U	10	U
bis(2-CHLOROETHOXY) METHANE, SPLP	UG/L	10	U	10	U
bis(2-ETHYLHEXYL) PHTHALATE, SPLP	UG/L	10	U	10	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB020		K698SB020	
	SampleID	698SB020S1 (0-1ft)		698SB020S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
DI-n-BUTYL PHTHALATE, SPLP	UG/L	0.79	J	0.96	J
DI-n-OCTYLPHTHALATE, SPLP	UG/L	10	U	10	U
DIBENZOFURAN, SPLP	UG/L	10	U	10	U
DIETHYL PHTHALATE, SPLP	UG/L	10	U	10	U
DIMETHYL PHTHALATE, SPLP	UG/L	10	U	10	U
Diphenylamine, SPLP	UG/L	10	U	10	U
HEXACHLOROBENZENE, SPLP	UG/L	10	U	10	U
HEXACHLOROBUTADIENE, SPLP	UG/L	10	U	10	U
HEXACHLOROCYCLOPENTADIENE, SPLP	UG/L	10	U	10	U
HEXACHLOROETHANE, SPLP	UG/L	10	U	10	U
ISOPHORONE, SPLP	UG/L	10	U	10	U
N-NITROSODI-n-PROPYLAMINE, SPLP	UG/L	10	U	10	U
N-Nitrosodimethylamine, SPLP	UG/L	10	U	10	U
NITROBENZENE, SPLP	UG/L	10	U	10	U
PENTACHLOROPHENOL, SPLP	UG/L	50	U	50	U
PHENOL, SPLP	UG/L	10	U	10	U
ACENAPHTHYLENE, SPLP	UG/L	10	U	10	U
bis(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER),	UG/L	10	U	10	U
ACENAPHTHENE, SPLP	UG/L	10	U	10	U
FLUORENE, SPLP	UG/L	10	U	10	U
PHENANTHRENE, SPLP	UG/L	10	U	10	U
ANTHRACENE, SPLP	UG/L	10	U	10	U
FLUORANTHENE, SPLP	UG/L	10	U	10	U
PYRENE, SPLP	UG/L	10	U	10	U
BENZO(a)ANTHRACENE, SPLP	UG/L	10	U	10	U
CHRYSENE, SPLP	UG/L	10	U	10	U
BENZO(b)FLUORANTHENE, SPLP	UG/L	10	U	10	U
BENZO(k)FLUORANTHENE, SPLP	UG/L	10	U	10	U
BENZO(a)PYRENE, SPLP	UG/L	10	U	10	U
INDENO(1,2,3-c,d)PYRENE, SPLP	UG/L	10	U	10	U
DIBENZ(a,h)ANTHRACENE, SPLP	UG/L	10	U	10	U
BENZO(g,h,i)PERYLENE, SPLP	UG/L	10	U	10	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB002		K698SB002	
	SampleID	698SB002T1 (0-1ft)		698SB002T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/29/99		10/29/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	UG/KG	19	U	1.8	U
GAMMA BHC (LINDANE)	UG/KG	19	U	1.8	U
BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	UG/KG	19	U	1.8	U
HEPTACHLOR	UG/KG	19	U	0.53	J
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	UG/KG	19	U	1.8	U
ALDRIN	UG/KG	19	U	0.11	J
HEPTACHLOR EPOXIDE	UG/KG	65	=	1.1	J
GAMMA-CHLORDANE	UG/KG	91	=	3.7	=
ALPHA-CHLORDANE	UG/KG	19	=	1.2	J
ENDOSULFAN I	UG/KG	19	U	1.8	U
p,p'-DDE	UG/KG	1	J	0.71	J
DIELDRIN	UG/KG	36	U	3.5	U
ENDRIN	UG/KG	36	U	3.5	U
p,p'-DDD	UG/KG	36	U	3.5	U
ENDOSULFAN II	UG/KG	36	U	3.5	U
p,p'-DDT	UG/KG	36	U	3.6	=
ENDRIN ALDEHYDE	UG/KG	36	U	3.5	U
ENDOSULFAN SULFATE	UG/KG	36	U	3.5	U
METHOXYCHLOR	UG/KG	190	U	18	U
ENDRIN KETONE	UG/KG	0.91	J	3.5	U
TOXAPHENE	UG/KG	1900	U	180	U

	StationID	K698SB002		K698SB002	
	SampleID	698SB002S1 (0-1ft)		698SB002S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/29/99		10/29/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
ALDRIN, SPLP	UG/L	0.05	UJ	0.05	UJ
DIELDRIN, SPLP	UG/L	0.1	UJ	0.1	UJ
ENDOSULFAN I, SPLP	UG/L	0.05	UJ	0.05	UJ
ENDOSULFAN II, SPLP	UG/L	0.1	UJ	0.1	UJ
ENDOSULFAN SULFATE, SPLP	UG/L	0.1	UJ	0.1	UJ
ENDRIN ALDEHYDE, SPLP	UG/L	0.1	UJ	0.1	UJ
ENDRIN KETONE, SPLP	UG/L	0.1	UJ	0.1	UJ
ENDRIN, SPLP	UG/L	0.1	UJ	0.1	UJ
GAMMA BHC (LINDANE), SPLP	UG/L	0.05	UJ	0.05	UJ
GAMMA-CHLORDANE, SPLP	UG/L	0.05	UJ	0.05	UJ
HEPTACHLOR EPOXIDE, SPLP	UG/L	0.033	J	0.05	UJ
HEPTACHLOR, SPLP	UG/L	0.05	UJ	0.05	UJ
METHOXYCHLOR, SPLP	UG/L	0.5	UJ	0.5	UJ
p,p'-DDD, SPLP	UG/L	0.1	UJ	0.1	UJ
p,p'-DDE, SPLP	UG/L	0.1	UJ	0.1	UJ
p,p'-DDT, SPLP	UG/L	0.1	UJ	0.1	UJ
TOXAPHENE, SPLP	UG/L	5	UJ	5	UJ
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE), SPLP	UG/L	0.05	UJ	0.05	UJ
BETA BHC (BETA HEXACHLOROCYCLOHEXANE), SPLP	UG/L	0.05	UJ	0.05	UJ
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE), SPLP	UG/L	0.05	UJ	0.05	UJ
ALPHA-CHLORDANE, SPLP	UG/L	0.05	UJ	0.05	UJ

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB002		K698SB002		K698SB002		K698SB002	
	SampleID	698SB002S1 (0-1ft)		698SB002S2 (3-5ft)		698SB002T1 (0-1ft)		698SB002T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/29/99		10/29/99		10/29/99		10/29/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	**Units**								
PCB-1016 (AROCHLOR 1016), SPLP	UG/L	1	UJ	1	UJ				
PCB-1221 (AROCHLOR 1221), SPLP	UG/L	2	UJ	2	UJ				
PCB-1232 (AROCHLOR 1232), SPLP	UG/L	1	UJ	1	UJ				
PCB-1242 (AROCHLOR 1242), SPLP	UG/L	1	UJ	1	UJ				
PCB-1248 (AROCHLOR 1248), SPLP	UG/L	1	UJ	1	UJ				
PCB-1254 (AROCHLOR 1254), SPLP	UG/L	1	UJ	1	UJ				
PCB-1260 (AROCHLOR 1260), SPLP	UG/L	1	UJ	1	UJ				
PCB-1016 (AROCHLOR 1016)	UG/KG					360	U	35	U
PCB-1221 (AROCHLOR 1221)	UG/KG					740	U	71	U
PCB-1232 (AROCHLOR 1232)	UG/KG					360	U	35	U
PCB-1242 (AROCHLOR 1242)	UG/KG					360	U	35	U
PCB-1248 (AROCHLOR 1248)	UG/KG					360	U	35	U
PCB-1254 (AROCHLOR 1254)	UG/KG					360	U	35	U
PCB-1260 (AROCHLOR 1260)	UG/KG					360	U	35	U

