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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM SOLID WATER MANAGEMENT UNIT 109 (SWMU 109) ZONE F CNC CHARLESTON SC

10/23/2001

CH2M HILL

RFI REPORT ADDENDUM

SWMU 109, Zone F

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

October 2001

Revision 0
Contract N62467-99-C-0960

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October 23, 2001

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

Re: RFI Report Addendum (Revision 0) – SWMU 109, Zone F

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for SWMU 109 in Zone F of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Louise Palmer. Please contact her at 704/329-0073, extension 296, 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

SWMU 109, Zone F

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

October 2001

Revision 0
Contract N62467-99-C-0960
158814.ZF.PR.08

Certification Page for RFI Report Addendum (Revision 0) – SWMU 109, Zone F

I, Casey Hudson, 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

Temporary Permit No. T2000358

Casey Hudson, P.E.

10-03-01

Date

SOUTH CAROLINA
CERTIFICATE OF AUTHORIZATION
CH2M HILL, INC.
No. C00201

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Acronyms and Abbreviations

AOC	area of concern
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BEQ	benzo(a)pyrene equivalent
BRAC	Base Realignment and Closure Act
BRC	background reference concentration
CA	corrective action
CMS	corrective measures study
CNC	Charleston Naval Complex
COC	chemical of concern
COPC	chemical of potential concern
DAF	dilution attenuation factor
DET	Environmental Detachment Charleston
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ft^2	square feet
ft bls	feet below land surface
HHRA	human health risk assessment
HI	hazard index
IEUBK	Integrated Exposures and Uptake Biokinetic
ILCR	Incremental Lifetime Cancer Risk
IM	interim measure
IRIS	Integrated Risk Information System
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
OP	organo-phosphorus
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
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
ThQ	total hazard quotient
UST	underground storage tank
VOC	volatile organic compound

1.0 Introduction

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

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

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 109 in Zone F of the CNC. Figure 1-1 illustrates the locations of SWMU 109 and Zone F within the CNC.

1.1 Background

SWMU 109 is the site of the former abrasive blast media storage area. The storage area consisted of three hoppers identified as Buildings 1364, 1365, and 1393. The hoppers were used for the temporary storage of unused abrasive blast media that were unloaded from trains and transferred to other vehicles to be transported to blasting locations remote from SWMU 109. Buildings 1364 and 1365 began operation in 1949, while Building 1393 was added in 1962. Particulate air emissions were permitted at the site in 1992. The site was recommended for confirmatory sampling in the RCRA Facility Assessment (RFA).

A covered unloading area on the north side of the hoppers spanned a concrete-lined sump pit designed to collect media spillage. Material stored at the site included aluminum oxide and "black beauty" blast media, along with other blasting material, such as sodium bicarbonate. This site was designated a SWMU because of the unused blast media that had spilled onto the ground surface around the hoppers.

An aerial photograph from 1997 (Figure 1-2) shows a cover over the sump pit and the unloading area. At present, the hoppers and cover have been removed, exposing the

cleaned concrete base slabs, sump pit, and foundations. The sump pit has been filled with stone and sand. Much of the surrounding area is paved with asphaltic concrete. The site is located in the northeast portion of Zone F in an industrial area east of Hobson Avenue, adjacent to the Zone E boundary. The investigated area extends into Zone E. The CNC Reuse Plan identifies this area for industrial land use; the City of North Charleston zoning for this site is M-2, for marine industrial use.

1.2 Purpose of the RFI Report Addendum

This RFI Report Addendum provides information about SWMU 109 that documents the conclusions from the *Zone F RFI Report, Revision 0* (EnSafe Inc.[EnSafe], 1997), and provides the results of additional sampling within the SWMU that was performed after the report was completed. Conclusions regarding site closure are also presented in this report.

The results of additional investigations are presented to complete the nature and extent evaluation for chemicals of potential concern (COPCs) previously identified in surface soil, subsurface soil, and groundwater. This Report Addendum also addresses the characteristics of the blast media present on the ground surface.

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

- Status of the RFI
- Presence of metals (inorganics) in groundwater
- Potential linkage to SWMU 37, Investigated Sanitary Sewers at the CNC
- Potential linkage to Area of Concern (AOC) 699, Investigated Storm Sewers at the CNC
- Potential linkage to 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 RFI Report Addendum to expedite evaluation of closure of the site.

Provided that the information presented in this report addendum is adequate to address these site closeout items, it is expected that the BCT will concur that No Further Action (NFA) is appropriate for the site.

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 SWMU 109—Summarizes the conclusions from the RFI investigations and risk evaluations for SWMU 109 presented in the *Zone F RFI Report, Revision 0.*

3.0 Interim Measures —Describes any interim measures (IMs) performed at SWMU 109.

4.0 Summary of Additional Investigations—Summarizes the data collected after completion of the *Zone F RFI Report, Revision 0.*

5.0 COPC/COC Refinement—Evaluates and identifies COPCs based on current screening criteria using all RFI data.

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 RFI Conclusions and Recommendations—Summarizes the RFI and provides recommendations for proceeding with site closure.

8.0 References—Lists the references used in this document.

Appendix A contains excerpts from the *Zone F RFI Report, Revision 0.*

Appendix B contains analytical data from additional investigations in the SWMU 109 area.

Appendix C contains validation reports from data presented in this RFI Report Addendum.

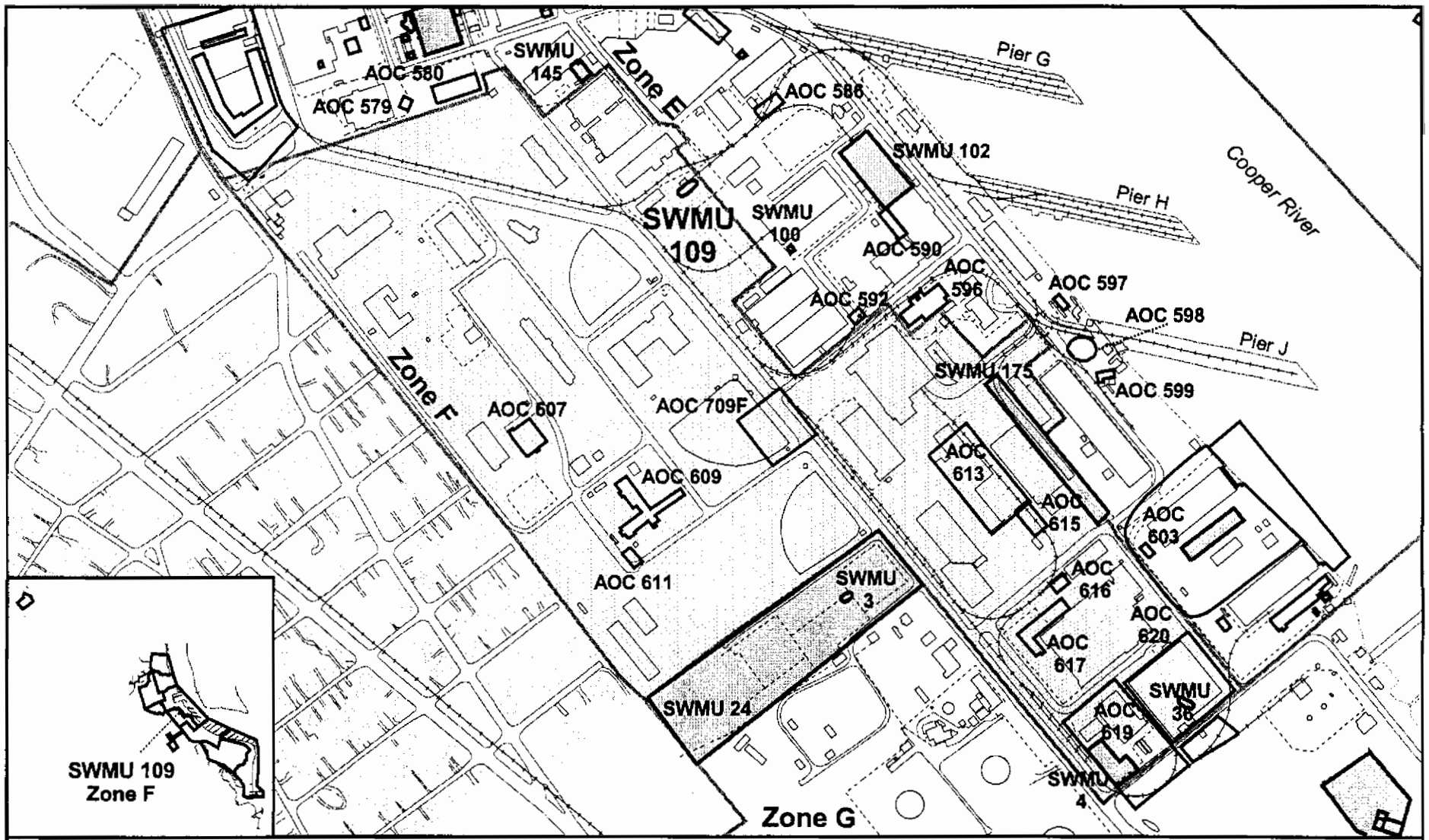
Appendix D contains soil screening levels (SSLs) pertinent to SWMU 109 and results of synthetic precipitation leaching procedure (SPLP) tests conducted at SWMU 109.

Appendix E contains the groundwater monitoring well construction diagram for F109GW002.

Appendix F contains risk calculation information for future residential and industrial receptors.

Appendix G contains responses to SCDEHC comments concerning the RFI report for SWMU 109. The responses address this site only. Comments for other sites addressed by the *Zone F RFI Report, Revision 0* are not included in this appendix.

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



Fence
Railroads
Roads
Shoreline
Surrounding Area

Zone Boundary
AOC Boundary
SWMU Boundary
Buildings

N

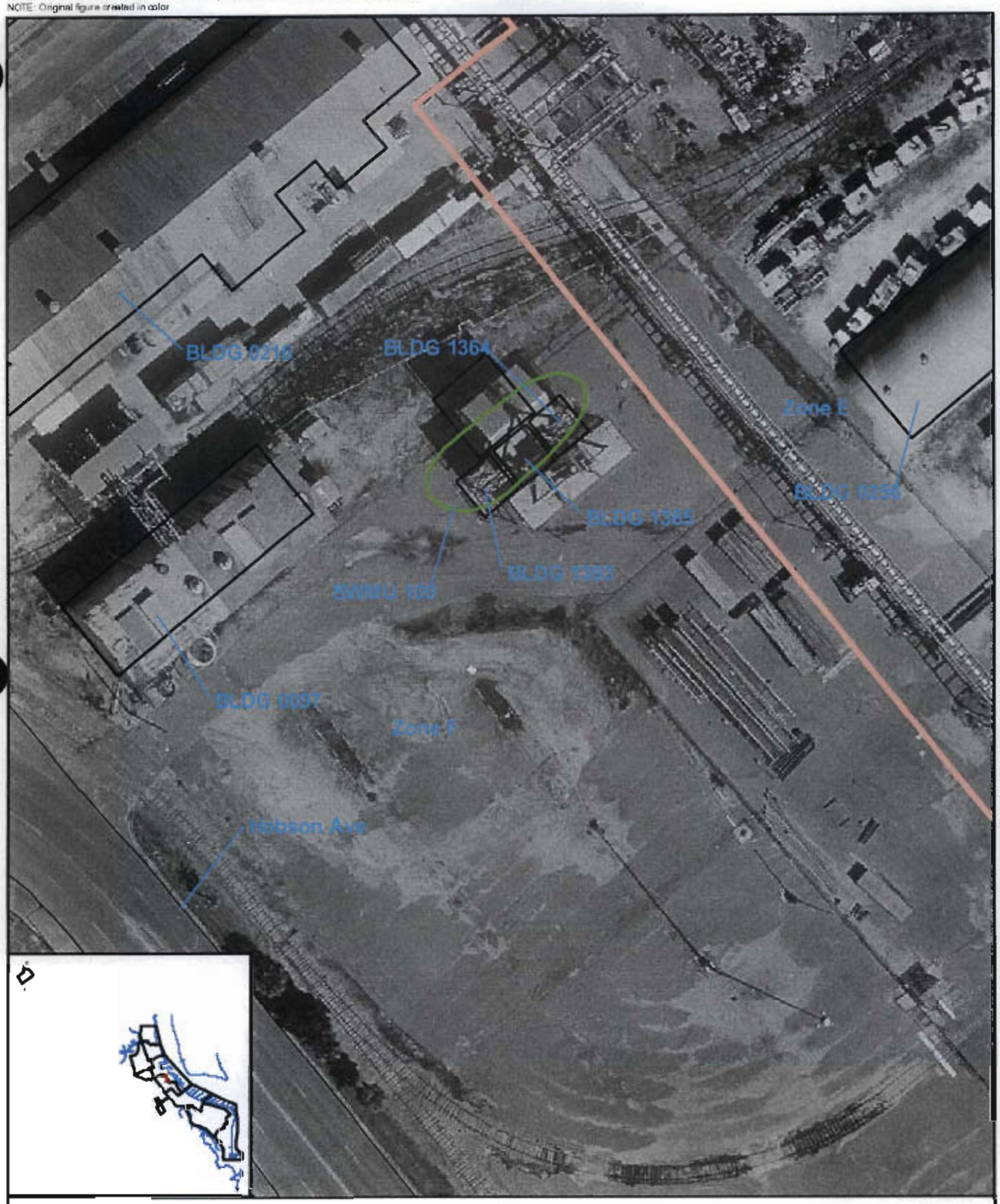
200 0 200 400 Feet

Figure 1-1
SWMU 109
Zone F
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\projects\zone_f\swmu_109\aprs\swmu_109.apr, Date: 03 Oct 2001 16:11, User: ASWINFOR, Figure 1-1 SWMU 109

NOTE: Aerial Photo Date is 1997 NOTE: Superstructure was removed after date of photo
NOTE: Original figure created in color



Roads
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 40 80 Feet

1 inch = 50 feet

Figure 1-2
Aerial Photo
SWMU 109
Charleston Naval Complex

CH2MHILL

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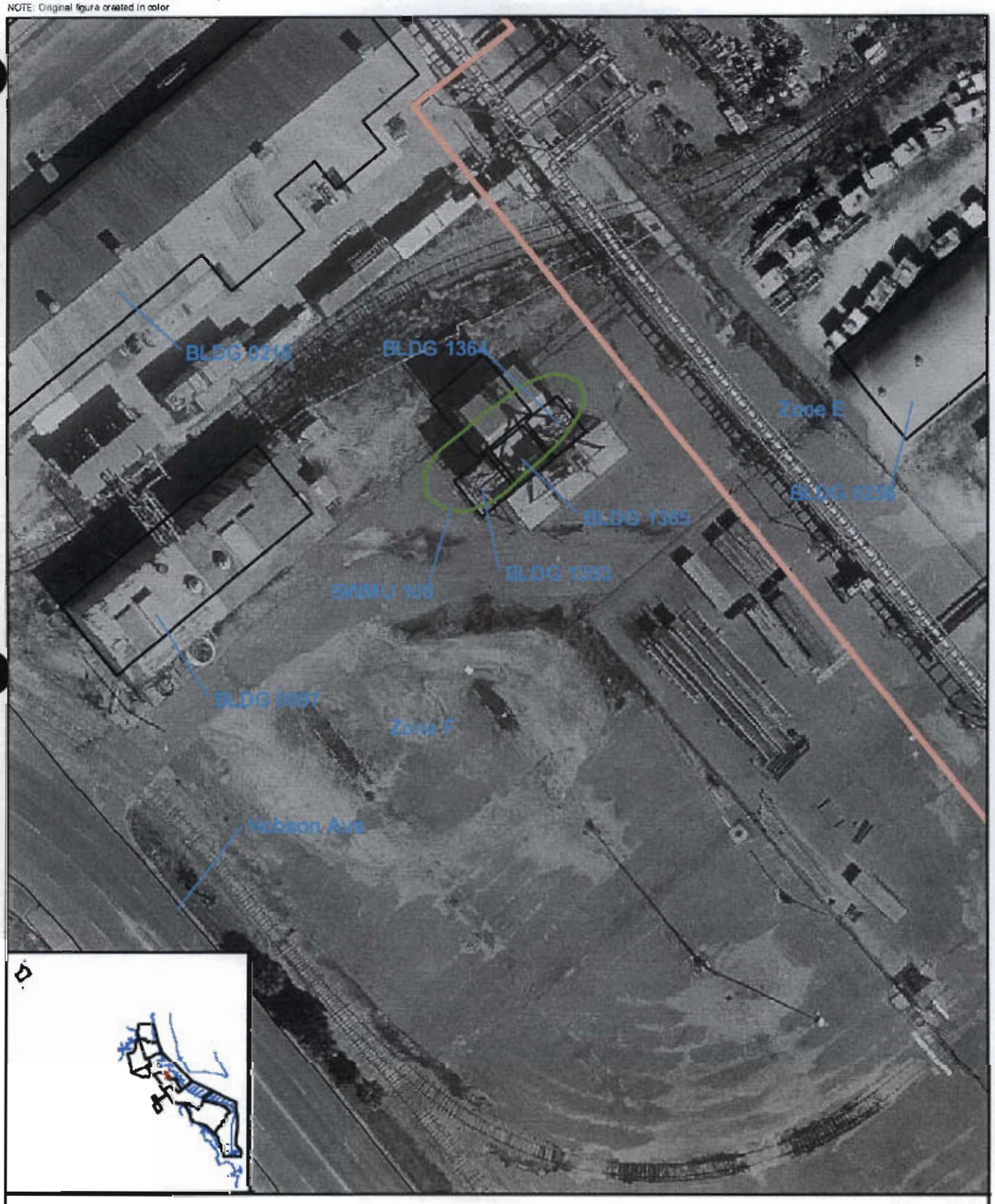
NOTE: Aerial Photo Date is 1997 NOTE: Superstructure was removed after date of photo
NOTE: Original figure created in color



Roads
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 40 80 Feet

1 inch = 50 feet

Figure 1-2
Aerial Photo
SWMU 109
Charleston Naval Complex

CH2MHILL

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2.0 Summary of RFI Conclusions for SWMU 109

During the Zone F RFI, soil, sediment, and groundwater investigations were conducted in the area of the former blast media storage area (SWMU 109). Figure 2-1 presents the site and sample locations within this area described in the *Zone F RFI Report, Revision 0* (EnSafe, 1997). Initially, six soil borings (F109SB001 through F109SB006) were advanced to collect both surface (0–1 ft below land surface [ft bls]) and subsurface (3–5 ft bls) soil samples. These samples were analyzed for metals and semivolatile organic compounds (SVOCs), with some of them also analyzed for pesticides, polychlorinated biphenyls (PCBs), and cyanide. A field duplicate sample was also analyzed for volatile organic compounds (VOCs), dioxins, organo-phosphorous (OP) pesticides, herbicides, and hexavalent chromium. Three additional surface soil samples (F109SB007 through F109SB009) were collected during a second soil sampling event and analyzed for arsenic.

Sediment sample F109M0001 was collected from the base of the sump pit adjacent to the hoppers. Sediment sample location F109M0002, which was planned within a stormwater catch basin west of the hoppers, contained insufficient sediment and a sample was not collected. Sediment sample F109M0003 was collected within a catch basin approximately 150 ft south of the hoppers. The sediment samples were analyzed for metals, SVOCs, and cyanide; a field duplicate sample from location F109M0003 was also analyzed for VOCs, dioxins, OP pesticides, herbicides, and hexavalent chromium.

During the initial phase of field sampling, groundwater monitoring well F109GW001 was installed and sampled. Groundwater samples were collected from the well during each quarter from 1996 to 1997; the fourth sampling event was not reported in the *Zone F RFI Report, Revision 0*. The samples were analyzed for metals and SVOCs. A second groundwater monitoring well (F109GW002) was installed after the *Zone F RFI Report, Revision 0* was issued. Results from samples from F109GW002 and the fourth sample from F109GW001 are presented in Section 4.0 of this RFI Report Addendum.

The *Zone F RFI Report, Revision 0* presented the results of these tests and conclusions concerning contamination and human health risk. Conclusions from the *Zone F RFI Report, Revision 0* are summarized in the following subsections. Excerpts from that report are presented in Appendix A.

2.1 Surface Soil Results

Data from surface soil samples were compared in the *Zone F RFI Report, Revision 0* to the U.S. Environmental Protection Agency (EPA) Region III risk-based concentrations (RBCs) for an unrestricted land use scenario, and SSLs that are protective of groundwater migration. RBCs for non-carcinogenic analytes were adjusted for total hazard quotient (ThQ)=0.1 by using one-tenth of the RBC value. The SSLs from Appendix A of the *EPA Soil Screening Guidance: Technical Background Document* (EPA, 1996) with dilution attenuation factor (DAF)=20 were used for SSL comparison. In addition, inorganic data were compared to Zone F background reference concentrations (BRCs) evaluated from a set of background (grid) samples. Benzo(a)pyrene equivalents (BEQs) were detected in the surface soils at a maximum concentration of 637 micrograms per kilogram (µg/kg), exceeding the RBC of 88 µg/kg. Other polycyclic aromatic hydrocarbons (PAHs) and benzoic acid were also detected in surface and subsurface soils below screening criteria. Aroclor-1260, traces of pesticides, and dioxins were also detected below risk-based screening criteria. Tables showing the site's detected constituents in surface and subsurface soil, which were reported in the *Zone F RFI Report, Revision 0*, are presented in Appendix A.

The following metals were detected in surface soils above screening criteria: arsenic, beryllium, chromium, iron, manganese, and vanadium. Metals exceedances were associated with sample locations F109SB004 and F109SB005.

2.2 Subsurface Soil Results

Data from subsurface soil samples were compared to SSLs and to Zone F subsurface soil BRCs. Benzoic acid was the only SVOC detected at a concentration less than its SSL; no pesticides or PCBs were detected. Metals were detected at concentrations less than the screening criteria.

2.3 Sediment Results

The sediment samples from the site were collected from engineered structures and therefore were not compared to reference concentrations or other criteria. Sediment from both the sump pit and the stormwater catch basin may be indicative of a combination of the blast media composition and surface soil runoff. However, the sediment collected from the storm sewer catch basin may have been affected by density stratification during storm events, leaving the heavier particles in the catch basin. Therefore, although the catch basin

sediment is derived from the blast media, its characteristics have been altered and are not representative of the blast media on the surface.

The RFI report states that four SVOCs (naphthalene, di-n-octylphthalate, 2-methylnaphthalene, and bis[2-ethylhexyl]phthalate) were detected in sediment sample F109M0001; bis(2-ethylhexyl)phthalate was also detected in F109M0003. Naphthalene was detected in surface soil at a similar concentration to naphthalene in the sediment. Dioxin was detected in a sediment sample, but at a concentration less than that detected in the site surface soil, which was less than screening criteria.

The sample collected from the stormwater catch basin, F109M0003, contained higher metals concentrations than sample F109M0001from the loading hopper sump. Metals were detected as frequently in sediment samples as they were in site soil. Appendix A lists concentrations of detected analytes from sediment samples as presented in the *Zone F RFI Report, Revision 0.*

2.4 Groundwater Results

A groundwater flow map from the RFI Report, presented in Appendix A, shows that groundwater was reported to flow in a southwest direction. There was very little difference in groundwater flow patterns observed between low and high tides.

Groundwater data from the three sampling events were compared to Zone F BRCs and to maximum contaminant levels (MCLs) and tap water RBCs. Iron and aluminum exceeded both BRCs and secondary MCLs, but not tap water RBCs. No other metals exceeded screening criteria, and no SVOCs were detected at F109GW001. Concentrations of constituents detected in groundwater during the first three RFI sampling events are presented in Appendix A.

2.5 COPC/COC Summary

Analytes detected in SWMU 109 samples that exceeded the screening criteria were considered COPCs and were further evaluated in the human health risk assessment (HHRA) (Section 10.3.7), to determine which of the parameters were considered chemicals of concern (COCs). BEQs, arsenic, beryllium, chromium, manganese, and vanadium were identified as COPCs in surface soil; iron was identified as an essential nutrient and was not considered a COPC. These metals exceeded both unrestricted land use RBCs and BRCs.

The fate and transport section, Section 10.3.6, concluded that although arsenic and total chromium were detected in site surface soil above applicable SSLs, they were not detected above BRCs in subsurface soil nor in site groundwater, indicating that existing soil concentrations of these constituents are protective of shallow groundwater. In addition, no COPCs were identified in subsurface soil.

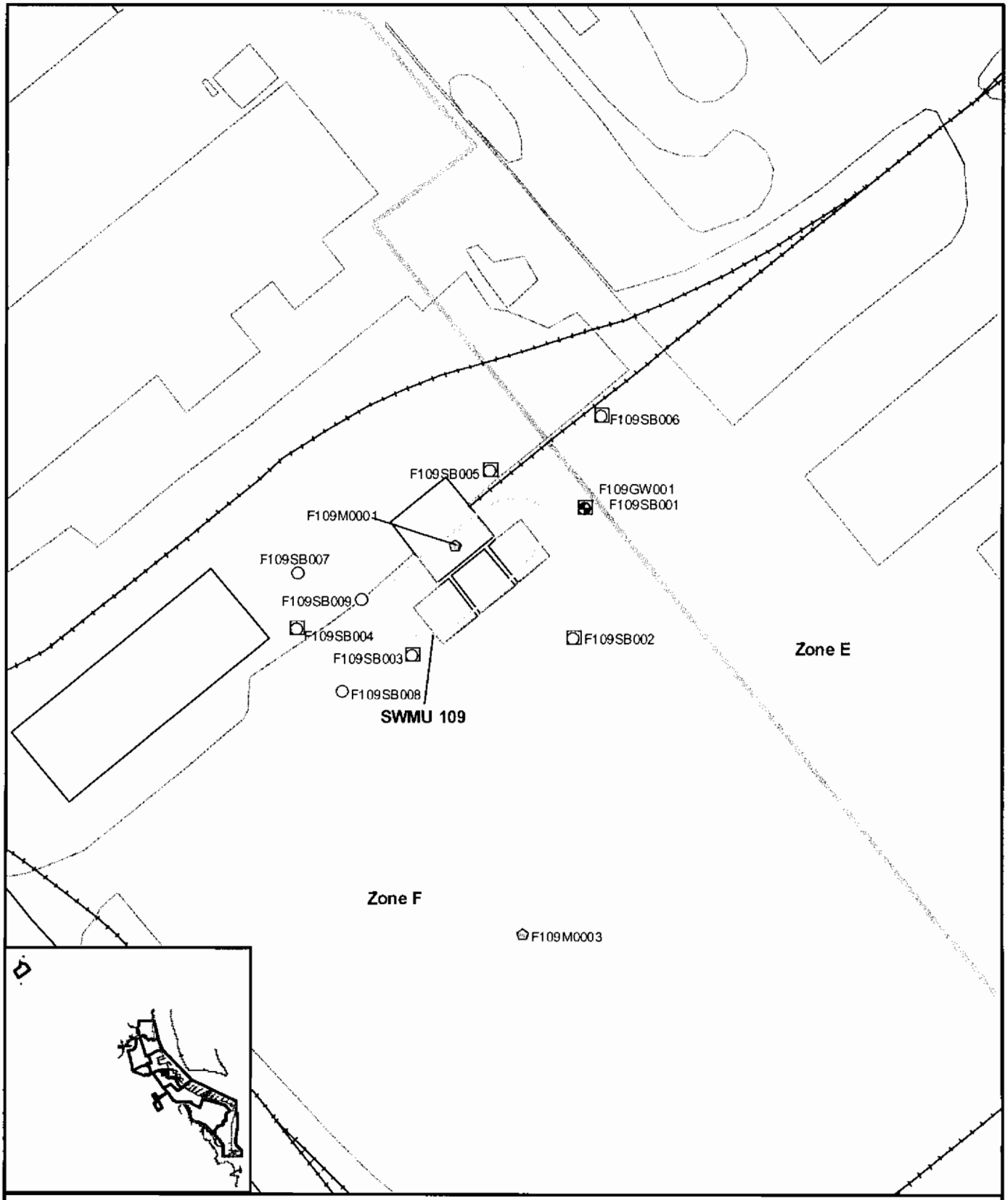
No COPCs/COCs were identified in site groundwater. In addition, the RFI report did not identify any COCs in SWMU 109 sediment.

COCs in surface soil were identified based on cumulative incremental lifetime cancer risk (ILCR) and hazard index (HI) levels. A COC was considered to be any chemical contributing to a cumulative risk level of 1E-6 or whose HI exceeds 0.1, for unrestricted land use. The risk assessment identified BEQs, arsenic, beryllium, chromium, manganese, and vanadium as COCs in surface soil at SWMU 109 based on their contribution to cumulative ILCR projections and cumulative HI projections. For the risk calculations, all of the detected chromium was assumed to be in its more toxic hexavalent state. BEQs and arsenic were identified as COCs under industrial worker exposure assumptions.

2.6 Conclusions and Recommendations

The RFI concluded that a corrective measures study (CMS) should be conducted for the surface soil at SWMU 109. Surface soil COCs were identified as arsenic, beryllium, chromium, manganese, vanadium, and BEQs, on the basis of the risk under an unrestricted land use scenario. No COCs were identified in other media.

NOTE: Original figure created in color



Sediment
Groundwater Well
Surface Soil
Soil Boring
SWMU 109
Railroads
Roads
Pavement
Buildings
Zone Boundary

N

0 40 80 Feet

1 inch = 50 feet

Figure 2-1
Originally Reported RFI Sample Locations
SWMU 109
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\cnc\swmu109.apr, Date: 02 Oct 2001 14:06, User: JOVERSTR, EGIS: Charleston Naval Complex SWMU 109 - Figure 2-1 Originally Reported RFI Sample Locations

3.0 Interim Measures

As part of an IM conducted in late 1998 for AOC 699 (Stormwater Sewer) by the Navy, the Environmental Detachment Charleston (DET) cleaned a total of 42 stormwater catch basins and 75 manholes located across the CNC. Over 12,900 linear feet of stormwater sewer piping were also cleaned as part of this effort. Included in the cleaning of these facilities were the catch basins and storm sewer lines located at SWMU 109. Sediments were removed from the catch basins. A Jet Rodder was used for line cleaning, with a vacuum truck to recover contaminated rinseate. A description of the IM was presented in the *Interim Measure Completion Report for AOC 699 Storm Drain Cleaning, Naval Base Charleston,* March 1999 (DET, 1999).

There are no records of underground storage tanks (USTs) or aboveground storage tanks (ASTs) located at SWMU 109.

Section 4.0

4.0 Summary of Additional Investigations

This section summarizes site activities conducted subsequent to the *Zone F RFI Report, Revision 0* (EnSafe, 1997), and provides interpretation of analytical data associated with these activities. The results from the first three groundwater sampling events were reported in the RFI report, as described in Section 2.0 of this RFI Report Addendum. Data from the fourth sampling event are described in this section, along with the data from a groundwater monitoring well installed in 1999. Data from additional soil samples collected in 1999 and 2001 are included in this section, along with data from two blast media samples collected from above the pavement surface. Sample locations described in this section are shown in Figure 4-1.

During 1999, additional field activities were conducted subsequent to the *Zone F RFI Report, Revision 0* in general accordance with the *Zone F RFI Work Plan Addendum, Revision 0* (EnSafe, 1999). One new soil boring was advanced in the western portion of the site, and surface and subsurface soil samples were collected. In addition, three boring locations from the 1996 RFI sampling effort were re-sampled (i.e., a new boring was installed in the immediate vicinity of the original location and new samples were collected) for the purpose of conducting an SPLP evaluation.

During 2001, soil at four boring locations in the eastern portion of SWMU 109 was sampled, in accordance with the *Zone F Work Plan Addendum, Revision 1* (CH2M-Jones, 2001). Two composite samples of blast media were also collected from loose material scattered on the pavement surface. Analytical data and data validation reports for the fourth groundwater sampling event, the 1999 soil and groundwater investigation activity, and the 2001 soil sampling efforts are summarized in Appendices B and C, respectively. The SPLP test results are summarized and presented in Appendix D, along with documentation regarding the methodology used to calculate site-specific SSLs.

4.1 Soil Sampling and Analysis

To evaluate arsenic concentrations west of SWMU 109, boring F109SB010 was sampled adjacent to Building 97 in 1999, and the samples were analyzed for metals. In 2001, CH2M-Jones sampled borings F109SB011, F109SB012, F109SB013, and F109SB014, east of the former storage hoppers, and analyzed them for lead. Each boring included surface and subsurface soil samples.

Surface and subsurface soils at three boring locations (F109SB001, F109SB004, and F109SB005) were re-sampled for VOCs, SVOCs, pesticides, PCBs, and metals in 1999. SPLP analyses were also performed for each sample/target analytical parameter. SPLP results are summarized in Appendix D.

All soil data were compared against EPA-derived SSLs using DAF=1 for VOCs, and DAF=10 for other analytes. Surface soil data were also compared against the October 2000 EPA Region III unrestricted land use RBCs (1/10 of the RBC was used for non-carcinogenic compounds). The November 2000 EPA Region IX PRG Table was used for analytes not listed in the Region III RBC Table. Inorganic analytes in both surface and subsurface soil were also compared against the Zones F and G combined background (grid-based) range values. Because the Zone F grid-based sample population is fewer than 10, Zones F and G background data were combined in order to screen against a greater population of data points. Inorganic analytes that were detected in soil at concentrations within the Zone F or Zone G background grid-based ranges were eliminated from further consideration as COPCs.

Additionally, SWMU 109 is in close proximity to the Zone E industrial area, and the areas of investigation extend into Zone E. A portion of the site is adjacent to railroad lines; the blast media was unloaded from trains directly into the hoppers. BEQs were likewise screened against the CNC-wide background BEQ value for surface or subsurface soils (1,304 and 1,400 µg/kg, respectively) as appropriate (CH2M-Jones, 2001). The background sampling conducted along railroad lines for PAHs, copper, and arsenic is pertinent to the background conditions at SWMU 109, particularly for samples collected along the northwest side of the buildings/site. Therefore, samples collected from this area will be compared with railroad line (background) samples, when appropriate.

4.1.1 Surface Soil Results

Tables 4-1 and 4-2, respectively, summarize metals and organics and pesticides/PCBs detected in surface soil samples collected during the 1999 and 2001 investigation activities. Of the metals, chromium, lead, mercury, nickel, and selenium were detected at concentrations greater than the Zones F and G background ranges. Of these background exceedances, lead concentrations exceeded screening values, with 476 milligrams per kilogram (mg/kg) at F109SB001 and 793 mg/kg at F109SB005, compared to an unrestricted land use screening value of 400 mg/kg. Both of these samples were collocated with samples that previously had lead concentrations of less than 400 mg/kg. Mercury (3.7 mg/kg) also exceeded unrestricted land use RBCs (HI=0.1) in the collocated sample from F109SB001. The SSL for chromium was exceeded in the collocated sample at F109SB005 (41.4 mg/kg),

although the detected concentration was less than the RBC and within ten percent of the background range. VOCs, SVOCs, and pesticides/PCBs detected in surface soil samples did not exceed unrestricted land use-based screening criteria. Therefore, lead, chromium, and mercury were identified as COPCs in surface soil.

4.1.2 Subsurface Soil Results

Tables 4-3 and 4-4 present metals and organics/pesticides detected in subsurface soil. Metals were all detected within the range of background concentrations for Zones F and G, with the exception of lead, selenium, antimony, and tin. No background range had been established for antimony. All of these metals were detected below their applicable SSLs. As noted in Table 4-4, VOCs, SVOCs, and pesticides detected in subsurface soil samples did not exceed screening criteria. Therefore, no COPCs for subsurface soil were identified from these sampling events.

4.2 Blast Media Sampling and Analysis

Two samples of blast media were each composited from above the pavement surrounding the former media storage hoppers and analyzed for metals. Sample F109VA001 was collected in the general vicinity of F109SB013, and sample F109VA002 was collected in the general vicinity of F109SB014 by sweeping up and collecting blast media that was present on top of the paved surface. As with surface soil, metals concentrations in the blast media were compared to RBCs, SSLs, and the range of surface soil background concentrations from Zones F and G. Table 4-5 lists the metals analyzed in the blast media.

The blast media contained several metals at concentrations in excess of the surface soil background range from Zones F and G. Of these metals, copper, iron, lead, and manganese concentrations exceeded unrestricted land use-based surface soil screening values, adjusted for HI=0.1. Chromium and nickel concentrations exceeded the SSLs used to screen soil samples, adjusted for DAF=10. These metals in the blast media may be considered COPCs for surface media. However, both surface soil samples (F109SB013 and F109SB014) from the same locations did not have copper, chromium, iron, lead, or manganese above background concentrations or any other criteria, thus indicating the blast media are not a leaching concern.

4.3 Groundwater Sampling and Analysis

Groundwater monitoring well F109GW002 was installed within the shallow aquifer and screened from 3 to 13 ft bls. The well construction log is presented in Appendix E. Locations of the site groundwater monitoring wells are shown in Figure 4-1. Groundwater from the

fourth sampling event at F109GW001 was analyzed for SVOCs and metals; the sample from F109GW002 was analyzed for VOCs, SVOCS, metals, and pesticides/PCBs. Table 4-6 presents the analytes detected in groundwater from the fourth sampling event at F109GW001 and from groundwater monitoring well F109GW002.

No VOCs, SVOCs, or pesticides/PCBs were detected in the groundwater. Detected metals concentrations were compared to Zone F BRCs and to primary drinking water MCLs. If no MCL was available, concentrations were compared to tap water RBCs presented in October 2000 EPA Region III RBC tables. As shown in Table 4-6, no constituent exceeded groundwater comparison criteria; therefore, no COPCs were identified in site groundwater.

TABLE 4-1
Metals Detected in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	RBC[a]	SSL[b]	Background Concentration Range[c]
Aluminum	F109SB001	14,600	=	7,800	NL	2,190 - 19,400
	F109SB004	2,190	=			
	F109SB005	6,810	=			
	F109SB010	8,340	=			
Antimony	F109SB004	0.45	J	3.1	2.5	0.5 - 5.7
	F109SB005	3.9	J			
Arsenic	F109SB001	16.9	=	0.43	15	3.0 - 30
	F109SB004	5	J			
	F109SB005	14.1	J			
	F109SB010	7.6	=			
Barium	F109SB001	74.3	=	550	800	11 - 129
	F109SB004	9.1	J			
	F109SB005	37.8	=			
	F109SB010	23.2	=			
Beryllium	F109SB001	0.67	=	16	32	0.19 - 1.3
	F109SB005	0.32	J			
	F109SB010	0.28	J			
Cadmium	F109SB001	0.24	J	7.8	4	0.12 - 1.7
	F109SB004	0.81	J			
	F109SB005	1.2	=			
Calcium	F109SB001	16,800	J	NL	NL	2,080 - 52,300
	F109SB004	334,000	J			
	F109SB005	252,000	J			
	F109SB010	33,900	J			
Chromium, Total	F109SB001	26	J	210[d]	19	6.3 - 39
	F109SB004	8.3	J			
	F109SB005	**41.4**	J			
	F109SB010	29.5	J			
Cobalt	F109SB001	16.9	=	470	1,000[e]	.94 - 36
	F109SB004	5.5	=			
	F109SB005	5.5	=			
	F109SB010	3.9	J			
Copper	F109SB001	48.7	J	310	5,300[f]	5.7 - 431
	F109SB004	26	=			
	F109SB005	84.2	=			
	F109SB010	49.9	J			
Iron	F109SB001	17,700	J	2,300	NL	3,570 - 32,700

TABLE 4-1
Metals Detected in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	RBC[a]	SSL[b]	Background Concentration Range[c]
	F109SB004	4,300	=			
	F109SB005	10,300	=			
	F109SB010	14,700	J			
Lead	F109SB001	**476**	J	400	400	3.5 - 275
	F109SB004	18.1	=			
	F109SB005	**793**	=			
	F109SB010	41.2	J			
	F109SB011	137	J			
	F109SB012	72	J			
	F109SB013	211	J			
	F109SB014	11.9	J			
Magnesium	F109SB001	1,970	J	NL	NL	323 - 5,280
	F109SB004	3,440	J			
	F109SB005	2,910	J			
	F109SB010	1,240	J			
Manganese	F109SB001	282	J	160	480[f]	32 - 436
	F109SB004	318	=			
	F109SB005	331	=			
	F109SB010	134	J			
Mercury	F109SB001	**3.7**	=	2.3[d]	1	0.06 - 2.0
	F109SB005	0.38	=			
	F109SB010	0.11	=			
Nickel	F109SB001	11.3	J	160	65	2.0 - 27
	F109SB004	17.1	=			
	F109SB005	23.9	=			
	F109SB010	32	J			
Potassium	F109SB001	1,110	J	NL	NL	202 - 1730
	F109SB004	1,580	J			
	F109SB005	1,450	J			
	F109SB010	720	J			
Selenium	F109SB001	1.6	=	39	2.5	0.44 - 1.4
	F109SB005	0.31	J			
	F109SB010	0.99	J			
Silver	F109SB001	1	J	39	17	5
Sodium	F109SB001	265	J	NL	NL	226 - 1,150
	F109SB004	681	=			
	F109SB005	574	=			
	F109SB010	212	J			

TABLE 4-1
Metals Detected in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	RBC[a]	SSL[b]	Background Concentration Range[c]
Tin	F109SB004	6.2	J	4,700	NL	2.6 - 26
	F109SB005	8.8	J			
Vanadium	F109SB001	36.4	=	55	3,000	6.8 - 60
	F109SB004	8.4	=			
	F109SB005	20.8	=			
	F109SB010	19.9	=			
Zinc	F109SB001	419	J	2,300	6,000	18 - 1,650
	F109SB004	56.4	J			
	F109SB005	326	J			
	F109SB010	93.8	J			

Concentrations in bolded and outlined text exceeded the comparison criteria.
[a] RBCs are from the EPA Region III RBC Tables, October 2000; RBCs for non-carcinogenic elements are adjusted for HI = 0.1.
[b] SSLs are from EPA's *Soil Screening Guidance: User's Guide*, Appendix A (May 1996), DAF = 10.
[c] Background range concentrations are the minimum and maximum concentrations detected in Zones F and G combined grid samples.
[d] RBCs for total chromium and mercury are from EPA Region IX PRG Tables, November 2000.
[e] SSL for cobalt is from the *Zone F RFI Report, Revision 0* (EnSafe, 1997), adjusted for DAF = 10.
[f] SSLs for copper and manganese are from EPA Region III RBC Table, October 2000, adjusted for DAF = 10.

=	Analyte was detected at the concentration shown.
J	Analyte was present, but the reported concentration is estimated.
mg/kg	Milligram per kilogram
NA	Not available
NL	Not listed

TABLE 4-2
Organics and Pesticides/PCBs Detected in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	RBC[a]	SSL[b]	Background Reference Concentration
Acetone	F109SB005	0.003	J	780	0.8	NA
Anthracene	F109SB005	0.12	J	2,300	6,000	NA
BEQs	F109SB005	0.519	=	0.087	NL	1.304 [c]
Benzo(a)Anthracene	F109SB005	0.14	J	0.87	1	0.616 [c]
Benzo(a)Pyrene	F109SB005	0.24	J	0.087	4	0.598 [c]
Benzo(b)Fluoranthene	F109SB005	0.48	=	0.87	2.5	0.608 [c]
Benzo(g,h,i)Perylene	F109SB005	0.16	J	NL	NL	NA
Benzo(k)Fluoranthene	F109SB005	0.25	J	8.7	25	0.596 [c]
Bis(2-Ethylhexyl) Phthalate	F109SB001	0.49	=	46	1,800	NA
Carbon Disulfide	F109SB005	0.002	J	780	2	NA
Chrysene	F109SB005	0.27	J	87	80	0.620 [c]
Endrin Ketone	F109SB005	0.0068	J	2.3 [d]	0.5[d]	NA
Flouranthene	F109SB001	0.12	J	310	2,200	NA
	F109SB005	0.18	J			
Gamma-chlordane	F109SB005	0.052	J	1.8 [e]	5 [e]	NA
Indeno(1,2,3-c,d)pyrene	F109SB005	0.19	J	0.87	7	0.525 [c]
Methoxychlor	F109SB005	0.02	J	39	80	NA
p,p'-DDD	F109SB005	0.017	J	2.7	8	NA
p,p'-DDE	F109SB005	0.11	J	1.9	27	NA
p,p'-DDT	F109SB005	0.035	J	1.9	16	NA
PCB-1260 (Aroclor 1260)	F109SB004	0.16	J	0.32	NL	NA
Phenanthrene	F109SB005	0.088	J	NL	NL	NA
Pyrene	F109SB001	0.1	J	230	2,100	NA
	F109SB005	0.24	J			

TABLE 4-2
Organics and Pesticides/PCBs Detected in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	RBC[a]	SSL[b]	Background Reference Concentration

[a] RBCs are from EPA Region III RBC Tables, October 2000; RBCs for non-carcinogenic compounds are adjusted for HI = 0.1.

[b] SSLs are from EPA's *Soil Screening Guidance: User's Guide*, Appendix A (May 1996), DAF = 1 for VOCs; DAF = 10 for other compounds.

[c] Site-wide background concentration is from *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values* (CH2M-Jones, 2001).

[d] RBC and SSL for endrin.

[e] RBC and SSL for chlordane.

=	Analyte was detected at the concentration shown.
J	Analyte was present, but the reported concentration is estimated.
mg/kg	Milligram per kilogram
NA	Not available
NL	Not listed

TABLE 4-3
Metals Detected in Subsurface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	SSL[a]	Background Concentration Range[b]
Aluminum	F109SB001	9,300	=	NL	2,630 - 36,800
	F109SB004	4,130	=		
	F109SB005	7,380	=		
	F109SB010	7,620	=		
Antimony	F109SB005	0.4	J	2.5	NA
Arsenic	F109SB001	4.4	=	15	1.4 - 36
	F109SB004	2.1	J		
	F109SB005	3.3	J		
	F109SB010	11.9	=		
Barium	F109SB001	22.1	=	800	7.7 - 63
	F109SB004	10.6	J		
	F109SB005	25.9	=		
	F109SB010	22.5	J		
Beryllium	F109SB001	0.3	J	32	0.22 - 2.4
	F109SB004	0.4	J		
	F109SB005	0.37	J		
	F109SB010	0.58	J		
Calcium	F109SB001	3,980	J	NL	1,040 - 127,000
	F109SB004	6,270	J		
	F109SB005	4,930	J		
	F109SB010	7,590	J		
Chromium, Total	F109SB001	15.5	J	19	7.4 - 65
	F109SB004	10.9	J		
	F109SB005	13	J		
	F109SB010	18.3	J		
Cobalt	F109SB001	2.8	J	1,000 [c]	0.9 - 15
	F109SB004	2.3	J		
	F109SB005	2.7	J		
	F109SB010	3.7	J		
Copper	F109SB001	4.8	J	5,300 [d]	2.5 - 55
	F109SB004	3.6	=		
	F109SB005	9.8	=		
	F109SB010	8.2	J		
Iron	F109SB001	9,850	J	NL	3,110 - 58,100
	F109SB004	4,270	=		
	F109SB005	6,760	=		
	F109SB010	11,600	J		

TABLE 4-3
Metals Detected in Subsurface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	SSL[a]	Background Concentration Range[b]
Lead	F109SB001	18.7	J	400	2.4 - 123
	F109SB004	4.9	=		
	F109SB005	29.1	=		
	F109SB010	6.7	J		
	F109SB011	4.2	J		
	F109SB012	2.41	J		
	F109SB013	235	J		
	F109SB014	2.11	J		
Magnesium	F109SB001	1,090	J	NL	399 - 7,040
	F109SB004	795	J		
	F109SB005	849	J		
	F109SB010	1,260	J		
Manganese	F109SB001	82	J	480[d]	20 - 1,120
	F109SB004	30.6	=		
	F109SB005	46.7	=		
	F109SB010	183	J		
Mercury	F109SB001	0.1	=	1	0.04 - 0.57
	F109SB004	0.18	=		
	F109SB005	0.06	=		
Nickel	F109SB001	5	J	65	1.9 - 22
	F109SB004	3.9	J		
	F109SB005	5.1	=		
	F109SB010	8.9	J		
Potassium	F109SB001	732	J	NL	195 - 3,790
	F109SB004	496	J		
	F109SB005	561	J		
	F109SB010	783	J		
Selenium	F109SB001	1.1	=	2.5	0.4 - 1.7
	F109SB004	0.75	J		
	F109SB005	0.97	J		
	F109SB010	2.3	=		
Sodium	F109SB001	154	J	NL	289 - 3,890
	F109SB004	86.4	J		
	F109SB005	134	J		
	F109SB010	135	J		
Tin	F109SB004	2.9	J	NL	1.1 - 2.9
	F109SB005	6.1	J		

TABLE 4-3
Metals Detected in Subsurface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	SSL[a]	Background Concentration Range[b]
Vanadium	F109SB001	19.9	=	3,000	5.9 - 112
	F109SB004	10.8	=		
	F109SB005	14.9	=		
	F109SB010	22	=		
Zinc	F109SB001	20.7	J	6,000	9.3 - 198
	F109SB004	15.4	J		
	F109SB005	35.3	J		
	F109SB010	27.4	J		

[a] SSLs are from EPA's *Soil Screening Guidance: User's Guide*, Appendix A (may 1996), DAF = 10.

[b] Background range concentrations are the minimum and maximum concentrations detected in Zones F and G subsurface soil grid samples.

[c] SSL for cobalt is from the *Zone F RFI Report, Revision 0* (EnSafe, 1997), adjusted for DAF = 10.

[d] SSLs for copper and manganese are from EPA Region III RBC Table, October 2000, adjusted for DAF = 10.

= Analyte was detected at the concentration shown.

J Analyte was present, but the reported concentration is estimated.

mg/kg Milligram per kilogram

NA Not available

NL Not listed

TABLE 4-4
Organics and Pesticides Detected in Subsurface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (mg/kg)	Qualifier	SSL[a]	Background Reference Concentration
Carbon Disulfide	F109SB001	0.002	J	2	NA
	F109SB004	0.002	J		
	F109SB005	0.002	J		
Acetone	F109SB004	0.031	=	0.8	NA
	F109SB005	0.016	J		
p,p'-DDE	F109SB005	0.0062	=	27	NA
p,p'-DDT	F109SB005	0.0081	=	16	NA

[a] SSLs are from EPA's *Soil Screening Guidance: User's Guide*, Appendix A (May 1996), DAF = 1 for VOCs; DAF = 10 for other compounds.

= Analyte was detected at the concentration shown.

J Analyte was present, but the reported concentration is estimated.

mg/kg milligram per kilogram

NA Not available

TABLE 4-5
Metals Detected in Blast Media on Surface
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Sample Location	Concentration (mg/kg)	Qualifier	RBC[a]	Soil-to-Groundwater SSL (DAF=10)[b]	Background Concentration Range[c]
Aluminum	109VA001	3,620	=	7,800	NL	2,190 - 19,400
	109VA002	3,730	=			
Antimony	109VA001	1.82	J	3.1	2.5	0.5 - 5.7
	109VA002	3.16	J			
Arsenic	109VA001	1.53	=	0.43	15	3.0 - 30
	109VA002	9.58	=			
Barium	109VA001	33.7	=	550	800	11 - 129
	109VA002	58.8	=			
Beryllium	109VA001	0.50	=	16	32	0.19 - 1.3
	109VA002	0.31	J			
Cadmium	109VA001	0.93	=	3.9	4	0.12 - 1.7
	109VA002	1.72	=			
Calcium	109VA001	24,800	=	NL	NL	2,080 - 52,300
	109VA002	5,770	=			
Chromium,	109VA001	**47.2**	=	210[d]	19	6.3 - 39
Total	109VA002	**113**	=			
Cobalt	109VA001	5.07	=	470	1,000[e]	0.94 - 36
	109VA002	9.85	=			
Copper	109VA001	**598**	=	310	5,300[f]	5.7 - 431
	109VA002	209	=			
Iron	109VA001	15,000	=	2,300	NL	3,570 - 32,700
	109VA002	**105,000**	=			
Lead	109VA001	**576**	J	400[d]	400	3.5 - 275
	109VA002	289	J			
Magnesium	109VA001	1,040	=	NL	NL	323 - 5,280
	109VA002	1,160	=			
Manganese	109VA001	144	J	160	480[f]	32 - 436
	109VA002	**601**	J			
Nickel	109VA001	**100**	=	160	65	2.0 - 27
	109VA002	**85.3**	=			
Potassium	109VA001	514	J	NL	NL	202 - 1,730
	109VA002	754	=			
Selenium	109VA002	0.86	=	39	2.5	0.44 - 1.4
Silver	109VA002	0.28	J	39	17	5.0

TABLE 4-5
Metals Detected in Blast Media on Surface
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Sample Location	Concentration (mg/kg)	Qualifier	RBC[a]	Soil-to-Groundwater SSL (DAF=10)[b]	Background Concentration Range[c]
Sodium	109VA001	122	J	NL	NL	226 - 1,150
	109VA002	91.9	J			
Vanadium	109VA001	11.9	=	55	3,000	6.8 - 60
	109VA002	17.5	=			
Zinc	109VA001	954	J	2,300	6,000	18 - 1,650
	109VA002	728	J			

Concentrations in bolded and outlined text exceeded the Surface Soil Background Range and SSL or RBCs.
[a] RBCs are from the EPA Region III RBC Table, October 2000, adjusted for HI = 0.1 for non-carcinogenic analytes.
[b] SSLs are from EPA's *Soil Screening Guidance: User's Guide*, Appendix A (May 1996), DAF = 10.
[c] Background range concentrations are the minimum and maximum concentrations detected in Zones F and G combined surface soil grid samples.
[e] SSL for cobalt is from the *Zone F RFI Report, Revision 0* (EnSafe, 1997), adjusted for DAF = 10.
[d] RBCs for chromium and lead are obtained from the EPA Region IX PRG Table (November 2000).
[f] SSLs for copper and manganese are from EPA Region III RBC Table, October 2000, adjusted for DAF = 10.

= Analyte was detected at the concentration shown.
J Analyte was present, but the reported concentration is estimated.
mg/kg Milligram per kilogram
NA Not available
NL Not listed

TABLE 4-6
Analytes Detected in Groundwater
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Station ID	Concentration (µg/L)	Qualifier	MCL/*RBC* [a]	Background Reference Concentration[b]
Aluminum	F109GW001	661	=	***37,000***	224
	F109GW002	169	J		
Barium	F109GW001	28.8	=	2,000	94.3
	F109GW002	16.6	J		
Calcium	F109GW001	195,000	J	NL	NA
	F109GW002	98,600	J		
Chromium, Total	F109GW001	7	J	100	2.05
Iron	F109GW001	1,740	=	***11,000***	46,900[c]
	F109GW002	679	J		
Magnesium	F109GW001	14,200	J	NL	NA
	F109GW002	20,600	J		
Manganese	F109GW001	83.6	J	***730***	2,010
	F109GW002	985	=		
Mercury	F109GW002	0.11	J	2	NA
Nickel	F109GW002	1.6	J	***730***	5.55
Potassium	F109GW001	11,500	J	NL	NA
	F109GW002	14,000	J		
Selenium	F109GW001	6.2	=	50	NA
Sodium	F109GW002	53,000	=	NL	NA
Vanadium	F109GW001	3.2	J	***260***	1.58
	F109GW002	3.5	J		

[a] RBCs are listed in italics and bolded text where no primary maximum contaminant level (MCL) exists. Tap water RBCs are listed in EPA Region III RBC table, October 2000.

[b] BRCs are Zone F background concentrations as presented in the *Zone F RFI Report, Revision 0* (EnSafe, 1997)..

[c] Iron background concentration is 2 x mean of Zones F and G shallow groundwater grid samples.

= Analyte was detected at the concentration shown.

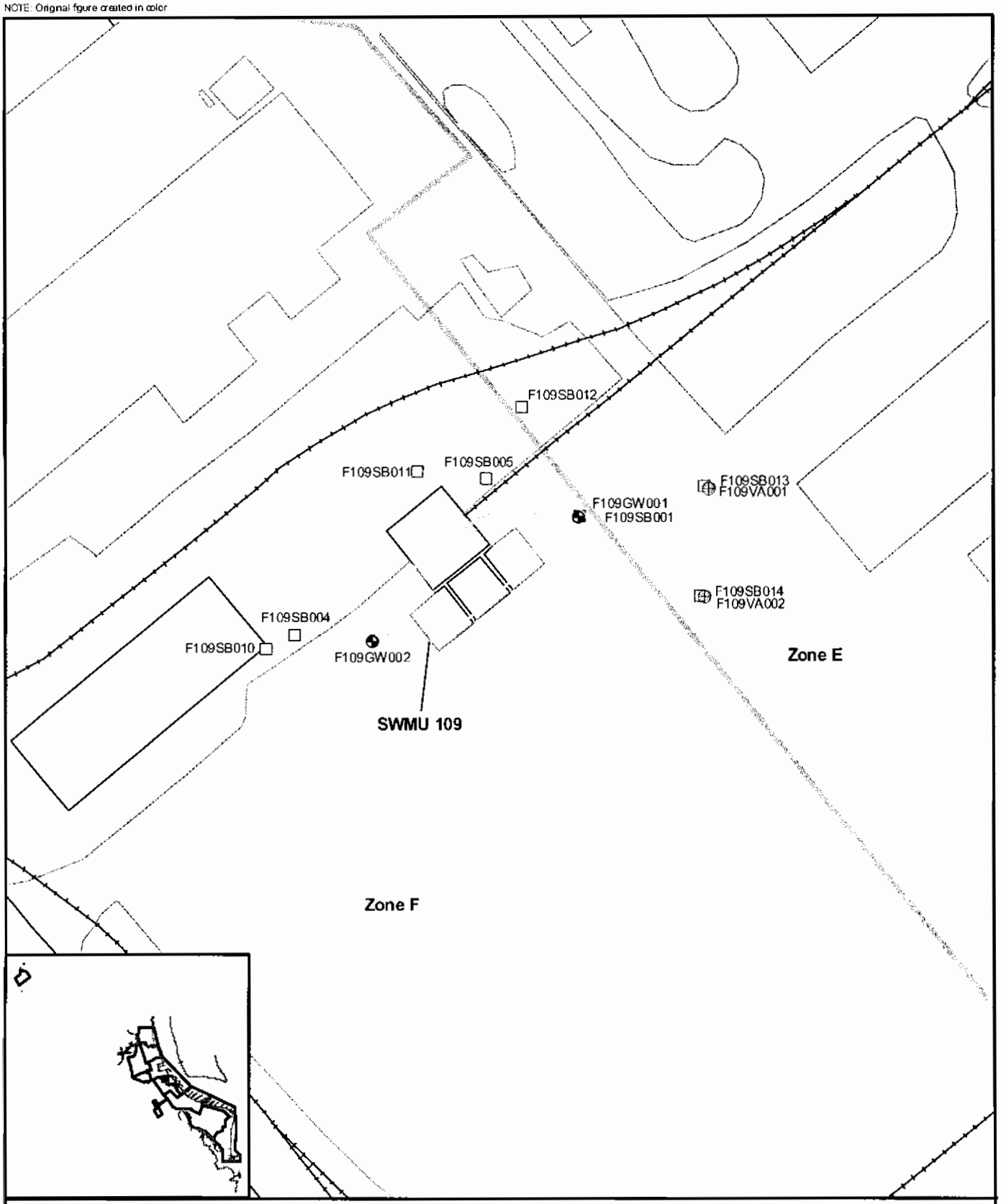
J Analyte was present, but the reported concentration is estimated.

µg/L Microgram per liter

NA Not available

NL Not listed

NOTE: Original figure created in color



Groundwater Well
Blast Media Composite Samples
Soil Boring
SWMU 109
Railroads
Roads
Pavement
Buildings
Zone Boundary
N
0 40 80 Feet
1 inch = 50 feet

Figure 4-1
RFI Report Addendum Sample Locations
SWMU 109
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\cnd\swmu109.apr, Date: 02 Oct 2001 14:31, User: JOVERSTR, EGIS: Charleston Naval Complex SWMU 109 - Figure 4-1 RFI Addendum Samples

Section 5.0

5.0 COPC/COC Refinement

This section discusses chemicals that were identified in the *Zone F RFI Report, Revision 0* (EnSafe, 1997) as COPCs (see Section 2.0 of this RFI Report Addendum), and COPCs that were identified in subsequent sampling events (see Section 4.0). Factors that determine whether a COPC meets the criteria for being a COC are discussed for each parameter. Chemicals detected above background and screening criteria, such as an RBC (HI=0.1), were included in a focused risk evaluation to determine if the site soils present unacceptable human health risk under unrestricted and industrial land use scenarios.

Blast media observed on the surface of the pavement was evaluated as a component of the surface soil. Blast media samples are included as surface soils and a risk evaluation was conducted for the combined data set for all the chemicals detected above background levels.

5.1 Surface Soil and Blast Media

On the basis of the data collected during and after completion of the *Zone F RFI Report, Revision 0,* site surface soil concentrations of selected metals and BEQs require further evaluation. COPCs in surface soil identified in the RFI report are:

- BEQs
- Arsenic
- Beryllium
- Chromium
- Manganese
- Vanadium

COPCs identified in surface soil and blast media samples following the *Zone F RFI Report, Revision 0* are:

- Chromium
- Copper
- Iron
- Lead
- Manganese
- Mercury
- Nickel

Surface soil and blast media inorganic COPCs were screened using the RBCs, SSLs, and background range of grid sample values for Zones F and G. Data for BEQs are provided in Table 5-1, and data for the inorganic COPCs are presented in Table 5-2. The constituents are discussed in the following subsections. Except for BEQs, no SVOCs, VOCs, or pesticides/PCBs have been identified as COPCs at SWMU 109.

5.1.1 BEQs

Table 5-1 presents BEQ data collected from surface soil at each sample location at SWMU 109. BEQs were detected at F109SB004 and F109SB005 and within a field duplicate sample collected from F109SB003. The calculation of BEQ for the field duplicate sample is also presented in Table 5-1. The table shows that BEQ concentrations detected in surface soil at SWMU 109 are lower than the background concentrations established for the CNC in *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values* (CH2M-Jones, 2001). Therefore, BEQs are not considered COCs in surface soil at SWMU 109 and are not included for risk assessment.

5.1.2 Arsenic

Table 5-2 presents arsenic data from surface soil and blast media samples at SWMU 109. With the exception of one sample from F109SB004, all arsenic data are within the range of background sample concentrations for combined Zones F and G, which is 3.1 to 30 mg/kg. Arsenic was not detected above background levels in blast material samples. Surface soil samples collected from location F109SB004 in 1996 contained arsenic at 134 mg/kg. Re-sampling this location in 1999 revealed arsenic concentrations at 5 mg/kg. Subsurface soil at F109SB004 contained arsenic concentrations of 16 mg/kg in 1996, but the concentration was 2.1 mg/kg when re-sampled in 1999. Both results are within the Zones F and G subsurface soil background range. In addition, arsenic has not been detected at SWMU 109 groundwater monitoring wells, indicating that leaching of arsenic from F109SB001 is not occurring.

The single location with elevated arsenic (F109SB004) is located in an unpaved area of the site near an entrance to Building 97, the former Air Compressor House, along the railroad line. Although releases from a compressor building may not be expected to contain arsenic, it is possible that arsenic at F109SB004 may be a result of CNC base-wide weed/pest control activities in the unpaved track area. In the more recent background study (CH2M-Jones, 2001) arsenic was detected between 2 and 92 mg/kg in the 21 samples collected along the railroad lines, indicating that arsenic could be associated weed/pest control applications in some areas. The collocated sample at F109SB004 had an estimated concentration of 5

mg/kg, well within the background range. In addition, arsenic concentrations detected in blast media were less than 10 mg/kg, indicating that the elevated arsenic at F109SB004 is likely not related to blast media management practices at SWMU 109. No source area of arsenic has been identified at SWMU 109. Therefore, arsenic is not considered a COC at SWMU 109 in surface media, and was not included as a COPC for risk evaluation.

5.1.3 Beryllium

Table 5-2 presents all beryllium data from surface soil and blast media samples at SWMU 109. The maximum detected concentration, 1.3 mg/kg, is within the range of surface soil background sample concentrations and is lower than the unrestricted land use RBC of 16 mg/kg (from the October 2000 EPA Region III RBCs, adjusted for HI=0.1). Beryllium was originally selected during the RFI as a COPC based on exceedence of an old RBC that was a much lower value. EPA has since updated the beryllium RBC, and site concentrations do not exceed these new RBCs or the range of background values for Zones F and G. Therefore, beryllium is not considered a COPC in surface soil at SWMU 109, and was not included for risk evaluation.

5.1.4 Chromium

Table 5-2 presents total chromium concentration data from surface soil and blast media samples collected at SWMU 109. The maximum detected blast medium concentration of 113 mg/kg was above the background range of 6.3 to 39 mg/kg, but was below an RBC for total chromium from EPA Region IX of 210 mg/kg (no total chromium RBC is available from EPA Region III). However, the blast media concentration is above an RBC value of 23 mg/kg (HI=0.1) for hexavalent chromium. Hexavalent chromium is not expected to be present at SWMU 109, as this more soluble form of chromium is unlikely to remain in surface soils over time. No hexavalent chromium was detected in the field duplicate sample collected at F109SB003, or in the duplicate sediment sample from the stormwater catch basin. However, chromium was included as a COPC for conservative risk estimates for site exposures under unrestricted land use conditions.

5.1.5 Copper

Copper was detected in surface soil at SWMU 109 at concentrations within the range of background concentrations (5.7 to 431 mg/kg). One blast media sample had a copper concentration of 598 mg/kg, which exceeded the background range. Sample F109VA001 was the only sample with copper concentrations greater than the unrestricted land use RBC (HI=0.1) of 310 mg/kg, and was therefore included as a COPC for risk evaluation.

5.1.6 Iron

Iron was detected at a maximum concentration of 29,500 mg/kg in surface soil, which is within the range of background concentrations for Zones F and G (3,570 mg/kg to 32,700 mg/kg). Iron was measured at 15,000 mg/kg and 105,000 mg/kg in surface blast media samples. Therefore, iron was retained as a COPC for risk evaluation.

5.1.7 Lead

Lead was detected at a maximum concentration of 793 mg/kg at F109SB005 compared to a range of background values of 3.5 to 275 mg/kg. Figure 5-1 presents lead concentrations in surface soil and blast media. The highest concentration of lead was detected in an area collocated for SPLP evaluation, where lead had been identified previously at 131 mg/kg, which is within the range of background concentrations.

The mean lead concentration in surface soils is 199 mg/kg, as shown on Table 5-3. Note that exposure point concentration (EPC) values for lead are based on the mean concentration, as the target lead value is calculated based on the central tendency (i.e., mean value), as described by EPA's Integrated Exposures and Uptake Biokinetic (IEUBK) Model. The EPC is well below the screening value for unrestricted land use of 400 mg/kg and the assumed SSL of 400 mg/kg.

Lead has not been detected in groundwater at SWMU 109 or above background levels in subsurface soil samples. Therefore, it appears that occurrences of lead at concentrations above screening levels are not leaching from the site's soils and are not a human health concern from future groundwater migration. Therefore, lead is not considered a COC in surface media at SWMU 109.

5.1.8 Manganese

Manganese was identified as a COPC within surface soil from the 1996 soil sampling event. As shown in Table 5-2, the maximum detected manganese concentration from surface media samples at SWMU 109 (601 mg/kg) is above the range of Zones F and G background concentrations (32 mg/kg to 436 mg/kg). Therefore, manganese is included as a COPC for further risk evaluation.

5.1.9 Mercury

Mercury was identified in SWMU 109 surface soils and blast media at concentrations ranging from non-detect (less than 0.007 mg/kg) to 3.7 mg/kg. The maximum concentration detected at the site was above the Zones F and G background range of 0.06 to 2.0 mg/kg. Therefore, mercury was included as a COPC for risk evaluation.

5.1.10 Nickel

Nickel was detected in surface soil and blast media at a maximum concentration of 114 mg/kg, above the background range of concentrations (2 mg/kg to 27 mg/kg). The maximum concentration is less than the unrestricted land use RBC (HI=0.1) of 160 mg/kg, but greater than the generic SSL (DAF=10) of 65 mg/kg. Nickel has not been detected above BRCs in collocated subsurface soil sample or groundwater at the site; therefore, nickel does not appear to be leaching from the surface media.

The mean nickel concentration at SWMU 109 has been estimated at 35 mg/kg, as shown in Table 5-2. This value is below the SSL set for nickel. Subsurface soil concentrations were below the background level, and it has not been detected in site groundwater above background levels. Therefore, nickel is not considered a COC for unrestricted land use in this medium. As described in the *EPA Soil Screening Guidance: Technical Background Document* (EPA, 1996), the average concentration in a release area must exceed an SSL in order for the migration from soil to groundwater to be of concern at a site. Therefore, nickel was not selected as a COPC for risk assessment.

5.1.11 Vanadium

Vanadium was identified in SWMU 109 surface soils and blast media at concentrations ranging between 2.4 and 64.5 mg/kg, slightly higher than the Zones F and G background range of 6.8 to 60 mg/kg and the RBC value (HI=0.1) of 55 mg/kg. Therefore, vanadium in surface soil at SWMU 109 is included as a COPC for risk evaluation. Table 5-2 presents the vanadium concentration data from all surface media sampling locations at SWMU 109.

5.2 Surface Soil and Blast Media Risk Evaluation

Several of the detected chemicals in surface soil and blast media are above the Zones F and G background range and RBC values (HI=0.1). Since more than one chemical is above the screening RBC values, a risk evaluation was conducted to determine if exposures to all the chemicals presented excessive risks or hazards from exposures. Table 5-3 presents the screening evaluation of all the metals and of those selected as COPCs in surface soil and blast media samples.

5.2.1 Selection of COPCs

Sample results for surface soil media and blast media from SWMU 109 were combined to select COPCs for risk calculation. Two sediment samples collected during the original RFI sampling event at SWMU 109 were removed as part of the IM as noted in Section 3.0; therefore, sediment samples are not included in this risk evaluation. Three surface soil

stations F109SB001, F109SB004, and F109SB005 were re-sampled subsequent to the *Zone F RFI Report, Revision 0.* In order to give equal weight to both results from the same location and avoid placing excessive importance on any particular value, the original and re-sampled results for these stations were averaged to provide a single result per station, and counted as one sample in the statistical calculations.

The metals identified in Section 5.1 were re-screened as presented in Table 5-3 for selection of COPCs. Maximum detected concentrations were compared to applicable criteria to determine which metals would be included in the health-based risk evaluation. Based on this screening, the metals selected for a health-based risk evaluation were:

- Chromium
- Copper
- Iron
- Manganese
- Mercury
- Vanadium

Table 5-3 provides data summaries for the combined samples, applicable criteria, and the reason for exclusion or inclusion in the risk based evaluation.

5.2.2 Exposure Assessment

Combined surface soil and blast media results were used to estimate EPCs. EPCs are assumed to be at the 95 percent mark of the high end of detected concentrations (95 percent Upper Confidence Limit [UCL_{95}] on the mean). During the UCL_{95} calculation, when the data distribution evaluation did not indicate a normal or log-normal distribution, a non-parametric UCL_{95} was calculated. Results of the distribution testing and the estimated EPCs for COPCs undergoing the health-based evaluation are included in Table 5-4.

Exposure pathways were assumed to be complete for a hypothetical industrial worker and hypothetical future residential adult and child. Default exposure assumptions common to EPA Region IV practice for these scenarios were used and are provided in the risk calculation sheets in Appendix F.

5.2.3 Toxicity Assessment

Toxicity factors were obtained from the Integrated Risk Information System (IRIS) website or Health Effects Assessment Summary Tables (HEAST, 1997), as appropriate. Toxicity factors, weight-of-evidence classification, and oral-to-dermal adjustment factors are provided in Appendix F. There are no toxicity factors available for total chromium. The

hexavalent state of chromium was not detected in field duplicates collected at this site (see Section 5.1.4). Therefore, available toxicity factors for chromium III were used as surrogate values for this assessment.

5.2.4 Risk Characterization

There were no carcinogenic chemicals identified as site COPCs, therefore, no cancer risks were estimated. The total HI from the presence of multiple chemicals above an RBC at HI=0.1 were estimated, regardless of their target organ for toxicity. EPA Region IV considers an HI value between 1 and 3 as acceptable. The calculated HIs are compared against a screening HI value of 1.0.

Appendix F also presents the HI calculations. The total HI for a hypothetical industrial worker under the default exposure assumptions scenario at this site is 0.052, which is well below the target value of 1.0. The total HIs for a residential adult and child are 0.14 and 1.30, respectively. The HI for a residential adult is well below a value of 1.0; however, the HI for child is slightly above 1.0. The exceeded HI is primarily from iron (HI=0.8) and manganese (HI=0.21), and individual HIs are below a value of 1.0. In addition, the target organs of toxicity for manganese and iron are not truly additive. The added toxicity from chemicals with common target organ (e.g., Fe and Cu) results in HI=0.89. Thus, no individual chemical or chemicals added for common target organ exceed a value of 1.0. Therefore, there are no excessive non-carcinogenic or carcinogenic health risks from exposure to soil and blast media to industrial or residential receptors at SWMU 109.

5.3 Subsurface Soil

No COPCs were identified in subsurface soil at SWMU 109.

5.4 Sediment

Sediments were collected within engineered structures; thus, sediment screening criteria based on ecological receptors are not applicable to these samples. Sediment transported to surface water bodies are evaluated in the *Zone J RFI Report, Revision 0* (EnSafe, 2000). The sediment collected from the sump pit adjacent to the hoppers did not contain constituents with concentrations greater than surface soil screening criteria. The sediment in the catch basin downgradient from the site has been removed by the DET, as described in Section 3.0 of this report. Visual observations indicate that there are no accumulated blast media or sediment in the catch basins. Therefore, there are no COPCs identified in sediment at SWMU 109.

5.5 Groundwater

No COPCs were identified in groundwater at SWMU 109.

TABLE 5-1
COPC Refinement; BEQs in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (µg/kg)	Qualifier	Surface Soil Background Concentration[a]
BEQs	F109SB001	451	U	1,304
	F109SB001 (SPLP Location)	520	U	
	F109SB002	416	U	
	F109SB003	474	U	
	F109SB003 (Field Duplicate)	518	=	
	F109SB004	661	=	
	F109SB004 (SPLP Location)	404	U	
	F109SB005	375	=	
	F109SB005 (SPLP Location)	519	=	
	F109SB006	427	U	

Calculation of BEQ for Field Duplicate Sample from F109SB003

Parameter	Concentration (µg/kg)	Qualifier	TEF	BEQ
Benzo(a)Anthracene	450	U	0.1	22.50
Benzo(a)Pyrene	450	U	1	225.00
Benzo(b)Fluoranthene	450	U	0.1	22.50
Benzo(k)Fluoranthene	66	J	0.01	0.66
Chrysene	450	U	0.001	0.23
Dibenz(a,h)anthracene	450	U	1	225.00
Indeno(1,2,3-c,d)Pyrene	450	U	0.1	22.50
Total BEQ				518

BEQ for non-detect compound equals one-half reporting limit multiplied by TEF.

[a] Site-wide background concentration for surface soil from the *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values* (CH2M-Jones, 2001).