	StationID	K698SB001		K698SB001		K698SB003		K698SB003		K698SB004	
	SampleID	698SB001T1 (0-1ft)		698SB001T2 (3-5ft)		698SB003T1 (0-1ft)		698SB003T2 (3-5ft)		698CB004T1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	**Units**										
ALUMINUM	MG/KG	6560	=	6490	=	5380	=	5680	=	6620	=
ANTIMONY	MG/KG	1.3	J	0.3	J	0.24	J	0.25	J	0.29	J
ARSENIC	MG/KG	15.7	=	1.3	=	3.7	=	0.39	J	2.8	=
BARIUM	MG/KG	93.7	J	6.5	J	14.7	J	4.1	J	15.3	J
BERYLLIUM	MG/KG	0.4	J	0.01	UJ	0.04	J	0.01	UJ	0.03	J
CADMIUM	MG/KG	2.1	=	0.04	UJ	0.04	UJ	0.04	UJ	0.23	J
CALCIUM	MG/KG	30000	=	1110	=	426	U	111	U	1760	U
CHROMIUM, TOTAL	MG/KG	21.2	=	6.8	=	7.3	=	5.2	=	6.4	=
COBALT	MG/KG	2.5	=	0.17	J	0.53	J	0.12	J	0.46	J
COPPER	MG/KG	35.9	=	0.52	J	2.9	=	0.43	J	3.4	=
IRON	MG/KG	10500	=	3790	=	2940	=	2990	=	2100	=
LEAD	MG/KG	972	=	8.8	=	27.5	=	4.2	=	51.5	=
MAGNESIUM	MG/KG	801	=	130	=	158	=	94.8	=	215	=
MANGANESE	MG/KG	103	=	6.2	=	14.6	=	4.3	=	67.9	=
MERCURY	MG/KG	0.41	=	0.01	J	0.07	=	0.01	J	0.08	=
NICKEL	MG/KG	8.7	=	1.7	J	2.2	J	1.5	J	2.6	J
POTASSIUM	MG/KG	215	J	79.8	J	71.2	J	55.2	J	165	J
SELENIUM	MG/KG	0.29	UJ	0.25	UJ	0.28	UJ	0.28	UJ	0.26	UJ
SILVER	MG/KG	0.25	J	0.05	U	0.05	U	0.05	U	0.05	U
SODIUM	MG/KG	153	U	35.5	U	35	U	34	U	44.5	U
THALLIUM	MG/KG	0.36	U	0.31	U	0.35	U	0.35	U	0.32	U
Tin (Sn)	MG/KG	4.2	U	1.8	U	1.8	U	1.6	U	2.2	U
VANADIUM	MG/KG	13.4	=	10.5	=	7.9	=	7.3	=	7.9	=
ZINC	MG/KG	738	=	10.6	U	96.6	=	6.6	U	68.7	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB004		K698SB004		K698SB021		K698SB021		K698SB022	
	SampleID	698SB004T1 (0-1ft)		698SB004T2 (3-5ft)		698SB02101 (0-1ft)		698SB02102 (3-5ft)		698SB02201 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	10/21/99		10/21/99		12/8/99		12/8/99		12/8/99	
	SDGNumber	NCBK03		NCBK03		NBCK09		NBCK09		NBCK09	
Parameter	**Units**										
ALUMINUM	MG/KG	6410	=	4890	=	5350	=	6800	=	7140	=
ANTIMONY	MG/KG	0.47	J	0.19	UJ	0.5	J	0.19	U	0.44	J
ARSENIC	MG/KG	3.1	=	0.93	J	1.9	=	0.63	J	5.2	=
BARIUM	MG/KG	14.4	J	5.4	J	22.8	=	6	=	32.2	=
BERYLLIUM	MG/KG	0.03	J	0.01	UJ	0.07	J	0.04	J	0.11	J
CADMIUM	MG/KG	0.23	J	0.04	UJ	0.15	J	0.04	U	0.09	J
CALCIUM	MG/KG	1470	=	158	U	3390	J	324	J	5960	J
CHROMIUM, TOTAL	MG/KG	6.7	=	5.7	=	5.8	=	5.7	=	6	=
COBALT	MG/KG	0.48	J	0.24	J	0.43	J	0.35	J	0.56	J
COPPER	MG/KG	3.8	=	0.53	J	2.5	=	0.63	J	4.4	=
IRON	MG/KG	2050	=	2780	=	2940	=	2410	=	4020	=
LEAD	MG/KG	57	=	5	=	35.7	=	4.2	=	15.7	=
MAGNESIUM	MG/KG	218	=	98.7	=	224	=	170	=	280	=
MANGANESE	MG/KG	15.9	=	4.9	=	23.9	=	8.1	=	22.6	=
MERCURY	MG/KG	0.07	=	0.01	J	0.06	=	0.02	J	0.04	=
NICKEL	MG/KG	2.5	J	1.8	J	2.8	J	2.4	J	3.9	=
POTASSIUM	MG/KG	148	J	85.4	U	110	=	108	=	156	=
SELENIUM	MG/KG	0.29	UJ	0.28	UJ	0.28	UJ	0.28	UJ	0.26	J
SILVER	MG/KG	0.06	U	0.05	U	0.05	U	0.05	U	0.04	U
SODIUM	MG/KG	30.5	U	20.2	U	31.4	U	12.1	U	34.7	U
THALLIUM	MG/KG	0.36	U	0.34	U	0.34	UJ	0.34	UJ	0.29	UJ
Tin (Sn)	MG/KG	2.2	U	1.7	U	2.2	U	2.1	U	1.9	U
VANADIUM	MG/KG	7.4	=	9.3	=	8.9	=	8.5	=	11.1	=
ZINC	MG/KG	68.8	=	4.5	U	34.6	=	4.5	U	39.8	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB022		K698SB023		K698SB023		K698SB023		K698SB025	
	SampleID	698SB02202 (3-5ft)		698CB02301 (0-1ft)		698SB02301 (0-1ft)		698SB02302 (3-5ft)		698CB02501 (0-1ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/8/99		12/8/99		12/8/99		12/8/99		12/8/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	Units										
ALUMINUM	MG/KG	4130	=	8080	=	9070	=	5900	=	9940	=
ANTIMONY	MG/KG	0.35	J	0.18	U	0.2	U	0.17	U	0.2	J
ARSENIC	MG/KG	0.86	J	1.2	=	1.5	=	0.86	J	3.6	=
BARIUM	MG/KG	3.7	=	16	=	15.7	=	3.4	=	15	=
BERYLLIUM	MG/KG	0.03	J	0.17	J	0.16	J	0.03	J	0.08	J
CADMIUM	MG/KG	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
CALCIUM	MG/KG	625	J	12800	J	5610	J	205	J	548	J
CHROMIUM, TOTAL	MG/KG	4.1	=	8.1	=	9.2	=	5.8	=	10	=
COBALT	MG/KG	0.29	J	2.2	=	1.9	=	0.33	J	0.7	J
COPPER	MG/KG	0.32	J	1.4	J	1.3	J	0.23	J	1.3	J
IRON	MG/KG	2000	=	2880	=	3510	=	2780	=	8070	=
LEAD	MG/KG	3.4	=	4.4	=	7.2	=	2.9	=	11.4	=
MAGNESIUM	MG/KG	94.6	=	365	=	400	=	104	=	231	=
MANGANESE	MG/KG	6.9	=	17.7	=	16.7	=	4.3	=	8.9	=
MERCURY	MG/KG	0.01	J	0.03	=	0.02	=	0.01	J	0.03	=
NICKEL	MG/KG	2.1	J	3.6	J	4.3	J	2	J	2.8	J
POTASSIUM	MG/KG	62	J	261	=	290	=	64.9	J	182	=
SELENIUM	MG/KG	0.25	UJ	0.24	UJ	0.29	UJ	0.25	UJ	0.29	UJ
SILVER	MG/KG	0.05	U	0.05	U	0.06	U	0.05	U	0.05	U
SODIUM	MG/KG	20.9	U	150	=	141	=	29.1	U	23.3	U
THALLIUM	MG/KG	0.31	UJ	0.29	UJ	0.36	UJ	0.31	UJ	0.35	UJ
Tin (Sn)	MG/KG	1.8	U	2	U	2.3	U	1.9	U	2.2	U
VANADIUM	MG/KG	6	=	10.5	=	11.6	=	7.4	=	18.1	=
ZINC	MG/KG	3.6	U	6.1	U	7.1	=	2.2	U	10.8	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB025		K698SB025		K698SB026		K698SB026		K698SB027	
	SampleID	698SB02501 (0-1ft)		698SB02502 (3-5ft)		698SB02601 (0-1ft)		698SB02602 (3-5ft)		698SB02701 (0-1ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/8/99		12/8/99		12/8/99		12/8/99		12/8/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	**Units**										
ALUMINUM	MG/KG	12000	=	6120	=	5570	=	5440	=	6250	=
ANTIMONY	MG/KG	0.2	U	0.37	J	0.2	U	0.41	J	0.34	J
ARSENIC	MG/KG	4.1	=	4.2	=	1.5	=	1.1	=	2	=
BARIUM	MG/KG	17.1	=	4.5	=	9.4	=	3.7	=	29.5	=
BERYLLIUM	MG/KG	0.1	J	0.03	J	0.04	J	0.03	J	0.11	J
CADMIUM	MG/KG	0.04	U	0.04	U	0.04	U	0.04	U	0.12	J
CALCIUM	MG/KG	509	J	229	J	341	J	28.1	J	2040	J
CHROMIUM, TOTAL	MG/KG	11.7	=	6.6	=	4.5	=	5.4	=	7.8	=
COBALT	MG/KG	0.95	J	0.34	J	0.24	J	0.28	J	0.77	J
COPPER	MG/KG	1.5	J	0.27	J	1.3	J	0.19	J	3.7	=
IRON	MG/KG	9000	=	2390	=	2750	=	3990	=	3060	=
LEAD	MG/KG	12.8	=	3	=	7.8	=	3.7	=	77.5	=
MAGNESIUM	MG/KG	290	=	147	=	140	=	99.2	=	579	=
MANGANESE	MG/KG	12.3	=	4.7	=	9.8	=	4.7	=	26	=
MERCURY	MG/KG	0.03	=	0.02	J	0.04	=	0.01	J	0.08	=
NICKEL	MG/KG	3.4	J	2.3	J	1.9	J	1.9	J	5.5	=
POTASSIUM	MG/KG	239	=	86.8	J	95.1	J	54.2	J	171	=
SELENIUM	MG/KG	0.29	UJ	0.25	UJ	0.29	UJ	0.28	UJ	0.4	J
SILVER	MG/KG	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
SODIUM	MG/KG	18.7	U	29.7	U	25	U	12.6	U	33.2	U
THALLIUM	MG/KG	0.35	UJ	0.31	UJ	0.35	UJ	0.34	UJ	0.34	UJ
Tin (Sn)	MG/KG	1.9	U	1.7	U	2.1	U	1.9	U	2.8	U
VANADIUM	MG/KG	20.5	=	9.1	=	8.6	=	7.7	=	8.6	=
ZINC	MG/KG	12.8	=	3.5	U	7.2	=	2.9	U	88.6	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB027		K698SB028		K698SB028		K698SB029		K698SB029	
	SampleID	698SB02702 (3-5ft)		698SB02801 (0-1ft)		698SB02802 (3-5ft)		698CB02901 (0-1ft)		698SB02901 (0-1ft)	
	DateCollected	11/19/1999		11/19/1999		11/19/1999		11/19/1999		11/19/1999	
	DateAnalyzed	12/8/99		12/8/99		12/8/99		12/8/99		12/8/99	
	SDGNumber	NBCK09		NBCK09		NBCK09		NBCK09		NBCK09	
Parameter	**Units**										
ALUMINUM	MG/KG	7430	=	4920	=	5780	=	6260	=	6240	=
ANTIMONY	MG/KG	0.23	J	0.32	J	0.18	U	0.19	U	0.17	U
ARSENIC	MG/KG	0.92	J	1.5	=	0.68	J	1.6	=	1.2	=
BARIUM	MG/KG	4.3	=	20.9	=	3.8	=	13.9	=	14.4	=
BERYLLIUM	MG/KG	0.03	J	0.05	J	0.04	J	0.06	J	0.05	J
CADMIUM	MG/KG	0.04	U	0.06	J	0.04	U	0.04	U	0.04	U
CALCIUM	MG/KG	123	J	1300	J	169	J	950	J	959	J
CHROMIUM, TOTAL	MG/KG	6.6	=	4.8	=	7.5	=	5.5	=	5.6	=
COBALT	MG/KG	0.4	J	0.36	J	0.44	J	0.3	J	0.3	J
COPPER	MG/KG	0.2	J	3.1	=	0.45	J	2.4	=	2.3	=
IRON	MG/KG	2280	=	1930	=	2030	=	2290	=	1870	=
LEAD	MG/KG	3.3	=	54.7	=	4.7	=	18	=	38.7	=
MAGNESIUM	MG/KG	123	=	193	=	99.9	=	166	=	170	=
MANGANESE	MG/KG	8.4	=	15.8	=	7.2	=	11.2	=	12	=
MERCURY	MG/KG	0.01	J	0.06	=	0.03	=	0.07	=	0.05	=
NICKEL	MG/KG	2.8	J	2.6	J	2.8	J	2.2	J	2.3	J
POTASSIUM	MG/KG	73.3	J	118	=	72.1	J	105	J	93	J
SELENIUM	MG/KG	0.28	UJ	0.29	UJ	0.25	UJ	0.28	UJ	0.28	UJ
SILVER	MG/KG	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
SODIUM	MG/KG	16.5	U	37.4	U	17.1	U	19	U	27.7	U
THALLIUM	MG/KG	0.34	UJ	0.35	UJ	0.31	UJ	0.34	UJ	0.34	UJ
Tin (Sn)	MG/KG	2	U	2.3	U	1.8	U	2	U	1.2	U
VANADIUM	MG/KG	11.7	=	6.4	=	6.8	=	9	=	7.9	=
ZINC	MG/KG	3	U	63.7	=	4.6	U	22.5	=	24.8	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB029		K698SB034		K698SB034		K698SB035		K698SB035	
	SampleID	698SB02902 (3-5ft)		698SB03401 (0-1ft)		698SB03402 (3-5ft)		698SB03501 (0-1ft)		698SB03502 (3-5ft)	
	DateCollected	11/19/1999		12/22/1999		12/22/1999		01/17/2000		01/17/2000	
	DateAnalyzed	12/8/99		1/10/00		1/10/00		1/24/00		1/24/00	
	SDGNumber	NBCK09		41577		41577		41772		41772	
Parameter	**Units**										
ALUMINUM	MG/KG	6450	=	6150	=	3490	=	8270	=	2970	=
ANTIMONY	MG/KG	0.2	J	0.3	U	0.34	U	0.3	UJ	0.28	UJ
ARSENIC	MG/KG	1.2	=	2.6	=	0.39	J	1.8	=	1.3	=
BARIUM	MG/KG	8.2	=	15.4	=	3	=	17.1	=	1.8	=
BERYLLIUM	MG/KG	0.03	J	0.12	J	0.1	U	0.23	J	0.08	U
CADMIUM	MG/KG	0.04	U	0.12	J	0.04	U	0.16	J	0.08	J
CALCIUM	MG/KG	228	J	723	=	95.5	J	26800	=	565	=
CHROMIUM, TOTAL	MG/KG	6.4	=	5.9	=	4.6	=	7.1	=	3.2	=
COBALT	MG/KG	0.21	J	0.44	J	0.29	J	0.93	J	0.26	J
COPPER	MG/KG	0.5	J	2.3	J	0.56	J	1.3	U	0.48	U
IRON	MG/KG	2550	=	3340	=	934	=	2880	=	2030	=
LEAD	MG/KG	5.1	=	23.9	=	3.5	=	19.3	=	2	=
MAGNESIUM	MG/KG	167	=	140	=	68.6	=	271	=	27.7	=
MANGANESE	MG/KG	9.9	=	9.8	=	2.8	=	17.3	=	1.3	=
MERCURY	MG/KG	0.03	=	0.06	=	0.03	J	0.12	J	0.02	J
NICKEL	MG/KG	1.9	J	2	J	1.4	J	2.5	J	2	J
POTASSIUM	MG/KG	95.9	J	83.2	J	48.3	J	121	J	18.6	J
SELENIUM	MG/KG	0.27	UJ	0.37	U	0.42	U	0.43	J	0.34	U
SILVER	MG/KG	0.05	U	0.13	U	0.15	U	0.13	U	0.12	U
SODIUM	MG/KG	14.1	U	250	J	254	J	327	J	192	J
THALLIUM	MG/KG	0.34	UJ	0.38	U	0.43	U	0.38	U	0.35	U
Tin (Sn)	MG/KG	2.2	U	4	U	4	U	3.4	U	3.3	U
VANADIUM	MG/KG	9.7	=	8.7	=	3.7	=	11.1	=	4.2	=
ZINC	MG/KG	5.2	U	22.3	=	2.9	=	4.4	J	3.2	J