U Analyte was not detected, the reporting limit is provided.
= Analyte was detected at the concentration shown.
J Analyte was present, but the reported concentration is estimated.
µg/kg Microgram per kilogram
TEF Toxicity equivalency factor

TABLE 5-2
COPC Refinement; Metals in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (mg/kg)	Qualifier	Unrestricted Land Use RBC[a]	Industrial Land Use RBC[b]	SSL[c]	Background Concentration Range[d]
Arsenic	F109SB001	4.0	=	0.43	3.8	15	3.0 - 30
	F109SB001	16.9	=				
	(SPLP Location)						
	F109SB002	1.4	=				
	F109SB003	11.3	=				
	F109SB004	**134.0**	=				
	F109SB004	5.0	J				
	(SPLP Location)						
	F109SB005	20.2	=				
	F109SB005	14.1	J				
	(SPLP Location)						
	F109SB006	6.1	=				
	F109SB007	25.9	=				
	F109SB008	20.0	=				
	F109SB009	5.1	=				
	F109SB010	7.6	=				
	109VA001	1.53	=				
	109VA002	9.58	=				
Beryllium	F109SB001	0.28	=	16	410	32	0.19 - 1.3
	F109SB001	0.67	=				
	(SPLP Location)						
	F109SB002	0.17	J				
	F109SB003	0.68	=				
	F109SB004	0.85	=				
	F109SB004	0.08	U				
	(SPLP Location)						
	F109SB005	1.30	=				
	F109SB005	0.32	J				
	(SPLP Location)						
	F109SB006	0.19	J				
	F109SB010	0.28	J				
	109VA001	0.50	=				
	109VA002	0.31	J				
Chromium, Total	F109SB001	6.3	=	210[e]	450[e]	19	6.3 - 39
	F109SB001	26.0	J				
	(SPLP Location)						
	F109SB002	3.0	=				
	F109SB003	21.2	=				
	F109SB004	**45.1**	=				

TABLE 5-2
COPC Refinement; Metals in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (mg/kg)	Qualifier	Unrestricted Land Use RBC[a]	Industrial Land Use RBC[b]	SSL[c]	Background Concentration Range[d]
Chromium, Total	F109SB004	8.3	J	210 [e]	450 [e]	19	6.3 - 39
	(SPLP Location)						
	F109SB005	33.8	=				
	F109SB005	**41.4**	J				
	(SPLP Location)						
	F109SB006	4.0	=				
	F109SB010	29.5	J				
	109VA001	**47.2**	=				
	109VA002	**113**	=				
Copper	F109SB001	4.0	=	310	8,200	5,300[g]	5.7 - 431
	F109SB001	48.7	J	3,100[f]	82,000[f]		
	(SPLP Location)						
	F109SB002	1.9	U				
	F109SB003	48.5	J				
	F109SB004	138	J				
	F109SB004	26.0	=				
	(SPLP Location)						
	F109SB005	49.9	J				
	F109SB005	84.2	=				
	(SPLP Location)						
	F109SB006	2.6	U				
	F109SB010	49.9	J				
	109VA001	**598**	=				
	109VA002	209	=				
Iron	F109SB001	4,820	=	23,000[f]	610,000[f]	NL	3,570 - 32,700
	F109SB001	17,700	J				
	(SPLP Location)						
	F109SB002	1,160	J				
	F109SB003	13,800	J				
	F109SB004	29,500	J				
	F109SB004	4,300	=				
	(SPLP Location)						
	F109SB005	28,000	J				
	F109SB005	10,300	=				
	(SPLP Location)						
	F109SB006	1,440	J				
	F109SB010	14,700	J				
	109VA001	15,000	=				

TABLE 5-2
COPC Refinement; Metals in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (mg/kg)	Qualifier	Unrestricted Land Use RBC[a]	Industrial Land Use RBC[b]	SSL[c]	Background Concentration Range[d]
Iron	109VA002	**105,000**	=	23,000[f]	610,000[f]	NL	3,570 - 32,700
	Mean Concentration	**20,477**					
Lead	F109SB001	6.7	=	400	1,000	400	3.5 - 275
	F109SB001 (SPLP Location)	**476**	J				
	F109SB002	9.4	J				
	F109SB003	46.7	J				
	F109SB004	362	J				
	F109SB004 (SPLP Location)	18.1	=				
	F109SB005	131	J				
	F109SB005 (SPLP Location)	**793**	=				
	F109SB006	6.5	J				
	F109SB010	41.2	J				
	F109SB011	137	J				
	F109SB012	72	J				
	F109SB013	211	J				
	F109SB014	11.9	J				
	109VA001	**576**	J				
	109VA002	289	J				
	Mean Concentration	**199**					
Manganese	F109SB001	119.0	=	160	4,100	480[g]	32 - 436
	F109SB001 (SPLP Location)	282.0	J				
	F109SB002	26.5	J				
	F109SB003	207.0	J				
	F109SB004	427.0	J				
	F109SB004 (SPLP Location)	318.0	=				
	F109SB005	274.0	J				
	F109SB005 (SPLP Location)	331.0	=				
	F109SB006	19.3	J				
	F109SB010	134	J				
	109VA001	144	J				
	109VA002	**601**	J				

TABLE 5-2
COPC Refinement; Metals in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (mg/kg)	Qualifier	Unrestricted Land Use RBC[a]	Industrial Land Use RBC[b]	SSL[c]	Background Concentration Range[d]
Mercury	F109SB001	0.04	U	2.3[e]	610[e]	1	0.06 - 2.0
	F109SB001	**3.70**	=				
	(SPLP Location)						
	F109SB002	0.04	U				
	F109SB003	0.13	=				
	F109SB004	0.90	=				
	F109SB004	0.04	U				
	(SPLP Location)						
	F109SB005	0.38	=				
	F109SB005	0.06	=				
	(SPLP Location)						
	F109SB006	0.04	U				
	F109SB010	0.11	=				
	109VA001	0.014	U				
	109VA002	0.007	U				
Nickel	F109SB001	2.8	=	160	4,100	65	2.0 - 27
	F109SB001	11.3	J				
	(SPLP Location)						
	F109SB002	0.9	U				
	F109SB003	19.5	=				
	F109SB004	**114**	=				
	F109SB004	17.1	=				
	(SPLP Location)						
	F109SB005	14.6	=				
	F109SB005	23.9	=				
	(SPLP Location)						
	F109SB006	1.7	U				
	F109SB010	32.0	J				
	109VA001	**100**	=				
	109VA002	**85.3**	=				
	Mean Concentration	**35**					
Vanadium	F109SB001	9.5	=	55	1,400	3,000	6.8 - 60
	F109SB001	36.4	=				
	(SPLP Location)						
	F109SB002	2.4	J				
	F109SB003	30.8	J				
	F109SB004	36.9	J				
	F109SB004	8.4	=				
	(SPLP Location)						

TABLE 5-2
COPC Refinement; Metals in Surface Soil
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Parameter	Location	Concentration (mg/kg)	Qualifier	Unrestricted Land Use RBC[a]	Industrial Land Use RBC[b]	SSL[c]	Background Concentration Range[d]
Vanadium	F109SB005	**64.5**	J	55	1,400	3,000	6.8 - 60
	F109SB005	20.8	=				
	(SPLP Location)						
	F109SB006	3.0	J				
	F109SB010	19.9	=				
	109VA001	11.9	=				
	109VA002	17.5	=				

Concentrations shown in bold and outlined text exceeded the unrestricted land use screening criteria.

[a] RBCs for unrestricted land use are from EPA Region III RBC Tables, October 2000; RBCs for non-carcinogenic elements are adjusted for HI = 0.1.

[b] RBCs for industrial land use are from EPA Region III RBC Tables, October 2000; RBCs for non-carcinogenic elements are adjusted for HI = 0.1.

[c] SSLs are from EPA's *Soil Screening Guidance: User's Guide Appendix A*, DAF = 10.

[d] Background concentration ranges are the minimum and maximum concentrations detected in combined Zones F and G grid samples.

[e] RBCs for total chromium and mercury are from EPA Region IX PRG Tables, November 2000.

[f] RBCs for copper and iron are using HI = 1.0

[g] SSLs for copper and manganese are from EPA Region III RBC Table, October 2000, adjusted for DAF = 10.

= Analyte is detected at the concentration shown.

J Analyte is detected at an estimated concentration.

NL Not listed

U Analyte was not detected; the reporting limit is provided.

TABLE 5-3
Risk Evaluation COPC Screening for Combined Surface Soil/Blast Media
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Chemical	Samples	Detects	Mean Detect	Max	Res RBC[a]	Bkgd Range[b]	COPC	Basis
Arsenic	15	15	19	134	0.43	3 - 30.2	NO	Highest sample (134 mg/kg, F109SB00401) adjacent to RR lines, all other detections below background. All blast media detections within background range; see Section 5.1.2
Beryllium	12	12	0.50	1.3	16	0.19 - 1.3	NO	Within range of background, below criteria
Chromium, Total*	12	12	32	113	23	6.3 - 39.3	**YES**	Exceeds range of background and criteria
Copper	12	10	126	598	310	5.7 - 431	**YES**	Exceeds range of background and criteria
Iron	12	12	20,477	105,000	23,000	3,570 - 32,700	**YES**	Exceeds range of background and criteria
Mercury	10	6	0.91	3.7	2.3	0.6 - 2	**YES**	Exceeds range of background and criteria
Manganese	12	12	240	601	160	32 - 436	**YES**	Exceeds range of background and criteria
Nickel	12	10	42	114	160	2 - 27	NO	Exceeds range of background but not RBC at HI =0.1
Lead	16	16	199	793	400	3.5 - 275	NO	Avg at 199 mg/kg is below residential RBC of 400 mg/kg
Selenium	12	8	0.83	1.6	39	0.44 - 1.4	NO	Exceeds range of background but not RBC at HI =0.1
Vanadium	12	12	22	65	55	6.8 - 60	**YES**	Exceeds range of background and criteria

Surface soil samples and blast media samples were combined for screening and risk assessment purposes.

Sediment samples F109MO001 and F109MO003 excluded

[a] Non-carcinogens at HI=0.1, Carcinogens at 1×10^{-6}

[b] Range includes Zones F and G background values

* Although Chromium VI was not detected in surface media at SWMU 109, Chromium VI RBC and SSL values were used for Chromium, Total for conservative screening purposes

NL Not Listed

TABLE 5-4
EPC Estimates for Risk Evaluation COPCs for Combined Surface Soil/Blast Media
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

COPC	Samples[b]	Detects[b]	Best Estimate of the Mean[b]	Max	Distribution[a]	UCL95 Normal[b]	UCL95 Lognormal[b]	UCL95 Nonparametric[b]	EPC	Basis
Chromium, Total	9	9	33	113	Neither	54	166	47	47	UCL95 Nonparametric
Copper	9	7	121	598	Neither	238	38,398	209	209	UCL95 Nonparametric
Iron	9	9	22,046	105,000	Neither	41,731	206,487	19,150	19,150	UCL95 Nonparametric
Mercury	7	5	0.42	3.7	Neither	0.90	19	1.9	1.9	UCL95 Nonparametric
Manganese	9	9	223	601	Normal	336	1,173	601	336	UCL95 Normal
Vanadium	9	9	19	65	Normal	27	80	43	27	UCL95 Normal

[a] W-Test

[b]For stations with collocated sampling (F109SB001, F109SB004, F109SB005), the two samples were averaged for distribution testing and EPC estimation.

Surface soil samples and blast media samples were combined for screening and risk assessment purposes.

Sediment samples F109MO001 and F109MO003 excluded.

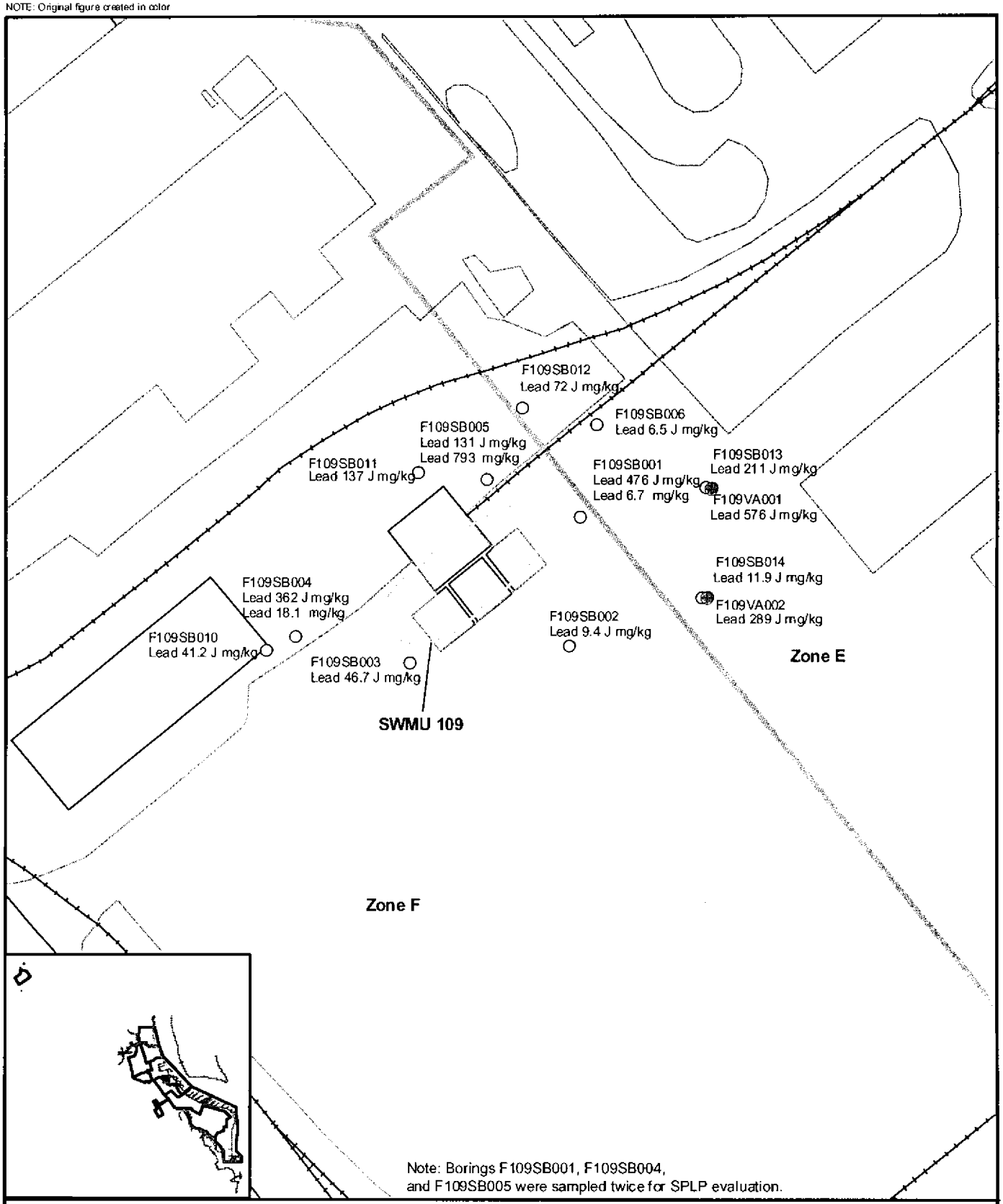
Neither The data distributions are neither normal nor lognormal

Normal Data are normally distributed

TABLE 5-5
Target Organs for Toxicity of Non-Carcinogenic COPCs
RFI Report Addendum, SWMU 109, Zone F, Charleston Naval Complex

Chemical	Target Organ for Toxicity
Chromium (Cr)	Cellular necrosis, respiratory
Copper (Cu)	Gastrointestinal
Iron (Fe)	Blood, Gastrointestinal
Manganese (Mn)	Neurological
Mercury (Hg)	Neurological
Vanadium (V)	Growth rate, survival, and hair cystine content

NOTE: Original figure created in color



Surface Soil
Blast Media Composite Samples
SWMU 109
Railroads
Roads
Pavement
Buildings
Zone Boundary

N

0 40 80 Feet

1 inch = 50 feet

Figure 5-1
Lead In Surface Soil
SWMU 109
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\cnd\swmu109.apr. Date: 02 Oct 2001 14:16. User: JOVERSTR. EGIS: Charleston Naval Complex SWMU 109 - Figure 5-1 Lead In Surface Soil

Section 6.0

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone F RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within the CNC, including SWMU 109. The subsequent *Zone F RFI Work Plan Addendum* (EnSafe, 1999) presented sampling and testing to address data gaps at SWMU 109. The samples were collected in 1999, and the results are reported in Section 4.0 of this RFI Report Addendum. Additional data gaps were identified and sampling was conducted as presented in the *Zone F RFI Work Plan Addendum, Revision 1* (CH2M-Jones, 2001). Comments and responses made by SCDHEC following the *Zone F RFI Report, Revision 0* confirmed that additional sampling was necessary. A copy of the Navy/EnSafe responses to SCDHEC comments on the *Zone F RFI Report, Revision 0* for this site, as well as CH2M-Jones responses to comments on the RFI Report, are provided in Appendix G.

The DET removed the sediments from the stormwater catch basins. Visual inspections confirmed the absence of blast media and sediment accumulations from the catch basins.

Based upon the original field activities conducted as part of the RFI and subsequent sampling and analysis as presented in Section 4.0 of this RFI Report Addendum, the RFI is considered complete. In accordance with the RFI completion process, if a determination of no further investigation is made upon completion of the RFI, then a site may proceed to either NFA status or to a CMS. This site is recommended for NFA status.

The remaining subsections address issues which the BCT agreed to evaluate prior to site closeout.

6.2 Presence of Inorganics in Groundwater

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

Metals have been consistently detected in SWMU 109 groundwater at concentrations below applicable screening criteria. No further evaluation or corrective action for groundwater at this site is warranted.

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

There are no sanitary sewer lines in the vicinity of SWMU 109; therefore, there is no linkage to SWMU 37.

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

Potential linkage of a SWMU or AOC to a storm sewer refers to the possibility of a groundwater plume at a SWMU or AOC migrating into a storm sewer from which it would subsequently migrate to the water bodies around the CNC, or to the presence of a cross connection between the sanitary sewer and storm sewer. Groundwater is not impacted at SWMU 109, and available information does not indicate that storm sewers are impacting the site.

The sediment sampled from the storm sewer catch basin south of SWMU 109 was removed by the DET after reviewing RFI data. The Zone L investigation included samples collected downstream of this catch basin and the samples were evaluated in the *Zone L RFI Report, Revision 0* (EnSafe, 1998). Therefore, further evaluation of this issue is not warranted.

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

The sampling conducted for the SWMU 109 RFI included soil in the vicinity of the railroad lines that supplied the hoppers. One instance of elevated arsenic in surface soil may have been influenced by arsenical herbicides applied to the railroad lines. No specific AOC 504 samples were collected within the SWMU 109 investigation area. There does not appear to be any linkage between SWMU 109 and AOC 504 and further evaluation of this issue is not warranted.

6.6 Potential Migration Pathways to Surface Water Bodies at the CNC

Surface water migration from this site is through the storm sewer system. There are no surface water bodies surrounding SWMU 109. The storm sewer system was investigated in the Zone L RFI.

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 UST process.

Neither the RFA nor the RFI refer to the presence or possible presence of an OWS at SWMU 109. There is no visual evidence of an OWS at this site, and there is no reference to an OWS at this facility in the *Oil Water Separator Data* (Navy, 2000). Therefore, further evaluation of this issue at SWMU 109 is not warranted.

6.8 Land Use Control Management Plan

There have been no COCs identified at this site, based on unrestricted land criteria, which are conservative for this industrial area. Therefore, land use controls are not necessary for SWMU 109.

7.0 RFI Conclusions and Recommendations

SWMU 109 is the site of the former abrasive blast media storage area. The storage area consisted of three hoppers identified as Buildings 1364, 1365, and 1393. The hoppers were used for the temporary storage of unused abrasive blast media that had been unloaded from trains and would be transferred to other vehicles to be transported to blasting locations remote from SWMU 109. Buildings 1364 and 1365 began operation in 1949, while Building 1393 was added in 1962. Material stored at the site included aluminum oxide and "black beauty" blast media, along with other blasting material, such as sodium bicarbonate. This site was designated a SWMU because of the unused blast media that had spilled onto the ground surface around the hoppers.

According to the *Zone F RFI Report, Revision 0* (EnSafe, 1997), arsenic, beryllium, chromium, manganese, vanadium, and BEQs were identified as COPCs in surface soil. Additional sampling identified copper, iron, lead, mercury, and nickel as COPCs in the surface soil and blast media on the ground surface. A re-evaluation of these chemicals determined that the single elevated arsenic detection is not reproducible, and therefore is not representative of site conditions (arsenic was not elevated above background levels where blast media and other site-related metals were detected). BEQs and some of the metals were lower than current screening criteria, and the average concentration for lead is within the residential screening concentration. Metals that were above background levels and the RBC (HI=0.1) were included as COPCs, and a risk evaluation was performed under unrestricted (residential) and industrial land use scenarios. The overall risks were well within acceptable limits, indicating site soils with blast media do not present human health exposure concerns, even under unrestricted land use conditions.

No COPCs or COCs were identified in subsurface soil or groundwater at SWMU 109. Sediment data reported in the *Zone F RFI Report, Revision 0* indicated metals concentrations in excess of surface soil screening values for unrestricted land use from a catch basin downgradient of SWMU 109. This sediment was subsequently removed; thus, sediment is no longer a concern at SWMU 109.

Although the *Zone F RFI Report, Revision 0* concluded that a CMS is appropriate for SWMU 109, the evaluation of COPCs as presented in Section 5.0 of this RFI Report Addendum concludes that corrective action is not necessary. This RFI Report Addendum concludes that further investigation is not necessary for protection of public health, and that NFA is appropriate at SWMU 109.

8.0 References

CH2M-Jones. *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values*. February 2001.

CH2M-Jones. *Zone F Work Plan Addendum, Revision 1*. 2001.

EnSafe Inc. *Zone F RFI Report, NAVBASE Charleston*. Revision 0. December 31, 1997.

EnSafe Inc. *Zone L RFI Report, NAVBASE Charleston*. Revision 0. December 31, 1998.

EnSafe Inc. *Zone F RFI Report Work Plan Addendum, NAVBASE Charleston*. Revision 0. November 3, 1999.

EnSafe Inc. *Zone J RFI Report, NAVBASE Charleston*. Revision 0. April 24, 2000.

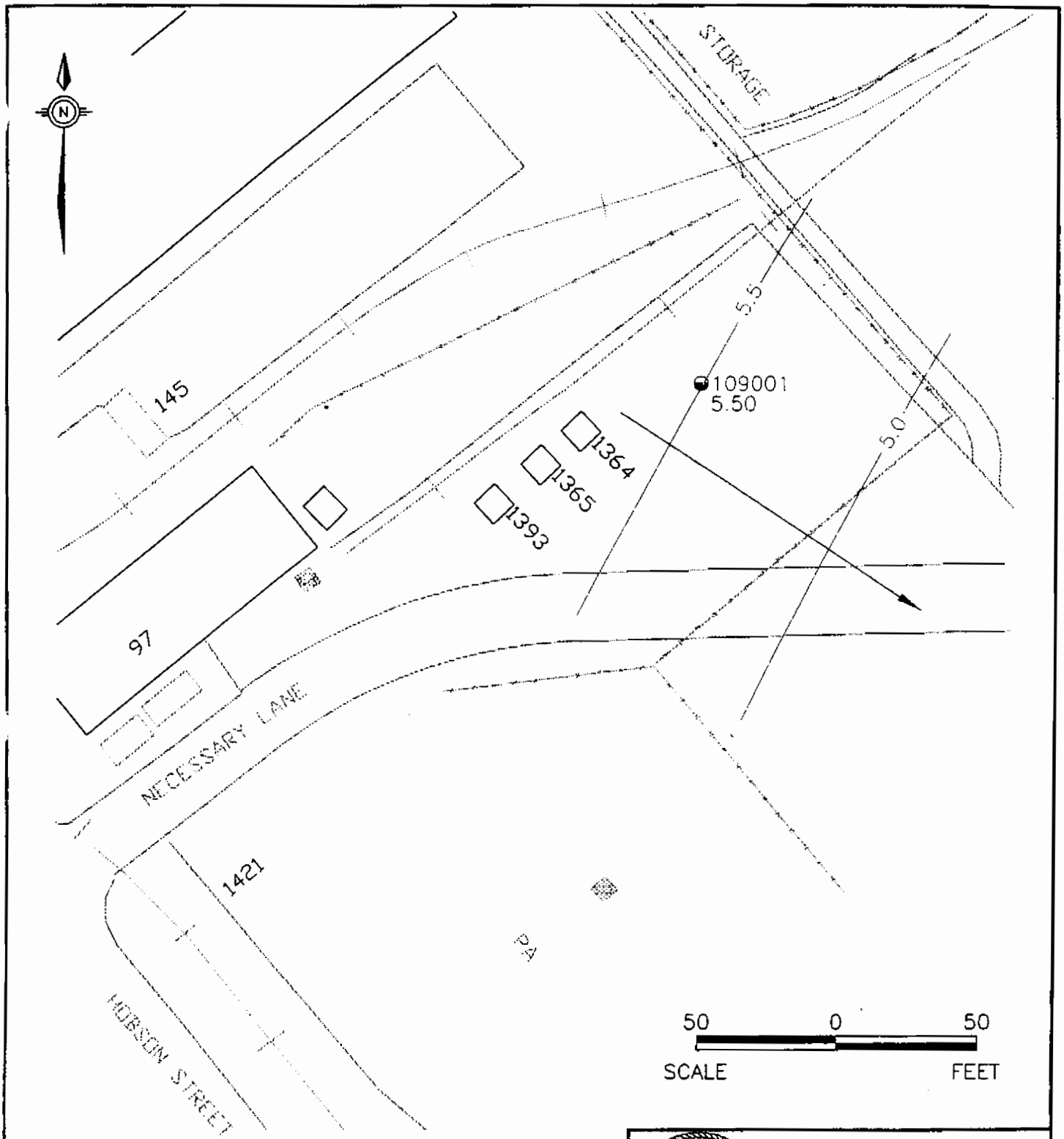
Environmental Detachment Charleston (DET). *Interim Measure Completion Report for AOC 699 Storm Drain Cleaning, Naval Base Charleston*. March 1999.

U.S. Environmental Protection Agency. *EPA Soil Screening Guidance: Technical Background Document* (Table A-1), EPA/540/R-95/128. May 1996.

U.S. Environmental Protection Agency. Health Effects Assessment Summary Tables (HEAST). EPA-540-R-97-036. 1997.

U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS). http://www.epa.gov/iris/. 2001.

Appendix A



LEGEND

- ◒ – SHALLOW MONITORING WELL
- CATCH BASIN
- —4— – CONTOUR INTERVAL – 0.5 FOOT
- ——→ – FLOW DIRECTION

NOTE:
GROUNDWATER FLOW DIRECTION BASED ON ADDITIONAL WELLS ASSOCIATED WITH OTHER SITES.

ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.

FIGURE 10.3–2
SHALLOW GROUNDWATER
LOW–TIDE POTENTIOMETRIC MAP
SWMU #109
ABRASIVE BLAST MEDIA STORAGE AREA

DWG DATE: 10/30/97 | DWG NAME: 29CZFS04

Table 10.3.1
SWMU 109
Soil Samples and Analyses

Boring Location	Sample Identifier	Sample Interval	Date Collected	Analyses	Remarks
109SB001	109SB00101	Upper	8/27/96	Note 1/pesticides/	
	109SB00102	Lower		PCBs	
109SB002	109SB00201	Upper	9/23/96	Note 1/pesticides/	
	109SB00202	Lower		PCBs, cyanide	
109SB003	109SB00301	Upper	9/23/96	Note 1/pesticides/	
	109CB00301*			PCBs, cyanide	*Duplicate Sample
	109SB00302	Lower		Note 3	
109SB004	109SB00401	Upper	9/23/96	Note 1/pesticides/	
	109SB00402	Lower		PCBs, cyanide	
109SB005	109SB00501	Upper	9/23/96	Note 1	
	109SB00502	Lower			
109SB006	109SB00601	Upper	9/23/96	Note 1	
	109SB00602	Lower			
109SB007	109SB00701	Upper	3/19/97	Note 2	Upper sample interval only Second-round sample
109SB008	109SB00801	Upper	3 /19/97	Note 2	Upper sample interval only Second-round sample
109SB009	109SB00901	Upper	3/19/97	Note 2	Upper sample interval only Second-round sample

Notes:

1 = SW-846 (metals and SVOAs) at DQO Level III
2 = Arsenic at DQO Level III
3 = Appendix IX suite: Appendix IX (pesticides/PCBs, herbicides, SVOAs, VOAs); SW-846 (metals, dioxins, OP-pesticides); cyanide; hex-chrome at DQO Level IV
* = Duplicate sample collected

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Semivolatile Organic Compounds (μg/kg)							
BEQs[1]	109SB003	0.66	88.0	NA	NA	NL	NA
	109SB004	637.44			NA		
	109SB005	74.56			NA		
Anthracene	109SB004	73.0	2300000	NA	ND	12000000[a]	NA
Benzo(a)anthracene	109SB004	420.0	880.0	NA	ND	2000[b]	NA
	109SB005	58.0			ND		
Benzo(a)pyrene	109SB004	450.0	88.0	NA	ND	8000	NA
	109SB005	68.0			ND		
Benzo(g,h,i)perylene	109SB004	240.0	230000.0	NA	ND	4.66E+08	NA
Benzo(k)fluoranthene	109SB003	66.0	8800.0	NA	ND	49000[b]	NA
	109SB004	500.0			ND		
	109SB005	70.0			ND		
Benzoic acid	109SB001	70.0	31000000	NA	52.0	400000[a,c]	NA
Chrysene	109SB004	440.0	88000.0	NA	ND	160000[b]	NA
	109SB005	62.0			ND		
Dibenz(a,h)anthracene	109SB004	120.0	88	NA	ND	2000[b]	NA
Fluoranthene	109SB004	790.0	310000.0	NA	ND	4300000[a]	NA
	109SB005	72.0			ND		
Indeno(1,2,3-cd)pyrene	109SB004	200.0	880	NA	ND	14000[b]	NA
Naphthalene	109SB001	220.0	310000	NA	ND	84000[a]	NA

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Semivolatile Organic Compounds (μg/kg)							
Phenanthrene	109SB004	270.0	230000.0	NA	ND	1380000	NA
Pyrene	109SB004	600.0	230000.0	NA	ND	4200000[b]	NA
	109SB005	72.0			ND		
Pesticides and PCBs (μg/kg)							
4,4'-DDE	109SB004	8.0	1900.0	NA	ND	54000[b]	NA
Aroclor-1260	109SB004	160.0	320	NA	ND	1000	NA
Dioxins (ng/kg)							
Dioxin (2,3,7,8-TCDD TEQs)[1]	109SB003	1.0229	1000	NA	ND	1900	NA
Inorganics (mg/kg)							
Aluminum (Al)	109SB001	2560.0	7800.0	18500	10600.0	1000000	17100
	109SB002	660.0			1880.0		
	109SB003	8970.0			2770.0		
	109SB004	11300.0			10800.0		
	109SB005	16000.0			4880.0		
	109SB006	707.0			5640.0		
Antimony (Sb)	109SB002	1.5	3.1	0.79	ND	5	NL

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Arsenic (As)	109SB001	4.0	0.43	19.9	5.0	29[c]	18.2
	109SB002	1.4			1.1		
	109SB003	10.2			2.9		
	109SB004	134.0			16.0		
	109SB005	20.2			6.4		
	109SB006	6.1			2.6		
	109SB007	25.9			ND		
	109SB008	20.0			[illegible]		
	109SB009	5.1			[illegible]		
Barium (Ba)	109SB001	11.4	550.0	61.5	16.4	1600[c]	51.8
	109SB002	4.3			6.1		
	109SB003	25.8			10.1		
	109SB004	118.0			29.8		
	109SB005	41.8			21.9		
	109SB006	7.0			19.6		
Beryllium (Be)	109SB001	0.28	0.15	1.05	0.33	63[c]	1.20
	109SB002	0.17			0.30		
	109SB003	0.595			0.37		
	109SB004	0.85			0.96		
	109SB005	1.30			0.56		
	109SB006	0.19			0.66		
Cadmium (Cd)	109SB001	0.09	3.9	0.26	0.07	8[c]	0.09
	109SB002	ND			0.06		
	109SB003	0.175			ND		
	109SB004	1.2			ND		
	109SB005	0.19			ND		
	109SB006	0.09			ND		

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Calcium (Ca)	109SB001	6170.0	NL	NL	2000.0	NL	NL
	109SB002	15000.0			5570.0		
	109SB003	15960.0			7200.0		
	109SB004	26200.0			11800.0		
	109SB005	14800.0			9310.0		
	109SB006	4620.0			16000.0		
Chromium (Cr)	109SB001	6.3	39 VI 7800 III	34.8	19.0	38[c] (total)	32.2
	109SB002	3.0			5.6		
	109SB003	19.65			6.2		
	109SB004	45.1			24.0		
	109SB005	33.8			10.9		
	109SB006	4.0			14.8		
Cobalt (Co)	109SB001	1.4	470.0	15.1	1.5	2000	6.85
	109SB002	1.5			1.6		
	109SB003	27.1			0.96		
	109SB004	16.6			4.8		
	109SB005	11.9			5.6		
	109SB006	1.2			3.2		
Copper (Cu)	109SB001	4.0	310.0	48.2	ND	920	30.4
	109SB003	53.75			ND		
	109SB004	138.0			18.1		
	109SB005	49.9			6.5		
	109SB006	ND			6.0		
Cyanide (CN)	109SB002	0.12	160.0	0.29	ND	40 (Amenable)	0.24
	109SB003	0.14			0.16		
	109SB004	0.61			0.21		

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[b] (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Iron (Fe)	109SB001	4820.0	2300.0	NL	14400.0	NL	NL
	109SB002	1160.0			2850.0		
	109SB003	11670.0			4380.0		
	109SB004	29500.0			14500.0		
	109SB005	28000.0			9620.0		
	109SB006	1440.0			10200.0		
Lead(Pb)	109SB001	6.7	400.0[d]	180	9.8	400[d]	51.7
	109SB002	9.4			3.9		
	109SB003	47.1			10.7		
	109SB004	362.0			35.5		
	109SB005	131.0			22.9		
	109SB006	6.5			19.6		
Magnesium (Mg)	109SB001	522.0	NL	NL	663.0	NL	NL
	109SB002	246.0			385.0		
	109SB003	1350.0			520.0		
	109SB004	1870.0			3100.0		
	109SB005	3480.0			1060.0		
	109SB006	160.0			1860.0		
Manganese (Mn)	109SB001	119.0	180.0	307	26.0	1100	469
	109SB002	26.5			35.9		
	109SB003	204.5			33.8		
	109SB004	427.0			210.0		
	109SB005	274.0			105.0		
	109SB006	19.3			132.0		
Mercury (Hg)	109SB003	0.30	2.3	0.62	ND	2[c]	0.23
	109SB004	0.90			0.07		
	109SB005	0.23			ND		

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Nickel (Ni)	109SB001	2.8	160.0	12.6	3.9	130[b]	8.85
	109SB003	22.2			ND		
	109SB004	114.0			13.8		
	109SB005	14.6			4.8		
	109SB006	ND			5.3		
Potassium (K)	109SB001	253.0	NL	NL	426.0	NL	NL
	109SB003	700.0			ND		
	109SB004	992.0			1480.0		
	109SB005	1320.0			633.0		
	109SB006	ND			883.0		
Selenium (Se)	109SB001	ND	39.0	1.15	0.50	[illegible]	1.24
	109SB002	0.52			1.10		
	109SB003	0.83			0.47		
	109SB004	0.68			1.20		
	109SB005	0.84			0.85		
	109SB006	ND			0.64		
Silver (Ag)	109SB003	1.3	39.0	1.85	ND	34[a,c]	ND
Sodium (Na)	109SB001	203.0	NL	NL	216.0	NL	NL
	109SB004	ND			590.0		
Vanadium (V)	109SB001	9.5	55.0	48.9	30.8	6000[d]	49.4
	109SB002	2.4			5.3		
	109SB003	24.75			7.9		
	109SB004	36.9			27.7		
	109SB005	64.5			13.7		
	109SB006	3.0			16.7		

Table 10.3.4
SWMU 109
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Zinc (Zn)	109SB001	16.1	2300.0	198	17.2	12000[a,c]	84.2
	109SB003	112.5			18.2		
	109SB004	822.0			97.6		
	109SB005	474.0			29.9		
	109SB006	15.8			35.1		

Notes:

a	=	Calculated values correspond to a noncancer hazard quotient of 1.
b	=	Calculated values correspond to a cancer risk level of 1 in 1,000,000.
c	=	SSL for pH of 6.8.
d	=	A screening level of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994a).
e	=	Residential RBCs (THQ=0.1) were used as a reference concentration for upper interval samples. Generic soil to groundwater SSLs (DAF=20) from the *Soil Screening Guidance: Technical Background Document* (USEPA, 1996c) were used as a reference concentration for lower interval samples.
f	=	Calculated from methods described in USEPA Interim *Supplemental Guidance to RAGS: Human Health Risk Assessment*, Bulletin 2 (USEPA, 1995b).
mg/kg	=	Milligrams per kilogram
ND	=	Not detected
NT	=	Not taken
NL	=	Not listed
NA	=	Not applicable

Bolded concentrations exceed both the reference concentration (RBC or SSL) and the zone background.
All background values for Zone F are based on twice the means of the grid sample concentrations. One grid sample from Zone E is included in each group.

Table 10.3.5
SWMU 109
Sediment Samples and Analyses

Sample Location	Sample Identifier	Sample Interval	Date Collected	Analyses	Remarks
109M00001	109M000101	NA	10/01/96	Note 1	
109M0002	NA	NA	NA	NA	Sample not taken
109M00003	109M000301 109N000301*	NA	10/01/96	Notes 1/2	*Duplicate sample

Notes:

1 = SW-846 (metals and SVOAs); cyanide at DQO Level III

2 = Appendix IX suite: Appendix IX (pesticides/PCBs, herbicides, SVOAs, VOAs); SW-846 (metals, dioxins, OP-pesticides); cyanide; hex-chrome at DQO Level IV

NA = Not applicable

* = Duplicate sample collected

Table 10.3.6
SWMU 109
Organic Compound Analytical Results for Sediment

Parameters	Frequency of Detection	Range of Detections (μg/kg)	Mean of Detections (μg/kg)
Semivolatile Organic Compounds (2 Samples) (μg/kg)			
2-Methylnapththalene	1/2	56.0	56.0
Di-n-octylphthalate	1/2	54.0	54.0
Naphthalene	1/2	170.0	170.0
Bis(2-ethylhexyl)phthalate (BEHP)	2/2	41.0 - 420.0	230.5
Dioxins (1 Duplicate Sample) (ng/kg)			
Dioxin (2,3,7,8-TCDD TEQs[1])	1/1	0.0711	0.0711

Note:

1 = Calculated from methods described in USEPA Interim *Supplemental Guidance to RAGS: Human Health Risk Assessment*, Bulletin 2 (USEPA, 1995b)

Table 10.3.7
SWMU 109
Inorganic Analytical Results for Sediment

Parameters	Frequency of Detection	Range of Detections (mg/kg)	Mean of Detections (mg/kg)
Inorganics (2 Samples) (mg/kg)			
Zinc	2/2	258.0 - 1560.0	909.0
Cyanide	1/2	0.15	0.15

Table 10.3.8
SWMU 109
Analytes Detected in Sediment Samples

Parameters	Location	Concentration
Semivolatile Organic Compounds (μg/kg)		
2-Methylnaphthalene	109M0001	56.0
Di-n-octylphthalate	109M0001	54.0
Naphthalene	109M0001	170.0
Bis(2-ethylhexyl)phthalate (BEHP)	109M0001	420.0
	109M0003	41.0
Dioxins (ng/kg)		
Dioxin (2,3,7,8-TCDD TEQs[1])	109M0003	0.0711
Inorganics (mg/kg)		
Aluminum (Al)	109M0001	1430.0
	109M0003	4865.0
Antimony (Sb)	109M0001	0.57
	109M0003	4.40
Arsenic (As)	109M0001	0.64
	109M0003	5.35
Barium (Ba)	109M0001	9.20
	109M0003	33.85
Beryllium (Be)	109M0001	0.20
	109M0003	1.55

Table 10.3.8
SWMU 109
Analytes Detected in Sediment Samples

Parameters	Location	Concentration
Inorganics (mg/kg)		
Cadmium (Cd)	109M0001	0.2
	109M0003	0.09
Calcium (Ca)	109M0001	633.0
	109M0003	71050.0
Chromium (Cr)	109M0001	13.0
	109M0003	88.7
Cobalt (Co)	109M0001	6.5
	109M0003	17.5
Copper (Cu)	109M0001	31.1
	109M0003	3840.0
Cyanide (CN)	109M0003	0.15
Iron (Fe)	109M0001	8740.0
	109M0003	142750.0
Lead (Pb)	109M0001	76.3
	109M0003	1295.0
Magnesium (Mg)	109M0001	112.0
	109M0003	1660.0
Manganese (Mn)	109M0001	50.6
	109M0003	860.5
Nickel (Ni)	109M0001	10.0
	109M0003	323.5
Potassium (K)	109M0003	241.5
Selenium (Se)	109M0001	0.52
	109M0003	2.35
Sodium (Na)	109M0003	586.0
Thallium (Tl)	109M0003	4.7
Tin (Sn)	109M0001	7.7
	109M0003	349.0
Vanadium (V)	109M0001	3.4
	109M0003	47.0

Table 10.3.8
SWMU 109
Analytes Detected in Sediment Samples

Parameters	Location	Concentration
Inorganics (mg/kg)		
Zinc (Zn)	109M0001	258.0
	109M0003	1560.0

Note:
[1] = Calculated from methods described in USEPA Interim *Supplemental Guidance to RAGS: Human Health Risk Assessment*, Bulletin 2 (USEPA, 1995b).

Semivolatile Organic Compounds in Sediment

Concentrations of four SVOCs 2-methylnapthalene, di-n-octylphthalate, napthalene, and bis(2-ethylhexyl)pthalate were detected in sediment. Napthalene was the only parameter which was also detected in site surface soil.

Other Organic Compounds in Sediment

Dioxin (2,3,7,8-TCDD TEQ) was detected in the duplicate sediment sample. Dioxin was also detected in the surface soil at the site.

Inorganic Elements in Sediment

Metals were as commonly detected in sediment as they were in site soil. The metals detected in site soil at relatively elevated levels, arsenic, beryllium, chromium, manganese, and vanadium were also detected in sediment.

10.3.5 Groundwater Sampling and Analysis

The approved final RFI work plan proposed the installation and sampling of one shallow monitoring well within the SWMU 109 area to: (1) assess groundwater quality, and (2) identify contaminants which may be migrating from the site in the shallow aquifer. One shallow

Table 10.3.11
SWMU 109
Analytes Detected in Shallow Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Inorganics (µg/L)							
Aluminum (Al)	109001	606.0	134	262	3700	50	224
Barium (Ba)	109001	21.1	15	15.9	260	2000	94.3
Calcium (Ca)	109001	87500.0	91600	72800	NL	NL	NL
Chromium (Cr)	109001	1.4	ND	ND	18	100	2.05
Iron (Fe)	109001	755.0	192	384	1100	300	NL
Magnesium (Mg)	109001	11500.0	10200	8970	NL	NL	NL
Manganese (Mn)	109001	38.8	58	36.4	84	50	2010
Potassium (K)	109001	7700.0	6220	6420	NL	NL	NL
Sodium (Na)	109001	17200.0	18200	14600	NL	NL	NL
Thallium (Tl)	109001	3.5	ND	ND	0.29	2	5.58
Vanadium (V)	109001	2.4	ND	1.5	26	NL	1.58

Notes:
ND = Not detected
NL = Not listed
* = Tap Water RBCs (THQ=0.1) from *Risk-Based Concentration Table, January-June 1996* (USEPA, 1996b). MCLs/SMCLs from *Drinking Water Regulations and Health Advisories* (USEPA, 1996e) were used as reference concentrations.
All background values for Zone F are based on twice the means of the grid sample concentrations. One grid sample from Zone E is included in each group. Background values for groundwater are based on two sampling rounds in two wells at each depth.
Data presented are from initial sampling event only.

Appendix B

Analytical Data Summary

	StationID	F109SB001	F109SB001	F109SB001	F109SB001	F109SB004
	SampleID	109SB001S1 (0-1ft)	109SB001S2 (3-5ft)	109SB001T1 (0-1ft)	109SB001T2 (3-5ft)	109SB004S1 (0-1ft)
	DateCollected	10/15/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	10/14/1999 0:00
	DateAnalyzed	10/28/1999	10/28/1999	11/01/1999	11/01/1999	10/26/1999
	SDGNumber	EN023	EN023	EN023	EN023	EN020
Parameter	**Units**					
Cyanide, SPLP	mg/L	0.01 U	0.01 U			0.01 U
Cyanide	mg/Kg			0.5 U	0.6 U	

	StationID	F109SB004		F109SB004		F109SB004		F109SB005		F109SB005	
	SampleID	109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/28/1999		10/27/1999		10/29/1999		10/26/1999		10/26/1999	
	SDGNumber	EN020		EN020		EN020		EN020		EN020	
Parameter	**Units**										
Cyanide, SPLP	mg/L	0.01	U					0.01	U	0.01	U
Cyanide	mg/Kg			0.5	U	0.5	U				

	StationID	F109SB005		F109SB005	
	SampleID	109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999	
	SDGNumber	EN020		EN020	
Parameter	**Units**				
Cyanide, SPLP	mg/L				
Cyanide	mg/Kg	0.5	U	0.5	U

	StationID	F109SB001	F109SB001	F109SB004	F109SB004	F109SB005
	SampleID	109SB001T1 (0-1ft)	109SB001T2 (3-5ft)	109SB004T1 (0-1ft)	109SB004T2 (3-5ft)	109SB005T1 (0-1ft)
	DateCollected	10/15/1999 0:00	10/15/1999 0:00	10/14/1999 0:00	10/14/1999 0:00	10/14/1999 0:00
	DateAnalyzed	11/02/1999	11/02/1999	10/28/1999	10/28/1999	10/26/1999
	SDGNumber	EN023	EN023	EN020	EN020	EN020
Parameter	**Units**					
Total Organic Carbon	%, DR	1.1 =	0.94 =	1.3 =	0.52 =	0.45 =

	StationID	F109SB005	
	SampleID	109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00	
	DateAnalyzed	10/26/1999	
	SDGNumber	EN020	
Parameter	**Units**		
Total Organic Carbon	%, DR	3.3	=

Analytical Data Summary

	StationID	F109SB001		F109SB001		F109SB001		F109SB001		F109SB004	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)		109SB004S1 (0-1ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/25/1999		10/22/1999		10/22/1999		10/20/1999	
	SDGNumber	EN023		EN023		EN023		EN023		EN020	
Parameter	**Units**										
Aluminum, SPLP	ug/L	37300	J	9330	J					5410	=
Antimony, SPLP	ug/L	2.4	U	3	J					2.4	U
Antimony	mg/Kg										
Arsenic,SPLP	ug/L	19.4	=	6.3	J					5.7	J
Barium, SPLP	ug/L	2350	=	893	=					446	=
Barium	mg/Kg										
Beryllium, SPLP	ug/L	0.9	U	0.9	U					0.9	U
Beryllium	mg/Kg										
Cadmium, SPLP	ug/L	0.3	U	0.3	U					0.3	UJ
Cadmium	mg/Kg										
Calcium, SPLP	ug/L	17200	=	13700	=					16900	=
Calcium	mg/Kg										
Chromium, Total	mg/Kg										
Cobalt, SPLP	ug/L	5.4	J	0.5	UJ					0.5	J
Cobalt	mg/Kg										
Copper, SPLP	ug/L	45.3	=	3	J					10.6	J
Iron, SPLP	ug/L	28100	J	5890	J					4150	J
Iron	mg/Kg										
Lead, SPLP	ug/L	176	=	18.4	=					6.2	J
Magnesium, SPLP	ug/L	3960	J	1470	J					1190	J
Magnesium	mg/Kg										
Manganese, SPLP	ug/L	174	=	23.2	=					18.7	=
Manganese	mg/Kg										
Mercury, SPLP	ug/L	1.4	=	0.4	U					0.4	U
Mercury	mg/Kg										
Nickel, SPLP	ug/L	17.1	J	5.2	J					6.2	J
Nickel	mg/Kg										
Potassium, SPLP	ug/L	4630	J	1000	J					825	J
Potassium	mg/Kg										
Selenium, SPLP	ug/L	3.2	U	4.1	U					1.7	U
Selenium	mg/Kg										

	StationID	F109SB004		F109SB004		F109SB004		F109SB005		F109SB005	
	SampleID	109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/29/1999		10/29/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020		EN020	
Parameter	**Units**										
Aluminum, SPLP	ug/L	475	=					2300	=	444	=
Antimony, SPLP	ug/L	5.3	J					10.7	J	6.3	J
Antimony	mg/Kg										
Arsenic,SPLP	ug/L	2	U					10.9	=	3.7	J
Barium, SPLP	ug/L	194	J					476	=	364	=
Barium	mg/Kg										
Beryllium, SPLP	ug/L	0.9	U					0.9	U	0.9	U
Beryllium	mg/Kg										
Cadmium, SPLP	ug/L	0.3	UJ					0.3	UJ	0.3	UJ
Cadmium	mg/Kg										
Calcium, SPLP	ug/L	12400	=					15600	=	17600	=
Calcium	mg/Kg										
Chromium, Total	mg/Kg										
Cobalt, SPLP	ug/L	0.5	U					0.5	U	0.5	U
Cobalt	mg/Kg										
Copper, SPLP	ug/L	1.4	J					11.9	J	4	J
Iron, SPLP	ug/L	700	J					2350	J	743	J
Iron	mg/Kg										
Lead, SPLP	ug/L	3.5	J					49.1	=	5	J
Magnesium, SPLP	ug/L	807	J					854	J	884	J
Magnesium	mg/Kg										
Manganese, SPLP	ug/L	10.7	J					10.6	J	5.5	J
Manganese	mg/Kg										
Mercury, SPLP	ug/L	0.4	U					0.4	U	0.4	U
Mercury	mg/Kg										
Nickel, SPLP	ug/L	1.1	U					5.7	J	1.7	J
Nickel	mg/Kg										
Potassium, SPLP	ug/L	1070	J					570	J	446	J
Potassium	mg/Kg										
Selenium, SPLP	ug/L	3.3	J					1.7	U	1.7	U
Selenium	mg/Kg										

	StationID	F109SB005	F109SB005	F109SB010	F109SB010	F109SB011
	SampleID	109SB005T1 (0-1ft)	109SB005T2 (3-5ft)	109SB01001 (0-1ft)	109SB01002 (3-5ft)	109SB01101 (0-1ft)
	DateCollected	10/14/1999 0:00	10/14/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	06/05/2001 0:00
	DateAnalyzed	10/29/1999	10/29/1999	10/22/1999	10/22/1999	06/20/2001
	SDGNumber	EN020	EN020	EN023	EN023	43554
Parameter	**Units**					
Aluminum, SPLP	ug/L					
Antimony, SPLP	ug/L					
Antimony	mg/Kg					
Arsenic,SPLP	ug/L					
Barium, SPLP	ug/L					
Barium	mg/Kg					
Beryllium, SPLP	ug/L					
Beryllium	mg/Kg					
Cadmium, SPLP	ug/L					
Cadmium	mg/Kg					
Calcium, SPLP	ug/L					
Calcium	mg/Kg					
Chromium, Total	mg/Kg					
Cobalt, SPLP	ug/L					
Cobalt	mg/Kg					
Copper, SPLP	ug/L					
Iron, SPLP	ug/L					
Iron	mg/Kg					
Lead, SPLP	ug/L					
Magnesium, SPLP	ug/L					
Magnesium	mg/Kg					
Manganese, SPLP	ug/L					
Manganese	mg/Kg					
Mercury, SPLP	ug/L					
Mercury	mg/Kg					
Nickel, SPLP	ug/L					
Nickel	mg/Kg					
Potassium, SPLP	ug/L					
Potassium	mg/Kg					
Selenium, SPLP	ug/L					
Selenium	mg/Kg					

	StationID	F109SB011	F109SB012	F109SB012	F109SB013	F109SB013
	SampleID	109SB01103 (2-3ft)	109SB01201 (0-1ft)	109SB01203 (2-3ft)	109CB01303 (2-3ft)	109SB01301 (0-1ft)
	DateCollected	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00
	DateAnalyzed	06/20/2001	06/20/2001	06/20/2001	06/20/2001	06/20/2001
	SDGNumber	43554	43554	43554	43554	43554
Parameter	Units					
Aluminum, SPLP	ug/L					
Antimony, SPLP	ug/L					
Antimony	mg/Kg					
Arsenic,SPLP	ug/L					
Barium, SPLP	ug/L					
Barium	mg/Kg					
Beryllium, SPLP	ug/L					
Beryllium	mg/Kg					
Cadmium, SPLP	ug/L					
Cadmium	mg/Kg					
Calcium, SPLP	ug/L					
Calcium	mg/Kg					
Chromium, Total	mg/Kg					
Cobalt, SPLP	ug/L					
Cobalt	mg/Kg					
Copper, SPLP	ug/L					
Iron, SPLP	ug/L					
Iron	mg/Kg					
Lead, SPLP	ug/L					
Magnesium, SPLP	ug/L					
Magnesium	mg/Kg					
Manganese, SPLP	ug/L					
Manganese	mg/Kg					
Mercury, SPLP	ug/L					
Mercury	mg/Kg					
Nickel, SPLP	ug/L					
Nickel	mg/Kg					
Potassium, SPLP	ug/L					
Potassium	mg/Kg					
Selenium, SPLP	ug/L					
Selenium	mg/Kg					

	StationID	F109SB013	F109SB014	F109SB014	F109VA001	F109VA001
	SampleID	109SB01303 (2-3ft)	109SB01401 (0-1ft)	109SB01403 (2-3ft)	109VA001 (0-1ft)	109VA001 (0-1ft)
	DateCollected	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00
	DateAnalyzed	06/20/2001	06/20/2001	06/20/2001	06/18/2001	06/20/2001
	SDGNumber	43554	43554	43554	43554	43554
Parameter	Units					
Aluminum, SPLP	ug/L					
Antimony, SPLP	ug/L					
Antimony	mg/Kg					1.82 J
Arsenic,SPLP	ug/L					
Barium, SPLP	ug/L					
Barium	mg/Kg					33.7 =
Beryllium, SPLP	ug/L					
Beryllium	mg/Kg					0.5 =
Cadmium, SPLP	ug/L					
Cadmium	mg/Kg					0.93 =
Calcium, SPLP	ug/L					
Calcium	mg/Kg					24800 =
Chromium, Total	mg/Kg					47.2 =
Cobalt, SPLP	ug/L					
Cobalt	mg/Kg					5.07 =
Copper, SPLP	ug/L					
Iron, SPLP	ug/L					
Iron	mg/Kg					15000 =
Lead, SPLP	ug/L					
Magnesium, SPLP	ug/L					
Magnesium	mg/Kg					1040 =
Manganese, SPLP	ug/L					
Manganese	mg/Kg					144 J
Mercury, SPLP	ug/L					
Mercury	mg/Kg				0.014 U	
Nickel, SPLP	ug/L					
Nickel	mg/Kg					100 =
Potassium, SPLP	ug/L					
Potassium	mg/Kg					514 J
Selenium, SPLP	ug/L					
Selenium	mg/Kg					0.29 U

	StationID	F109VA002		F109VA002	
	SampleID	109VA002 (ft)		109VA002 (ft)	
	DateCollected	06/05/2001 0:00		06/05/2001 0:00	
	DateAnalyzed	06/18/2001		06/20/2001	
	SDGNumber	43554		43554	
Parameter	**Units**				
Aluminum, SPLP	ug/L				
Antimony, SPLP	ug/L				
Antimony	mg/Kg			3.16	J
Arsenic,SPLP	ug/L				
Barium, SPLP	ug/L				
Barium	mg/Kg			58.8	=
Beryllium, SPLP	ug/L				
Beryllium	mg/Kg			0.31	J
Cadmium, SPLP	ug/L				
Cadmium	mg/Kg			1.72	=
Calcium, SPLP	ug/L				
Calcium	mg/Kg			5770	=
Chromium, Total	mg/Kg			113	=
Cobalt, SPLP	ug/L				
Cobalt	mg/Kg			9.85	=
Copper, SPLP	ug/L				
Iron, SPLP	ug/L				
Iron	mg/Kg			105000	=
Lead, SPLP	ug/L				
Magnesium, SPLP	ug/L				
Magnesium	mg/Kg			1160	=
Manganese, SPLP	ug/L				
Manganese	mg/Kg			601	J
Mercury, SPLP	ug/L				
Mercury	mg/Kg	0.007	U		
Nickel, SPLP	ug/L				
Nickel	mg/Kg			85.3	=
Potassium, SPLP	ug/L				
Potassium	mg/Kg			754	J
Selenium, SPLP	ug/L				
Selenium	mg/Kg			0.86	=

	StationID	F109SB001		F109SB001		F109SB001		F109SB001		F109SB004	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)		109SB004S1 (0-1ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/25/1999		10/22/1999		10/22/1999		10/20/1999	
	SDGNumber	EN023		EN023		EN023		EN023		EN020	
Parameter	**Units**										
Silver, SPLP	ug/L	0.5	U	0.5	U					0.5	UJ
Silver	mg/Kg										
Sodium, SPLP	ug/L	14000	=	1970	J					1200	J
Sodium	mg/Kg										
Thallium, SPLP	ug/L	2.4	UJ	2.4	UJ					2.4	U
Thallium	mg/Kg										
Tin (Sn), SPLP	ug/L	3.9	J	2.9	J					2.7	U
Vanadium, SPLP	ug/L	70.2	=	28.9	J					12.2	J
Vanadium	mg/Kg										
Aluminum	mg/Kg					14600	=	9300	=		
Antimony	mg/Kg					1.3	UJ	0.7	UJ		
Arsenic	mg/Kg					16.9	=	4.4	=		
Barium	mg/Kg					74.3	=	22.1	=		
Beryllium	mg/Kg					0.67	=	0.3	J		
Cadmium	mg/Kg					0.24	J	0.03	U		
Calcium	mg/Kg					16800	J	3980	J		
Chromium, Total	mg/Kg					26	J	15.5	J		
Chromium, Total	ug/L	50.6	=	12.5	=					8.2	J
Cobalt	mg/Kg					16.9	=	2.8	J		
Copper	mg/Kg					48.7	J	4.8	J		
Iron	mg/Kg					17700	J	9850	J		
Lead	mg/Kg					476	J	18.7	J		
Magnesium	mg/Kg					1970	J	1090	J		
Manganese	mg/Kg					282	J	82	J		
Mercury	mg/Kg					3.7	=	0.1	=		
Nickel	mg/Kg					11.3	J	5	J		
Potassium	mg/Kg					1110	J	732	J		
Selenium	mg/Kg					1.6	=	1.1	=		
Silver	mg/Kg					1	J	0.04	U		
Sodium	mg/Kg					265	J	154	J		
Thallium	mg/Kg					0.28	UJ	0.21	UJ		

	StationID	F109SB004		F109SB004		F109SB004		F109SB005		F109SB005	
	SampleID	109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/29/1999		10/29/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020		EN020	
Parameter	**Units**										
Silver, SPLP	ug/L	0.5	UJ					0.5	UJ	0.5	UJ
Silver	mg/Kg										
Sodium, SPLP	ug/L	854	J					2780	J	2680	J
Sodium	mg/Kg										
Thallium, SPLP	ug/L	2.4	U					2.4	U	2.4	U
Thallium	mg/Kg										
Tin (Sn), SPLP	ug/L	6.2	J					3	J	2.7	U
Vanadium, SPLP	ug/L	6.5	J					9.7	J	12	J
Vanadium	mg/Kg										
Aluminum	mg/Kg			2190	=	4130	=				
Antimony	mg/Kg			0.45	J	0.24	UJ				
Arsenic	mg/Kg			5	J	2.1	J				
Barium	mg/Kg			9.1	J	10.6	J				
Beryllium	mg/Kg			0.08	U	0.4	J				
Cadmium	mg/Kg			0.81	J	0.03	UJ				
Calcium	mg/Kg			334000	J	6270	J				
Chromium, Total	mg/Kg			8.3	J	10.9	J				
Chromium, Total	ug/L	1.3	J					172	J	2.6	J
Cobalt	mg/Kg			5.5	=	2.3	J				
Copper	mg/Kg			26	=	3.6	=				
Iron	mg/Kg			4300	=	4270	=				
Lead	mg/Kg			18.1	=	4.9	=				
Magnesium	mg/Kg			3440	J	795	J				
Manganese	mg/Kg			318	=	30.6	=				
Mercury	mg/Kg			0.04	U	0.18	=				
Nickel	mg/Kg			17.1	=	3.9	J				
Potassium	mg/Kg			1580	J	496	J				
Selenium	mg/Kg			0.15	U	0.75	J				
Silver	mg/Kg			0.04	U	0.05	U				
Sodium	mg/Kg			681	=	86.4	J				
Thallium	mg/Kg			2.1	R	0.24	R				

	StationID	F109SB005		F109SB005		F109SB010		F109SB010		F109SB011	
	SampleID	109SB005T1 (0-1ft)		109SB005T2 (3-5ft)		109SB01001 (0-1ft)		109SB01002 (3-5ft)		109SB01101 (0-1ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		06/05/2001 0:00	
	DateAnalyzed	10/29/1999		10/29/1999		10/22/1999		10/22/1999		06/20/2001	
	SDGNumber	EN020		EN020		EN023		EN023		43554	
Parameter	**Units**										
Silver, SPLP	ug/L										
Silver	mg/Kg										
Sodium, SPLP	ug/L										
Sodium	mg/Kg										
Thallium, SPLP	ug/L										
Thallium	mg/Kg										
Tin (Sn), SPLP	ug/L										
Vanadium, SPLP	ug/L										
Vanadium	mg/Kg										
Aluminum	mg/Kg	6810	=	7380	=	8340	=	7620	=		
Antimony	mg/Kg	3.9	J	0.4	J	1.2	UJ	1.3	UJ		
Arsenic	mg/Kg	14.1	J	3.3	J	7.6	=	11.9	=		
Barium	mg/Kg	37.8	=	25.9	=	23.2	=	22.5	J		
Beryllium	mg/Kg	0.32	J	0.37	J	0.28	J	0.58	J		
Cadmium	mg/Kg	1.2	=	0.03	UJ	0.03	U	0.04	U		
Calcium	mg/Kg	252000	J	4930	J	33900	J	7590	J		
Chromium, Total	mg/Kg	41.4	J	13	J	29.5	J	18.3	J		
Chromium, Total	ug/L										
Cobalt	mg/Kg	5.5	=	2.7	J	3.9	J	3.7	J		
Copper	mg/Kg	84.2	=	9.8	=	49.9	J	8.2	J		
Iron	mg/Kg	10300	=	6760	=	14700	J	11600	J		
Lead	mg/Kg	793	=	29.1	=	41.2	J	6.7	J	137	J
Magnesium	mg/Kg	2910	J	849	J	1240	J	1260	J		
Manganese	mg/Kg	331	=	46.7	=	134	J	183	J		
Mercury	mg/Kg	0.38	=	0.06	=	0.11	=	0.07	U		
Nickel	mg/Kg	23.9	=	5.1	=	32	J	8.9	J		
Potassium	mg/Kg	1450	J	561	J	720	J	783	J		
Selenium	mg/Kg	0.31	J	0.97	J	0.99	J	2.3	=		
Silver	mg/Kg	0.05	U	0.06	U	0.05	U	0.07	U		
Sodium	mg/Kg	574	=	134	J	212	J	135	J		
Thallium	mg/Kg	2.6	R	0.28	R	0.25	UJ	0.34	UJ		

	StationID	F109SB011		F109SB012		F109SB012		F109SB013		F109SB013	
	SampleID	109SB01103 (2-3ft)		109SB01201 (0-1ft)		109SB01203 (2-3ft)		109CB01303 (2-3ft)		109SB01301 (0-1ft)	
	DateCollected	06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00	
	DateAnalyzed	06/20/2001		06/20/2001		06/20/2001		06/20/2001		06/20/2001	
	SDGNumber	43554		43554		43554		43554		43554	
Parameter	**Units**										
Silver, SPLP	ug/L										
Silver	mg/Kg										
Sodium, SPLP	ug/L										
Sodium	mg/Kg										
Thallium, SPLP	ug/L										
Thallium	mg/Kg										
Tin (Sn), SPLP	ug/L										
Vanadium, SPLP	ug/L										
Vanadium	mg/Kg										
Aluminum	mg/Kg										
Antimony	mg/Kg										
Arsenic	mg/Kg										
Barium	mg/Kg										
Beryllium	mg/Kg										
Cadmium	mg/Kg										
Calcium	mg/Kg										
Chromium, Total	mg/Kg										
Chromium, Total	ug/L										
Cobalt	mg/Kg										
Copper	mg/Kg										
Iron	mg/Kg										
Lead	mg/Kg	4.2	J	72	J	2.41	J	236	J	211	J
Magnesium	mg/Kg										
Manganese	mg/Kg										
Mercury	mg/Kg										
Nickel	mg/Kg										
Potassium	mg/Kg										
Selenium	mg/Kg										
Silver	mg/Kg										
Sodium	mg/Kg										
Thallium	mg/Kg										

	StationID	F109SB013		F109SB014		F109SB014		F109VA001		F109VA001	
	SampleID	109SB01303 (2-3ft)		109SB01401 (0-1ft)		109SB01403 (2-3ft)		109VA001 (0-1ft)		109VA001 (0-1ft)	
	DateCollected	06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00		06/05/2001 0:00	
	DateAnalyzed	06/20/2001		06/20/2001		06/20/2001		06/18/2001		06/20/2001	
	SDGNumber	43554		43554		43554		43554		43554	
Parameter	**Units**										
Silver, SPLP	ug/L										
Silver	mg/Kg									0.09	U
Sodium, SPLP	ug/L										
Sodium	mg/Kg									122	J
Thallium, SPLP	ug/L										
Thallium	mg/Kg									0.38	U
Tin (Sn), SPLP	ug/L										
Vanadium, SPLP	ug/L										
Vanadium	mg/Kg									11.9	=
Aluminum	mg/Kg									3620	=
Antimony	mg/Kg										
Arsenic	mg/Kg									1.53	=
Barium	mg/Kg										
Beryllium	mg/Kg										
Cadmium	mg/Kg										
Calcium	mg/Kg										
Chromium, Total	mg/Kg										
Chromium, Total	ug/L										
Cobalt	mg/Kg										
Copper	mg/Kg									598	=
Iron	mg/Kg										
Lead	mg/Kg	235	J	11.9	J	2.11	J			576	J
Magnesium	mg/Kg										
Manganese	mg/Kg										
Mercury	mg/Kg										
Nickel	mg/Kg										
Potassium	mg/Kg										
Selenium	mg/Kg										
Silver	mg/Kg										
Sodium	mg/Kg										
Thallium	mg/Kg										

	StationID	F109VA002	F109VA002	
	SampleID	109VA002 (ft)	109VA002 (ft)	
	DateCollected	06/05/2001 0:00	06/05/2001 0:00	
	DateAnalyzed	06/18/2001	06/20/2001	
	SDGNumber	43554	43554	
Parameter	Units			
Silver, SPLP	ug/L			
Silver	mg/Kg		0.28	J
Sodium, SPLP	ug/L			
Sodium	mg/Kg		91.9	J
Thallium, SPLP	ug/L			
Thallium	mg/Kg		0.91	U
Tin (Sn), SPLP	ug/L			
Vanadium, SPLP	ug/L			
Vanadium	mg/Kg		17.5	=
Aluminum	mg/Kg		3730	=
Antimony	mg/Kg			
Arsenic	mg/Kg		9.58	=
Barium	mg/Kg			
Beryllium	mg/Kg			
Cadmium	mg/Kg			
Calcium	mg/Kg			
Chromium, Total	mg/Kg			
Chromium, Total	ug/L			
Cobalt	mg/Kg			
Copper	mg/Kg		209	=
Iron	mg/Kg			
Lead	mg/Kg		289	J
Magnesium	mg/Kg			
Manganese	mg/Kg			
Mercury	mg/Kg			
Nickel	mg/Kg			
Potassium	mg/Kg			
Selenium	mg/Kg			
Silver	mg/Kg			
Sodium	mg/Kg			
Thallium	mg/Kg			

	StationID	F109SB001		F109SB001		F109SB001		F109SB001		F109SB004	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)		109SB004S1 (0-1ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/25/1999		10/22/1999		10/22/1999		10/20/1999	
	SDGNumber	EN023		EN023		EN023		EN023		EN020	
Parameter	**Units**										
Tin (Sn)	mg/Kg					6.3	U	5.5	U		
Vanadium	mg/Kg					36.4	=	19.9	=		
Zinc, SPLP	ug/L	1920	=	285	=					134	J
Zinc	mg/Kg					419	J	20.7	J		

	StationID	F109SB004		F109SB004		F109SB004		F109SB005		F109SB005	
	SampleID	109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/25/1999		10/29/1999		10/29/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020		EN020	
Parameter	**Units**										
Tin (Sn)	mg/Kg			6.2	J	2.9	J				
Vanadium	mg/Kg			8.4	=	10.8	=				
Zinc, SPLP	ug/L	31.9	J					138	J	38.9	J
Zinc	mg/Kg			56.4	J	15.4	J				

	StationID	F109SB005		F109SB005		F109SB010		F109SB010		F109SB011
	SampleID	109SB005T1 (0-1ft)		109SB005T2 (3-5ft)		109SB01001 (0-1ft)		109SB01002 (3-5ft)		109SB01101 (0-1ft)
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		06/05/2001 0:00
	DateAnalyzed	10/29/1999		10/29/1999		10/22/1999		10/22/1999		06/20/2001
	SDGNumber	EN020		EN020		EN023		EN023		43554
Parameter	**Units**									
Tin (Sn)	mg/Kg	8.8	J	6.1	J	7.8	U	5.7	U	
Vanadium	mg/Kg	20.8	=	14.9	=	19.9	=	22	=	
Zinc, SPLP	ug/L									
Zinc	mg/Kg	326	J	35.3	J	93.8	J	27.4	J	

	StationID	F109SB011	F109SB012	F109SB012	F109SB013	F109SB013
	SampleID	109SB01103 (2-3ft)	109SB01201 (0-1ft)	109SB01203 (2-3ft)	109CB01303 (2-3ft)	109SB01301 (0-1ft)
	DateCollected	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00
	DateAnalyzed	06/20/2001	06/20/2001	06/20/2001	06/20/2001	06/20/2001
	SDGNumber	43554	43554	43554	43554	43554
Parameter	**Units**					
Tin (Sn)	mg/Kg					
Vanadium	mg/Kg					
Zinc, SPLP	ug/L					
Zinc	mg/Kg					

	StationID	F109SB013	F109SB014	F109SB014	F109VA001	F109VA001
	SampleID	109SB01303 (2-3ft)	109SB01401 (0-1ft)	109SB01403 (2-3ft)	109VA001 (0-1ft)	109VA001 (0-1ft)
	DateCollected	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00	06/05/2001 0:00
	DateAnalyzed	06/20/2001	06/20/2001	06/20/2001	06/18/2001	06/20/2001
	SDGNumber	43554	43554	43554	43554	43554
Parameter	**Units**					
Tin (Sn)	mg/Kg					
Vanadium	mg/Kg					
Zinc, SPLP	ug/L					
Zinc	mg/Kg					954 J

	StationID	F109VA002	F109VA002
	SampleID	109VA002 (ft)	109VA002 (ft)
	DateCollected	06/05/2001 0:00	06/05/2001 0:00
	DateAnalyzed	06/18/2001	06/20/2001
	SDGNumber	43554	43554
Parameter	**Units**		
Tin (Sn)	mg/Kg		
Vanadium	mg/Kg		
Zinc, SPLP	ug/L		
Zinc	mg/Kg		728 J

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/24/1999		10/24/1999		10/27/1999		10/27/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
PCB-1016 (Arochlor 1016), SPLP	ug/L	1	U	1	U				
PCB-1221 (Arochlor 1221), SPLP	ug/L	2	U	2	U				
PCB-1232 (Arochlor 1232), SPLP	ug/L	1	U	1	U				
PCB-1242 (Arochlor 1242), SPLP	ug/L	1	U	1	U				
PCB-1248 (Arochlor 1248), SPLP	ug/L	1	U	1	U				
PCB-1254 (Arochlor 1254), SPLP	ug/L	1	U	1	U				
PCB-1260 (Arochlor 1260), SPLP	ug/L	1	U	1	U				
PCB-1016 (Arochlor 1016)	ug/Kg					45	U	43	U
PCB-1221 (Arochlor 1221)	ug/Kg					89	U	87	U
PCB-1232 (Arochlor 1232)	ug/Kg					45	U	43	U
PCB-1242 (Arochlor 1242)	ug/Kg					45	U	43	U
PCB-1248 (Arochlor 1248)	ug/Kg					45	U	43	U
PCB-1254 (Arochlor 1254)	ug/Kg					45	U	43	U
PCB-1260 (Arochlor 1260)	ug/Kg					45	U	43	U

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/23/1999		10/28/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
PCB-1016 (Arochlor 1016), SPLP	ug/L	1	U	1	U				
PCB-1221 (Arochlor 1221), SPLP	ug/L	2	U	2	U				
PCB-1232 (Arochlor 1232), SPLP	ug/L	1	U	1	U				
PCB-1242 (Arochlor 1242), SPLP	ug/L	1	U	1	U				
PCB-1248 (Arochlor 1248), SPLP	ug/L	1	U	1	U				
PCB-1254 (Arochlor 1254), SPLP	ug/L	1	U	1	U				
PCB-1260 (Arochlor 1260), SPLP	ug/L	1	U	1	U				
PCB-1016 (Arochlor 1016)	ug/Kg					35	U	42	U
PCB-1221 (Arochlor 1221)	ug/Kg					70	U	85	U
PCB-1232 (Arochlor 1232)	ug/Kg					35	U	42	U
PCB-1242 (Arochlor 1242)	ug/Kg					35	U	42	U
PCB-1248 (Arochlor 1248)	ug/Kg					35	U	42	U
PCB-1254 (Arochlor 1254)	ug/Kg					35	U	42	U
PCB-1260 (Arochlor 1260)	ug/Kg					160	J	42	U

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/23/1999		10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
PCB-1016 (Arochlor 1016), SPLP	ug/L	1	U	1	U				
PCB-1221 (Arochlor 1221), SPLP	ug/L	2	U	2	U				
PCB-1232 (Arochlor 1232), SPLP	ug/L	1	U	1	U				
PCB-1242 (Arochlor 1242), SPLP	ug/L	1	U	1	U				
PCB-1248 (Arochlor 1248), SPLP	ug/L	1	U	1	U				
PCB-1254 (Arochlor 1254), SPLP	ug/L	1	U	1	U				
PCB-1260 (Arochlor 1260), SPLP	ug/L	1	U	1	U				
PCB-1016 (Arochlor 1016)	ug/Kg					39	U	42	U
PCB-1221 (Arochlor 1221)	ug/Kg					78	U	85	U
PCB-1232 (Arochlor 1232)	ug/Kg					39	U	42	U
PCB-1242 (Arochlor 1242)	ug/Kg					39	U	42	U
PCB-1248 (Arochlor 1248)	ug/Kg					39	U	42	U
PCB-1254 (Arochlor 1254)	ug/Kg					39	U	42	U
PCB-1260 (Arochlor 1260)	ug/Kg					39	U	42	U

	StationID	F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/24/1999		10/24/1999		10/27/1999	
	SDGNumber	EN023		EN023		EN023	
Parameter	**Units**						
Aldrin, SPLP	ug/L	0.05	U	0.05	U		
Dieldrin, SPLP	ug/L	0.1	U	0.1	U		
Endosulfan I, SPLP	ug/L	0.05	U	0.05	U		
Endosulfan II, SPLP	ug/L	0.1	U	0.1	U		
Endosulfan Sulfate, SPLP	ug/L	0.1	U	0.1	U		
Endrin aldehyde, SPLP	ug/L	0.1	U	0.1	U		
Endrin ketone, SPLP	ug/L	0.1	U	0.1	U		
Endrin, SPLP	ug/L	0.1	U	0.1	U		
Gamma BHC (lindane), SPLP	ug/L	0.05	U	0.05	U		
Gamma-chlordane, SPLP	ug/L	0.05	U	0.05	U		
Heptachlor, SPLP	ug/L	0.05	U	0.05	U		
Heptochlor epoxide, SPLP	ug/L	0.05	U	0.05	U		
Methoxychlor, SPLP	ug/L	0.5	U	0.5	U		
p,p'-DDD, SPLP	ug/L	0.1	U	0.1	U		
p,p'-DDE, SPLP	ug/L	0.1	U	0.1	U		
p,p'-DDT, SPLP	ug/L	0.1	U	0.1	U		
Toxaphene, SPLP	ug/L	5	U	5	U		
Alpha BHC (alpha hexachlorocyclohexane), SPLP	ug/L	0.05	U	0.05	U		
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/Kg					2.3	U
Gamma BHC (Lindane)	ug/Kg					2.3	U
Beta BHC (beta hexachlorocyclohexane), SPLP	ug/L	0.05	U	0.05	U		
Beta BHC (Beta Hexachlorocyclohexane)	ug/Kg					2.3	U
Heptachlor	ug/Kg					2.3	U
Delta BHC (delta hexachlorocyclohexane), SPLP	ug/L	0.05	U	0.05	U		
Delta BHC (Delta Hexachlorocyclohexane)	ug/Kg					2.3	U
Aldrin	ug/Kg					2.3	U
Heptachlor Epoxide	ug/Kg					2.3	U
Gamma-chlordane	ug/Kg					2.3	U
Alpha-chlordane, SPLP	ug/L	0.05	U	0.05	U		
Alpha-chlordane	ug/Kg					2.3	U
Endosulfan I	ug/Kg					2.3	U

	StationID	F109SB001		F109SB004		F109SB004	
	SampleID	109SB001T2 (3-5ft)		109SB004S1 (0-1ft)		109SB004S2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/27/1999		10/23/1999		10/28/1999	
	SDGNumber	EN023		EN020		EN020	
Parameter	**Units**						
Aldrin, SPLP	ug/L			0.05	U	0.05	U
Dieldrin, SPLP	ug/L			0.1	U	0.1	U
Endosulfan I, SPLP	ug/L			0.05	U	0.05	U
Endosulfan II, SPLP	ug/L			0.1	U	0.1	U
Endosulfan Sulfate, SPLP	ug/L			0.1	U	0.1	U
Endrin aldehyde, SPLP	ug/L			0.1	U	0.1	U
Endrin ketone, SPLP	ug/L			0.1	U	0.1	U
Endrin, SPLP	ug/L			0.1	U	0.1	U
Gamma BHC (lindane), SPLP	ug/L			0.05	U	0.05	U
Gamma-chlordane, SPLP	ug/L			0.05	U	0.05	U
Heptachlor, SPLP	ug/L			0.05	U	0.05	U
Heptochlor epoxide, SPLP	ug/L			0.05	U	0.05	U
Methoxychlor, SPLP	ug/L			0.5	U	0.5	U
p,p'-DDD, SPLP	ug/L			0.1	U	0.1	U
p,p'-DDE, SPLP	ug/L			0.1	U	0.1	U
p,p'-DDT, SPLP	ug/L			0.1	U	0.1	U
Toxaphene, SPLP	ug/L			5	U	5	U
Alpha BHC (alpha hexachlorocyclohexane), SPLP	ug/L			0.05	U	0.05	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/Kg	2.2	U				
Gamma BHC (Lindane)	ug/Kg	2.2	U				
Beta BHC (beta hexachlorocyclohexane), SPLP	ug/L			0.05	U	0.05	U
Beta BHC (Beta Hexachlorocyclohexane)	ug/Kg	2.2	U				
Heptachlor	ug/Kg	2.2	U				
Delta BHC (delta hexachlorocyclohexane), SPLP	ug/L			0.05	U	0.05	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/Kg	2.2	U				
Aldrin	ug/Kg	2.2	U				
Heptachlor Epoxide	ug/Kg	2.2	U				
Gamma-chlordane	ug/Kg	2.2	U				
Alpha-chlordane, SPLP	ug/L			0.05	U	0.05	U
Alpha-chlordane	ug/Kg	2.2	U				
Endosulfan I	ug/Kg	2.2	U				