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB036		K698SB036		K698SB042		K698SB042		K698SB043	
	SampleID	698SB03601 (0-1ft)		698SB03602 (3-5ft)		698SB04201 (0-1ft)		698SB04202 (3-5ft)		698SB04301 (0-1ft)	
	DateCollected	01/17/2000		01/17/2000		12/22/1999		12/22/1999		12/22/1999	
	DateAnalyzed	1/24/00		1/24/00		1/10/00		1/10/00		1/10/00	
	SDGNumber	41772		41772		41577		41577		41577	
Parameter	**Units**										
ALUMINUM	MG/KG	2990	=	5550	=	5120	=	7160	=	7920	=
ANTIMONY	MG/KG	0.3	UJ	0.28	UJ	0.32	U	0.31	U	0.41	J
ARSENIC	MG/KG	2.5	=	0.62	J	1.6	=	1.3	=	15.5	=
BARIUM	MG/KG	12.9	=	3.7	=	26.5	=	4.4	=	34.6	=
BERYLLIUM	MG/KG	0.09	U	0.08	U	0.2	J	0.09	U	0.37	J
CADMIUM	MG/KG	0.25	J	0.12	J	0.19	J	0.06	J	0.62	J
CALCIUM	MG/KG	6140	=	247	J	52700	=	1180	=	21500	=
CHROMIUM, TOTAL	MG/KG	3.9	=	4.4	=	4.5	=	7.2	=	12.5	=
COBALT	MG/KG	0.27	J	0.23	J	0.62	J	0.28	J	3	=
COPPER	MG/KG	5.1	J	0.58	U	1.4	J	0.78	J	15.1	=
IRON	MG/KG	2070	=	2200	=	2950	=	3150	=	5450	=
LEAD	MG/KG	24.4	=	2.9	=	11.2	=	3.4	=	56.6	=
MAGNESIUM	MG/KG	139	=	81.3	=	667	=	104	=	420	=
MANGANESE	MG/KG	15.6	=	2.7	=	43.6	=	5.5	=	40.2	=
MERCURY	MG/KG	0.08	J	0.03	J	0.05	=	0.03	J	0.1	=
NICKEL	MG/KG	1.5	J	1.9	J	2.2	J	2.1	J	6	=
POTASSIUM	MG/KG	43.1	J	37.7	J	107	J	60.4	J	193	J
SELENIUM	MG/KG	0.37	U	0.34	U	0.53	J	0.37	U	0.36	U
SILVER	MG/KG	0.13	U	0.13	U	0.14	U	0.14	U	0.13	U
SODIUM	MG/KG	191	J	188	J	308	J	256	J	485	=
THALLIUM	MG/KG	0.38	U	0.35	U	0.41	U	0.5	J	0.56	J
Tin (Sn)	MG/KG	4.5	U	3.4	U	3.6	U	3.9	U	4.3	J
VANADIUM	MG/KG	5.8	=	7.1	=	7.9	=	12.5	=	14.5	=
ZINC	MG/KG	40.7	J	3.1	J	10.2	=	3.3	=	105	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB043	
	SampleID	698SB04302 (3-5ft)	
	DateCollected	12/22/1999	
	DateAnalyzed	1/10/00	
	SDGNumber	41577	
Parameter	**Units**		
ALUMINUM	MG/KG	5190	=
ANTIMONY	MG/KG	0.3	U
ARSENIC	MG/KG	2.2	=
BARIUM	MG/KG	4.9	=
BERYLLIUM	MG/KG	0.09	U
CADMIUM	MG/KG	0.06	J
CALCIUM	MG/KG	731	=
CHROMIUM, TOTAL	MG/KG	5.3	=
COBALT	MG/KG	0.39	J
COPPER	MG/KG	0.9	J
IRON	MG/KG	1400	=
LEAD	MG/KG	5.2	=
MAGNESIUM	MG/KG	108	=
MANGANESE	MG/KG	4	=
MERCURY	MG/KG	0.03	J
NICKEL	MG/KG	2.1	J
POTASSIUM	MG/KG	60.5	J
SELENIUM	MG/KG	0.36	U
SILVER	MG/KG	0.13	U
SODIUM	MG/KG	230	J
THALLIUM	MG/KG	0.37	U
Tin (Sn)	MG/KG	3.6	U
VANADIUM	MG/KG	5.3	=
ZINC	MG/KG	6.9	=