	StationID	F109SB004		F109SB004		F109SB005	
	SampleID	109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/20/1999		10/20/1999		10/23/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	**Units**						
Aldrin, SPLP	ug/L					0.05	U
Dieldrin, SPLP	ug/L					0.1	U
Endosulfan I, SPLP	ug/L					0.05	U
Endosulfan II, SPLP	ug/L					0.1	U
Endosulfan Sulfate, SPLP	ug/L					0.1	U
Endrin aldehyde, SPLP	ug/L					0.1	U
Endrin ketone, SPLP	ug/L					0.1	U
Endrin, SPLP	ug/L					0.1	U
Gamma BHC (lindane), SPLP	ug/L					0.05	U
Gamma-chlordane, SPLP	ug/L					0.05	U
Heptachlor, SPLP	ug/L					0.05	U
Heptochlor epoxide, SPLP	ug/L					0.05	U
Methoxychlor, SPLP	ug/L					0.5	U
p,p'-DDD, SPLP	ug/L					0.1	U
p,p'-DDE, SPLP	ug/L					0.1	U
p,p'-DDT, SPLP	ug/L					0.1	U
Toxaphene, SPLP	ug/L					5	U
Alpha BHC (alpha hexachlorocyclohexane), SPLP	ug/L					0.05	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/Kg	1.8	U	2.2	U		
Gamma BHC (Lindane)	ug/Kg	1.8	U	2.2	U		
Beta BHC (beta hexachlorocyclohexane), SPLP	ug/L					0.05	U
Beta BHC (Beta Hexachlorocyclohexane)	ug/Kg	1.8	U	2.2	U		
Heptachlor	ug/Kg	1.8	U	2.2	U		
Delta BHC (delta hexachlorocyclohexane), SPLP	ug/L					0.05	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/Kg	1.8	U	2.2	U		
Aldrin	ug/Kg	1.8	U	2.2	U		
Heptachlor Epoxide	ug/Kg	1.8	U	2.2	U		
Gamma-chlordane	ug/Kg	1.8	U	2.2	U		
Alpha-chlordane, SPLP	ug/L					0.05	U
Alpha-chlordane	ug/Kg	1.8	U	2.2	U		
Endosulfan I	ug/Kg	1.8	U	2.2	U		

	StationID	F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	**Units**						
Aldrin, SPLP	ug/L	0.05	U				
Dieldrin, SPLP	ug/L	0.1	U				
Endosulfan I, SPLP	ug/L	0.05	U				
Endosulfan II, SPLP	ug/L	0.1	U				
Endosulfan Sulfate, SPLP	ug/L	0.1	U				
Endrin aldehyde, SPLP	ug/L	0.1	U				
Endrin ketone, SPLP	ug/L	0.1	U				
Endrin, SPLP	ug/L	0.1	U				
Gamma BHC (lindane), SPLP	ug/L	0.05	U				
Gamma-chlordane, SPLP	ug/L	0.05	U				
Heptachlor, SPLP	ug/L	0.05	U				
Heptochlor epoxide, SPLP	ug/L	0.05	U				
Methoxychlor, SPLP	ug/L	0.5	U				
p,p'-DDD, SPLP	ug/L	0.1	U				
p,p'-DDE, SPLP	ug/L	0.1	U				
p,p'-DDT, SPLP	ug/L	0.1	U				
Toxaphene, SPLP	ug/L	5	U				
Alpha BHC (alpha hexachlorocyclohexane), SPLP	ug/L	0.05	U				
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/Kg			2	U	2.2	U
Gamma BHC (Lindane)	ug/Kg			2	U	2.2	U
Beta BHC (beta hexachlorocyclohexane), SPLP	ug/L	0.05	U				
Beta BHC (Beta Hexachlorocyclohexane)	ug/Kg			2	U	2.2	U
Heptachlor	ug/Kg			2	U	2.2	U
Delta BHC (delta hexachlorocyclohexane), SPLP	ug/L	0.05	U				
Delta BHC (Delta Hexachlorocyclohexane)	ug/Kg			2	U	2.2	U
Aldrin	ug/Kg			2	U	2.2	U
Heptachlor Epoxide	ug/Kg			2	U	2.2	U
Gamma-chlordane	ug/Kg			52	J	2.2	U
Alpha-chlordane, SPLP	ug/L	0.05	U				
Alpha-chlordane	ug/Kg			2	U	2.2	U
Endosulfan I	ug/Kg			2	U	2.2	U

	StationID	F109SB001	F109SB001	F109SB001	
	SampleID	109SB001S1 (0-1ft)	109SB001S2 (3-5ft)	109SB001T1 (0-1ft)	
	DateCollected	10/15/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	
	DateAnalyzed	10/24/1999	10/24/1999	10/27/1999	
	SDGNumber	EN023	EN023	EN023	
Parameter	**Units**				
p,p'-DDE	ug/Kg			4.5	U
Dieldrin	ug/Kg			4.5	U
Endrin	ug/Kg			4.5	U
p,p'-DDD	ug/Kg			4.5	U
Endosulfan II	ug/Kg			4.5	U
p,p'-DDT	ug/Kg			4.5	U
Endrin Aldehyde	ug/Kg			4.5	U
Endosulfan Sulfate	ug/Kg			4.5	U
Methoxychlor	ug/Kg			23	U
Endrin Ketone	ug/Kg			4.5	U
Toxaphene	ug/Kg			230	U

	StationID	F109SB001		F109SB004	F109SB004
	SampleID	109SB001T2 (3-5ft)		109SB004S1 (0-1ft)	109SB004S2 (3-5ft)
	DateCollected	10/15/1999 0:00		10/14/1999 0:00	10/14/1999 0:00
	DateAnalyzed	10/27/1999		10/23/1999	10/28/1999
	SDGNumber	EN023		EN020	EN020
Parameter	**Units**				
p,p'-DDE	ug/Kg	4.3	U		
Dieldrin	ug/Kg	4.3	U		
Endrin	ug/Kg	4.3	U		
p,p'-DDD	ug/Kg	4.3	U		
Endosulfan II	ug/Kg	4.3	U		
p,p'-DDT	ug/Kg	4.3	U		
Endrin Aldehyde	ug/Kg	4.3	U		
Endosulfan Sulfate	ug/Kg	4.3	U		
Methoxychlor	ug/Kg	22	U		
Endrin Ketone	ug/Kg	4.3	U		
Toxaphene	ug/Kg	220	U		

	StationID	F109SB004		F109SB004		F109SB005
	SampleID	109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB005S1 (0-1ft)
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00
	DateAnalyzed	10/20/1999		10/20/1999		10/23/1999
	SDGNumber	EN020		EN020		EN020
Parameter	**Units**					
p,p'-DDE	ug/Kg	3.5	U	4.2	U	
Dieldrin	ug/Kg	3.5	U	4.2	U	
Endrin	ug/Kg	3.5	U	4.2	U	
p,p'-DDD	ug/Kg	3.5	U	4.2	U	
Endosulfan II	ug/Kg	3.5	U	4.2	U	
p,p'-DDT	ug/Kg	3.5	U	4.2	U	
Endrin Aldehyde	ug/Kg	3.5	U	4.2	U	
Endosulfan Sulfate	ug/Kg	3.5	U	4.2	U	
Methoxychlor	ug/Kg	18	U	22	U	
Endrin Ketone	ug/Kg	3.5	U	4.2	U	
Toxaphene	ug/Kg	180	U	220	U	

	StationID	F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	**Units**						
p,p'-DDE	ug/Kg			110	J	6.2	=
Dieldrin	ug/Kg			3.9	U	4.2	U
Endrin	ug/Kg			3.9	U	4.2	U
p,p'-DDD	ug/Kg			17	J	4.2	U
Endosulfan II	ug/Kg			3.9	U	4.2	U
p,p'-DDT	ug/Kg			35	J	8.1	=
Endrin Aldehyde	ug/Kg			3.9	U	4.2	U
Endosulfan Sulfate	ug/Kg			3.9	U	4.2	U
Methoxychlor	ug/Kg			20	J	22	U
Endrin Ketone	ug/Kg			6.8	J	4.2	U
Toxaphene	ug/Kg			200	U	220	U

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999		10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,3-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,4-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-Chloro)propane, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-chloro)propane	ug/Kg					450	U	440	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dimethylphenol, SPLP	ug/L	5	U	5	U				
2,4-Dinitrophenol, SPLP	ug/L	10	U	10	U				
2,4-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2,6-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2-Chloronaphthalene, SPLP	ug/L	5	U	5	U				
2-Chlorophenol, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene	ug/Kg					450	U	440	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	5	U				
2-Methylphenol (o-Cresol)	ug/Kg					450	U	440	U
2-Nitroaniline, SPLP	ug/L	5	U	5	U				
2-Nitrophenol, SPLP	ug/L	5	U	5	U				
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	10	U				
3-Nitroaniline, SPLP	ug/L	5	U	5	U				
4,6-Dinitro-2-methylphenol, SPLP	ug/L	10	U	10	U				
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U				
4-Chloro-3-methylphenol, SPLP	ug/L	5	U	5	U				
4-Chloroaniline, SPLP	ug/L	5	U	5	U				
4-Chlorophenyl phenyl ether, SPLP	ug/L	5	U	5	U				
4-Nitroaniline, SPLP	ug/L	5	U	5	U				
4-Nitrophenol, SPLP	ug/L	10	U	10	U				
Benzoic acid, SPLP	ug/L	1	J	25	U				

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/26/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,3-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,4-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-Chloro)propane, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-chloro)propane	ug/Kg					350	U	420	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dimethylphenol, SPLP	ug/L	5	U	5	U				
2,4-Dinitrophenol, SPLP	ug/L	10	U	10	U				
2,4-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2,6-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2-Chloronaphthalene, SPLP	ug/L	5	U	5	U				
2-Chlorophenol, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene	ug/Kg					350	U	420	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	5	U				
2-Methylphenol (o-Cresol)	ug/Kg					350	U	420	U
2-Nitroaniline, SPLP	ug/L	5	U	5	U				
2-Nitrophenol, SPLP	ug/L	5	U	5	U				
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	10	U				
3-Nitroaniline, SPLP	ug/L	5	U	5	U				
4,6-Dinitro-2-methylphenol, SPLP	ug/L	10	U	10	U				
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U				
4-Chloro-3-methylphenol, SPLP	ug/L	5	U	5	U				
4-Chloroaniline, SPLP	ug/L	5	U	5	U				
4-Chlorophenyl phenyl ether, SPLP	ug/L	5	U	5	U				
4-Nitroaniline, SPLP	ug/L	5	U	5	U				
4-Nitrophenol, SPLP	ug/L	10	U	10	U				
Benzoic acid, SPLP	ug/L	2	J	25	U				

Parameter	StationID / SampleID / DateCollected / DateAnalyzed / SDGNumber / Units	F109SB005 109SB005S1 (0-1ft) 10/14/1999 0:00 10/26/1999 EN020		F109SB005 109SB005S2 (3-5ft) 10/14/1999 0:00 10/22/1999 EN020		F109SB005 109SB005T1 (0-1ft) 10/14/1999 0:00 10/22/1999 EN020		F109SB005 109SB005T2 (3-5ft) 10/14/1999 0:00 10/22/1999 EN020	
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,3-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,4-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-Chloro)propane, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-chloro)propane	ug/Kg					390	U	430	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dimethylphenol, SPLP	ug/L	5	U	5	U				
2,4-Dinitrophenol, SPLP	ug/L	10	U	10	U				
2,4-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2,6-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2-Chloronaphthalene, SPLP	ug/L	5	U	5	U				
2-Chlorophenol, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene	ug/Kg					390	U	430	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	5	U				
2-Methylphenol (o-Cresol)	ug/Kg					390	U	430	U
2-Nitroaniline, SPLP	ug/L	5	U	5	U				
2-Nitrophenol, SPLP	ug/L	5	U	5	U				
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	10	U				
3-Nitroaniline, SPLP	ug/L	5	U	5	U				
4,6-Dinitro-2-methylphenol, SPLP	ug/L	10	U	10	U				
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U				
4-Chloro-3-methylphenol, SPLP	ug/L	5	U	5	U				
4-Chloroaniline, SPLP	ug/L	5	U	5	U				
4-Chlorophenyl phenyl ether, SPLP	ug/L	5	U	5	U				
4-Nitroaniline, SPLP	ug/L	5	U	5	U				
4-Nitrophenol, SPLP	ug/L	10	U	10	U				
Benzoic acid, SPLP	ug/L	25	U	25	U				

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999		10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Benzyl alcohol, SPLP	ug/L	5	U	5	U				
Benzyl butyl phthalate, SPLP	ug/L	5	U	5	U				
bis(2-Chloroethoxy) methane, SPLP	ug/L	5	U	5	U				
bis(2-Ethylhexyl) phthalate, SPLP	ug/L	5	U	5	U				
Di-n-butyl phthalate, SPLP	ug/L	5	U	5	U				
Di-n-octylphthalate, SPLP	ug/L	5	U	5	U				
Dibenzofuran, SPLP	ug/L	5	U	5	U				
Diethyl phthalate, SPLP	ug/L	5	U	5	U				
Dimethyl phthalate, SPLP	ug/L	5	U	5	U				
Hexachlorobenzene, SPLP	ug/L	5	U	5	U				
Hexachlorobutadiene, SPLP	ug/L	5	U	5	U				
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	5	U				
Hexachloroethane, SPLP	ug/L	5	U	5	U				
Isophorone, SPLP	ug/L	5	U	5	U				
N-Nitrosodi-n-propylamine, SPLP	ug/L	5	U	5	U				
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	5	U				
Nitrobenzene, SPLP	ug/L	5	U	5	U				
Pentachlorophenol, SPLP	ug/L	10	U	10	U				
Phenol, SPLP	ug/L	5	U	5	U				
Phenol	ug/Kg					450	U	440	U
Acenaphthylene, SPLP	ug/L	5	U	5	U				
Acenaphthylene	ug/Kg					450	U	440	U
bis(2-Chloroethyl) ether (2-Chloroethyl ether), S	ug/L	5	U	5	U				
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/Kg					450	U	440	U
2-Chlorophenol	ug/Kg					450	U	440	U
Acenaphthene, SPLP	ug/L	5	U	5	U				
Acenaphthene	ug/Kg					450	U	440	U
1,3-Dichlorobenzene	ug/Kg					450	U	440	U
Fluorene, SPLP	ug/L	5	U	5	U				
Fluorene	ug/Kg					450	U	440	U
1,4-Dichlorobenzene	ug/Kg					450	U	440	U

Parameter	StationID / SampleID / DateCollected / DateAnalyzed / SDGNumber / Units	F109SB004 109SB004S1 (0-1ft) 10/14/1999 0:00 10/26/1999 EN020		F109SB004 109SB004S2 (3-5ft) 10/14/1999 0:00 10/26/1999 EN020		F109SB004 109SB004T1 (0-1ft) 10/14/1999 0:00 10/22/1999 EN020		F109SB004 109SB004T2 (3-5ft) 10/14/1999 0:00 10/22/1999 EN020	
Benzyl alcohol, SPLP	ug/L	5	U	5	U				
Benzyl butyl phthalate, SPLP	ug/L	5	U	5	U				
bis(2-Chloroethoxy) methane, SPLP	ug/L	5	U	5	U				
bis(2-Ethylhexyl) phthalate, SPLP	ug/L	5	U	5	U				
Di-n-butyl phthalate, SPLP	ug/L	5	U	5	U				
Di-n-octylphthalate, SPLP	ug/L	5	U	5	U				
Dibenzofuran, SPLP	ug/L	5	U	5	U				
Diethyl phthalate, SPLP	ug/L	5	U	5	U				
Dimethyl phthalate, SPLP	ug/L	5	U	5	U				
Hexachlorobenzene, SPLP	ug/L	5	U	5	U				
Hexachlorobutadiene, SPLP	ug/L	5	U	5	U				
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	5	U				
Hexachloroethane, SPLP	ug/L	5	U	5	U				
Isophorone, SPLP	ug/L	5	U	5	U				
N-Nitrosodi-n-propylamine, SPLP	ug/L	5	U	5	U				
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	5	U				
Nitrobenzene, SPLP	ug/L	5	U	5	U				
Pentachlorophenol, SPLP	ug/L	10	U	10	U				
Phenol, SPLP	ug/L	5	U	5	U				
Phenol	ug/Kg					350	U	420	U
Acenaphthylene, SPLP	ug/L	5	U	5	U				
Acenaphthylene	ug/Kg					350	U	420	U
bis(2-Chloroethyl) ether (2-Chloroethyl ether), S	ug/L	5	U	5	U				
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/Kg					350	U	420	U
2-Chlorophenol	ug/Kg					350	U	420	U
Acenaphthene, SPLP	ug/L	5	U	5	U				
Acenaphthene	ug/Kg					350	U	420	U
1,3-Dichlorobenzene	ug/Kg					350	U	420	U
Fluorene, SPLP	ug/L	5	U	5	U				
Fluorene	ug/Kg					350	U	420	U
1,4-Dichlorobenzene	ug/Kg					350	U	420	U

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/22/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Benzyl alcohol, SPLP	ug/L	5	U	5	U				
Benzyl butyl phthalate, SPLP	ug/L	5	U	5	U				
bis(2-Chloroethoxy) methane, SPLP	ug/L	5	U	5	U				
bis(2-Ethylhexyl) phthalate, SPLP	ug/L	6	U	5	U				
Di-n-butyl phthalate, SPLP	ug/L	5	U	5	U				
Di-n-octylphthalate, SPLP	ug/L	5	U	5	U				
Dibenzofuran, SPLP	ug/L	5	U	5	U				
Diethyl phthalate, SPLP	ug/L	5	U	5	U				
Dimethyl phthalate, SPLP	ug/L	5	U	5	U				
Hexachlorobenzene, SPLP	ug/L	5	U	5	U				
Hexachlorobutadiene, SPLP	ug/L	5	U	5	U				
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	5	U				
Hexachloroethane, SPLP	ug/L	5	U	5	U				
Isophorone, SPLP	ug/L	5	U	5	U				
N-Nitrosodi-n-propylamine, SPLP	ug/L	5	U	5	U				
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	5	U				
Nitrobenzene, SPLP	ug/L	5	U	5	U				
Pentachlorophenol, SPLP	ug/L	10	U	10	U				
Phenol, SPLP	ug/L	5	U	5	U				
Phenol	ug/Kg					390	U	430	U
Acenaphthylene, SPLP	ug/L	5	U	5	U				
Acenaphthylene	ug/Kg					390	U	430	U
bis(2-Chloroethyl) ether (2-Chloroethyl ether), S	ug/L	5	U	5	U				
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/Kg					390	U	430	U
2-Chlorophenol	ug/Kg					390	U	430	U
Acenaphthene, SPLP	ug/L	5	U	5	U				
Acenaphthene	ug/Kg					390	U	430	U
1,3-Dichlorobenzene	ug/Kg					390	U	430	U
Fluorene, SPLP	ug/L	5	U	5	U				
Fluorene	ug/Kg					390	U	430	U
1,4-Dichlorobenzene	ug/Kg					390	U	430	U

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999		10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Phenanthrene, SPLP	ug/L	5	U	5	U				
Phenanthrene	ug/Kg					450	U	440	U
Anthracene, SPLP	ug/L	5	U	5	U				
Anthracene	ug/Kg					450	U	440	U
Benzyl alcohol	ug/Kg					450	U	440	U
Flouranthene	ug/Kg					120	J	440	U
Fluoranthene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene	ug/Kg					450	U	440	U
Pyrene, SPLP	ug/L	5	U	5	U				
Pyrene	ug/Kg					100	J	440	U
Benzo(a)anthracene, SPLP	ug/L	5	U	5	U				
Benzo(a)Anthracene	ug/Kg					450	U	440	U
Chrysene, SPLP	ug/L	5	U	5	U				
Chrysene	ug/Kg					450	U	440	U
Benzo(b)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(b)Fluoranthene	ug/Kg					450	U	440	U
N-Nitrosodi-n-propylamine	ug/Kg					450	U	440	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	5	U				
4-Methylphenol (p-Cresol)	ug/Kg					450	U	440	U
Benzo(k)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(k)Fluoranthene	ug/Kg					450	U	440	U
Benzo(a)pyrene, SPLP	ug/L	5	U	5	U				
Benzo(a)Pyrene	ug/Kg					450	U	440	U
Hexachloroethane	ug/Kg					450	U	440	U
Indeno(1,2,3-c,d)pyrene, SPLP	ug/L	5	U	5	U				
Indeno(1,2,3-c,d)pyrene	ug/Kg					450	U	440	U
Nitrobenzene	ug/Kg					450	U	440	U
Dibenz(a,h)anthracene, SPLP	ug/L	5	U	5	U				
Dibenz(a,h)anthracene	ug/Kg					450	U	440	U
Isophorone	ug/Kg					450	U	440	U
2-Nitrophenol	ug/Kg					450	U	440	U

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/26/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Phenanthrene, SPLP	ug/L	5	U	5	U				
Phenanthrene	ug/Kg					350	U	420	U
Anthracene, SPLP	ug/L	5	U	5	U				
Anthracene	ug/Kg					350	U	420	U
Benzyl alcohol	ug/Kg					350	U	420	U
Flouranthene	ug/Kg					350	U	420	U
Fluoranthene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene	ug/Kg					350	U	420	U
Pyrene, SPLP	ug/L	5	U	5	U				
Pyrene	ug/Kg					350	U	420	U
Benzo(a)anthracene, SPLP	ug/L	5	U	5	U				
Benzo(a)Anthracene	ug/Kg					350	U	420	U
Chrysene, SPLP	ug/L	5	U	5	U				
Chrysene	ug/Kg					350	U	420	U
Benzo(b)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(b)Fluoranthene	ug/Kg					350	U	420	U
N-Nitrosodi-n-propylamine	ug/Kg					350	U	420	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	5	U				
4-Methylphenol (p-Cresol)	ug/Kg					350	U	420	U
Benzo(k)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(k)Fluoranthene	ug/Kg					350	U	420	U
Benzo(a)pyrene, SPLP	ug/L	5	U	5	U				
Benzo(a)Pyrene	ug/Kg					350	U	420	U
Hexachloroethane	ug/Kg					350	U	420	U
Indeno(1,2,3-c,d)pyrene, SPLP	ug/L	5	U	5	U				
Indeno(1,2,3-c,d)pyrene	ug/Kg					350	U	420	U
Nitrobenzene	ug/Kg					350	U	420	U
Dibenz(a,h)anthracene, SPLP	ug/L	5	U	5	U				
Dibenz(a,h)anthracene	ug/Kg					350	U	420	U
Isophorone	ug/Kg					350	U	420	U
2-Nitrophenol	ug/Kg					350	U	420	U

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/22/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Phenanthrene, SPLP	ug/L	5	U	5	U				
Phenanthrene	ug/Kg					88	J	430	U
Anthracene, SPLP	ug/L	5	U	5	U				
Anthracene	ug/Kg					120	J	430	U
Benzyl alcohol	ug/Kg					390	U	430	U
Flouranthene	ug/Kg					180	J	430	U
Fluoranthene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene	ug/Kg					390	U	430	U
Pyrene, SPLP	ug/L	5	U	5	U				
Pyrene	ug/Kg					240	J	430	U
Benzo(a)anthracene, SPLP	ug/L	5	U	5	U				
Benzo(a)Anthracene	ug/Kg					140	J	430	U
Chrysene, SPLP	ug/L	5	U	5	U				
Chrysene	ug/Kg					270	J	430	U
Benzo(b)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(b)Fluoranthene	ug/Kg					480	=	430	U
N-Nitrosodi-n-propylamine	ug/Kg					390	U	430	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	5	U				
4-Methylphenol (p-Cresol)	ug/Kg					390	U	430	U
Benzo(k)fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(k)Fluoranthene	ug/Kg					250	J	430	U
Benzo(a)pyrene, SPLP	ug/L	5	U	5	U				
Benzo(a)Pyrene	ug/Kg					240	J	430	U
Hexachloroethane	ug/Kg					390	U	430	U
Indeno(1,2,3-c,d)pyrene, SPLP	ug/L	5	U	5	U				
Indeno(1,2,3-c,d)pyrene	ug/Kg					190	J	430	U
Nitrobenzene	ug/Kg					390	U	430	U
Dibenz(a,h)anthracene, SPLP	ug/L	5	U	5	U				
Dibenz(a,h)anthracene	ug/Kg					390	U	430	U
Isophorone	ug/Kg					390	U	430	U
2-Nitrophenol	ug/Kg					390	U	430	U

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999		10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Benzo(g,h,i)perylene, SPLP	ug/L	5	U	5	U				
Benzo(g,h,i)Perylene	ug/Kg					450	U	440	U
2,4-Dimethylphenol	ug/Kg					450	U	440	U
bis(2-Chloroethoxy) Methane	ug/Kg					450	U	440	U
Benzoic acid	ug/Kg					2300	U	2200	U
2,4-Dichlorophenol	ug/Kg					450	U	440	U
1,2,4--Trichlorobenzene	ug/Kg					450	U	440	U
4-Chloroaniline	ug/Kg					450	U	440	U
Hexachlorobutadiene	ug/Kg					450	U	440	U
4-Chloro-3-methylphenol	ug/Kg					450	U	440	U
Hexachlorocyclopentadiene	ug/Kg					450	U	440	U
2,4,6-Trichlorophenol	ug/Kg					450	U	440	U
2,4,5-Trichlorophenol	ug/Kg					450	U	440	U
2-Chloronaphthalene	ug/Kg					450	U	440	U
2-Nitroaniline	ug/Kg					450	U	440	U
2,6-Dinitrotoluene	ug/Kg					450	U	440	U
3-Nitroaniline	ug/Kg					450	U	440	U
2,4-Dinitrophenol	ug/Kg					900	U	880	U
Dibenzofuran	ug/Kg					450	U	440	U
4-Nitrophenol	ug/Kg					900	U	880	U
2,4-Dinitrotoluene	ug/Kg					450	U	440	U
Dimethyl Phthalate	ug/Kg					450	U	440	U
Diethyl Phthalate	ug/Kg					450	U	440	U
4-Chlorophenyl Phenyl Ether	ug/Kg					450	U	440	U
4-Nitroaniline	ug/Kg					450	U	440	U
4,6-Dinitro-2-methylphenol	ug/Kg					900	U	880	U
N-Nitrosodiphenylamine	ug/Kg					450	U	440	U
4-Bromophenyl Phenyl Ether	ug/Kg					450	U	440	U
Hexachlorobenzene	ug/Kg					450	U	440	U
Pentachlorophenol	ug/Kg					900	U	880	U
Di-n-butyl Phthalate	ug/Kg					450	U	440	U

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/26/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Benzo(g,h,i)perylene, SPLP	ug/L	5	U	5	U				
Benzo(g,h,i)Perylene	ug/Kg					350	U	420	U
2,4-Dimethylphenol	ug/Kg					350	U	420	U
bis(2-Chloroethoxy) Methane	ug/Kg					350	U	420	U
Benzoic acid	ug/Kg					1800	U	2100	U
2,4-Dichlorophenol	ug/Kg					350	U	420	U
1,2,4--Trichlorobenzene	ug/Kg					350	U	420	U
4-Chloroaniline	ug/Kg					350	U	420	U
Hexachlorobutadiene	ug/Kg					350	U	420	U
4-Chloro-3-methylphenol	ug/Kg					350	U	420	U
Hexachlorocyclopentadiene	ug/Kg					350	U	420	U
2,4,6-Trichlorophenol	ug/Kg					350	U	420	U
2,4,5-Trichlorophenol	ug/Kg					350	U	420	U
2-Chloronaphthalene	ug/Kg					350	U	420	U
2-Nitroaniline	ug/Kg					350	U	420	U
2,6-Dinitrotoluene	ug/Kg					350	U	420	U
3-Nitroaniline	ug/Kg					350	U	420	U
2,4-Dinitrophenol	ug/Kg					710	U	840	U
Dibenzofuran	ug/Kg					350	U	420	U
4-Nitrophenol	ug/Kg					710	U	840	U
2,4-Dinitrotoluene	ug/Kg					350	U	420	U
Dimethyl Phthalate	ug/Kg					350	U	420	U
Diethyl Phthalate	ug/Kg					350	U	420	U
4-Chlorophenyl Phenyl Ether	ug/Kg					350	U	420	U
4-Nitroaniline	ug/Kg					350	U	420	U
4,6-Dinitro-2-methylphenol	ug/Kg					710	U	840	U
N-Nitrosodiphenylamine	ug/Kg					350	U	420	U
4-Bromophenyl Phenyl Ether	ug/Kg					350	U	420	U
Hexachlorobenzene	ug/Kg					350	U	420	U
Pentachlorophenol	ug/Kg					710	U	840	U
Di-n-butyl Phthalate	ug/Kg					350	U	420	U

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/22/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Benzo(g,h,i)perylene, SPLP	ug/L	5	U	5	U				
Benzo(g,h,i)Perylene	ug/Kg					160	J	430	U
2,4-Dimethylphenol	ug/Kg					390	U	430	U
bis(2-Chloroethoxy) Methane	ug/Kg					390	U	430	U
Benzoic acid	ug/Kg					2000	UJ	2100	UJ
2,4-Dichlorophenol	ug/Kg					390	U	430	U
1,2,4--Trichlorobenzene	ug/Kg					390	U	430	U
4-Chloroaniline	ug/Kg					390	U	430	U
Hexachlorobutadiene	ug/Kg					390	U	430	U
4-Chloro-3-methylphenol	ug/Kg					390	U	430	U
Hexachlorocyclopentadiene	ug/Kg					390	U	430	U
2,4,6-Trichlorophenol	ug/Kg					390	U	430	U
2,4,5-Trichlorophenol	ug/Kg					390	U	430	U
2-Chloronaphthalene	ug/Kg					390	U	430	U
2-Nitroaniline	ug/Kg					390	U	430	U
2,6-Dinitrotoluene	ug/Kg					390	U	430	U
3-Nitroaniline	ug/Kg					390	U	430	U
2,4-Dinitrophenol	ug/Kg					780	U	850	U
Dibenzofuran	ug/Kg					390	U	430	U
4-Nitrophenol	ug/Kg					780	U	850	U
2,4-Dinitrotoluene	ug/Kg					390	U	430	U
Dimethyl Phthalate	ug/Kg					390	U	430	U
Diethyl Phthalate	ug/Kg					390	U	430	U
4-Chlorophenyl Phenyl Ether	ug/Kg					390	U	430	U
4-Nitroaniline	ug/Kg					390	U	430	U
4,6-Dinitro-2-methylphenol	ug/Kg					780	U	850	U
N-Nitrosodiphenylamine	ug/Kg					390	U	430	U
4-Bromophenyl Phenyl Ether	ug/Kg					390	U	430	U
Hexachlorobenzene	ug/Kg					390	U	430	U
Pentachlorophenol	ug/Kg					780	U	850	U
Di-n-butyl Phthalate	ug/Kg					390	U	430	U

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/27/1999		10/27/1999		10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Benzyl Butyl Phthalate	ug/Kg					450	U	440	U
3,3'-Dichlorobenzidine	ug/Kg					900	U	880	U
bis(2-Ethylhexyl) Phthalate	ug/Kg					490	=	440	U
Di-n-octylphthalate	ug/Kg					450	U	440	U

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/26/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Benzyl Butyl Phthalate	ug/Kg					350	U	420	U
3,3'-Dichlorobenzidine	ug/Kg					710	U	840	U
bis(2-Ethylhexyl) Phthalate	ug/Kg					350	U	420	U
Di-n-octylphthalate	ug/Kg					350	U	420	U

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/26/1999		10/22/1999		10/22/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Benzyl Butyl Phthalate	ug/Kg					390	U	430	U
3,3'-Dichlorobenzidine	ug/Kg					780	U	850	U
bis(2-Ethylhexyl) Phthalate	ug/Kg					390	U	430	U
Di-n-octylphthalate	ug/Kg					390	U	430	U

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001S2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/21/1999		10/27/1999		10/21/1999		10/27/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Chloromethane, SPLP	ug/L	60	U			60	U		
Chloromethane	ug/Kg								
Naphthalene, SPLP	ug/L			5	U			5	U
Naphthalene	ug/Kg								
Vinyl Chloride, SPLP	ug/L	60	U			60	U		
Vinyl chloride	ug/Kg								
Toluene, SPLP	ug/L	60	U			60	U		
Bromomethane, SPLP	ug/L	60	U			60	U		
Bromomethane	ug/Kg								
Chloroethane, SPLP	ug/L	60	U			60	U		
Chloroethane	ug/Kg								
1,1-Dichloroethene, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethene	ug/Kg								
Acetone, SPLP	ug/L	100	R			100	R		
Acetone	ug/Kg								
Carbon Disulfide, SPLP	ug/L	60	U			60	U		
Carbon Disulfide	ug/Kg								
Methylene Chloride, SPLP	ug/L	60	U			60	U		
Methylene Chloride	ug/Kg								
1,2-Dichloropropane, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethane	ug/Kg								
Vinyl acetate, SPLP	ug/L	60	U			60	U		
Vinyl acetate	ug/Kg								
Methyl ethyl ketone (2-Butanone), SPLP	ug/L	100	U			100	U		
Methyl ethyl ketone (2-Butanone)	ug/Kg								
1,2-Dichloroethene (total), SPLP	ug/L	60	U			60	U		
1,2-Dichloroethene (total)	ug/Kg								
Chloroform, SPLP	ug/L	60	U			60	U		
Chloroform	ug/Kg								
1,1,1-Trichloroethane, SPLP	ug/L	60	U			60	U		
1,1,1-Trichloroethane	ug/Kg								

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001T1 (0-1ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/19/1999		10/28/1999		10/21/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Chloromethane, SPLP	ug/L								
Chloromethane	ug/Kg	5	U			4	U		
Naphthalene, SPLP	ug/L								
Naphthalene	ug/Kg			450	U			440	U
Vinyl Chloride, SPLP	ug/L								
Vinyl chloride	ug/Kg	5	U			4	U		
Toluene, SPLP	ug/L								
Bromomethane, SPLP	ug/L								
Bromomethane	ug/Kg	5	U			4	U		
Chloroethane, SPLP	ug/L								
Chloroethane	ug/Kg	5	U			4	U		
1,1-Dichloroethene, SPLP	ug/L								
1,1-Dichloroethene	ug/Kg	5	U			4	U		
Acetone, SPLP	ug/L								
Acetone	ug/Kg	21	U			17	U		
Carbon Disulfide, SPLP	ug/L								
Carbon Disulfide	ug/Kg	5	U			2	J		
Methylene Chloride, SPLP	ug/L								
Methylene Chloride	ug/Kg	16	U			6	U		
1,2-Dichloropropane, SPLP	ug/L								
1,1-Dichloroethane	ug/Kg	5	U			4	U		
Vinyl acetate, SPLP	ug/L								
Vinyl acetate	ug/Kg	5	U			4	U		
Methyl ethyl ketone (2-Butanone), SPLP	ug/L								
Methyl ethyl ketone (2-Butanone)	ug/Kg	8	U			6	U		
1,2-Dichloroethene (total), SPLP	ug/L								
1,2-Dichloroethene (total)	ug/Kg	5	U			4	U		
Chloroform, SPLP	ug/L								
Chloroform	ug/Kg	5	U			4	U		
1,1,1-Trichloroethane, SPLP	ug/L								
1,1,1-Trichloroethane	ug/Kg	5	U			4	U		

		StationID	F109SB004		F109SB004		F109SB004		F109SB004	
		SampleID	109SB004S1 (0-1ft)		109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004S2 (3-5ft)	
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
		DateAnalyzed	10/19/1999		10/26/1999		10/19/1999		10/26/1999	
		SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**									
Chloromethane, SPLP	ug/L		60	U			60	U		
Chloromethane	ug/Kg									
Naphthalene, SPLP	ug/L				5	U			5	U
Naphthalene	ug/Kg									
Vinyl Chloride, SPLP	ug/L		60	U			60	U		
Vinyl chloride	ug/Kg									
Toluene, SPLP	ug/L		60	U			60	U		
Bromomethane, SPLP	ug/L		60	U			60	U		
Bromomethane	ug/Kg									
Chloroethane, SPLP	ug/L		60	U			60	U		
Chloroethane	ug/Kg									
1,1-Dichloroethene, SPLP	ug/L		60	U			60	U		
1,1-Dichloroethene	ug/Kg									
Acetone, SPLP	ug/L		100	R			100	R		
Acetone	ug/Kg									
Carbon Disulfide, SPLP	ug/L		60	U			60	U		
Carbon Disulfide	ug/Kg									
Methylene Chloride, SPLP	ug/L		60	U			60	U		
Methylene Chloride	ug/Kg									
1,2-Dichloropropane, SPLP	ug/L		60	U			60	U		
1,1-Dichloroethane	ug/Kg									
Vinyl acetate, SPLP	ug/L		60	U			60	U		
Vinyl acetate	ug/Kg									
Methyl ethyl ketone (2-Butanone), SPLP	ug/L		100	U			100	U		
Methyl ethyl ketone (2-Butanone)	ug/Kg									
1,2-Dichloroethene (total), SPLP	ug/L		60	U			60	U		
1,2-Dichloroethene (total)	ug/Kg									
Chloroform, SPLP	ug/L		60	U			60	U		
Chloroform	ug/Kg									
1,1,1-Trichloroethane, SPLP	ug/L		60	U			60	U		
1,1,1-Trichloroethane	ug/Kg									

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004T1 (0-1ft)		109SB004T1 (0-1ft)		109SB004T2 (3-5ft)		109SB004T2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/15/1999		10/22/1999		10/15/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Chloromethane, SPLP	ug/L								
Chloromethane	ug/Kg	3	U			4	U		
Naphthalene, SPLP	ug/L								
Naphthalene	ug/Kg			350	U			420	U
Vinyl Chloride, SPLP	ug/L								
Vinyl chloride	ug/Kg	3	U			4	U		
Toluene, SPLP	ug/L								
Bromomethane, SPLP	ug/L								
Bromomethane	ug/Kg	3	U			4	U		
Chloroethane, SPLP	ug/L								
Chloroethane	ug/Kg	3	U			4	U		
1,1-Dichloroethene, SPLP	ug/L								
1,1-Dichloroethene	ug/Kg	3	U			4	U		
Acetone, SPLP	ug/L								
Acetone	ug/Kg	5	U			31	=		
Carbon Disulfide, SPLP	ug/L								
Carbon Disulfide	ug/Kg	3	U			2	J		
Methylene Chloride, SPLP	ug/L								
Methylene Chloride	ug/Kg	4	U			4	U		
1,2-Dichloropropane, SPLP	ug/L								
1,1-Dichloroethane	ug/Kg	3	U			4	U		
Vinyl acetate, SPLP	ug/L								
Vinyl acetate	ug/Kg	3	U			4	U		
Methyl ethyl ketone (2-Butanone), SPLP	ug/L								
Methyl ethyl ketone (2-Butanone)	ug/Kg	5	U			6	U		
1,2-Dichloroethene (total), SPLP	ug/L								
1,2-Dichloroethene (total)	ug/Kg	3	U			4	U		
Chloroform, SPLP	ug/L								
Chloroform	ug/Kg	3	U			4	U		
1,1,1-Trichloroethane, SPLP	ug/L								
1,1,1-Trichloroethane	ug/Kg	3	U			4	U		

		StationID	F109SB005		F109SB005		F109SB005		F109SB005	
		SampleID	109SB005S1 (0-1ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005S2 (3-5ft)	
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
		DateAnalyzed	10/19/1999		10/26/1999		10/19/1999		10/22/1999	
		SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**									
Chloromethane, SPLP	ug/L		60	U			60	U		
Chloromethane	ug/Kg									
Naphthalene, SPLP	ug/L				5	U			5	U
Naphthalene	ug/Kg									
Vinyl Chloride, SPLP	ug/L		60	U			60	U		
Vinyl chloride	ug/Kg									
Toluene, SPLP	ug/L		60	U			60	U		
Bromomethane, SPLP	ug/L		60	U			60	U		
Bromomethane	ug/Kg									
Chloroethane, SPLP	ug/L		60	U			60	U		
Chloroethane	ug/Kg									
1,1-Dichloroethene, SPLP	ug/L		60	U			60	U		
1,1-Dichloroethene	ug/Kg									
Acetone, SPLP	ug/L		100	R			100	R		
Acetone	ug/Kg									
Carbon Disulfide, SPLP	ug/L		60	U			60	U		
Carbon Disulfide	ug/Kg									
Methylene Chloride, SPLP	ug/L		60	U			60	U		
Methylene Chloride	ug/Kg									
1,2-Dichloropropane, SPLP	ug/L		60	U			60	U		
1,1-Dichloroethane	ug/Kg									
Vinyl acetate, SPLP	ug/L		60	U			60	U		
Vinyl acetate	ug/Kg									
Methyl ethyl ketone (2-Butanone), SPLP	ug/L		100	U			100	U		
Methyl ethyl ketone (2-Butanone)	ug/Kg									
1,2-Dichloroethene (total), SPLP	ug/L		60	U			60	U		
1,2-Dichloroethene (total)	ug/Kg									
Chloroform, SPLP	ug/L		60	U			60	U		
Chloroform	ug/Kg									
1,1,1-Trichloroethane, SPLP	ug/L		60	U			60	U		
1,1,1-Trichloroethane	ug/Kg									

		StationID	F109SB005		F109SB005		F109SB005		F109SB005	
		SampleID	109SB005T1 (0-1ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)		109SB005T2 (3-5ft)	
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
		DateAnalyzed	10/15/1999		10/22/1999		10/18/1999		10/22/1999	
		SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**									
Chloromethane, SPLP	ug/L									
Chloromethane	ug/Kg		4	U			4	UJ		
Naphthalene, SPLP	ug/L									
Naphthalene	ug/Kg				390	U			430	U
Vinyl Chloride, SPLP	ug/L									
Vinyl chloride	ug/Kg		4	U			4	UJ		
Toluene, SPLP	ug/L									
Bromomethane, SPLP	ug/L									
Bromomethane	ug/Kg		4	U			4	UJ		
Chloroethane, SPLP	ug/L									
Chloroethane	ug/Kg		4	U			4	UJ		
1,1-Dichloroethene, SPLP	ug/L									
1,1-Dichloroethene	ug/Kg		4	U			4	UJ		
Acetone, SPLP	ug/L									
Acetone	ug/Kg		3	J			16	J		
Carbon Disulfide, SPLP	ug/L									
Carbon Disulfide	ug/Kg		2	J			2	J		
Methylene Chloride, SPLP	ug/L									
Methylene Chloride	ug/Kg		5	U			14	UJ		
1,2-Dichloropropane, SPLP	ug/L									
1,1-Dichloroethane	ug/Kg		4	U			4	UJ		
Vinyl acetate, SPLP	ug/L									
Vinyl acetate	ug/Kg		4	U			4	UJ		
Methyl ethyl ketone (2-Butanone), SPLP	ug/L									
Methyl ethyl ketone (2-Butanone)	ug/Kg		6	U			6	UJ		
1,2-Dichloroethene (total), SPLP	ug/L									
1,2-Dichloroethene (total)	ug/Kg		4	U			4	UJ		
Chloroform, SPLP	ug/L									
Chloroform	ug/Kg		4	U			4	UJ		
1,1,1-Trichloroethane, SPLP	ug/L									
1,1,1-Trichloroethane	ug/Kg		4	U			4	UJ		

		StationID	F109SB001		F109SB001		F109SB001		F109SB001	
		SampleID	109SB001S1 (0-1ft)		109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001S2 (3-5ft)	
		DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
		DateAnalyzed	10/21/1999		10/27/1999		10/21/1999		10/27/1999	
		SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**									
1,1-Dichloroethane, SPLP	ug/L		60	U			60	U		
Carbon Tetrachloride, SPLP	ug/L		60	U			60	U		
Carbon Tetrachloride	ug/Kg									
1,2-Dichloroethane, SPLP	ug/L		60	U			60	U		
1,2-Dichloroethane	ug/Kg									
Benzene, SPLP	ug/L		60	U			60	U		
Benzene	ug/Kg									
Trichloroethylene (TCE), SPLP	ug/L		60	U			60	U		
Trichloroethylene (TCE)	ug/Kg									
1,2-Dichloropropane	ug/Kg									
Bromodichloromethane, SPLP	ug/L		60	U			60	U		
Bromodichloromethane	ug/Kg									
2-Chloroethyl vinyl ether, SPLP	ug/L		200	U			200	U		
2-Chloroethyl vinyl ether	ug/Kg									
cis-1,3-Dichloropropene, SPLP	ug/L		60	U			60	U		
cis-1,3-Dichloropropene	ug/Kg									
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/L		100	U			100	U		
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg									
Toluene	ug/Kg									
trans-1,3-Dichloropropene	ug/Kg									
trans-1,3-Dlichloropropene, SPLP	ug/L		60	U			60	U		
1,1,2-Trichloroethane, SPLP	ug/L		60	U			60	U		
1,1,2-Trichloroethane	ug/Kg									
2-Hexanone, SPLP	ug/L		100	U			100	U		
2-Hexanone	ug/Kg									
Tetrachloroethylene (PCE)	ug/Kg									
Tetrachloroethylene(PCE), SPLP	ug/L		60	U			60	U		
Dlbromochloromethane, SPLP	ug/L		60	U			60	U		
Dibromochloromethane	ug/Kg									
Chlorobenzene, SPLP	ug/L		60	U			60	U		
Chlorobenzene	ug/Kg									

	StationID	F109SB001	F109SB001	F109SB001	F109SB001	
	SampleID	109SB001T1 (0-1ft)	109SB001T1 (0-1ft)	109SB001T2 (3-5ft)	109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	10/15/1999 0:00	
	DateAnalyzed	10/19/1999	10/28/1999	10/21/1999	10/28/1999	
	SDGNumber	EN023	EN023	EN023	EN023	
Parameter	**Units**					
1,1-Dichloroethane, SPLP	ug/L					
Carbon Tetrachloride, SPLP	ug/L					
Carbon Tetrachloride	ug/Kg	5 U		4 U		
1,2-Dichloroethane, SPLP	ug/L					
1,2-Dichloroethane	ug/Kg	5 U		4 U		
Benzene, SPLP	ug/L					
Benzene	ug/Kg	5 U		4 U		
Trichloroethylene (TCE), SPLP	ug/L					
Trichloroethylene (TCE)	ug/Kg	5 U		4 U		
1,2-Dichloropropane	ug/Kg	5 U		4 U		
Bromodichloromethane, SPLP	ug/L					
Bromodichloromethane	ug/Kg	5 U		4 U		
2-Chloroethyl vinyl ether, SPLP	ug/L					
2-Chloroethyl vinyl ether	ug/Kg	16 U		12 U		
cis-1,3-Dichloropropene, SPLP	ug/L					
cis-1,3-Dichloropropene	ug/Kg	5 U		4 U		
Methyl Isobutyl ketone (4-Methyl-2-pentanc	ug/L					
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg	8 U		6 U		
Toluene	ug/Kg	5 U		4 U		
trans-1,3-Dichloropropene	ug/Kg	5 U		4 U		
trans-1,3-Dlichloropropene, SPLP	ug/L					
1,1,2-Trichloroethane, SPLP	ug/L					
1,1,2-Trichloroethane	ug/Kg	5 U		4 U		
2-Hexanone, SPLP	ug/L					
2-Hexanone	ug/Kg	8 U		6 U		
Tetrachloroethylene (PCE)	ug/Kg	5 U		4 U		
Tetrachloroethylene(PCE), SPLP	ug/L					
Dibromochloromethane, SPLP	ug/L					
Dibromochloromethane	ug/Kg	5 U		4 U		
Chlorobenzene, SPLP	ug/L					
Chlorobenzene	ug/Kg	5 U		4 U		

		StationID	F109SB004		F109SB004		F109SB004		F109SB004	
		SampleID	109SB004S1 (0-1ft)		109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004S2 (3-5ft)	
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
		DateAnalyzed	10/19/1999		10/26/1999		10/19/1999		10/26/1999	
		SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**									
1,1-Dichloroethane, SPLP	ug/L		60	U			60	U		
Carbon Tetrachloride, SPLP	ug/L		60	U			60	U		
Carbon Tetrachloride	ug/Kg									
1,2-Dichloroethane, SPLP	ug/L		60	U			60	U		
1,2-Dichloroethane	ug/Kg									
Benzene, SPLP	ug/L		60	U			60	U		
Benzene	ug/Kg									
Trichloroethylene (TCE), SPLP	ug/L		60	U			60	U		
Trichloroethylene (TCE)	ug/Kg									
1,2-Dichloropropane	ug/Kg									
Bromodichloromethane, SPLP	ug/L		60	U			60	U		
Bromodichloromethane	ug/Kg									
2-Chloroethyl vinyl ether, SPLP	ug/L		200	U			200	U		
2-Chloroethyl vinyl ether	ug/Kg									
cis-1,3-Dichloropropene, SPLP	ug/L		60	U			60	U		
cis-1,3-Dichloropropene	ug/Kg									
Methyl Isobutyl ketone (4-Methyl-2-pentanc	ug/L		100	U			100	U		
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg									
Toluene	ug/Kg									
trans-1,3-Dichloropropene	ug/Kg									
trans-1,3-Dlichloropropene, SPLP	ug/L		60	U			60	U		
1,1,2-Trichloroethane, SPLP	ug/L		60	U			60	U		
1,1,2-Trichloroethane	ug/Kg									
2-Hexanone, SPLP	ug/L		100	U			100	U		
2-Hexanone	ug/Kg									
Tetrachloroethylene (PCE)	ug/Kg									
Tetrachloroethylene(PCE), SPLP	ug/L		60	U			60	U		
Dibromochloromethane, SPLP	ug/L		60	U			60	U		
Dibromochloromethane	ug/Kg									
Chlorobenzene, SPLP	ug/L		60	U			60	U		
Chlorobenzene	ug/Kg									

	StationID	F109SB004	F109SB004	F109SB004	F109SB004
	SampleID	109SB004T1 (0-1ft)	109SB004T1 (0-1ft)	109SB004T2 (3-5ft)	109SB004T2 (3-5ft)
	DateCollected	10/14/1999 0:00	10/14/1999 0:00	10/14/1999 0:00	10/14/1999 0:00
	DateAnalyzed	10/15/1999	10/22/1999	10/15/1999	10/22/1999
	SDGNumber	EN020	EN020	EN020	EN020
Parameter	**Units**				
1,1-Dichloroethane, SPLP	ug/L				
Carbon Tetrachloride, SPLP	ug/L				
Carbon Tetrachloride	ug/Kg	3 U		4 U	
1,2-Dichloroethane, SPLP	ug/L				
1,2-Dichloroethane	ug/Kg	3 U		4 U	
Benzene, SPLP	ug/L				
Benzene	ug/Kg	3 U		4 U	
Trichloroethylene (TCE), SPLP	ug/L				
Trichloroethylene (TCE)	ug/Kg	3 U		4 U	
1,2-Dichloropropane	ug/Kg	3 U		4 U	
Bromodichloromethane, SPLP	ug/L				
Bromodichloromethane	ug/Kg	3 U		4 U	
2-Chloroethyl vinyl ether, SPLP	ug/L				
2-Chloroethyl vinyl ether	ug/Kg	9 U		12 U	
cis-1,3-Dichloropropene, SPLP	ug/L				
cis-1,3-Dichloropropene	ug/Kg	3 U		4 U	
Methyl Isobutyl ketone (4-Methyl-2-pentanc	ug/L				
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg	5 U		6 U	
Toluene	ug/Kg	3 U		4 U	
trans-1,3-Dichloropropene	ug/Kg	3 U		4 U	
trans-1,3-Dlichloropropene, SPLP	ug/L				
1,1,2-Trichloroethane, SPLP	ug/L				
1,1,2-Trichloroethane	ug/Kg	3 U		4 U	
2-Hexanone, SPLP	ug/L				
2-Hexanone	ug/Kg	5 U		6 U	
Tetrachloroethylene (PCE)	ug/Kg	3 U		4 U	
Tetrachloroethylene(PCE), SPLP	ug/L				
Dibromochloromethane, SPLP	ug/L				
Dibromochloromethane	ug/Kg	3 U		4 U	
Chlorobenzene, SPLP	ug/L				
Chlorobenzene	ug/Kg	3 U		4 U	

		StationID	F109SB005		F109SB005	F109SB005		F109SB005
		SampleID	109SB005S1 (0-1ft)		109SB005S1 (0-1ft)	109SB005S2 (3-5ft)		109SB005S2 (3-5ft)
		DateCollected	10/14/1999 0:00		10/14/1999 0:00	10/14/1999 0:00		10/14/1999 0:00
		DateAnalyzed	10/19/1999		10/26/1999	10/19/1999		10/22/1999
		SDGNumber	EN020		EN020	EN020		EN020
Parameter	**Units**							
1,1-Dichloroethane, SPLP	ug/L		60	U		60	U	
Carbon Tetrachloride, SPLP	ug/L		60	U		60	U	
Carbon Tetrachloride	ug/Kg							
1,2-Dichloroethane, SPLP	ug/L		60	U		60	U	
1,2-Dichloroethane	ug/Kg							
Benzene, SPLP	ug/L		60	U		60	U	
Benzene	ug/Kg							
Trichloroethylene (TCE), SPLP	ug/L		60	U		60	U	
Trichloroethylene (TCE)	ug/Kg							
1,2-Dichloropropane	ug/Kg							
Bromodichloromethane, SPLP	ug/L		60	U		60	U	
Bromodichloromethane	ug/Kg							
2-Chloroethyl vinyl ether, SPLP	ug/L		200	U		200	U	
2-Chloroethyl vinyl ether	ug/Kg							
cis-1,3-Dichloropropene, SPLP	ug/L		60	U		60	U	
cis-1,3-Dichloropropene	ug/Kg							
Methyl Isobutyl ketone (4-Methyl-2-pentanc	ug/L		100	U		100	U	
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg							
Toluene	ug/Kg							
trans-1,3-Dichloropropene	ug/Kg							
trans-1,3-Dlichloropropene, SPLP	ug/L		60	U		60	U	
1,1,2-Trichloroethane, SPLP	ug/L		60	U		60	U	
1,1,2-Trichloroethane	ug/Kg							
2-Hexanone, SPLP	ug/L		100	U		100	U	
2-Hexanone	ug/Kg							
Tetrachloroethylene (PCE)	ug/Kg							
Tetrachloroethylene(PCE), SPLP	ug/L		60	U		60	U	
Dibromochloromethane, SPLP	ug/L		60	U		60	U	
Dibromochloromethane	ug/Kg							
Chlorobenzene, SPLP	ug/L		60	U		60	U	
Chlorobenzene	ug/Kg							

		StationID	F109SB005		F109SB005		F109SB005		F109SB005	
		SampleID	109SB005T1 (0-1ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)		109SB005T2 (3-5ft)	
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
		DateAnalyzed	10/15/1999		10/22/1999		10/18/1999		10/22/1999	
		SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**									
1,1-Dichloroethane, SPLP	ug/L									
Carbon Tetrachloride, SPLP	ug/L									
Carbon Tetrachloride	ug/Kg		4	U			4	UJ		
1,2-Dichloroethane, SPLP	ug/L									
1,2-Dichloroethane	ug/Kg		4	U			4	UJ		
Benzene, SPLP	ug/L									
Benzene	ug/Kg		4	U			4	UJ		
Trichloroethylene (TCE), SPLP	ug/L									
Trichloroethylene (TCE)	ug/Kg		4	U			4	UJ		
1,2-Dichloropropane	ug/Kg		4	U			4	UJ		
Bromodichloromethane, SPLP	ug/L									
Bromodichloromethane	ug/Kg		4	U			4	UJ		
2-Chloroethyl vinyl ether, SPLP	ug/L									
2-Chloroethyl vinyl ether	ug/Kg		12	U			12	UJ		
cis-1,3-Dichloropropene, SPLP	ug/L									
cis-1,3-Dichloropropene	ug/Kg		4	U			4	UJ		
Methyl Isobutyl ketone (4-Methyl-2-pentanc	ug/L									
Methyl isobutyl ketone (4-Methyl-2-pentanc	ug/Kg		6	U			6	UJ		
Toluene	ug/Kg		4	UJ			4	UJ		
trans-1,3-Dichloropropene	ug/Kg		4	UJ			4	UJ		
trans-1,3-Dlichloropropene, SPLP	ug/L									
1,1,2-Trichloroethane, SPLP	ug/L									
1,1,2-Trichloroethane	ug/Kg		4	UJ			4	UJ		
2-Hexanone, SPLP	ug/L									
2-Hexanone	ug/Kg		6	UJ			6	UJ		
Tetrachloroethylene (PCE)	ug/Kg		4	UJ			4	UJ		
Tetrachloroethylene(PCE), SPLP	ug/L									
DIbromochloromethane, SPLP	ug/L									
Dibromochloromethane	ug/Kg		4	UJ			4	UJ		
Chlorobenzene, SPLP	ug/L									
Chlorobenzene	ug/Kg		4	UJ			4	UJ		

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001S1 (0-1ft)		109SB001S1 (0-1ft)		109SB001S2 (3-5ft)		109SB001S2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/21/1999		10/27/1999		10/21/1999		10/27/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Ethylbenzene, SPLP	ug/L	60	U			60	U		
Ethylbenzene	ug/Kg								
Xylenes, Total, SPLP	ug/L	60	U			60	U		
Xylenes, Total	ug/Kg								
Styrene, SPLP	ug/L	60	U			60	U		
Styrene	ug/Kg								
Bromoform, SPLP	ug/L	60	U			60	U		
Bromoform	ug/Kg								
1,1,2,2-Tetrachloroethane, SPLP	ug/L	60	U			60	U		
1,1,2,2-Tetrachloroethane	ug/Kg								

	StationID	F109SB001		F109SB001		F109SB001		F109SB001	
	SampleID	109SB001T1 (0-1ft)		109SB001T1 (0-1ft)		109SB001T2 (3-5ft)		109SB001T2 (3-5ft)	
	DateCollected	10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00		10/15/1999 0:00	
	DateAnalyzed	10/19/1999		10/28/1999		10/21/1999		10/28/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	**Units**								
Ethylbenzene, SPLP	ug/L								
Ethylbenzene	ug/Kg	5	U			4	U		
Xylenes, Total, SPLP	ug/L								
Xylenes, Total	ug/Kg	5	U			4	U		
Styrene, SPLP	ug/L								
Styrene	ug/Kg	5	U			4	U		
Bromoform, SPLP	ug/L								
Bromoform	ug/Kg	5	U			4	U		
1,1,2,2-Tetrachloroethane, SPLP	ug/L								
1,1,2,2-Tetrachloroethane	ug/Kg	5	UJ			4	U		

	StationID	F109SB004		F109SB004		F109SB004		F109SB004	
	SampleID	109SB004S1 (0-1ft)		109SB004S1 (0-1ft)		109SB004S2 (3-5ft)		109SB004S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/19/1999		10/26/1999		10/19/1999		10/26/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Ethylbenzene, SPLP	ug/L	60	U			60	U		
Ethylbenzene	ug/Kg								
Xylenes, Total, SPLP	ug/L	60	U			60	U		
Xylenes, Total	ug/Kg								
Styrene, SPLP	ug/L	60	U			60	U		
Styrene	ug/Kg								
Bromoform, SPLP	ug/L	60	U			60	U		
Bromoform	ug/Kg								
1,1,2,2-Tetrachloroethane, SPLP	ug/L	60	U			60	U		
1,1,2,2-Tetrachloroethane	ug/Kg								

	StationID	F109SB004	F109SB004	F109SB004	F109SB004
	SampleID	109SB004T1 (0-1ft)	109SB004T1 (0-1ft)	109SB004T2 (3-5ft)	109SB004T2 (3-5ft)
	DateCollected	10/14/1999 0:00	10/14/1999 0:00	10/14/1999 0:00	10/14/1999 0:00
	DateAnalyzed	10/15/1999	10/22/1999	10/15/1999	10/22/1999
	SDGNumber	EN020	EN020	EN020	EN020
Parameter	**Units**				
Ethylbenzene, SPLP	ug/L				
Ethylbenzene	ug/Kg	3 U		4 U	
Xylenes, Total, SPLP	ug/L				
Xylenes, Total	ug/Kg	3 U		4 U	
Styrene, SPLP	ug/L				
Styrene	ug/Kg	3 U		4 U	
Bromoform, SPLP	ug/L				
Bromoform	ug/Kg	3 U		4 U	
1,1,2,2-Tetrachloroethane, SPLP	ug/L				
1,1,2,2-Tetrachloroethane	ug/Kg	3 UJ		4 U	

	StationID	F109SB005		F109SB005		F109SB005		F109SB005	
	SampleID	109SB005S1 (0-1ft)		109SB005S1 (0-1ft)		109SB005S2 (3-5ft)		109SB005S2 (3-5ft)	
	DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00	
	DateAnalyzed	10/19/1999		10/26/1999		10/19/1999		10/22/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Ethylbenzene, SPLP	ug/L	60	U			60	U		
Ethylbenzene	ug/Kg								
Xylenes, Total, SPLP	ug/L	60	U			60	U		
Xylenes, Total	ug/Kg								
Styrene, SPLP	ug/L	60	U			60	U		
Styrene	ug/Kg								
Bromoform, SPLP	ug/L	60	U			60	U		
Bromoform	ug/Kg								
1,1,2,2-Tetrachloroethane, SPLP	ug/L	60	U			60	U		
1,1,2,2-Tetrachloroethane	ug/Kg								

		StationID	F109SB005		F109SB005		F109SB005		F109SB005
		SampleID	109SB005T1 (0-1ft)		109SB005T1 (0-1ft)		109SB005T2 (3-5ft)		109SB005T2 (3-5ft)
		DateCollected	10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00		10/14/1999 0:00
		DateAnalyzed	10/15/1999		10/22/1999		10/18/1999		10/22/1999
		SDGNumber	EN020		EN020		EN020		EN020
Parameter	**Units**								
Ethylbenzene, SPLP	ug/L								
Ethylbenzene	ug/Kg		4	UJ		4	UJ		
Xylenes, Total, SPLP	ug/L								
Xylenes, Total	ug/Kg		4	UJ		4	UJ		
Styrene, SPLP	ug/L								
Styrene	ug/Kg		4	UJ		4	UJ		
Bromoform, SPLP	ug/L								
Bromoform	ug/Kg		4	UJ		4	UJ		
1,1,2,2-Tetrachloroethane, SPLP	ug/L								
1,1,2,2-Tetrachloroethane	ug/Kg		4	UJ		4	UJ		

Analytical Data Summary

	StationID	F109GW001		F109GW002	
	SampleID	109GW00104		109GW00201	
	DateCollected	10/29/1997 0:00		05/20/1999 0:00	
	DateAnalyzed	11/25/1997		05/28/1999	
	SDGNumber	31653		38649	
Parameter	**Units**				
Aluminum	ug/L	661	=	169	J
Antimony	ug/L	4.4	U	5	U
Arsenic	ug/L	2.1	U	3.3	U
Barium	ug/L	28.8	=	16.6	J
Beryllium	ug/L	0.46	U	0.3	U
Cadmium	ug/L	0.3	U	0.3	U
Calcium	ug/L	195000	J	98600	J
Chromium, Total	ug/L	7	J	0.5	U
Cobalt	ug/L	0.8	U	1.7	U
Copper	ug/L	2.6	U	2.6	U
Iron	ug/L	1740	=	679	J
Lead	ug/L	0.9	U	2.1	U
Magnesium	ug/L	14200	J	20600	J
Manganese	ug/L	83.6	J	985	=
Mercury	ug/L	0.1	U	0.11	J
Nickel	ug/L	4.8	U	1.6	J
Potassium	ug/L	11500	J	14000	J
Selenium	ug/L	6.2	=	2.9	U
Silver	ug/L	1	U	2	U
Sodium	ug/L	22400	U	53000	=
Thallium	ug/L	5	U	2.3	UJ
Tin (Sn)	ug/L	14	U	29.5	U
Vanadium	ug/L	3.2	J	3.5	J
Zinc	ug/L	28.6	U	10.6	U

	StationID	F109GW002	
	SampleID	109GW00201	
	DateCollected	05/20/1999 0:00	
	DateAnalyzed	05/26/1999	
	SDGNumber	38649	
Parameter	**Units**		
PCB-1016 (Arochlor 1016)	ug/L	1	U
PCB-1221 (Arochlor 1221)	ug/L	1	U
PCB-1232 (Arochlor 1232)	ug/L	1	U
PCB-1242 (Arochlor 1242)	ug/L	1	U
PCB-1248 (Arochlor 1248)	ug/L	1	U
PCB-1254 (Arochlor 1254)	ug/L	2	U
PCB-1260 (Arochlor 1260)	ug/L	2	U

Analytical Data Summary

	StationID	F109GW002	
	SampleID	109GW00201	
	DateCollected	05/20/1999 0:00	
	DateAnalyzed	05/26/1999	
	SDGNumber	38649	
Parameter	**Units**		
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/L	0.04	U
Gamma BHC (Lindane)	ug/L	0.04	U
Beta BHC (Beta Hexachlorocyclohexane)	ug/L	0.04	U
Heptachlor	ug/L	0.04	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/L	0.04	U
Aldrin	ug/L	0.04	U
Heptachlor Epoxide	ug/L	0.04	U
Gamma-chlordane	ug/L	0.04	U
Alpha-chlordane	ug/L	0.04	U
Endosulfan I	ug/L	0.04	U
p,p'-DDE	ug/L	0.08	U
Dieldrin	ug/L	0.08	U
Endrin	ug/L	0.08	U
p,p'-DDD	ug/L	0.08	U
Endosulfan II	ug/L	0.08	U
p,p'-DDT	ug/L	0.08	U
Endrin Aldehyde	ug/L	0.08	U
Endosulfan Sulfate	ug/L	0.08	U
Methoxychlor	ug/L	0.38	U
Endrin Ketone	ug/L	0.08	U
Toxaphene	ug/L	2.5	U

Analytical Data Summary

	StationID	F109GW001		F109GW002	
	SampleID	109GW00104		109GW00201	
	DateCollected	10/29/1997 0:00		05/20/1999 0:00	
	DateAnalyzed	11/18/1997		05/26/1999	
	SDGNumber	31653		38649	
Parameter	**Units**				
2,2'-Oxybis(1-chloro)propane	ug/L	11	U	10	U
2-Methylnaphthalene	ug/L	11	U	10	U
2-Methylphenol (o-Cresol)	ug/L	11	U	10	U
Phenol	ug/L	11	U	10	U
Acenaphthylene	ug/L	11	U	10	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/L	11	U	10	U
2-Chlorophenol	ug/L	11	U	10	U
Acenaphthene	ug/L	11	U	10	U
1,3-Dichlorobenzene	ug/L	11	U	10	U
Fluorene	ug/L	11	U	10	U
1,4-Dichlorobenzene	ug/L	11	U	10	U
Phenanthrene	ug/L	11	U	10	U
Anthracene	ug/L	11	U	10	U
Benzyl alcohol	ug/L	11	U	10	U
Flouranthene	ug/L	11	U	10	U
1,2-Dichlorobenzene	ug/L	11	U	10	U
Pyrene	ug/L	11	U	10	U
Benzo(a)Anthracene	ug/L	11	U	10	U
Chrysene	ug/L	11	U	10	U
Benzo(b)Fluoranthene	ug/L	11	U	10	U
N-Nitrosodi-n-propylamine	ug/L	11	U	10	U
4-Methylphenol (p-Cresol)	ug/L	11	U	10	U
Benzo(k)Fluoranthene	ug/L	11	U	10	U
Benzo(a)Pyrene	ug/L	11	U	10	U
Hexachloroethane	ug/L	11	U	10	U
Indeno(1,2,3-c,d)pyrene	ug/L	11	U	10	U
Nitrobenzene	ug/L	11	U	10	U
Dibenz(a,h)anthracene	ug/L	11	U	10	U
Isophorone	ug/L	11	U	10	U
2-Nitrophenol	ug/L	11	U	10	U
Benzo(g,h,i)Perylene	ug/L	11	U	10	U
2,4-Dimethylphenol	ug/L	11	U	10	U
bis(2-Chloroethoxy) Methane	ug/L	11	U	10	U
Benzoic acid	ug/L	53	U	25	U

Analytical Data Summary

	StationID	F109GW001		F109GW002	
	SampleID	109GW00104		109GW00201	
	DateCollected	10/29/1997 0:00		05/20/1999 0:00	
	DateAnalyzed	11/18/1997		05/26/1999	
	SDGNumber	31653		38649	
Parameter	**Units**				
2,4-Dichlorophenol	ug/L	11	U	10	U
1,2,4--Trichlorobenzene	ug/L	11	U	10	U
4-Chloroaniline	ug/L	11	U	10	U
Hexachlorobutadiene	ug/L	11	U	10	U
4-Chloro-3-methylphenol	ug/L	11	U	10	U
Hexachlorocyclopentadiene	ug/L	11	U	10	U
2,4,6-Trichlorophenol	ug/L	11	U	10	U
2,4,5-Trichlorophenol	ug/L	53	U	25	U
2-Chloronaphthalene	ug/L	11	U	10	U
2-Nitroaniline	ug/L	53	U	25	U
2,6-Dinitrotoluene	ug/L	11	U	10	U
3-Nitroaniline	ug/L	53	U	25	U
2,4-Dinitrophenol	ug/L	53	U	25	U
Dibenzofuran	ug/L	11	U	10	U
4-Nitrophenol	ug/L	53	U	25	U
2,4-Dinitrotoluene	ug/L	11	U	10	U
Dimethyl Phthalate	ug/L	11	U	10	U
Diethyl Phthalate	ug/L	11	U	10	U
4-Chlorophenyl Phenyl Ether	ug/L	11	U	10	U
4-Nitroaniline	ug/L	53	U	25	U
4,6-Dinitro-2-methylphenol	ug/L	53	U	25	U
N-Nitrosodiphenylamine	ug/L	11	U	10	U
4-Bromophenyl Phenyl Ether	ug/L	11	U	10	U
Hexachlorobenzene	ug/L	11	U	10	U
Pentachlorophenol	ug/L	53	U	25	U
Di-n-butyl Phthalate	ug/L	11	U	10	U
Benzyl Butyl Phthalate	ug/L	11	U	10	U
3,3'-Dichlorobenzidine	ug/L	21	U	10	U
bis(2-Ethylhexyl) Phthalate	ug/L	11	U	10	U
Di-n-octylphthalate	ug/L	11	U	10	U

Analytical Data Summary

	StationID	F109GW001		F109GW002		F109GW002	
	SampleID	109GW00104		109GW00201		109GW00201	
	DateCollected	10/29/1997 0:00		05/20/1999 0:00		05/20/1999 0:00	
	DateAnalyzed	11/18/1997		05/24/1999		05/26/1999	
	SDGNumber	31653		38649		38649	
Parameter	**Units**						
Chloromethane	ug/L			5	U		
Naphthalene	ug/L	11	U			10	U
Vinyl chloride	ug/L			5	U		
Bromomethane	ug/L			5	U		
Chloroethane	ug/L			5	U		
1,1-Dichloroethene	ug/L			5	U		
Acetone	ug/L			5	R		
Carbon Disulfide	ug/L			5	UJ		
Methylene Chloride	ug/L			5	U		
1,1-Dichloroethane	ug/L			5	U		
Vinyl acetate	ug/L			5	U		
Methyl ethyl ketone (2-Butanone)	ug/L			5	R		
1,2-Dichloroethene (total)	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		
Benzene	ug/L			5	U		
Trichloroethylene (TCE)	ug/L			5	U		
1,2-Dichloropropane	ug/L			5	U		
Bromodichloromethane	ug/L			5	U		
2-Chloroethyl vinyl ether	ug/L			5	R		
cis-1,3-Dichloropropene	ug/L			5	U		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L			5	U		
Toluene	ug/L			5	U		
trans-1,3-Dichloropropene	ug/L			5	U		
1,1,2-Trichloroethane	ug/L			5	U		
2-Hexanone	ug/L			5	U		
Tetrachloroethylene (PCE)	ug/L			5	U		
Dibromochloromethane	ug/L			5	U		
Chlorobenzene	ug/L			5	U		

Analytical Data Summary

	StationID	F109GW001	F109GW002	F109GW002
	SampleID	109GW00104	109GW00201	109GW00201
	DateCollected	10/29/1997 0:00	05/20/1999 0:00	05/20/1999 0:00
	DateAnalyzed	11/18/1997	05/24/1999	05/26/1999
	SDGNumber	31653	38649	38649
Parameter	**Units**			
Ethylbenzene	ug/L		5 U	
Xylenes, Total	ug/L		5 U	
Styrene	ug/L		5 U	
Bromoform	ug/L		5 U	
1,1,2,2-Tetrachloroethane	ug/L		5 U	

Data Validation Report

EnSafe
Charleston - Zone F
SDG #: 31653

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	31653
Date:	December 8, 1997
Client Name:	EnSafe
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 29-31, 1997
Number of Samples:	19 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Metals

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searson

Paul B. Humburg, President

12/9/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 31653

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
109GW00104	WATER			X		X	
109DW00104	WATER	X		X		X	
109EW00104	WATER	X		X		X	
109FW00104	WATER	X		X		X	
607GW00104	WATER	X		X		X	
607GW01I04	WATER	X		X		X	
109TW00104	WATER	X					
607GW01D04	WATER	X		X		X	
607GW00204	WATER	X		X		X	
607GW02I04	WATER	X		X		X	
607GW00304	WATER	X		X		X	
607GW03I04	WATER	X		X		X	
607TW03I04	WATER	X					
607GW02D04	WATER	X		X		X	
607HW02D04	WATER	X		X		X	
607GW00604	WATER	X		X		X	
607HW00604	WATER	X		X		X	
607GW06IA3	WATER	X		X		X	
607TW00604	WATER	X					
Total Billable Samples (Water/Soil)		18	0	16	0	16	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260A; the National Functional Guidelines for Organic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 31653B

A validation was performed on the Volatile Data from SDG 31653B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibration

The continuing calibration standard N29338.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and compound, all positive and non-detect results are qualified as estimated, J/UJ.

607GW00104	bromomethane (51.6%)
607GW01I04	
607GW01D04	
607GW00204	

Calibrations, continued

The continuing calibration standard N29338.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and compound, all positive and non-detect results are qualified as estimated, J/UJ.

607GW02I04	bromomethane (51.6%)
607GW00304	
607GW03I04	

The continuing calibration standard N29408.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and compound, all positive results are qualified as estimated, J.

607GW00604DL	tetrachloroethene (33.9%)
607HW00604DL	

Method Blanks

The method blanks associated with samples in this SDG exhibited contamination. The end-user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into consideration when applying the 5X or 10X criteria to field samples.

Associated Blank	Compound	Conc.	Action Level
VBLK2	xylene (total)	2J µg/L	10 µg/L

Samples	Compound	Qualification
607GW02D04	xylene (total)	CRQL
607HW02D04		
607GW00604		
607HW00604		
607GW06IA3		

Surrogates

Two (2) samples exhibited one (1) surrogate compound recovery above the QC limits. All reported positive results in the samples are qualified as estimated, J.

Sample	Surrogate	%R
607GW00604	toluene-d8	114%
607HW00604	toluene-d8	117%

Field Duplicates

The field duplicate pair of the following samples exhibited a non-compliant RPD for the noted compound. The reported positive results for the compound are qualified as estimated, J.

607GW00604 tetrachloroethene (33% RPD)
607HW00604

Compound Quantitation

For the following samples, the E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis. All other results from the dilution analyses are not used in favor of the results reported from the undiluted analyses.

607GW00604
607HW00604
607GW06IA3

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
607GW00104	bromomethane (51.6%)	+/-	J/UJ
607GW01I04			
607GW01D04			
607GW00204			
607GW02I04			
607GW00304			
607GW03I04			
607GW00604DL	tetrachloroethene	+	J
607HW00604DL			
607GW02D04	xylene (total)	+B	CRQL
607HW02D04			
607GW00604			
607HW00604			
607GW06IA3			
607GW00604	All Compounds	+	J
607HW00604			
607GW00604	tetrachloroethene	+	J
607HW00604			
607GW00604	All E flagged compounds	+E	Not Used
607HW00604			
607GW06IA3			
607GW00604	All except corresponding	+/-	Not Used
607HW00604	E flagged compounds		
607GW06IA3			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270B, Revision 2, 9/94; the National Functional Guidelines for Organic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 31653B

A validation was performed on the Semivolatile Data from SDG 31653B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Method Blanks

The method blanks associated with samples in this SDG exhibited contamination. Several samples required qualification. The end-user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into consideration when applying the 5X or 10X criteria to field samples.

Method Blanks, continued

Associated Blank	Compound	Conc.	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	7J µg/L	70 µg/L
SBLK2	bis(2-ethylhexyl)phthalate	1J µg/L	10 µg/L
SBLK3	bis(2-ethylhexyl)phthalate	7J µg/L	70 µg/L

Samples	Compound	Qualification
607GW01D04	bis(2-ethylhexyl)phthalate	CRQL
607GW00204		
607GW00304		
607GW03I04		
607GW02D04		
607HW00604		
607GW06IA3		
607GW00104		
607GW01I04		
109GW00104		
607GW00604	bis(2-ethylhexyl)phthalate	U

Field QC Blanks

The field QC blanks associated with samples in this SDG exhibited contamination and several samples required qualification. The end-user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into consideration when applying the 5X or 10X criteria to field samples.

Associated Blanks	Compound	Conc.	Action Level
109EW00104	bis(2-ethylhexyl)phthalate	8JB µg/L	80 µg/L
109FW00104	bis(2-ethylhexyl)phthalate	6JB µg/L	60 µg/L
109DW00104	bis(2-ethylhexyl)phthalate	9JB µg/L	90 µg/L

Samples	Compound	Qualification
607GW02I04	bis(2-ethylhexyl)phthalate	CRQL

Surrogate Recoveries

Sample 607GW06IA3 exhibited one (1) or more acid surrogate recoveries below 10% in both the original analysis and RE analysis. For the following samples and compounds, all positive results for the acid fraction are qualified as estimated, J, and all non-detect results are rejected, UR.