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB001		K698SB001		K698SB003		K698SB003		K698SB004	
	SampleID	698SB001S1 (0-1ft)		698SB001S2 (3-5ft)		698SB003S1 (0-1ft)		698SB003S2 (3-5ft)		698CB004S1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/22/99		10/22/99		10/22/99		10/22/99		10/22/99	
	SDGNumber	NCBK03		NCBK03		NCBK03		NCBK03		NCBK03	
Parameter	**Units**										
ALUMINUM, SPLP	UG/L	3740	=	13100	=	15000	=	12900	=	7660	=
ANTIMONY, SPLP	UG/L	4.3	J	1.8	UJ	1.8	UJ	2.8	J	1.8	UJ
ARSENIC,SPLP	UG/L	6.7	J	3.6	U	7.3	J	3.6	U	6.3	J
BARIUM, SPLP	UG/L	14.7	=	15	=	16.2	=	7.4	J	9.1	J
BERYLLIUM, SPLP	UG/L	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
CADMIUM, SPLP	UG/L	0.4	UJ	0.4	UJ	0.4	UJ	0.4	UJ	0.4	UJ
CALCIUM, SPLP	UG/L	16700	J	11900	J	1290	U	3530	J	2770	J
COBALT, SPLP	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
COPPER, SPLP	UG/L	4.7	J	0.6	U	0.98	U	0.6	U	2.1	U
IRON, SPLP	UG/L	1830	J	6390	J	6090	J	7330	J	1910	J
LEAD, SPLP	UG/L	197	=	6.7	=	7.9	=	2.4	J	9.6	=
MAGNESIUM, SPLP	UG/L	628	=	927	=	632	=	596	=	605	=
MANGANESE, SPLP	UG/L	6.5	J	5.2	J	8.9	J	3.1	J	4	J
MERCURY, SPLP	UG/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
NICKEL, SPLP	UG/L	1.8	J	4	J	4.7	J	4.3	J	2.1	J
POTASSIUM, SPLP	UG/L	242	U	412	U	293	U	397	U	337	U
SELENIUM, SPLP	UG/L	2.6	UJ	2.6	UJ	2.6	UJ	2.6	UJ	2.6	UJ
SILVER, SPLP	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
SODIUM, SPLP	UG/L	26100	=	5980	=	4220	=	5140	=	5520	=
THALLIUM, SPLP	UG/L	3.3	J	3.2	U	3.2	U	3.2	U	3.2	U
Tin (Sn), SPLP	UG/L	2.8	UJ	2.8	UJ	2.8	UJ	2.8	UJ	2.8	UJ
VANADIUM, SPLP	UG/L	7.6	J	19.6	=	19.2	=	15.2	=	10.2	=
CHROMIUM, TOTAL	UG/L	7.1	J	11.6	=	11.2	=	9.3	J	5.9	J
ZINC, SPLP	UG/L	219	=	21.5	U	93.1	=	10.2	U	32.8	U

Analytical Data Summary
Charleston Naval Complex
AOC 698, Zone K

	StationID	K698SB004		K698SB004	
	SampleID	698SB004S1 (0-1ft)		698SB004S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/22/99		10/22/99	
	SDGNumber	NCBK03		NCBK03	
Parameter	**Units**				
ALUMINUM, SPLP	UG/L	8260	=	3540	=
ANTIMONY, SPLP	UG/L	1.8	UJ	1.8	UJ
ARSENIC,SPLP	UG/L	5.9	J	3.6	U
BARIUM, SPLP	UG/L	9.5	J	6.1	J
BERYLLIUM, SPLP	UG/L	0.1	UJ	0.1	UJ
CADMIUM, SPLP	UG/L	0.4	UJ	0.4	UJ
CALCIUM, SPLP	UG/L	2540	J	2720	J
COBALT, SPLP	UG/L	0.7	U	0.7	U
COPPER, SPLP	UG/L	2.1	U	0.6	U
IRON, SPLP	UG/L	1990	J	1670	J
LEAD, SPLP	UG/L	10.2	=	2	U
MAGNESIUM, SPLP	UG/L	592	=	536	=
MANGANESE, SPLP	UG/L	3.5	J	1.1	J
MERCURY, SPLP	UG/L	0.1	U	0.1	U
NICKEL, SPLP	UG/L	1.9	J	1.2	U
POTASSIUM, SPLP	UG/L	306	U	315	U
SELENIUM, SPLP	UG/L	2.6	UJ	2.6	UJ
SILVER, SPLP	UG/L	0.5	U	0.5	U
SODIUM, SPLP	UG/L	5720	=	5420	=
THALLIUM, SPLP	UG/L	3.2	U	3.2	U
Tin (Sn), SPLP	UG/L	2.8	UJ	2.8	UJ
VANADIUM, SPLP	UG/L	10.2	=	6	J
CHROMIUM, TOTAL	UG/L	5.6	J	3.2	J
ZINC, SPLP	UG/L	32.3	U	7.2	U

Appendix B

APPENDIX B IS PROVIDED IN .PDF FORMAT/CD-ROM,
AND IS PROVIDED IN THE FRONT POCKET OF THIS BINDER.

Appendix C

10.9.1 Soil Sampling and Analysis

Three soil sampling rounds were performed at AOC 698 from the locations shown on Figure 10.9.1. The final RFI work plan proposed collection of eight soil samples from the upper-interval (0 to 1 foot) and eight from the lower-interval (3 to 5 feet) for the AOC 698 investigation area. All of the originally proposed samples were collected during first-round soil sampling in December 1996.

Round one soil samples were submitted for analysis at DQO Level III for VOCs, SVOCs, and metals. One duplicate was collected from boring 698SB002's upper-interval and submitted for Appendix IX analyses at DQO Level IV. During a second sampling round in February 1998, four additional upper-interval samples were collected and submitted at DQO Level III for pesticide analysis only. January 1999 (round three samples) from borings 698SB013 through 016 were submitted at DQO Level III for pesticides; those from borings 698SB017 through 020 were submitted for VOC and SVOC analysis. An additional duplicate was collected during round three from boring 698SB020's upper-interval and submitted for VOC and SVOC analysis only. Table 10.9.1 summarizes soil sampling for AOC 698.

Table 10.9.1
AOC 698
Soil Sampling Summary

Sampling Round	Sampling Date	Samples Collected	Sample Analyses	Comments
1	12/3/96	Upper - 8 (8) Lower - 8 (8) Duplicate - 1	VOCs, SVOCs, and metals	None
2	2/26/98	Upper - 4 (0)	Pesticides	None
3	1/23/99	Upper - 8 (0) Lower - 8 (0)	VOCs, SVOCs and pesticides[a,b]	None
		Duplicate - 1	VOCs and SVOCs	

Notes:
( ) = Parentheses indicate the number of samples proposed in the RFI work plan.
a = Samples from borings 698SB013 through 016 received pesticides analysis only.
b = Samples from borings 698SB017 through 020 received VOCs and SVOCs analysis only.

10.9.2 Nature and Extent of Contamination in Soil

Organic compound analytical results for soil are summarized in Table 10.9.2. Inorganic chemical analytical results are summarized in Table 10.9.3. Table 10.9.4 summarizes all analytes detected in soil at AOC 698. Analyte concentrations are listed in bold type it they exceeded their screening concentrations the applicable residential soil RBC or SSL and, when available, the associated background concentration. Appendix F is a complete analytical data report for all samples collected in Zone K, including AOC 698.