SAMPLE	COMPOUNDS	SURROGATE %R
607GW06IA3	acid fraction results	phenol-d5 0% 2-fluorophenol 0%, 2,4,6-tribromophenol 0%

Compound Quantitation

For the following sample, the results are not used in favor of the results reported from the original analysis of the sample because of similar acid fraction surrogate recoveries and exceeded holding times.

607GW06IA3RE

System Performance and Overall Assessment

The data required qualifications and rejections

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
607GW01D04	bis(2-ethylhexyl)phthalate	+B	CRQL
607GW00204			
607GW00304			
607GW03I04			
607GW02D04			
607HW00604			
607GW06IA3			
607GW00104			
607GW01I04			
109GW00104			
607GW00604	bis(2-ethylhexyl)phthalate	+B	U
607GW02I04	bis(2-ethylhexyl)phthalate	+	CRQL
607GW06IA3	acid fraction results	+/-	J/UR
607GW06IA3RE	All Results	+/-	Not Used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm

DATA ASSESSMENT NARRATIVE
METALS

General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Appendix IX Methods; the Functional Guidelines for Inorganic Data Validation,. February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 31653

A validation was performed on the Metals Data from SDG 31653. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation and Field Blanks

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	2.7 ug/l	all water samples below 13.5 ug/l
Beryllium	0.35 ug/l	all water samples below 1.35 ug/l
Calcium	60.5 ug/l	no impact
Copper	2.54 ug/l	all water samples below 12.7 ug/l
Iron	32.0 ug/l	all water samples below 160 ug/l
Lead	0.98 ug/l	all water samples below 4.9 ug/l
Manganese	1.21 ug/l	all water samples below 6.05 ug/l
Mercury	0.16 ug/l	all water samples below 0.8 ug/l

Nickel	1.03 ug/l	all water samples below 5.15 ug/l
Potassium	178 ug/l	no impact
Sodium	107 ug/l	no impact
Tin	19.6 ug/l	no impact
Zinc	9.89 ug/l	all water samples below 49.5 ug/l

The field blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.94 ug/l	all water samples below 4.7 ug/l
Zinc	13.1 ug/l	no impact
Sodium	12000 ug/l	all water samples below 60000ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-15.4 ug/l	all water samples below 154 ug/l

This reviewer qualifies all positive and non-detect results below ten times the negative bias as estimated, "J" or "UJ".

Field Duplicate Results

The RPDs for samples 607GW00604 and 607HW00604 for Aluminum (74%), Calcium (62%), Iron (62%) and Manganese (58%) were greater than 35%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

The RPDs for samples 607GW02D04 and 607HW02D04 for Aluminum (139%), Barium (132%), Calcium (84%), Iron (179%), Magnesium (68%), Manganese (181%), Potassium (99%) and Sodium (110%) were greater than 35%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Serial Dilution results

The serial dilution RPDs for waters for Calcium, Magnesium, Potassium and Sodium were greater than 10%. All positive results are qualified as estimated, "J".

"B" Qualifier

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 12.7 ug/l	Cu.	+	U
All water samples below 13.5 ug/l	Sb.		
All water samples below 4.7 ug/l	Ba.		
All water samples below 1.15 ug/l	Be.		
All water samples below 160 ug/l	Fe.		
All water samples below 4.9 ug/l	Pb.		
All water samples below 6.05 ug/l	Mn.		
All water samples below 0.8 ug/l	Hg.		
All water samples below 5.15 ug/l	Ni.		
All water samples below 60000 ug/l	Na.		
All water samples below 49.5 ug/l	Zn.		
All water samples below 154 ug/l	Al.	+/U	J/UJ
607GW00604 and 607HW00604.	Al, Ca, Fe and Mn.	+/U	J/UJ
607GW02D04 and 607HW02D04.	Al, Ba, Ca, Fe, Mg, Mn, K and Na.	+/U	J/UJ
All water samples	Ca, Mg, Mn, K and Na.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	38649
Date:	July 2, 1999
Client Name:	Ensafe
Project/Site Name:	Charleston Zone F
Date Sampled:	May 20, 1999
Number of Samples:	5 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticides/PCBs, Metals

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Seazbos
for Paul B. Humburg, President

7-2-99.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 38649

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		MET	
109GW00201	WATER	X		X		X		X	.
609GW00101	WATER	X		X		X		X	
609TW00101	WATER	X							
609GW00201	WATER	X		X		X		X	
617GW00301	WATER	X		X		X		X	
Total Billable Samples (Water/Soil)		5	0	4	0	4	0	4	0

VOA= Volatiles
SVOA= Semivolatiles
P/P= Pesticides/PCBs
MET= Metals

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Qrganic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 38649

A validation was performed on the Volatile Data from SDG 38649. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
* Internal Standard Performance
* Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

Initial Calibration

The initial calibration, analyzed 05-13-99, contained compounds with RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

All Samples	acetone (0.04516)

Continuing Calibration

The continuing calibration, UL9455.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

All Samples	carbon disulfide (71.6%)
	2-chloroethyl vinyl ether (61.2%)

The continuing calibration, UL9455.D, contained compounds with RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

All Samples	acetone (0.24)
	2-butanone (0.047)
	2-chloroethyl vinyl ether (0.027)

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
All Samples	acetone	+/-	J/UR
All Samples	carbon disulfide 2-chloroethyl vinyl ether	+/-	J/UJ
All Samples	acetone 2-butanone 2-chloroethyl vinyl ether	+/-	J/UR

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT AND NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8270C; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 38649

A validation was performed on the Semivolatile Data from SDG 38649. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
* Calibrations
* Internal Standard Performance
  Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

Blank

The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Method Blank

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	2J ug/L	20 ug/L

Samples	Compound	Qualification
617GW00301	bis(2-ethylhexyl)phthalate	CRQL
109GW00201		
609GW00101		
609GW00201		

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
617GW00301	bis(2-ethylhexyl)phthalate	+	CRQL
109GW00201			
609GW00101			
609GW00201			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

PESTICIDE/AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8081; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 38649

A validation was performed on the Pesticide/Aroclor Data from SDG 38649. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Method Deviations

The SW-846 Method 8081 (1994) requires a five-point calibration curve for all single-component pesticides, Toxaphene, and Aroclors 1016 and 1260. The laboratory analyzed a single point curve for Toxaphene and Aroclors 1016 and 1260. No positive results were reported for this compound, therefore the data did not require qualification.

Surrogate Recoveries

The sample listed below exhibited a low DCB recovery. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
609GW00101	DCB-1	40%

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
609GW00101	ALL	+/-	J/UJ

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

DATA ASSESSMENT NARRATIVE
METALS

General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods for Appendix IX metals; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDGs # 38649

A validation was performed on the Metals Data from SDG 38649. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Calibrations
- Blanks
- * Interferences
- Matrix Spike Recovery
- * Matrix Duplicates
- * Field Duplicates
- * Laboratory Control Samples
- Serial Dilutions

* - All criteria were met for this parameter.

Preparation and Field Blanks

The preparation and calibration blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	5.98 ug/l	no impact
Copper	1.12 ug/l	all water samples below 5.6 ug/l
Sodium	82.0 ug/l	no impact
Zinc	26.9 ug/l	all water samples below 135 ug/l
Magnesium	42.0 ug/l	no impact

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blanks exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Mercury	-0.22 ug/l	all water samples below 2.2 ug/l
Thallium	-2.47 ug/l	all water samples below 24.7 ug/l

This reviewer qualifies all samples results below 10 times the absolute value of the negative blank value.

Matrix Spike Recovery results

The matrix spike recoveries for waters for Calcium (69%), Magnesium (66%) and Potassium (70%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

The matrix spike recovery for waters for Aluminum (196%) was above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Serial Dilution results

The serial dilution results for waters for Aluminum, Calcium, Iron and Magnesium were greater than 10%. All positive results are qualified as estimated, "J".

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all water samples below 5.6 ug/l	Cu.	+	U
all water samples below 135 ug/l	Zn.		
all water samples below 2.2 ug/l	Hg.	+/U	J/UJ
all water samples below 24.7 ug/l	Tl.		
all water samples	Ca, Mg and K.	+/U	J/UJ
all water samples	Al.	+	J
all water samples	Al, Ca, Fe and Mg.	+	J
all "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	EN020
Date:	November 19, 1999
Client Name:	Ensafe
Project/Site Name:	Charleston Zone F
Date Sampled:	October 14, 1999
Number of Samples:	40 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Laucks Testing Laboratories
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, SPLP Volatiles, Semivolatiles, SPLP Semivolatiles, Pesticides/PCBs, SPLP Pesticides/PCBs, Metals, SPLP Metals, Cyanide, SPLP Cyanide and Total Organic Carbon

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searfoss

Paul B. Humburg, President

11-24-99.

Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# EN020

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SPLP-V		SVOA		SPLP-SV		P/P		SPLP-P/P		MET		SPLP-MET		CN		SPLP-CN		TOC	
616SB002T1	SOIL		X				X				X				X				X				X
616SB002T2	SOIL		X				X				X				X				X				X
617SB003T1	SOIL		X				X				X				X				X				X
617SB003T2	SOIL		X				X				X				X				X				X
617SB004T1	SOIL		X				X				X				X				X				X
617SB004T2	SOIL		X				X				X				X				X				X
619SB001T1	SOIL		X				X				X				X				X				X
619SB001T2	SOIL		X				X				X				X				X				X
619SB004T1	SOIL		X				X				X				X				X				X
619SB004T2	SOIL		X				X				X				X				X				X
619SB015T1	SOIL		X				X				X				X				X				X
619SB015T2	SOIL		X				X				X				X				X				X
109SB004T1	SOIL		X				X				X				X				X				X
109SB004T2	SOIL		X				X				X				X				X				X
109SB005T1	SOIL		X				X				X				X				X				X
109SB005T2	SOIL		X				X				X				X				X				X
607SB016T1	SOIL		X				X				X				X				X				X
613SP027T1	SOIL		X				X				X				X				X				X
613SP027T2	SOIL		X				X				X				X				X				X
109SB004S1	SOIL				X				X				X				X				X		
109SB004S2	SOIL				X				X				X				X				X		
109SB005S1	SOIL				X				X				X				X				X		
109SB005S2	SOIL				X				X				X				X				X		
607SB016S1	SOIL				X				X				X				X				X		
613SP027S1	SOIL				X				X				X				X				X		
613SP027S2	SOIL				X				X				X				X				X		
616SB002S1	SOIL				X				X				X				X				X		
616SB002S2	SOIL				X				X				X				X				X		
617SB003S1	SOIL				X				X				X				X				X		
617SB003S2	SOIL				X				X				X				X				X		
617SB004S1	SOIL				X				X				X				X				X		
617SB004S2	SOIL				X				X				X				X				X		
619SB001S1	SOIL				X				X				X				X				X		
619SB001S2	SOIL				X				X				X				X				X		
619SB004S1	SOIL				X				X				X				X				X		
619SB004S2	SOIL				X				X				X				X				X		
619SB015S1	SOIL				X				X				X				X				X		
619SB015S2	SOIL				X				X				X				X				X		
611SB00901	SOIL														X								
611SB00902	SOIL														X								
Total Billable Samples (Water/Soil)		0	19	0	19	0	19	0	19	0	19	0	19	0	21	0	19	0	19	0	19	0	19

VOA= Volatiles
SPLP-V= SPLP Volatiles
SVOA= Semivolatiles
SPLP-SV= SPLP Semivolatiles
P/P= Pesticides/PCBs
MET= Metals
SPLP-MET= SPLP Metals
CN= Cyanide
P-CN= SPLP Cyanide
TOC= Total Organic Carbon

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # EN020

A validation was performed on the Volatile Data from SDG EN020. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
	•	Internal Standard Performance
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The initial calibration analyzed 07/02/99 on Instrument ORCA exhibited one (1) compound with a %RSD greater than 15% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

616SB002T2	carbon disulfide (21.6%)
617SB003T2	
617SB004T2	
619SB001T2	
619SB004T2	
619SB015T1	
109SB004T2	
109SB005T1	
109SB005T2	
613SP027T1	
613SP027T2	

The continuing calibration F1019003.D exhibited one (1) compound with a RF less than 0.05. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

619SB001S2	acetone (0.049)
619SB001S1	
619SB015S1	
619SB004S2	
619SB004S1	
619SB015S2	
109SB005S1	
109SB005S2	
109SB004S1	
109SB004S2	
616SB002S1	
616SB002S2	
607SB016S1	
617SB004S1	
617SB003S1	
617SB004S2	
613SP027S2	

Calibrations (continued)

The continuing calibration F1020010.D exhibited one (1) compound with a RF less than 0.05. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

617SB003S2	acetone (0.045)
613SP027S1	

Blanks

The method blanks and one of the SPLP blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Associated blank	Compound	Concentration	Action Level
VBLKO1	methylene chloride	4 ug/Kg	40 ug/Kg
VBLKO2	methylene chloride	5 ug/Kg	50 ug/Kg
VBLKO4	methylene chloride	9 ug/Kg	90 ug/Kg
	acetone	4 ug/Kg	40 ug/Kg
T101799ZHE	methylene chloride	20 ug/L	200 ug/L

Samples	Compound	Qualifications
619SB001T2	methylene chloride	U
619SB004T2		
619SB015T1		
109SB005T1		
109SB004T1		
616SB002T1		
616SB002T2		
607SB016T1		
109SB005T2		
617SB003T1		
617SB004T2		
617SB003T2		
613SP027T1		

Blanks (continued)

Samples	Compound	Qualifications
613SP027T2 619SB004T1RE	methylene chloride	U
619SB001T1 619SB015T2 109SB004T2 617SB004T1 109SB004S1 109SB004S2 109SB005S1 109SB005S2 607SB016S1 613SP027S2 616SB002S1 616SB002S2 617SB003S1 617SB004S1 619SB001S1 619SB001S2 619SB004S1 619SB015S1 619SB015S2	methylene chloride	CRQL
619SB004T1RE	acetone	U

Internal Standards

The following sample exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

619SB004T2 109SB004T1 616SB002T2 617SB003T2 613SP027T2	1,4-dichlorobenzene-d4

Internal Standards (continued)

The following sample exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

619SB001T2	chlorobenzene-d5
109SB005T1	1,4-dichlorobenzene-d4

619SB015T1	fluorobenzene
109SB005T2	chlorobenzene-d5
617SB004T2	1,4-dichlorobenzene-d4
613SP027T1	

Surrogate Recoveries

The following samples exhibited a surrogate recovery above the QC limits. The reported positive results are qualified as estimated, J.

Sample	Surrogate	%R
617SB003T2	4-bromofluorobenzene	146%
613SP027T2	4-bromofluorobenzene	141%

Compound Quantitation

For the following samples, the reported results are not used in favor of the results reported from the original analysis of the samples. Both analyses of the sample exhibited similar internal standard area recoveries.

619SB001T2RE
619SB004T2RE
619SB015T1RE
109SB005T1RE
109SB004T1RE
616SB002T2RE
109SB005T2RE
617SB004T2RE
617SB003T2RE
613SP027T1RE
613SP027T2RE

Compound Quantitation (continued)

For the following sample, the reported results are not used in favor of the results reported from the RE analysis of the sample. The RE analyses of the sample exhibited acceptable internal standard area recoveries.

619SB004T1

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
616SB002T2	carbon disulfide (21.6%)	+	J
617SB003T2			
617SB004T2			
619SB001T2			
619SB004T2			
619SB015T1			
109SB004T2			
109SB005T1			
109SB005T2			
613SP027T1			
613SP027T2			
619SB001S2	acetone (0.049)	+/-	J/UR
619SB001S1			
619SB015S1			
619SB004S2			
619SB004S1			
619SB015S2			
109SB005S1			
109SB005S2			
109SB004S1			
109SB004S2			
616SB002S1			
616SB002S2			
607SB016S1			
617SB004S1			
617SB003S1			
617SB004S2			
613SP027S2			
617SB003S2	acetone (0.045)	+/-	J/UR
613SP027S1			

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
619SB001T2	methylene chloride	+B	U
619SB004T2			
619SB015T1			
109SB005T1			
109SB004T1			
616SB002T1			
616SB002T2			
607SB016T1			
109SB005T2			
617SB003T1			
617SB004T2			
617SB003T2			
613SP027T1			
613SP027T2			
619SB004T1RE			
619SB001T1	methylene chloride	+B	CRQL
619SB015T2			
109SB004T2			
617SB004T1			
109SB004S1	methylene chloride	+	CRQL
109SB004S2			
109SB005S1			
109SB005S2			
607SB016S1			
613SP027S2			
616SB002S1			
616SB002S2			
617SB003S1			
617SB004S1			
619SB001S1			
619SB001S2			
619SB004S1			
619SB015S1			
619SB015S2			
619SB004T1RE	acetone	+B	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
	All associated with:		
619SB004T2	1,4-dichlorobenzene-d4	+/-	J/UJ
109SB004T1			
616SB002T2			
617SB003T2			
613SP027T2			
	All associated with:		
619SB001T2	chlorobenzene-d5	+/-	J/UJ
109SB005T1	1,4-dichlorobenzene-d4		
	All associated with:		
619SB015T1	fluorobenzene	+/-	J/UJ
109SB005T2	chlorobenzene-d5		
617SB004T2	1,4-dichlorobenzene-d4	+/-	J/UJ
613SP027T1			
617SB003T2	All Compounds	+	J
613SP027T2			
619SB001T2RE	All Compounds	+/-	Do Not Use
619SB004T2RE			
619SB015T1RE			
109SB005T1RE			
109SB004T1RE			
616SB002T2RE			
109SB005T2RE			
617SB004T2RE			
617SB003T2RE			
613SP027T1RE			
613SP027T2RE			
619SB004T1			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # EN020

A validation was performed on the Semivolatile Data from SDG EN020. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The initial calibration analyzed 10/11/99 on Instrument 5970Z exhibited two (2) compounds with %RSDs greater than 15% for which qualifications were required. For the following samples and non-compliant compounds, the reported positive results are qualified as estimated, J.

109SB004S1	benzoic acid (36.9%)

Calibrations (continued)

The initial calibration analyzed 10/11/99 on Instrument 5970Z exhibited two (2) compounds with %RSDs greater than 15% for which qualifications were required. For the following samples and non-compliant compounds, the reported positive results are qualified as estimated, J.

109SB005T1	benzo(k)fluoranthene (17.4%)
613SP027T1	
109SB004T2	
613SP027T2	
617SB004T2	
617SB003T2	

The continuing calibration standard Z1021011.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and non-compliant compound, the reported positive and non-detect results are qualified as estimated, J/UJ.

619SB001T2	benzoic acid (61.5%)
619SB001T1	
619SB004T1	
619SB004T2	
619SB015T1	
619SB015T2	
109SB005T1	
109SB005T2	

The continuing calibration standard Z1022009.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

617SB003T2	indeno(1,2,3-cd)pyrene (36.4%)

The continuing calibration standard Z1026002.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

109SB004S1	benzoic acid (30.5%)

Blanks

Two (2) of the three (3) SPLP blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Associated blank	Compound	Concentration	Action Level
SSPLPBLK01	diethylphthalate	3J ug/L	30 ug/L
SSPLPBLK	bis(2-ethylhexyl)phthalate	1J ug/L	10 ug/L

Samples	Compound	Qualifications
109SB005S2 616SB002S1	diethylphthalate	CRQL
619SB001S1 109SB004S1 607SB016S1	bis(2-ethylhexyl)phthalate	CRQL
109SB005S1 617SB003S1 613SP027S2	bis(2-ethylhexyl)phthalate	U

Internal Standards

The following samples exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

613SP027T1 613SP027T2	perylene-d12

Compound Quantitation

For the following samples, the reported results are not used in favor of the results reported from the original analyses of the samples. The dilution analyses were not necessary because there were no compounds reported in the lessor dilutions that were above the calibration range.

613SP027T2DL
613SP027T1DL
619SB001T1DL

For the following sample, the E flagged result is not used in favor of the corresponding D flagged result reported in the dilution analysis of the sample. All other results reported in the dilution analysis are not used in favor of the results reported in the lessor dilution of the sample.

617SB003T2

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
109SB004S1	benzoic acid (36.9%)	+	J
109SB005T1 613SP027T1 109SB004T2 613SP027T2 617SB004T2 617SB003T2	benzo(k)fluoranthene (17.4%)	+	J
619SB001T2 619SB001T1 619SB004T1 619SB004T2 619SB015T1 619SB015T2 109SB005T1 109SB005T2	benzoic acid (61.5%)	+/-	J/UJ
617SB003T2	indeno(1,2,3-cd)pyrene (36.4%)	+	J
109SB004S1	benzoic acid (30.5%)	+	J
109SB005S2 616SB002S1	diethylphthalate	+	CRQL
619SB001S1 109SB004S1 607SB016S1	bis(2-ethylhexyl)phthalate	+	CRQL
109SB005S1 617SB003S1 613SP027S2	bis(2-ethylhexyl)phthalate	+	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP027T1 613SP027T2	*All associated with* perylene-d12	+/-	J/UJ
613SP027T2DL 613SP027T1DL 619SB001T1DL	All Compounds	+/-	Do not use
617SB003T2	All E flagged compounds	+E	Do not use
617SB003T2DL	All except corresponding D flagged results	+/-	Do Not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

PESTICIDE/AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8081A/8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # EN020

A validation was performed on the Pesticide/Aroclor Data from SDG EN020. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuing calibration analyzed on 10/20/99 at 05:46 exhibited one (1) compound with a %D greater than 15% and less than 50% and required qualifications. For the following sample and non-compliant compound, the positive results are qualified as estimated, J.

109SB005T1	Methoxychlor (17.0%)

The continuing calibration analyzed on 10/20/99 at 17:02 exhibited one (1) compound with a %D greater than 15% and less than 50% and required qualifications. For the following sample and non-compliant compound, the positive results are qualified as estimated, J.

109SB005T1DL	4,4'-DDE (-17.2%)

The continuing calibration analyzed on 10/22/99 at 16:43 exhibited one (1) compound with a %D greater than 15% and less than 50% and required qualifications. For the following samples and non-compliant compound, the positive results are qualified as estimated, J.

613SP027T2DL	4,4'-DDD (-15.8%)
617SB003T2	
617SB004T2	

The continuing calibration analyzed on 10/22/99 at 17:28 exhibited one (1) compound with a %D greater than 15% and less than 50% and required qualifications. For the following sample and non-compliant compound, the positive results are qualified as estimated, J.

617SB003T2	4,4'-DDE (-17.8%)

The continuing calibration analyzed on 10/23/99 at 03:15 exhibited one (1) compound with a %D greater than 15% and less than 50% and required qualifications. For the following sample and non-compliant compound, the positive results are qualified as estimated, J.

613SP027T2	4,4'-DDE (-16.9%)

Surrogate Recoveries

The samples listed below exhibited high DCB recoveries. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
109SB005T1	DCB	275%
109SB005T1DL	DCB	335%

Compound Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. The following guidelines were used to qualify the data:

1. No qualifications are required for positive sample results which exhibited column quantitation differences < 40%. The "P" flag is removed from the result.

2. The positive sample result which exhibited a column quantitation difference >40%, but ≤100% is qualified as estimated, J.

3. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and is <10X the respective compound CRQL, is qualified as non-detect, U. (All multi-component results are exempt from this rule.)

4. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and >10X the respective compound CRQL, is qualified as presumptively present at an estimated concentration, NJ. (All multi-component results are exempt from this rule.)

5. The positive multi-component pesticide sample result which exhibited a column quantitation difference >100% and <10% the respective multi-component CRQL is qualified as presumptively present at an estimated concentration, NJ.

Compound Quantitation, Continued

The following samples and compounds have been qualified for high column quantitation %Ds.

Sample ID	Compound	%D	Lab Qual.	HESI Qual.	Ref. #
109SB005T1	4,4'-DDE	71.4%	P	J	2
	Methoxychlor	28.3%	P		1
109SB005T1DL	Gamma-Chlordane	223.9%	P	NJ	4
109SB005T2	4,4'-DDT	35.5%	P		1
109SB004T1	Aroclor-1260	44.7%	P	J	2
607SB016T1	4,4'-DDD	150.9%	P	U	3
613SP027T1	Alpha-Chlordane	82.2%	P	J	2
	Gamma-Chlordane	525.9%	P	NJ	4
613SP027T2	4,4'-DDE	372%	P	NJ	4

Several samples were diluted to accurately quantitate target compounds. For the following samples, the results for the E-flagged compounds are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

109SB005T1
613SP027T1
613SP027T1DL1
613SP027T2

For the following sample, the results for the dilution analysis are not used in favor of the results reported from the original analysis as the original analysis does not exhibit positive results above the calibration range of the instrument.

607SB016T1DL

Compound Quantitation, Continued

Sample 613SP027T1 exhibited a positive result above the calibration range of the instrument for Gamma-Chlordane. Gamma-Chlordane was not detected in the dilution analysis. For the following sample and E-flagged compound, the positive result is qualified as estimated, J.

613SP027T1	Gamma-Chlordane

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
109SB005T1	Methoxychlor	+	J
109SB005T1DL	4,4'-DDE	+	J
613SP027T2DL 617SB003T2 617SB004T2	4,4'-DDD	+	J
617SB003T2	4,4'-DDE	+	J
613SP027T2	4,4'-DDE	+	J
109SB005T1 109SB005T1DL	ALL	+	J
ALL	All P < 40%	+	
ALL	All P > 40% But ≤ 100%	+	J
ALL	single component pests All P > 100% And < 10X CRQL	+	U
ALL	single component pests All P > 100% And > 10X CRQL	+	NJ
ALL	multi-component pests All P> 100% And < 10X CRQL	+	NJ
109SB005T1 613SP027T1 613SP027T1DL1 613SP027T2	All E-Flagged	+E	D
109SB005T1DL 613SP027T1DL 613SP027T2DL	All except corresponding D-Flagged results	+/-	not used

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
607SB016T1DL	ALL	+/-	not used
613SP027T1	Gamma-Chlordane	+E	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

DATA ASSESSMENT NARRATIVE
METALS (SOILS AND SPLP) AND WET CHEMISTRY

General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 methods: the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDGs # EN020

A validation was performed on the Metals for soils and splp and wet chemistry Data from SDG EN020. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation and Field Blanks

The preparation and calibration blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Iron	2.42 mg/kg	no impact
Zinc	0.40 mg/kg	no impact

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blanks exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Cadmium	-0.06 mg/kg	all soil samples below 0.6 mg/kg
Cobalt	-0.06 mg/kg	no impact
Magnesium	-4.43 mg/kg	no impact
Thallium	-0.25 mg/kg	all soil samples below 2.5 mg/kg
Cadmium	-0.4 ug/l	all splp samples below 4.0 ug/l
Copper	-1.0 ug/l	all splp samples below 10.0 ug/l
Magnesium	-29.3 ug/l	no impact
Manganese	-0.3 ug/l	all splp samples below 3.0 ug/l

This reviewer qualifies all samples results below 10 times the absolute value of the negative blank value.

Matrix Spike Recovery results

The matrix spike recovery for soils for Thallium (0%) was below 30%. All positive results are qualified as estimated, "J" and all non-detect results are rejected, "UR".

The matrix spike recovery for soils for Antimony (47%), Chromium (49%) and Zinc (63%) and for splp samples Silver (63%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Matrix Duplicate results

The matrix duplicate RPD results for splp samples for Zinc (128%) is greater than 35% and Chromium and Iron were greater than the CRDL. All positive results are qualified as estimated, "J".

Serial Dilution recovery results

The serial dilution results for soils for Arsenic, Calcium, Magnesium and Potassium and for splp samples for Potassium were greater than 10%. All positive results are qualified as estimated, "J".

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 0.6 mg/kg	Cd.	+/U	J/UJ
all soil samples below 2.5 mg/kg	Tl.		
all splp samples below 4.0 ug/l	Cd.		
all splp samples below 10.0 ug/l	Cu.		
all splp samples below 3.0 ug/l	Mn.		
all soil samples	Tl.	+	J
		U	UR
all soil samples	Sb, Cr and Zn.	+/U	J/UJ
all splp samples	Ag.		
all splp samples	Zn, Cr and Fe.	+	J
all soil samples	As, Ca, Mg and K.	+	J
all splp samples	K.		
all "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	EN023
Date:	November 29, 1999
Client Name:	Ensafe
Project/Site Name:	Charleston Zone F
Date Sampled:	October 15, 1999
Number of Samples:	22 Non-Aqueous Sample(s) with 0 MS/MSD(s) 3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Laucks Testing Laboratories
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, SPLP Volatiles, Semivolatiles, SPLP Semivolatiles, Pesticides/PCBs, SPLP Pesticides/PCBs, Metals, SPLP Metals, Cyanide, SPLP Cyanide and Total Organic Carbon

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searfoss — 12-2-99.

Paul B. Humburg, President — Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# EN023

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SPLP-V		SVOA		SPLP-SV		P/P		SPLP-P/P		MET		SPLP-MET		CN		SPLP-CN		TOC	
109SB001T1	SOIL		X				X				X				X				X				X
109SB001T2	SOIL		X				X				X				X				X				X
109SB01001	SOIL														X								
109SB01002	SOIL														X								
613SB01101	SOIL						X								X								
613SB01102	SOIL						X								X								
613SP051T1	SOIL		X				X				X				X				X				X
613SP051T2	SOIL		X				X				X				X				X				X
619SB01601	SOIL						X																
619SB01602	SOIL						X																
619SB01701	SOIL						X																
619SB01702	SOIL						X																
619SB01801	SOIL						X																
619SB01802	SOIL						X																
619SB02001	SOIL						X																
619SB02002	SOIL						X																
620SB008T2	SOIL		X				X				X				X				X				X
620TB01201	WATER	X																					
620EB01201	WATER	X				X				X				X				X					
620FB01201	WATER	X				X				X				X				X					
109SB001S1	SOIL				X				X				X				X				X		
109SB001S2	SOIL				X				X				X				X				X		
613SP051S1	SOIL				X				X				X				X				X		
613SP051S2	SOIL				X				X				X				X				X		
620SB008S2	SOIL				X				X				X				X				X		
Total Billable Samples (Water/Soil)		3	5	0	5	2	15	0	5	2	5	0	5	2	9	0	5	2	5	0	5	0	5

VOA= Volatiles
SPLP-V= SPLP Volatiles
SVOA= Semivolatiles
SPLP-SV= SPLP Semivolatiles
P/P= Pesticides/PCBs
SPLP-P/P= SPLP Pesticides/PCBs
MET= Metals
SPLP-MET= SPLP Metals
CN= Cyanide
SPLP-CN= SPLP Cyanide
TOC= Total Organic Carbon

CHARLESTON - ZONE F
CHARLESTON ZONE F SOIL (ONLY)
SDG# EN023

8846-SVOA

SAMPLE ID ------->	613-S-P051-T1 DL	613-S-P051-T2	619-S-B016-01	619-S-B016-02	619-S-B017-01	619-S-B017-02
ORIGINAL ID ----->	613SP051T1	613SP051T2	619SB01601	619SB01602	619SB01701	619SB01702
LAB SAMPLE ID --->	991043615DL	9910436-17	9910436-09	9910436-10	9910436-07	9910436-08
ID FROM REPORT -->	613SP051T1	613SP051T2	619SB01601	619SB01602	619SB01701	619SB01702
SAMPLE DATE ----->	10/15/99	10/15/99	10/15/99	10/15/99	10/15/99	10/15/99
DATE EXTRACTED -->	10/19/99	10/19/99	10/19/99	10/19/99	10/19/99	10/19/99
DATE ANALYZED --->	10/29/99	10/28/99	10/29/99	10/28/99	10/28/99	10/29/99
MATRIX ---------->	Soil	Soil	Soil	Soil	Soil	Soil
UNITS ---------->	UG/KG C	UG/KG A	UG/KG A	UG/KG A	UG/KG A	UG/KG A

CAS #	Parameter	EN023		EN023		EN023		EN023		EN023		EN023	
108-95-2	Phenol	1800.	U UR	640.	U	410.	U	470.	U	370.	U	410.	U
111-44-4	bis(2-Chloroethyl)ether	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
95-57-8	2-Chlorophenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
541-73-1	1,3-Dichlorobenzene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
106-46-7	1,4-Dichlorobenzene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
100-51-6	Benzyl alcohol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
95-50-1	1,2-Dichlorobenzene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
95-48-7	2-Methylphenol (o-Cresol)	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
106-44-5	4-Methylphenol (p-Cresol)	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
621-64-7	N-Nitroso-di-n-propylamine	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
67-72-1	Hexachloroethane	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
98-95-3	Nitrobenzene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
78-59-1	Isophorone	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
88-75-5	2-Nitrophenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
105-67-9	2,4-Dimethylphenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
65-85-0	Benzoic acid	8800.	U	3200.	U	2000.	U	2300.	U	1900.	U	2000.	U
111-91-1	bis(2-Chloroethoxy)methane	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
120-83-2	2,4-Dichlorophenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
120-82-1	1,2,4-Trichlorobenzene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
91-20-3	Naphthalene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
106-47-8	4-Chloroaniline	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
87-68-3	Hexachlorobutadiene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
59-50-7	4-Chloro-3-methylphenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
91-57-6	2-Methylnaphthalene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
77-47-4	Hexachlorocyclopentadiene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
88-06-2	2,4,6-Trichlorophenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
95-95-4	2,4,5-Trichlorophenol	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
91-58-7	2-Chloronaphthalene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
88-74-4	2-Nitroaniline	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
131-11-3	Dimethyl phthalate	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
208-96-8	Acenaphthylene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
99-09-2	3-Nitroaniline	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
83-32-9	Acenaphthene	1800.	U	640.	U	410.	U	470.	U	370.	U	410.	U
51-28-5	2,4-Dinitrophenol	3500.	U	1300.	U	810.	U	940.	U	750.	U	810.	U
100-02-7	4-Nitrophenol	3500.	U	1300.	U	810.	U	940.	U	750.	U	810.	U

CHARLESTON - ZONE F
CHARLESTON ZONE F SOIL (ONLY)
SDG# EN023

0846-SVOA

SAMPLE ID ------->	613-S-P051-T1 DL			613-S-P051-T2			619-S-B016-01			619-S-B016-02			619-S-B017-01			619-S-B017-02		
ORIGINAL ID ----->	613SP051T1			613SP051T2			619SB01601			619SB01602			619SB01701			619SB01702		
LAB SAMPLE ID --->	991043615DL			9910436-17			9910436-09			9910436-10			9910436-07			9910436-08		
ID FROM REPORT -->	613SP051T1			613SP051T2			619SB01601			619SB01602			619SB01701			619SB01702		
SAMPLE DATE ----->	10/15/99			10/15/99			10/15/99			10/15/99			10/15/99			10/15/99		
DATE EXTRACTED -->	10/19/99			10/19/99			10/19/99			10/19/99			10/19/99			10/19/99		
DATE ANALYZED --->	10/29/99			10/28/99			10/29/99			10/28/99			10/28/99			10/29/99		
MATRIX ---------->	Soil			Soil			Soil			Soil			Soil			Soil		
UNITS ---------->	UG/KG		C	UG/KG		A	UG/KG		A	UG/KG		A	UG/KG		A	UG/KG		A
CAS #	Parameter	EN023			EN023			EN023			EN023			EN023			EN023		
132-64-9	Dibenzofuran	1800.	U	UR	640.	U		410.	U		470.	U		370.	U		410.	U	
121-14-2	2,4-Dinitrotoluene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
606-20-2	2,6-Dinitrotoluene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
84-66-2	Diethylphthalate	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
7005-72-3	4-Chlorophenylphenylether	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
86-73-7	Fluorene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
100-01-6	4-Nitroaniline	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
534-52-1	2-Methyl-4,6-Dinitrophenol	3500.	U		1300.	U		810.	U		940.	U		750.	U		810.	U	
86-30-6	N-Nitrosodiphenylamine	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
101-55-3	4-Bromophenyl-phenylether	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
118-74-1	Hexachlorobenzene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
87-86-5	Pentachlorophenol	3500.	U		1300.	U		810.	U		940.	U		750.	U		810.	U	
85-01-8	Phenanthrene	1800.	U		640.	U		410.	U		470.	U		120.	J		410.	U	
120-12-7	Anthracene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
84-74-2	Di-n-butylphthalate	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
206-44-0	Fluoranthene	1800.	U		640.	U		410.	U		150.	J		150.	J		410.	U	
129-00-0	Pyrene	1800.	U		180.	J		410.	U		140.	J		140.	J		410.	U	
85-68-7	Butylbenzylphthalate	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
91-94-1	3,3'-Dichlorobenzidine	3500.	U		1300.	U		810.	U		940.	U		750.	U		810.	U	
56-55-3	Benzo(a)anthracene	1800.	U		640.	U		410.	U		470.	U		99.	J		410.	U	
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	1800.	U		640.	U		410.	U		470.	U		230.	J		250.	J	—
218-01-9	Chrysene	1800.	U		640.	U		410.	U		120.	J		130.	J		410.	U	
117-84-0	Di-n-octyl phthalate	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
205-99-2	Benzo(b)fluoranthene	1800.	U		640.	U		410.	U		96.	J		130.	J		410.	U	
207-08-9	Benzo(k)fluoranthene	1800.	U		640.	U		410.	U		120.	J		83.	J		410.	U	
50-32-8	Benzo(a)pyrene	1800.	U		640.	U		410.	U		100.	J		94.	J		410.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
53-70-3	Dibenz(a,h)anthracene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	
191-24-2	Benzo(g,h,i)perylene	1800.	U		640.	U		410.	U		470.	U		370.	U		410.	U	

028

DJC 8-2-99

CHARLESTON - ZONE F
CHARLESTON ZONE F SOIL (ONLY)
SDG# EN023

W846-SVOA

SAMPLE ID ------->		619-S-B018-01			619-S-B018-02			619-S-B020-01			619-S-B020-02			620-S-B008-T2			620-E-B012-01		
ORIGINAL ID ----->		619SB01801			619SB01802			619SB02001			619SB02002			620SB008T2			620EB01201		
LAB SAMPLE ID --->		9910436-03			9910436-04			9910436-05			9910436-06			9910439-01			9910436-21		
ID FROM REPORT -->		619SB01801			619SB01802			619SB02001			619SB02002			620SB008T2			620EB01201		
SAMPLE DATE ----->		10/15/99			10/15/99			10/15/99			10/15/99			10/15/99			10/15/99		
DATE EXTRACTED -->		10/19/99			10/19/99			10/19/99			10/19/99			10/19/99			10/19/99		
DATE ANALYZED --->		10/28/99			10/28/99			10/28/99			10/28/99			10/29/99			10/27/99		
MATRIX ---------->		Soil			Soil			Soil			Soil			Soil			Water		
UNITS ---------->		UG/KG		A	UG/KG		A	UG/KG		A	UG/KG		A	UG/KG		A	UG/L		B
CAS #	Parameter	EN023			EN023			EN023			EN023			EN023			EN023		
108-95-2	Phenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
111-44-4	bis(2-Chloroethyl)ether	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
95-57-8	2-Chlorophenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
541-73-1	1,3-Dichlorobenzene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
106-46-7	1,4-Dichlorobenzene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
100-51-6	Benzyl alcohol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
95-50-1	1,2-Dichlorobenzene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
95-48-7	2-Methylphenol (o-Cresol)	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
108-60-1	2,2'-oxybis(1-Chloropropane)	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
106-44-5	4-Methylphenol (p-Cresol)	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
621-64-7	N-Nitroso-di-n-propylamine	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
67-72-1	Hexachloroethane	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
98-95-3	Nitrobenzene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
78-59-1	Isophorone	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
88-75-5	2-Nitrophenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
105-67-9	2,4-Dimethylphenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
65-85-0	Benzoic acid	1800.	U		2000.	U		1900.	U		2000.	U		2400.	U		26.	U	
111-91-1	bis(2-Chloroethoxy)methane	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
120-83-2	2,4-Dichlorophenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
120-82-1	1,2,4-Trichlorobenzene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
91-20-3	Naphthalene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
106-47-8	4-Chloroaniline	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
87-68-3	Hexachlorobutadiene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
59-50-7	4-Chloro-3-methylphenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
91-57-6	2-Methylnaphthalene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
77-47-4	Hexachlorocyclopentadiene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
88-06-2	2,4,6-Trichlorophenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
95-95-4	2,4,5-Trichlorophenol	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
91-58-7	2-Chloronaphthalene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
88-74-4	2-Nitroaniline	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
131-11-3	Dimethyl phthalate	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
208-96-8	Acenaphthylene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
99-09-2	3-Nitroaniline	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
83-32-9	Acenaphthene	360.	U		400.	U		370.	U		400.	U		480.	U		5.	U	
51-28-5	2,4-Dinitrophenol	720.	U		790.	U		750.	U		800.	U		710.			5.	U	
100-02-7	4-Nitrophenol	720.	U		790.	U		750.	U		800.	U		950.	U		10.	U	
														950.	U		10.	U	

*** Lab Results - Unvalidated Data - Do NOT Cite ***

CHARLESTON - ZONE F
CHARLESTON ZONE F SOIL (ONLY)
SDG# EN023

8846-SVOA

	SAMPLE ID ------->	619-S-B018-01		619-S-B018-02		619-S-B020-01		619-S-B020-02		620-S-B008-T2		620-E-B012-01	
	ORIGINAL ID ----->	619SB01801		619SB01802		619SB02001		619SB02002		620SB008T2		620EB01201	
	LAB SAMPLE ID --->	9910436-03		9910436-04		9910436-05		9910436-06		9910439-01		9910436-21	
	ID FROM REPORT -->	619SB01801		619SB01802		619SB02001		619SB02002		620SB008T2		620EB01201	
	SAMPLE DATE ----->	10/15/99		10/15/99		10/15/99		10/15/99		10/15/99		10/15/99	
	DATE EXTRACTED -->	10/19/99		10/19/99		10/19/99		10/19/99		10/19/99		10/19/99	
	DATE ANALYZED --->	10/28/99		10/28/99		10/28/99		10/28/99		10/29/99		10/27/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Water	
	UNITS ---------->	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/L	B
CAS #	Parameter	EN023		EN023		EN023		EN023		EN023		EN023	
132-64-9	Dibenzofuran	360.	U	400.	U	370.	U	400.	U	120.	J	5.	U
121-14-2	2,4-Dinitrotoluene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
606-20-2	2,6-Dinitrotoluene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
84-66-2	Diethylphthalate	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
7005-72-3	4-Chlorophenylphenylether	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
86-73-7	Fluorene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
100-01-6	4-Nitroaniline	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
534-52-1	2-Methyl-4,6-Dinitrophenol	720.	U	790.	U	750.	U	800.	U	950.	U	10.	U
86-30-6	N-Nitrosodiphenylamine	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
101-55-3	4-Bromophenyl-phenylether	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
118-74-1	Hexachlorobenzene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
87-86-5	Pentachlorophenol	720.	U	790.	U	750.	U	800.	U	950.	U	10.	U
85-01-8	Phenanthrene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
120-12-7	Anthracene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
84-74-2	Di-n-butylphthalate	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
206-44-0	Fluoranthene	360.	U	400.	U	370.	U	400.	U	150.	J	5.	U
129-00-0	Pyrene	360.	U	400.	U	370.	U	400.	U	150.	J	5.	U
85-68-7	Butylbenzylphthalate	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
91-94-1	3,3'-Dichlorobenzidine	720.	U	790.	U	750.	U	800.	U	950.	U	10.	U
56-55-3	Benzo(a)anthracene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	360.	U	400.	U	370.	U	260.	J	480.	U	5.	U
218-01-9	Chrysene	360.	U	400.	U	370.	U	400.	U	95.	J	5.	U
117-84-0	Di-n-octyl phthalate	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
205-99-2	Benzo(b)fluoranthene	360.	U	400.	U	370.	U	400.	U	120.	J	5.	U
207-08-9	Benzo(k)fluoranthene	360.	U	400.	U	370.	U	400.	U	97.	J	5.	U
50-32-8	Benzo(a)pyrene	360.	U	400.	U	370.	U	400.	U	100.	J	5.	U
193-39-5	Indeno(1,2,3-cd)pyrene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
53-70-3	Dibenz(a,h)anthracene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U
191-24-2	Benzo(g,h,i)perylene	360.	U	400.	U	370.	U	400.	U	480.	U	5.	U

030

Data Validation Summary - CNC Zone F SWMU 109

TO: Louise Palmer/CH2M HILL/CLT

FROM: Herb Kelly/CH2M HILL/GNA

DATE: September 14, 2001

The purpose of this memorandum is to present the results of the data validation process for the samples collected at SWMU 109 in Zone F. The field samples were collected on June 5, 2001.