Table 10.9.2
AOC 698
Organics Detected In Soil

Parameter	Sample Interval	Detection Frequency	Detection Range	Mean	RBC (upper) SSL (lower)	Number of Samples Exceeding RBC or SSL
Semivolatile Organic Compounds (μg/kg)						
24 samples collected, 12 upper-interval, 12 lower-interval, and 1 duplicate sample						
BEQs	Upper	2/12	28.06 - 2092.6	1060.3	87	1
	Lower	0/12	ND	ND	4,000	0
Benzo(a)anthracene	Upper	1/12	550	550	870	0
	Lower	0/12	ND	ND	800	0
Benzo(a)pyrene	Upper	1/12	1,300	1,300	87	1
	Lower	0/12	ND	ND	4,000	0
Benzo(b)fluoranthene	Upper	2/12	110 - 1,500	805	870	1
	Lower	0/12	ND	ND	2,300	0
Benzo(k)fluoranthene	Upper	2/12	93 - 1,700	897	8,700	0
	Lower	0/12	ND	ND	25,000	0
Chrysene	Upper	2/12	130 - 600	365	87,000	0
	Lower	0/12	ND	ND	80,000	0
Dibenz(a,h)anthracene	Upper	1/12	410	410	87	1
	Lower	0/12	ND	ND	800	0
Indeno(1,2,3-cd)pyrene	Upper	2/12	160 - 1,600	880	870	1
	Lower	0/12	ND	ND	7,000	0
2-Methylnaphthalene	Upper	2/12	96 - 300	198	160,000	0
	Lower	0/12	ND	ND	18,000	0
Anthracene	Upper	1/12	41	41	2,300,000	0
	Lower	0/12	ND	ND	6,000,000	0
Benzo(g,h,i)perylene	Upper	1/12	1600	1600	160,000	0
	Lower	0/12	ND	ND	57,000,000	0
bis(2-Ethylhexyl)phthalate (BEHP)	Upper	2/12	98 - 120	109	46,000	0
	Lower	0/12	ND	ND	1,800,000	0
Butylbenzylphthalate	Upper	1/12	150	150	1,600,000	0
	Lower	0/12	ND	ND	930,000	0

Table 10.9.2
AOC 698
Organics Detected In Soil

Parameter	Sample Interval	Detection Frequency	Detection Range	Mean	RBC (upper) SSL (lower)	Number of Samples Exceeding RBC or SSL
Dibenzofuran	Upper	1/12	100	100	31,000	0
	Lower	0/12	ND	ND	6,800	0
Fluoranthene	Upper	2/12	210 - 320	265	310,000	0
	Lower	0/12	ND	ND	2,100,000	0
Naphthalene	Upper	2/12	55 - 160	108	160,000	0
	Lower	0/12	ND	ND	31,000	0
Phenanthrene	Upper	2/12	90 - 360	225	160,000	0
	Lower	0/12	ND	ND	660,000	0
Phenol	Upper	2/12	100 - 2,100	1,100	4,700,000	0
	Lower	0/12	ND	ND	50,000	0
Pyrene	Upper	2/12	200 - 560	380	230,000	0
	Lower	0/12	ND	ND	2,100,000	0
Pesticides (μg/kg)						
13 samples collected, 9 upper-interval samples, 4 lower-interval samples, and 1 duplicate sample						
4,4'-DDD	Upper	2/9	4.38 - 54	29.2	2,700	0
	Lower	0/4	ND	ND	8,000	0
4,4'-DDE	Upper	8/9	3.3 - 990	139	1,900	0
	Lower	0/4	ND	ND	27,000	0
4,4'-DDT	Upper	9/9	5.4 - 370	65.4	1,900	0
	Lower	0/4	ND	ND	16,000	0
alpha-Chlordane	Upper	4/9	2.6 - 55.2	28.6	1,800	0
	Lower	0/4	ND	ND	5,000	0
Dieldrin	Upper	1/9	6.59	6.59	40	0
	Lower	0/4	ND	ND	2	0
Endosulfan sulfate	Upper	1/9	5.94	5.94	47,000	0
	Lower	0/4	ND	ND	4,600	0
Endrin	Upper	1/9	27	27	2,300	0
	Lower	0/4	ND	NT	500	0
Endrin aldehyde	Upper	1/9	15	15	2,300	0
	Lower	0/4	ND	ND	340	0
Endrin ketone	Upper	2/9	5.2 - 9.79	7.50	2,300	0
	Lower	0/4	ND	ND	340	0
gamma-Chlordane	Upper	6/9	1.7 - 214	50.9	1,800	0
	Lower	0/4	ND	ND	5,000	0
Heptachlor	Upper	1/9	9.5	9.5	140	0
	Lower	0/4	ND	ND	11,000	0
Heptachlor epoxide	Upper	4/9	2.2 - 140	69.4	70	2
	Lower	0/4	ND	ND	330	0

Table 10.9.2
AOC 698
Organics Detected In Soil

Parameter	Sample Interval	Detection Frequency	Detection Range	Mean	RBC (upper) SSL (lower)	Number of Samples Exceeding RBC or SSL
TPH-DRO (mg/kg)						
1 upper-interval duplicate sample collected						
Diesel	Upper	1/1	149	149	100[a]	1
	Lower	0/0	NT	NT	100[a]	NA
Dioxins (ng/kg)						
1 upper-interval duplicate for Appendix IX analysis						
TEQ	Upper	1/1	11.92	11.92	4.3	1
	Lower	0/0	NT	NT	1,600	0
1234678-HpCDD	Upper	1/1	306	306	430	0
	Lower	0/0	NT	NT	110,000	0
1234678-HpCDF	Upper	1/1	84	84	430	0
	Lower	0/0	NT	NT	54,000	0
1234789-HpCDF	Upper	1/1	1.92	1.92	430	0
	Lower	0/0	NT	NT	54,000	0
123478-HxCDD	Upper	1/1	2.05	2.05	43	0
	Lower	0/0	NT	NT	4,100	0
123478-HxCDF	Upper	1/1	8.81	8.81	43	0
	Lower	0/0	NT	NT	220,000	0
123678-HxCDD	Upper	1/1	6.91	6.91	43	0
	Lower	0/0	NT	NT	4,100	0
123678-HxCDF	Upper	1/1	4.46	4.46	43	0
	Lower	0/0	NT	NT	220,000	0
123789-HxCDD	Upper	1/1	5.2	5.2	43	0
	Lower	0/0	NT	NT	4,140	0
12378-PeCDF	Upper	1/1	0.926	0.926	85	0
	Lower	0/0	NT	NT	770	0
234678-HxCDF	Upper	1/1	7.2	7.2	43	0
	Lower	0/0	NT	NT	220,000	0
2378-TCDD	Upper	1/1	2.12	2.12	43	0
	Lower	0/0	NT	NT	1,600	0
OCDD	Upper	1/1	2,240	2,240	4,300	0
	Lower	0/0	NT	NT	1,100,000	0
OCDF	Upper	1/1	129	129	4,300	1
	Lower	0/0	NT	NT	540,000	0

Notes:

a = Charleston Naval Complex project screening level
NA = Not applicable/not available/not analyzed
ND = Not detected/not determined
NL = Not listed
NT = Not taken
μg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram
ng/kg = Nanograms per kilogram

Table 10.9.3
AOC 698
Inorganics Detected in Soil (mg/kg)

Parameter	Sample Interval	Detection Frequency	Detection Range	Mean	Background Concentration	RBC (upper) SSL (lower)	Number of Samples Exceeding: RBCs and Background (upper) or SSL and Background (lower)
Inorganics mg/kg							
20 upper-interval samples and 16 lower-interval samples, 3 duplicates							
Aluminum	Upper	8/8	4,590 - 5,940	5,120	11,200	7,800	0
	Lower	8/8	2,490 - 6,910	4,570	10,500	560,000	0
Antimony	Upper	3/8	0.44 - 0.53	0.49	0.45	3.1	0
	Lower	0/8	ND	NA	***	2.7	NA
Arsenic	Upper	8/8	0.98 - 10.5	4.5	3	0.43[a]	5
	Lower	6/8	0.49 - 3.4	1.2	1.98	15	0
Barium	Upper	8/8	9.9 - 105	28	25.6	550	0
	Lower	8/8	1.8 - 3.6	2.6	6.83	820	0
Beryllium	Upper	4/8	0.06 - 0.65	0.22	0.17	16.0	0
	Lower	0/8	ND	ND	0.12	32	ND
Cadmium	Upper	5/8	0.1 - 4	1	0.13	3.9	1
	Lower	0/8	ND	NA	***	4	ND
Calcium	Upper	8/8	96.5 - 1,450	1,450	NA	NL	NA
	Lower	8/8	19.2 - 327	133	NA	NL	NA
Chromium	Upper	8/8	2.5 - 10.7	4.9	8.4	23	0
	Lower	8/8	1.6 - 6.3	3.4	8.76	19	0
Cobalt	Upper	4/8	0.2 - 2	0.72	0.34	470	0
	Lower	3/8	0.13 - 0.23	0.17	0.62	990	0
Copper	Upper	8/8	0.71 - 30.7	9.0	3.86	310	0
	Lower	3/8	0.25 - 0.45	0.36	0.34	5,600	0
Iron	Upper	8/8	1240 - 7160	2,831	7,060	2,300	1
	Lower	8/8	944 - 4820	2,046	5,130	NL	NA
Lead	Upper	8/8	5.2 - 119	54	39.6	400*	0
	Lower	5/8	2.8 - 3.2	3.1	6.43	400**	0
Magnesium	Upper	8/8	80 - 505	175	NA	NL	NA
	Lower	8/8	26.7 - 62.9	48.3	NA	NL	NA
Manganese	Upper	8/8	5.7 - 70.4	18.9	26.4	160	0
	Lower	8/8	1.6 - 2.8	2.1	5.93	480	0

Table 10.9.3
AOC 698
Inorganics Detected in Soil (mg/kg)

Parameter	Sample Interval	Detection Frequency	Detection Range	Mean	Background Concentration	RBC (upper) SSL (lower)	Number of Samples Exceeding: RBCs and Background (upper) or SSL and Background (lower)
Mercury	Upper	4/8	0.06 - 0.16	0.11	***	2.3	0
	Lower	0/8	ND	NA	***	1.0	0
Nickel	Upper	8/8	0.2 - 6.7	1.8	1.7	160	0
	Lower	8/8	0.32 - 2.4	1.0	2.64	65	0
Potassium	Upper	8/8	31 - 192	79	NA	NL	NA
	Lower	8/8	5.9 - 25.6	16.9	NA	NL	NA
Sodium	Upper	8/8	6.4 - 131	31	NA	NL	NA
	Lower	8/8	4.7 - 9.9	8.0	NA	NL	NA
Tin	Upper	1/8	9.8	9.8	19.4	4,700	0
	Lower	1/8	10.4	10.4	NA	5,500	0
Vanadium	Upper	8/8	4.5 - 9.3	7.0	15.8	55	0
	Lower	8/8	3.9 - 16.7	6.4	12.2	3,000	0
Zinc	Upper	7/8	12.5 - 296	129	14.8	2,300	0
	Lower	0/8	ND	NA	***	6,200	0

Notes:

a = Arsenic as a carcinogen.
* = RBC for lead is not listed. USEPA residential soil cleanup level is used for comparison.
** = SSL value not based on target leachate concentration.
*** = Number of nondetects prevented determination of reference concentrations.
NA = Not applicable/not available/not analyzed.
ND = Not detected/not determined.

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Semivolatile Organic Compounds (μg/kg)							
BEQs	698SB019	28.06	87	NA	ND	4,000	NA
	698SB020	2092.6			ND		
Benzo(a)anthracene	698SB020	550	870	NA	ND	800	NA
Benzo(a)pyrene	698SB020	1,300	87	NA	ND	4,000	NA
Benzo(b)fluoranthene	698SB019	110	870	NA	ND	2,300	NA
	698SB020	1,500			ND		
Benzo(k)fluoranthene	698SB019	93	8,700	NA	ND	25,000	NA
	698SB020	1,700			ND		
Chrysene	698SB019	130	87,000	NA	ND	80,000	NA
	698SB020	600			ND		
Dibenz(a,h)anthracene	698SB020	410	87	NA	ND	800	NA
Indeno(1,2,3-cd)pyrene	698SB019	160	870	NA	ND	7,000	NA
	698SB020	1,600			ND		
2-Methylnaphthalene	698SB019	96	160,000	NA	ND	18,000	NA
	698SB020	300			ND		
Anthracene	698SB020	41	2,300,000	NA	ND	6,000,000	NA
Benzo(g,h,i)perylene	698SB020	1,600	160,000	NA	ND	57,000,000	NA
bis(2-Ethylhexyl)phthalate (BEHP)	698SB019	120	46,000	NA	ND	1,800,000	NA
	698SB020	98			ND		
Butylbenzylphthalate	698SB019	150	1,600,000	NA	ND	930,000	NA
Dibenzofuran	698SB020	100	31,000	NA	ND	6,800	NA

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Fluoranthene	698SB019	210	310,000	NA	ND	2,100,000	NA
	698SB020	320			ND		
Naphthalene	698SB019	55	160,000	NA	ND	31,000	NA
	698SB020	160			ND		
Phenanthrene	698SB019	90	160,000	NA	ND	660,000	NA
	698SB020	360			ND		
Phenol	698SB019	2,100	4,700,000	NA	ND	50,000	NA
	698SB020	100			ND		
Pyrene	698SB019	200	230,000	NA	ND	2,100,000	NA
	698SB020	560			ND		
Pesticides/PCBs (μg/kg)							
4,4-DDD	698CB002	4.38	2,700	NA	ND	8,000	NA
	698SB011	54			ND		
4,4-DDE	698SB009	5.9	1,900	NA	ND	27,000	NA
	698SB010	5.3			ND		
	698SB011	990			ND		
	698SB012	26			ND		
	698SB013	52			ND		
	698SB014	9.6			ND		
	698SB015	16			ND		
	698SB016	3.3			ND		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
4,4-DDT	698CB002	31.6	1,900	NA	ND	16,000	NA
	698SB009	8.8			ND		
	698SB010	33			ND		
	698SB011	370			ND		
	698SB012	43			ND		
	698SB013	68			ND		
	698SB014	9.8			ND		
	698SB015	19			ND		
	698SB016	5.4			ND		
alpha-Chlordane	698CB002	55.2	1,800	NA	ND	5,000	NA
	698SB010	2.6			ND		
	698SB011	50			ND		
	698SB012	6.4			ND		
Dieldrin	698CB002	6.59	40	NA	NA	2.0	NA
Endosulfan sulfate	698CB002	5.94	47,000	NA	NA	4,600	NA
Endrin	698SB011	27	2,300	NA	NA	500	NA
Endrin aldehyde	698SB011	15	2,300	NA	NA	340	NA
Endrin ketone	698CB002	9.79	2,300	NA	NA	340	NA
	698SB012	5.2			ND		
gamma-Chlordane	698CB002	214	1,800	NA	ND	5,000	NA
	698SB010	1.8			ND		
	698SB011	80			ND		
	698SB012	4.3			ND		
	698SB013	3.3			ND		
	698SB015	1.7			ND		
Heptachlor	698SB011	9.5	140	NA	ND	11,000	NA

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Heptachlor epoxide	698CB002	129	70	NA	ND	330	NA
	698SB011	140			ND		
	698SB012	2.2			ND		
	698SB013	6.3			ND		
Dioxin Compounds (ng/kg)							
TCDD TEQ	698CB002	11.92	4.3	NA	NT	1,600	NA
1234678-HpCDD	698CB002	306	430	NA	NT	110,000	NA
1234678-HpCDF	698CB002	84	430	NA	NT	54,000	NA
1234789-HpCDF	698CB002	1.92	430	NA	NT	54,000	NA
123478-HxCDD	698CB002	2.05	43	NA	NT	4,100	NA
123478-HxCDF	698CB002	8.81	43	NA	NT	220,000	NA
123678-HxCDD	698CB002	6.91	43	NA	NT	4,100	NA
123678-HxCDF	698CB002	4.46	43	NA	NT	220,000	NA
123789-HpCDD	698CB002	5.2	NA	NA	NT	NA	NA
12378-PeCDF	698CB002	0.926	85	NA	NT	770	NA
234678-HxCDF	698CB002	7.2	43	NA	NT	220,000	NA
2378-TCDD	698CB002	2.12	43	NA	NT	1,600	NA
OCDD	698CB002	2,240	4,300	NA	NT	1,100,000	NA
OCDF	698CB002	129	4,300	NA	NT	540,000	NA
TPH-DRO (mg/kg)							
Diesel	698CB002	149	100	NA	NT	100	NA

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Inorganics (mg/kg)							
Aluminum (Al)	698SB001	5,390	7,800	11,200	3,630	560,000	10,500
	698SB002	4,590			4,200		
	698SB003	5,280			2,490		
	698SB004	4,800			5,980		
	698SB005	4,620			6,910		
	698SB006	5,450			5,840		
	698SB007	5,940			4,040		
	698SB008	4,890			3,470		
Antimonoy (Sb)	698SB001	0.53	3.1	0.45	ND	2.7	NA
	698SB002	0.44			ND		
	698SB003	0.5			ND		
Arsenic (As)	698SB001	6.7	0.43	3.0	1.5	15	1.98
	698SB002	2.45			0.49		
	698SB003	4.8			0.63		
	698SB004	10.5			ND		
	698SB005	0.98			0.58		
	698SB006	5.4			3.4		
	698SB007	3.5			ND		
	698SB008	1.4			0.76		
Barium (Ba)	698SB001	105	550	25.6	2.6	820	6.83
	698SB002	25.85			2.8		
	698SB003	16			1.8		
	698SB004	24.2			3.6		
	698SB005	11.1			3.4		
	698SB006	18.8			1.8		
	698SB007	11.1			2.6		
	698SB008	9.9			2.2		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Beryllium (Be)	698SB001	0.65	16	0.17	ND	32	0.12
	698SB002	0.09			ND		
	698SB003	0.06			ND		
	698SB006	0.06			ND		
Cadmium (Cd)	698SB001	0.71	3.9	0.13	ND	4	NA
	698SB002	0.435			ND		
	698SB003	4			ND		
	698SB004	0.1			ND		
	698SB006	0.27			ND		
Calcium (Ca)	698SB001	4,150	NL	NL	126	NL	NA
	698SB002	1,560			108		
	698SB003	1,080			68.7		
	698SB004	1,180			327		
	698SB005	295			19.2		
	698SB006	2,010			89.8		
	698SB007	1,230			115		
	698SB008	96.5			212		
Chromium (Cr)	698SB001	7.5	23	8.4	2.5	19	8.76
	698SB002	4.05			3.1		
	698SB003	10.7			1.6		
	698SB004	3.4			6.3		
	698SB005	2.5			4.3		
	698SB006	4.2			4.2		
	698SB007	3.6			2.7		
	698SB008	3			2.4		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Cobalt (Co)	698SB001	2	470	0.34	ND	990	0.62
	698SB002	0.24			0.13		
	698SB003	0.45			ND		
	698SB004	ND			0.15		
	698SB005	ND			0.23		
	698SB006	0.2			ND		
Copper (Cu)	698SB001	30.7	310	3.86	ND	5,600	0.34
	698SB002	23.7			0.39		
	698SB003	4.6			ND		
	698SB004	1.8			0.45		
	698SB005	0.71			0.25		
	698SB006	8.7			ND		
	698SB007	0.92			ND		
	698SB008	1			ND		
Iron (Fe)	698SB001	7,160	2,300	7060	3,480	NL	5130
	698SB002	3,150			1,730		
	698SB003	3,040			1,490		
	698SB004	1,300			944		
	698SB005	1,240			1,200		
	698SB006	2,440			4,820		
	698SB007	3,050			1,500		
	698SB008	1,270			1,200		
Lead (Pb)	698SB001	119	400	39.6	3	400	6.43
	698SB002	53.9			ND		
	698SB003	101			3.2		
	698SB004	17.2			2.8		
	698SB005	15			3.1		
	698SB006	113			ND		
	698SB007	8.2			3.2		
	698SB008	5.2			ND		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Magnesium (Mg)	698SB001	505	NL	NA	61	NL	NA
	698SB002	135.5			51.4		
	698SB003	117			26.7		
	698SB004	80			53.2		
	698SB005	81.2			62.9		
	698SB006	140			39.2		
	698SB007	121			54.8		
	698SB008	222			37		
Manganese (Mn)	698SB001	70.4	160	26.4	2.7	480	5.93
	698SB002	18.75			1.9		
	698SB003	15.7			1.6		
	698SB004	7.7			2		
	698SB005	5.7			2.8		
	698SB006	19.7			1.7		
	698SB007	7.1			2.2		
	698SB008	6.3			1.6		
Mercury (Hg)	698SB001	0.15	2.3	NA	ND	1	NA
	698SB002	0.065			ND		
	698SB003	0.16			ND		
	698SB006	0.06			ND		
Nickel (Ni)	698SB001	6.7	160	1.7	0.66	65	2.64
	698SB002	1.55			1.3		
	698SB003	1.3			0.32		
	698SB004	0.83			1.7		
	698SB005	0.5			2.4		
	698SB006	1.8			0.77		
	698SB007	1.4			0.64		
	698SB008	0.2			0.6		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Potassium (K)	698SB001	150	NL	NA	15.1	NL	NA
	698SB002	48.35			23.5		
	698SB003	34.6			5.9		
	698SB004	35.8			25.6		
	698SB005	31			21.6		
	698SB006	70.8			7.5		
	698SB007	70.8			18.8		
	698SB008	192			17.4		
Sodium (Na)	698SB001	131	NL	NA	9.4	NL	NA
	698SB002	29.25			6.6		
	698SB003	14.3			9.8		
	698SB004	15			9.6		
	698SB005	7.6			8.3		
	698SB006	29.1			4.7		
	698SB007	15			9.9		
	698SB008	6.4			5.9		
Tin (Sn)	698CB002	9.8	4,700	19.4	ND	5,500	NA
	698SB005	ND			10.4		
Vanadium (V)	698SB001	9.3	55	15.8	4.9	3,000	12.2
	698SB002	7.65			6.3		
	698SB003	7.8			3.9		
	698SB004	5.5			4.5		
	698SB005	5.4			5.3		
	698SB006	6.9			16.7		
	698SB007	9.1			5.1		
	698SB008	4.5			4.2		

Table 10.9.4
AOC 698
Analytes Detected in Surface and Subsurface Soil

Parameter	Location	Surface Conc.	Residential RBC (THQ=0.1)	Surface Background	Subsurface Conc.	Soil-to-Groundwater SSL (DAF=10)	Subsurface Background
Zinc (Zn)	698SB001	196	2,300	14.8	ND	6,200	NA
	698SB002	147			ND		
	698SB003	181			ND		
	698SB004	32.1			ND		
	698SB005	12.5			ND		
	698SB006	296			ND		
	698SB008	35.2			ND		

Notes:
Bold concentrations exceed the RBCs, SSL, and the zone background.
All background values for Zone K are based on twice the means of the grid sample concentrations.

DAF = Dilution attenuation factor
NA = Not applicable/not available/not analyzed
ND = Not detected/not determined
NL = Not listed
NT = Not taken
RBC = Risk-based concentration
SSL = Soil screening level
THQ = Target hazard quotient
µg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram

Appendix D

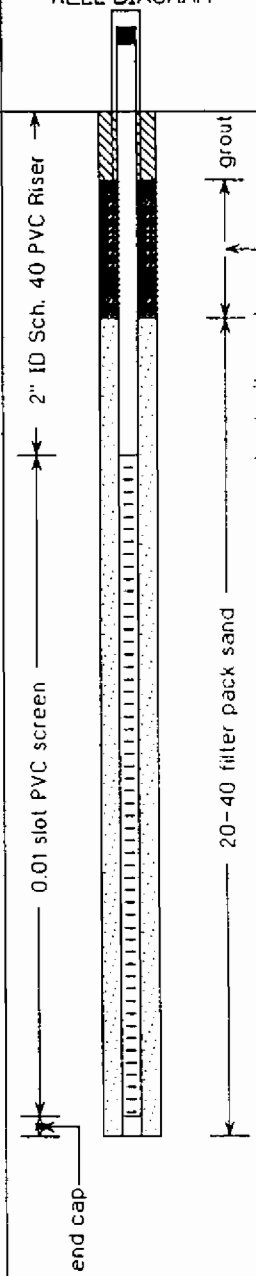
ENSAFE

Monitoring Well NBCK698002

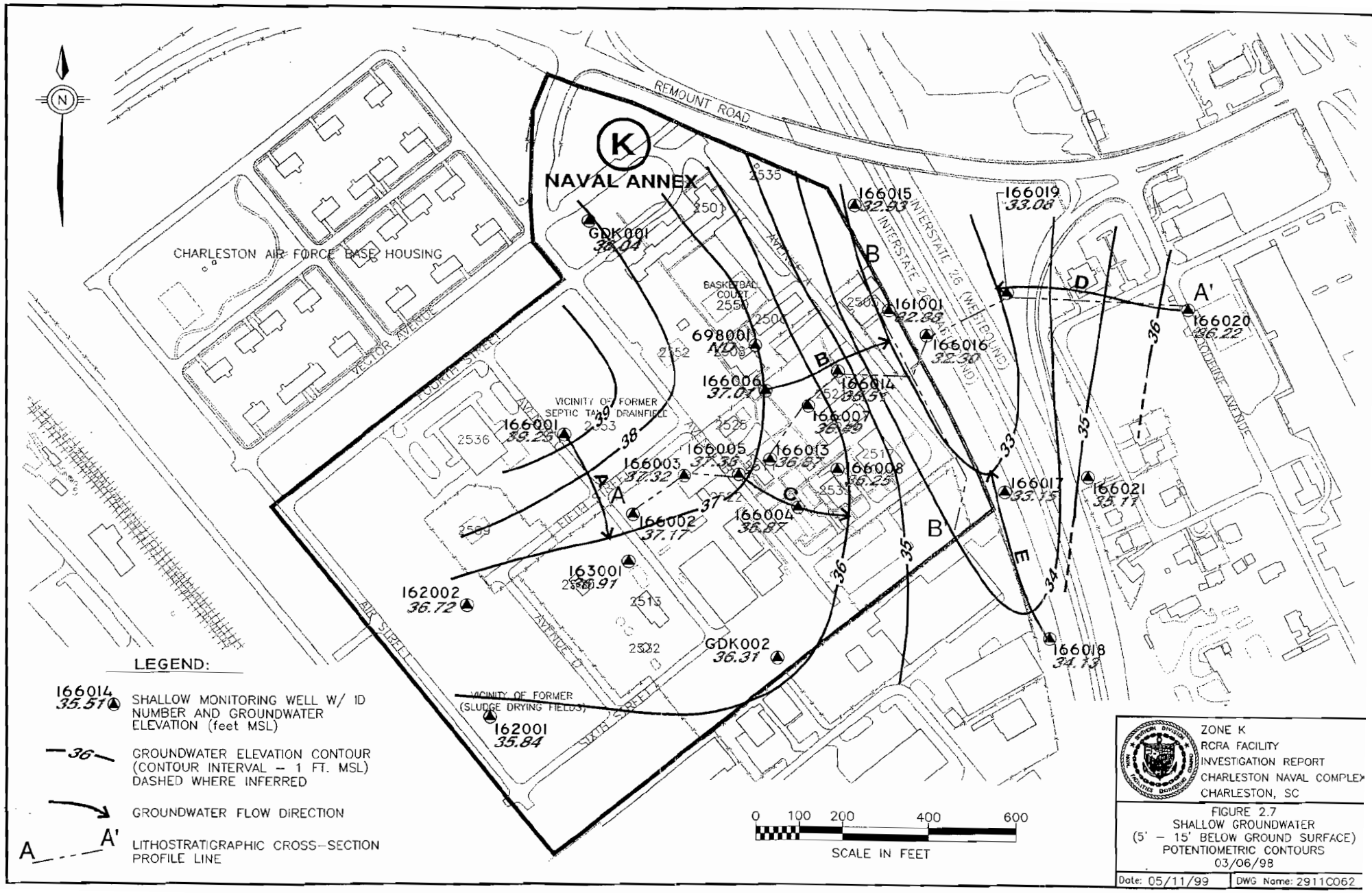
Project: *ZONE K – Naval Base Charleston*	Coordinates: *2300442.79 E, 388484.16 N*
Location: *Charleston, SC*	Surface Elevation: *41.1 feet msl*
Started at *1500 on 11/30/99*	TOC Elevation: *40.42 feet msl*
Completed at *1640 on 11/30/99*	Depth to Groundwater: *7.61 feet TOC* Measured: *1/12/00*
Drilling Method: *4.25" ID (7.5" OD) HSA w/ split spoon*	Groundwater Elevation: *33.31 feet msl*
Drilling Company: *AET (SC# 1435)*	Total Depth: *15 feet*
Geologist: *T. Streufert*	Well Screen: *5 to 14.7 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Sand: yell-brn to dk brn; fine; dry.	39.5
			1		80		SP	Sand: yell-brn grading to gry-brn; fine; dry.	39.1
									37.7
			2		70		SP	Sand: lt gry-brn; fine.	37.1
5							SM	Sand: as above w/ inc. dk brn silt content (40%); slightly moist.	36.1
									35.6
			3		75		SP	Sand: yell-brn; fine; moist.	35.1
									33.8
			4		65		SP	Sand: as above; saturated.	33.1
									32.1
10			5		50		SP	Sand: as above.	31.1
									29.9
			6		60		SP	Sand: as above.	29.1
									28.3
			7		40		SP	Sand: as above w/ inc. dk staining.	27.1
15									26.3
			8		40				
20									

WELL DIAGRAM



Appendix E


N
K
NAVAL ANNEX
REMOUNT ROAD
CHARLESTON AIR FORCE BASE HOUSING
VECTOR AVENUE
FOURTH STREET
AIR STREET
SIXTH STREET
AVENUE
INTERSTATE 26 (WESTBOUND)
BASKETBALL COURT
VICINITY OF FORMER SEPTIC TANK DRAINFIELD
VICINITY OF FORMER (SLUDGE DRYING FIELDS)
GDK001 36.04
166015 32.93
166019 33.08
161001 32.88
166016 32.30
166020 36.22
698001 ND
166006 37.07
166014 35.51
166007 36.40
166001 39.25
166005 37.36
166013 36.67
166008 36.25
166003 37.32
166002 37.17
166004 36.87
166017 33.75
166021 35.11
163001 36.91
162002 36.72
GDK002 36.31
166018 34.13
162001 35.84
A
A'
B
C
D
E
39
38
37
36
35
34
33
LEGEND:
166014 35.51 SHALLOW MONITORING WELL W/ ID NUMBER AND GROUNDWATER ELEVATION (feet MSL)
36 GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL – 1 FT. MSL) DASHED WHERE INFERRED
GROUNDWATER FLOW DIRECTION
A A' LITHOSTRATIGRAPHIC CROSS-SECTION PROFILE LINE
0 100 200 400 600
SCALE IN FEET
ZONE K
RCRA FACILITY
INVESTIGATION REPORT
CHARLESTON NAVAL COMPLEX
CHARLESTON, SC
FIGURE 2.7
SHALLOW GROUNDWATER
(5' – 15' BELOW GROUND SURFACE)
POTENTIOMETRIC CONTOURS
03/06/98
Date: 05/11/99
DWG Name: 2911C062

Appendix F

Comments and Responses on the Draft Final Zone K RFI Report June 11, 1999

Comment 14. Page 10.9.56, 57, 58, and 59, AOC 698 (Susan Byrd)

The text lists alpha-BHC as a contributor to the groundwater ingestion pathway; however it was not included in Table 10.9.20.

CH2M-Jones Response: EnSafe had intended to revise the table accordingly. However, submittal of a revised table is not planned at this time because the risk assessment is not being revised. The RFI risk assessment did address alpha-BHC in the groundwater, as does the RFI Report Addendum (Sections 4.2.3 and 5.3.3). Variable low level detections of lindane and its isomers (alpha- and delta-BHC) were at or slightly above their respective RBCs; however, they are below the maximum contaminant level (MCL) for lindane. Since these pesticides are likely from routine base historical applications, detected levels are low, and offsite migration is not occurring, no further action (NFA) is recommended for the BHC isomers at AOC 698.

Comment 27. Page 10.9.1, AOC 698 (Paul Bergstrand)

A) **The "J" flag is not an obvious indication of blank contamination. Please revise.**

CH2M-Jones Response: The definition of the analytical data qualifier "J" has been revised in the RFI Report Addendum to "chemical detected at concentration below the method detection limit; concentration not known."

D) **The problem which remains is the specific source of the petroleum contamination has not been defined. This issue should be resolved.**

CH2M-Jones Response: Additional soil borings were taken in the vicinity of the former AST and analyzed for VOCs and SVOCs to further define the source. This information is provided in Section 4.0 of the RFI Report Addendum and confirms that offsite migration of petroleum constituents is not occurring. Also, the petroleum issue has also been addressed under the tanks program. The former fuel oil AST at Building 2508 was removed in a closure action documented by a letter from SCDHEC dated October 22, 1997 (see Appendix G of the RFI Report Addendum). This letter also documents NFA for the AST removal at this site. Therefore, because petroleum constituents are not associated with AOC 698 operations, the AST has been closed, and detected petroleum hydrocarbons are not migrating offsite.

E) **Additional soil samples terminated at 3 to 5 feet BGS and not at the water-table. The Navy assumes layer cake geology and sequential contamination of media. Permanent downgradient groundwater monitoring wells should be installed to verify the extent of contamination.**

CH2M-Jones Response: Downgradient monitoring well K698GW002 was installed in November 1999 and sampled in December 1999 for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), metals, and dioxins; in July 2000 the well was

sampled again for VOCs. The downgradient well (K698GW002) analytical results indicate that it is free of any contamination above screening criteria.

F) **Even though pesticides were detected in groundwater the text states *"Based on soil data, no pesticides appear to be leaching to groundwater."* Downgradient groundwater monitoring wells should be installed to verify the extent of contamination. Additional groundwater samples analyzed for VOCs, SVOCs, metals, and pesticides should be taken to complete the RFI Report.**

CH2M-Jones Response: See response to comment 27(E) above.

Comments and Responses on the Final Zone K RFI Work Plan Addendum November 16, 1999

Comment 20: Figure 2.7

This figure does not indicate groundwater flow direction for this site. This Department cannot be sure proposed wells are up or down gradient unless the groundwater direction is shown. Please revise the figure for the report.

CH2M-Jones Response: The flow direction arrow was inadvertently left off of the figure. Groundwater flow at AOC 698 is to the northeast. A potentiometric map showing location of RFI wells, groundwater elevation contours, and groundwater flow direction is provided in Appendix E of the RFI Report Addendum.

Comment 21: Page 2.7.1, AOC 698, Building 2508, Boiler House, Naval Annex, lines 5-10.

This text explains that this area was designated as an AOC because of the lead based paint peeling from the building. The previous sample locations are too far from the building to get a more accurate reading of the lead content in the soil. The Navy should propose additional samples to better characterize the lead content in the soil adjacent to the building.

CH2M-Jones Response: According to EnSafe, soil samples 698SB003, 698SB006, and 698SB008 were collected within one to three feet of the building in areas where there was visible paint peeling from the building's exterior. The highest lead concentration in these samples was 113 milligrams per kilogram (mg/kg), which is below the 400 mg/kg screening criteria established for lead on the basis of the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (EPA, 1994). Lead was not detected above the screening criteria value in any of the RFI soil samples collected from the site and analyzed for metals. During the additional investigations, locations 698SB001, 698SB003, and 698SB004 were resampled and analyzed for metals. Surface soil sample at K698SB001 had a lead concentration of 972 mg/kg compared with 119 mg/kg during the RFI sampling. No significant lead source is apparent at this site.

Comment 22: Page 2.7.5, Section 2.7.2 Data Gaps, Shallow Groundwater, lines 7-12.

These lines state that analytes exceeded their respective screening values and will be listed under the sample locations of which they were found. However, figure 2.7 does not list any analytes for any sample location. Please revise the figure in the report.

CH2M-Jones Response: The information was inadvertently left off of the figure. However, there were only three analyte detections from the entire results data set, and these were estimated values near or below the detection limits: K698GP006 had TCE at 4(J) micrograms per liter (µg/L), K698GP002 had toluene at 1(J) µg/L, and K698GP003 had toluene at 1(J) µg/L. Further discussion of the nature and extent of groundwater contamination at AOC 698 is presented in Sections 4.2 and 5.3 of the RFI Report Addendum.

Comment 23: Page 2.7.5, Sampling and Analysis Plan, lines 20-22.

These lines propose the location of a well down gradient of well 698001. However, the figure 2.7 does not indicate which direction groundwater flows. See comment 20.

CH2M-Jones Response: See Response to Comment 20.

Appendix G

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

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

Re Aboveground Storage Tank Assessment Report dated May 9, 1997
Bldg. 2508 (AST 2508) (Site Identification # 00951)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Date: October 22, 1997

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the report provides a narrative describing closure activities and analytical results of environmental sampling to determine if releases have occurred as a result of operation of the referenced vessel and/or associated piping system. The employed closure activities and sampling results appear to indicate that no additional endeavors for remedial actions and/or contaminant characterization are warranted at the referenced site at this time. If in the future contamination is identified which is attributable to this site, additional assessments and/or remedial endeavors may be required, as appropriate.

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

Sincerely,

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

cc: Trident District EQC

Appendix H

PHOTO 1
Northeast corner, area next to Building 2508

PHOTO 2
Main investigation area, front of Building 2508

PHOTO 3
Northeast area, approaching Building 2508 (behind the tree) and construction debris collection bin

PHOTO 4
Area south of Building 2508, looking west