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

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

Samples were submitted to General Engineering Laboratories, Inc., in Charleston, South Carolina, for the following analyses: metals, including specific samples for lead only, following SW-846 6010 methodology.

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

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

The following primary flags were used to qualify the data:

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

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

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

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

[R] Rejected. The data is not useable.

Secondary Data Validation Qualifiers

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

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

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples
Charleston Naval Complex, Zone F, SWMU 109, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Date Collected	Sample Type	Matrix	Upper Depth	Lower Depth	SW6010 Metals	SW6010 Lead Only
43554	F109SB011	109SB01101	43554001	6/5/01	N	SO	0	1		X
43554	F109SB011	109SB01103	43554002	6/5/01	N	SO	2	3		X
43554	F109SB012	109SB01201	43554003	6/5/01	N	SO	0	1		X
43554	F109SB012	109SB01203	43554004	6/5/01	N	SO	2	3		X
43554	F109SB013	109SB01301	43554005	6/5/01	N	SO	0	1		X
43554	F109SB013	109SB01303	43554006	6/5/01	N	SO	2	3		X
43554	F109SB013	109CB01303	43554007	6/5/01	FD	SO	2	3		X
43554	F109SB014	109SB01401	43554008	6/5/01	N	SO	0	1		X
43554	F109SB014	109SB01403	43554009	6/5/01	N	SO	2	3		X
43554	F109VA001	109VA001	43554010	6/5/01	N	SO	0	0	X	
43554	F109VA002	109VA002	43554011	6/5/01	N	SO	0	0	X	
43555	FIELDQC	109EB014	43555001	6/5/01	EB	WQ			X	

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples
Charleston Naval Complex, Zone F, SWMU 109, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Date Collected	Sample Type	Matrix	Upper Depth	Lower Depth	SW6010 Metals	SW6010 Lead Only

MATRIX CODE

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

SAMPLE TYPE CODE

EB - Equipment Blank
FD - Field Duplicate
N - Native Sample

Inorganic Parameters

Quality Control Review

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

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Sample preparation, initial calibration blanks/continuing calibration blanks, and equipment blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", in which target parameters have been added prior to digestion/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.
- **Pre/Post Digestion Spike (MS/MSD)** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **ICP Interference Check Sample** – This sample verifies the lab's interelement and background correction factors.
- **Initial Calibration Verification** – This parameter ensures that the instrument is capable of producing acceptable quantitative data for the target analyte list to be measured.
- **Continuing Calibration Verification** – This one-point, mid-range parameter establishes that the initial calibration is still valid by checking the performance of the instrument on a continual basis.
- **ICP Serial Dilution** – The serial dilution of samples quantitated by ICP determines whether or not significant physical or chemical interferences exist due to the sample matrix.

Metals Analyses

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

Blanks

Selected parameters were detected in the preparation blank and in the equipment blank samples. The parameters and the concentration are listed in Table 2 below. In addition, selected initial and continuing calibration blanks contained target parameters.

TABLE 2
Equipment Blank Contamination: Metals
Charleston Naval Complex, Zone F, SWMU 109, Charleston, SC

SDG	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units
43554	1200018666	1200018666	LB	ALUMINUM	1.26	mg/Kg
43554			ICB/CCB	ALUMINUM	14	ug/L
43554	1200018666	1200018666	LB	BARIUM	0.02	mg/Kg
43554			ICB/CCB	BARIUM	0.211	ug/L
43554			ICB/CCB	CADMIUM	0.315	ug/L
43554	1200018666	1200018666	LB	CALCIUM	9.86	mg/Kg
43554			ICB/CCB	CALCIUM	17.6	ug/L
43554	1200018666	1200018666	LB	COPPER	0.11	mg/Kg
43554			ICB/CCB	COPPER	0.831	ug/L
43554	1200018666	1200018666	LB	IRON	1.73	mg/Kg
43554			ICB/CCB	IRON	11.8	ug/L
43554			ICB/CCB	LEAD	2.87	ug/L
43554			ICB/CCB	MAGNESIUM	17.8	ug/L
43554			ICB/CCB	MERCURY	0.058	ug/L
43554	1200018666	1200018666	LB	POTASSIUM	1.86	mg/Kg
43554			ICB/CCB	POTASSIUM	6.96	ug/L
43554	1200018666	1200018666	LB	SODIUM	2.23	mg/Kg
43554			ICB/CCB	SODIUM	19.5	ug/L
43554	1200018666	1200018666	LB	ZINC	0.26	mg/Kg
43555	43555001	109EB014	EB	BARIUM	14.8	ug/L
43555	43555001	109EB014	EB	CALCIUM	16900	ug/L

TABLE 2
Equipment Blank Contamination: Metals
Charleston Naval Complex, Zone F, SWMU 109, Charleston, SC

SDG	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units
43555	1200018314	1200018314	LB	CALCIUM	6.48	ug/L
43555	43555001	109EB014	EB	IRON	52.8	ug/L
43555	1200018314	1200018314	LB	IRON	5.12	ug/L
43555	43555001	109EB014	EB	MAGNESIUM	1560	ug/L
43555	43555001	109EB014	EB	MANGANESE	4.24	ug/L
43555	43555001	109EB014	EB	NICKEL	3.29	ug/L
43555	43555001	109EB014	EB	POTASSIUM	1150	ug/L
43555	43555001	109EB014	EB	SODIUM	11100	ug/L
43555	43555001	109EB014	EB	ZINC	3.12	ug/L

- The equipment blank reported several parameters at unusually high concentrations. Upon investigation, it was determined that the water provided by the laboratory had not been processed through a Cation-exchange cartridge. Therefore, the equipment blank was not used in determining possible contamination for flagging purposes.

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

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

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

Recoveries - MS/MSD and LCS/LCSD

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

TABLE 3
MS/MSD Recoveries Out of QC Limits: Metals
Charleston Naval Complex, Zone F, SWMU 109, Charleston, SC

SDG	Parameter	Recovery	Recovery Limits	Associated Samples	Flag
43554	Lead	92/131*	75-125	43554 - 1-11	Detects only - J
43554	Antimony	39.4*/37.2	75-125	43554 - 10, 11	Detects-J, non-detects-UJ
	Potassium	151.8*/146.5*	75-125	43554 - 10, 11	Detects only - J
	Manganese	81/127*	75-125		
	Zinc	106/126*	75-125		

* - out of control limits

Serial Dilution

The serial dilution for zinc was slightly above QC limits of 10 percent at 12.8 percent. Therefore, detected compounds were flagged "J" as estimated, and non-detected compounds were flagged "UJ".

Conclusion

A review of the analytical data submitted regarding the investigation of SWMU 109 in Zone F at the Charleston Naval Complex, Charleston, South Carolina by CH2M HILL has been completed. An overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed, and that the analytical results should be considered usable as qualified.

The analytical data had minor QC concerns as discussed above. However, the validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process as qualified.

Attachment 1 - Changeu Qualifiers and Results
Zone F SWMU 109 - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
43554	109CB01303	43554007	SO	METAL	SW6010	LEAD	236	=	236	J	mg/Kg	MS
43554	109SB01101	43554001	SO	METAL	SW6010	LEAD	137	=	137	J	mg/Kg	MS
43554	109SB01103	43554002	SO	METAL	SW6010	LEAD	4.2	=	4.2	J	mg/Kg	MS
43554	109SB01201	43554003	SO	METAL	SW6010	LEAD	72	=	72	J	mg/Kg	MS
43554	109SB01203	43554004	SO	METAL	SW6010	LEAD	2.41	=	2.41	J	mg/Kg	MS
43554	109SB01301	43554005	SO	METAL	SW6010	LEAD	211	=	211	J	mg/Kg	MS
43554	109SB01303	43554006	SO	METAL	SW6010	LEAD	235	=	235	J	mg/Kg	MS
43554	109SB01401	43554008	SO	METAL	SW6010	LEAD	11.9	=	11.9	J	mg/Kg	MS
43554	109SB01403	43554009	SO	METAL	SW6010	LEAD	2.11	=	2.11	J	mg/Kg	MS
43554	109VA001	43554010	SO	METAL	SW6010	ANTIMONY	1.82	=	1.82	J	mg/Kg	MS
43554	109VA001	43554010	SO	METAL	SW6010	POTASSIUM	514	=	514	J	mg/Kg	MS
43554	109VA001	43554010	SO	METAL	SW6010	MANGANESE	144	=	144	J	mg/Kg	MS
43554	109VA001	43554010	SO	METAL	SW6010	LEAD	576	=	576	J	mg/Kg	MS
43554	109VA001	43554010	SO	METAL	SW6010	ZINC	954	=	954	J	mg/Kg	MS,SD
43554	109VA001	43554010	SO	METAL	SW6010	SODIUM	122	=	122	J	mg/Kg	IB
43554	109VA001	43554010	SO	METAL	SW7471	MERCURY	0.014	=	0.014	U	mg/Kg	BL
43554	109VA002	43554011	SO	METAL	SW6010	SILVER	0.28	=	0.28	J	mg/Kg	IB
43554	109VA002	43554011	SO	METAL	SW6010	BERYLLIUM	0.31	=	0.31	J	mg/Kg	IB
43554	109VA002	43554011	SO	METAL	SW6010	POTASSIUM	754	=	754	J	mg/Kg	MS
43554	109VA002	43554011	SO	METAL	SW6010	MANGANESE	601	=	601	J	mg/Kg	MS
43554	109VA002	43554011	SO	METAL	SW6010	SODIUM	91.9	=	91.9	J	mg/Kg	IB
43554	109VA002	43554011	SO	METAL	SW6010	LEAD	289	=	289	J	mg/Kg	MS
43554	109VA002	43554011	SO	METAL	SW6010	ANTIMONY	3.16	=	3.16	J	mg/Kg	MS
43554	109VA002	43554011	SO	METAL	SW6010	ZINC	728	=	728	J	mg/Kg	MS,SD
43554	109VA002	43554011	SO	METAL	SW7471	MERCURY	0.007	=	0.007	U	mg/Kg	BL

Chain of Custody/ Laboratory Analysis Form

Lab Batch/SDG ID: 43554

Laboratory:	GEL, Charleston, SC
Project Name:	Charleston Navy Complex
Site Name:	Zone A, SWMU 109
Project Number:	
TAT:	21 day
Project Manager:	Tom Beisel/ATL
Level:	Level 3
Address:	GNV: 3011 SW Williston Rd., Gainesville, FL 32605
	ATL: 115 Perimeter Center Place NE, Suite 700, Atlanta, GA 30346-1278
Send Report To:	see 2nd page of COC
EDD:	CNC format

Sample ID	Station ID	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	Lead (SW6010) (1 - 4 oz CWM Jar)	Metals (SW6010B) (1 - 4 oz CWM Jar)	Metals (SW6010B) (1 - 500 mL HDPE, HNO3)	Comments
109SB011D1	F109SB011	0	1	6.5.01/1150	SO	1	X			43554 001
109SB011D3	F109SB011	2	3	6.5.01/1155	SO	1	X			002
109SB012D1	F109SB012	0	1	6.5.01/1215	SO	1	X			003
109SB012D3	F109SB012	2	3	6.5.01/1230	SO	1	X			004
109SB013D1	F109SB013	0	1	6.5.01/1245	SO	1	X			005
109SB013D3	F109SB013	2	3	6.5.01/1255	SO	1	X			006
109CB013D3	F109SB013	2	3	6.5.01/1258	SO	1	X			007
109SB014D1	F109SB014	0	1	6.5.01/1310	SO	1	X			008
109SB014D3	F109SB014	2	3	6.5.01/1315	SO	1	X			009
109VA001	F109VA001			6.5.01/1330	SO	1		X		010 011
109VA002	F109VA002			6.5.01/1335	SO	1		X		012 014
109EB014	F109EB014			6.5.01/1410	SQ	1			X	EB 43555 001

Sampled By: Darrell Gates/Stan Elkins Date/Time: 6.5.01/as above

Relinquished by: [signature] Date/Time: 6.6.01/1715

Additional Samplers:

Received By Lab: [signature] Date/Time: 6-6-01/1715

Relinquished by: Date/Time

Received By: [signature] MK Date/Time: 6/7/01 MK

Shipped Via: UPS FedEx Hand Other

Remarks: Metals - Full CNC List. Notes on sample nomenclature on 2nd page of COC.

Temperature: 6°

Data Review and Validation for: Metals and/or Cyanide

Project Name & Task:	CNC	ZONE A, SWMU 109	
Project # & Case/SDG:	158814.PM.04	43554	
Methods:	☐ ILM04.0 ☒ SW-846 (6010B,7000 Series) ☐ Hg 7470A/71A ☐ 200 series ☐ 300 series ☐ 1600 series		
Program:	☐ AFCEE ☐ NFESC ☒ Other: CNC	**Number of Samples:** ~~12~~ 11	
Field QC Samples:	#617 FD; 43676-1 MS/MSD 43555-1 EB		
Reviewed by & Date:	A Juchem / H. Kelly	6/28/01 / 7/2/01	
Matrix:	☐ Water ☒ Soil ☐ Other		

Quality Control	Form #	Requirements	Check (If No* checked, see comments)	Flags Applied (see comments)
Data Pkg Complete (DP)	Pkg	All required deliverables in pkg.	☒ OK ☐ No* ☐ Not provided	☐ Flags Applied
	COC	All samples on COC reported	☒ OK ☐ No*	☐ Flags Applied
Holding Times (HT)	1, 13, 14, COC	Cyanide 14 day HT met	☐ OK ☐ No* ☒ N/A	☐ Flags Applied
		Mercury 28 day HT met	☒ OK ☐ No* ☐ N/A	☐ Flags Applied
		Other metals 160 day HT met	☒ OK ☐ No* ☐ N/A	☐ Flags Applied
Initial Calibration (IC)	14	Min. initial # of levels per method	☐ OK ☐ No* ☒ Not provided	☐ Flags Applied
	raw	Linearity method criteria	☐ OK ☐ No* ☒ Not provided	
	2	ICV criteria	☒ OK ☐ No*	
Continuing Calibration (CC)	14	CCV frequency	☒ OK ☐ No*	☐ Flags Applied
	2	CCV critieria	☒ OK ☐ No*	
Blanks (PB/EB/FB/AB)	3	Detects (>RL/CRDL)	☐ OK ☐ No* ☒ see blnk wksht	☒ Flags Applied
ICB and CCB	3	ICB, CCB	☐ OK ☐ No* ☒ see blnk wksht	
Prep Blank Frequency (PB)	3	1 PB per batch	☒ OK ☐ No*	
ICP Interference Check (ICS)	4	Method criteria met	☒ OK ☐ No*	☐ Flags Applied
MS/MSD or MS/LD	5	☒ MS/MSD ☐ MS/LD ☐ None*	☒ OK ☐ No*	☒ Flags Applied
	5	Recovery Limits: ☐ Lab ☐ Meth	☐ OK ☒ No*	
	6	Precision criteria	☒ OK ☐ No*	
Post Spike Samp. Recov.	5	Criteria met	☐ OK ☐ No* ☒ N/A	☐ Flags Applied
Duplicate Samples (LD)	6	Criteria met	☒ OK ☐ No* ☐ N/A	☐ Flags Applied
LCS (BS)	7	Frequency	☒ OK ☐ No* ☐ N/A	☐ Flags Applied
☒ LCS only ☐ LCS/LCSD		Acceptance criteria met	☒ OK ☐ No*	
Standard Addition	8	Criteria met	☐ OK ☐ No* ☒ N/A	☐ Flags Applied
ICP Serial Dilution (SD)	9	Criteria met	☐ OK ☒ No* ☐ N/A	☒ Flags Applied
Internal Standard (IS)		Internal Standards used	☐ OK ☐ No* ☒ N/A	
Sample Evaluations (SAM)	1	All hits within cal. Range	☒ OK ☐ No* ☐ All ND	☐ Flags Applied
	1	Total > Dissolved	☐ OK ☐ No* ☒ N/A	☐ Flags Applied
Field Duplicates (FD)	1	Precision of native vs Field Dup	☒ OK ☐ No* ☐ N/A	☐ Flags Applied

This sheet is applicable to multiple methods. All requirement items may not apply to every analytical method.

Case Narrative Comments: PB - Pb; MS/MSD; SD;

OC Item	Comments
COC	lab Sam ID 43676001 - samp. ID 611SB01701 Included in this SDG - NOT ON COC (used for MS/MSD)
- Blk	See Worksheet ⇒ U BL
- MS/MSD	See Worksheet
- SD	Zn 12.8% D (10% Limit) ⇒ J/UJ

Data Review & Validation Inorganic Blank Worksheet

Case/SDG:	CNC 43554	Matrix:	☐ Water ☒ Soil ☐ Other
Reviewed by	A Juchem	Date:	6/28/01

Target	ug/L ICB CCB	Water PB	mg/Kg Soil PB	ug/L EB	FB/AB	x5 ug/L	x5 mg/Kg	Comments
Aluminum (Al)	14.0		1.26				6.3	
Antimony (Sb)								
Arsenic (As)								
Barium (Ba)	0.211		0.2	14.8			3.7	
Beryllium (be)								
Cadmium (Cd)	0.315						0.079	
Calcium (Ca)	17.6		9.86	16900			4225	
Chromium (Cr)								
Cobalt (Co)								
Copper (Cu)	0.831		0.11				0.55	
Iron (Fe)	11.8		1.73	52.8			13.2	
Lead (Pb)	2.87						0.718	
Magnesium (Mg)	17.8			1560			390	
Manganese (Mn)				4.240			1.06	
Mercury (Hg)	0.0579						0.0145	
Molybdenum (Mo)								
Nickel (Ni)				3.290			0.823	
Potassium (K)	6.96		1.86	1150			287.5	
Selenium (Se)								
Silver (Ag)								
Sodium (Na)	19.5		2.23	11100			2775	
Strontium (Sr)								
Thallium (Tl)								
Tin (Sn)								
Vanadium (V)								
Zinc (Zn)			0.26	3.120			1.3	
Cyanide (CN)								

Comments:

U - BL

EB NOTE: water used for EB was not run through cation exchange resin therefore anomalous results appeared. Data not used for flagging.

Data Review & Validation Inorganic MS/MSD, LCS, or LCS/LCSD Worksheet

Case/SDG:	CUC 43554	**Matrix:**	☐ Water ☒ Soil ☐ Other
Reviewed by	AJuchem	**Date:**	6/28/01

Parameter	Recovery	Recovery Limits	RPD	RPD Limits	Associated Samples Flag
>4X ~~Al~~	~~288.3%/258%~~	~~AJ~~			
Sb	39.4%/37.2%	75-125			J/UJ
K	151.8%/146.5%	↓			J/–
Pb	92%/131%	↓			J/–
Mn	81%/127%	↓			J/–
Zn	106%/126%	✓			J/–
CA	5430/9410		53.8%		
(native conc WAS 17500. No flag)					

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554001 Client ID: 109SB01101

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 93.90

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 137	mg/kg		N	P	0.16	TIA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

ng 7/11/01

CZ 7/15/01 HM 6/28/01

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846.

Sample ID: 43554002 Client ID: 109SB01103

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 88.10

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 4.20	mg/kg		~~N~~	P	0.16	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

ng 7/11/01

6/28

CL 7/5/01

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554003 Client ID: 1093B01201

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 92.30

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 72.0	mg/kg		~~N~~	P	0.15	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

vg 7/11/07

CF 7/5

6/28

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554004 Client ID: 109SB01203

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 79.20

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 2.41	mg/kg		N	P	0.18	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

mg 7/11/01 6/28

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554005 Client ID: 109SB01301

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 86.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 211	mg/kg		~~N~~	P	0.16	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

G 7/5

mg 7/11/01

6/28

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554006 Client ID: 109SB01303

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 73.70

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 235	mg/kg		~~N~~	P	0.18	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

7/11/01 7/15 6/28

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554007 Client ID: 109CB01303

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 71.40

CAS No.	Analyte	Concentration		Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J	MS 236	mg/kg		N	P	0.20	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

mg 7/11/07

C 7/5

6/28

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554008 Client ID: 109SB01401

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 96.40

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 11.9	mg/kg		N	P	0.14	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

vg 7/11/01

G 7/15

6/28

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554009 Client ID: 109SB01403

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 93.40

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	J MS 2.11	mg/kg		N	P	0.16	TJA61 Trace ICP2	61901B

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

7/11/01 7/5 6/28

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554010 Client ID: 109VA001

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 99.90

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	3620	mg/kg			P	0.74	TJA61 Trace ICP2	61901B
7440-36-0	Antimony	1.82	mg/kg	J	~~B~~ MS ~~N~~	P	0.28	TJA61 Trace ICP1	62001
7440-38-2	Arsenic	1.53	mg/kg			P	0.23	TJA61 Trace ICP2	61901B
7440-39-3	Barium	33.7	mg/kg			P	0.02	TJA61 Trace ICP2	61901B
7440-41-7	Beryllium	0.50	mg/kg			P	0.02	TJA61 Trace ICP2	61901B
7440-43-9	Cadmium	0.93	mg/kg			P	0.03	TJA61 Trace ICP2	61901B
7440-70-2	Calcium	24800	mg/kg			P	0.49	TJA61 Trace ICP2	61901B
7440-47-3	Chromium	47.2	mg/kg			P	0.06	TJA61 Trace ICP2	61901B
7440-48-4	Cobalt	5.07	mg/kg			P	0.04	TJA61 Trace ICP2	61901B
7440-50-8	Copper	598	mg/kg			P	0.06	TJA61 Trace ICP2	61901B
7439-89-6	Iron	15000	mg/kg			P	0.32	TJA61 Trace ICP2	61901B
7439-92-1	Lead	576	mg/kg	J	MS ~~N~~	P	0.14	TJA61 Trace ICP2	61901B
7439-95-4	Magnesium	1040	mg/kg			P	0.36	TJA61 Trace ICP2	61901B
7439-96-5	Manganese	144	mg/kg	J	MS ~~N~~	P	0.03	TJA61 Trace ICP2	61901B
7439-97-6	Mercury	0.014	mg/kg	U	BL	AV	0.003	PE CVAA	61801spHg
7440-02-0	Nickel	100	mg/kg			P	0.08	TJA61 Trace ICP2	61901B
7440-09-7	Potassium	514	mg/kg	J	MS ~~N~~	P	0.64	TJA61 Trace ICP2	61901B
7782-49-2	Selenium	0.29	mg/kg	U		P	0.29	TJA61 Trace ICP2	61901B
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace ICP2	61901B
7440-23-5	Sodium	J-~~B~~ 122	mg/kg	~~U~~	~~B BL~~	P	0.77	TJA61 Trace ICP2	61901B
7440-28-0	Thallium	0.38	mg/kg	U		P	0.38	TJA61 Trace ICP2	61901B
7440-62-2	Vanadium	11.9	mg/kg			P	0.06	TJA61 Trace ICP2	61901B
7440-66-6	Zinc	954	mg/kg	J	MS,SD ~~EN~~	P	0.18	TJA61 Trace ICP2	61901

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

7/5

6/28

ng 7/11/07

TOTAL METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 43554 Method Type: SW-846

Sample ID: 43554011 Client ID: 109VA002

Contract: CH2M00400 Lab Code: GEL Case No.: GEL SAS No.:

Matrix: SOIL Date Received: 6/6/2001 Level: LOW % Solids: 99.70

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	3730	mg/kg			P	0.71	TJA61 Trace ICP2	61901B
7440-36-0	Antimony	3.16	mg/kg	J	B MS N	P	0.26	TJA61 Trace ICP1	62001
7440-38-2	Arsenic	9.58	mg/kg			P	0.22	TJA61 Trace ICP2	61901B
7440-39-3	Barium	58.8	mg/kg			P	0.02	TJA61 Trace ICP2	61901B
7440-41-7	Beryllium	0.31	mg/kg	J	B IB	P	0.01	TJA61 Trace ICP2	61901B
7440-43-9	Cadmium	1.72	mg/kg			P	0.03	TJA61 Trace ICP2	61901B
7440-70-2	Calcium	5770	mg/kg		N	P	0.47	TJA61 Trace ICP2	61901B
7440-47-3	Chromium	113	mg/kg			P	0.05	TJA61 Trace ICP2	61901B
7440-48-4	Cobalt	9.85	mg/kg			P	0.04	TJA61 Trace ICP2	61901B
7440-50-8	Copper	209	mg/kg			P	0.06	TJA61 Trace ICP2	61901B
7439-89-6	Iron	105000	mg/kg			P	0.77	TJA61 Trace ICP2	61901
7439-92-1	Lead	289	mg/kg	J	MS N	P	0.14	TJA61 Trace ICP2	61901B
7439-95-4	Magnesium	1160	mg/kg			P	0.34	TJA61 Trace ICP2	61901B
7439-96-5	Manganese	601	mg/kg	J	MS N	P	0.03	TJA61 Trace ICP2	61901B
7439-97-6	Mercury	0.007	mg/kg	U	B BL	AV	0.003	PE CVAA	61801spHg
7440-02-0	Nickel	85.3	mg/kg			P	0.08	TJA61 Trace ICP2	61901B
7440-09-7	Potassium	754	mg/kg	J	MS N	P	0.61	TJA61 Trace ICP2	61901B
7782-49-2	Selenium	0.86	mg/kg			P	0.28	TJA61 Trace ICP2	61901B
7440-22-4	Silver	0.28	mg/kg	J	B IB	P	0.08	TJA61 Trace ICP2	61901B
7440-23-5	Sodium J-FB	91.9	mg/kg	~~U~~	~~B BL~~	P	0.74	TJA61 Trace ICP2	61901B
7440-28-0	Thallium	0.91	mg/kg	U		P	0.91	TJA61 Trace ICP2	61901
7440-62-2	Vanadium	17.5	mg/kg			P	0.06	TJA61 Trace ICP2	61901B
7440-66-6	Zinc	728	mg/kg	J	MS,SD EN	P	0.17	TJA61 Trace ICP2	61901

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

mg 7/11/07

7/5

6/28

APPENDIX D

Soil Screening Level Tables and SPLP Data

Site-specific soil screening levels (SSLs) were calculated based on the results of the synthetic precipitation leaching procedure (SPLP) data. A site-specific dilution attenuation factor (DAF) was calculated using parameters shown in the attached table. Infiltration rates for the unpaved site condition used the full infiltration value provided by the United States Geological Survey (USGS). Hydraulic conductivity was estimated using the USGS model for the Charleston Naval Complex (CNC) area.

Please refer to attached tables.

DAF Calculations

Assuming100% of USGS Infiltration Rate for all sites; K from USGS model

Site(s)	Hydraulic Conductivity K (m/yr)	Hydraulic Gradient I (m/m)	Aquifer Thickness da (m)	Source Length Sw (m)	Infiltration Rate I' (m/yr)	Mixing Zone d (m)	DAF
004/619, 036/620	445	0.02	9.8	120	0.0305	9.8	24.8
616,617	389	0.018	9.8	21	0.0305	2.3	26.3
607	445	0.0079	8.2	46	0.0305	5.3	14.2
609, 611	375	0.0043	8.5	38	0.0305	4.7	7.6
109	278	0.0058	7.6	30	0.0305	3.7	7.6
613/615/175	222	0.0227	9.1	150	0.0305	9.1	11.0
709	278	0.025	10.8	120	0.0305	10.8	21.5

From Eqs 11 and 12 in EPA Soil Screening Guidance
Equation assumes that the same soil concentration occurs all the way to the water table. Depth to water has very minor effect on the DAF; only affecting the mixing zone thickness to a limit.

The 'Source width' is almost directly proportional to DAF, as is K and I.

Infiltration rate is for unpaved condition

Site-Specific SSL

SWMU 109 **ZONE F SSL calculations**

Infiltration, m/yr			I' = .0305
Hydraulic Conductivity, m/yr			300
Site-Specific DAF			7.6
Constituent		SSL for DAF=1	Adjusted SSL
Ag	MG/KG	5.7E+01	4.3E+02
Al	MG/KG	7.4E+04	5.6E+05
As	MG/KG	4.6E+01	3.5E+02
Ba	MG/KG	8.3E+01	6.3E+02
Be	MG/KG	7.7E-01	5.8E+00
Ca	MG/KG		
Cd	MG/KG	4.6E+00	3.5E+01
Co	MG/KG	1.3E+04	9.7E+04
Cr	MG/KG	1.4E+02	1.0E+03
Cu	MG/KG	3.1E+03	2.4E+04
Fe	MG/KG	2.8E+04	2.1E+05
Hg	MG/KG	5.4E+00	4.1E+01
K	MG/KG		
Mg	MG/KG		
Mn	MG/KG	1.3E+04	9.7E+04
Na	MG/KG		
Ni	MG/KG	1.9E+02	1.4E+03
Pb	MG/KG		4.0E+02
Sb	MG/KG	1.1E+00	8.0E+00
Se	MG/KG	1.8E+01	1.4E+02
Sn	MG/KG		
Tl	MG/KG		
V	MG/KG	2.6E+02	2.0E+03
Zn	MG/KG	4.8E+03	3.7E+04

SSL calculated from SPLP data for each site

[a] Thallium from EPA Region III tables; no SPLP detects

[b] Lead default to 400 mg/kg

SWMU 109 SPLP Data

Sample no.		Concentration					SPLP		
109SB001T1	Ag	1.00	MG/KG	J	109SB001S1	Ag	0.50	UG/L	U
surface	Al	14600.00	MG/KG	=	surface	Al	37300.00	UG/L	J
	As	16.90	MG/KG	=		As	19.40	UG/L	=
	Ba	74.30	MG/KG	=		Ba	2350.00	UG/L	=
	Be	0.67	MG/KG	=		Be	0.90	UG/L	U
	Ca	16800.00	MG/KG	J		Ca	17200.00	UG/L	=
	Cd	0.24	MG/KG	J		Cd	0.30	UG/L	U
	Co	16.90	MG/KG	=		Co	5.40	UG/L	J
	Cr	26.00	MG/KG	J		Cr	50.60	UG/L	=
	Cu	48.70	MG/KG	J		Cu	45.30	UG/L	=
	Fe	17700.00	MG/KG	J		Fe	28100.00	UG/L	J
	Hg	3.70	MG/KG	=		Hg	1.40	UG/L	=
	K	1110.00	MG/KG	J		K	4630.00	UG/L	J
	Mg	1970.00	MG/KG	J		Mg	3960.00	UG/L	J
	Mn	282.00	MG/KG	J		Mn	174.00	UG/L	=
	Na	265.00	MG/KG	J		Na	14000.00	UG/L	=
	Ni	11.30	MG/KG	J		Ni	17.10	UG/L	J
	Pb	476.00	MG/KG	J		Pb	176.00	UG/L	=
	Sb	1.30	MG/KG	UJ		Sb	2.40	UG/L	U
	Se	1.60	MG/KG	=		Se	3.20	UG/L	U
	Sn	6.30	MG/KG	U		Sn	3.90	UG/L	J
	Tl	0.28	MG/KG	UJ		Tl	2.40	UG/L	UJ
	V	36.40	MG/KG	=		V	70.20	UG/L	=
	Zn	419.00	MG/KG	J		Zn	1920.00	UG/L	=
109SB001T2	Ag	0.04	MG/KG	U	109SB001S2	Ag	0.50	UG/L	U
subsurface	Al	9300.00	MG/KG	=	subsurface	Al	9330.00	UG/L	J
	As	4.40	MG/KG	=		As	6.30	UG/L	J
	Ba	22.10	MG/KG	=		Ba	893.00	UG/L	=
	Be	0.30	MG/KG	J		Be	0.90	UG/L	U
	Ca	3980.00	MG/KG	J		Ca	13700.00	UG/L	=
	Cd	0.03	MG/KG	U		Cd	0.30	UG/L	U
	Co	2.80	MG/KG	J		Co	0.50	UG/L	UJ
	Cr	15.50	MG/KG	J		Cr	12.50	UG/L	=
	Cu	4.80	MG/KG	J		Cu	3.00	UG/L	J
	Fe	9850.00	MG/KG	J		Fe	5890.00	UG/L	J
	Hg	0.10	MG/KG	=		Hg	0.40	UG/L	U
	K	732.00	MG/KG	J		K	1000.00	UG/L	J
	Mg	1090.00	MG/KG	J		Mg	1470.00	UG/L	J
	Mn	82.00	MG/KG	J		Mn	23.20	UG/L	=
	Na	154.00	MG/KG	J		Na	1970.00	UG/L	J
	Ni	5.00	MG/KG	J		Ni	5.20	UG/L	J
	Pb	18.70	MG/KG	J		Pb	18.40	UG/L	=
	Sb	0.70	MG/KG	UJ		Sb	3.00	UG/L	J
	Se	1.10	MG/KG	=		Se	4.10	UG/L	U
	Sn	5.50	MG/KG	U		Sn	2.90	UG/L	J
	Tl	0.21	MG/KG	UJ		Tl	2.40	UG/L	UJ
	V	19.90	MG/KG	=		V	28.90	UG/L	J
	Zn	20.70	MG/KG	J		Zn	285.00	UG/L	=

SWMU 109 SPLP Data

Sample no.		Concentration				SPLP	
109SB004T1	Ag	0.04 MG/KG	U	109SB004S1	Ag	0.50 UG/L	UJ
surface	Al	2190.00 MG/KG	=	surface	Al	5410.00 UG/L	=
	As	5.00 MG/KG	J		As	5.70 UG/L	J
	Ba	9.10 MG/KG	J		Ba	446.00 UG/L	=
	Be	0.08 MG/KG	U		Be	0.90 UG/L	U
	Ca	334000.00 MG/KG	J		Ca	16900.00 UG/L	=
	Cd	0.81 MG/KG	J		Cd	0.30 UG/L	UJ
	Co	5.50 MG/KG	=		Co	0.50 UG/L	J
	Cr	8.30 MG/KG	J		Cr	8.20 UG/L	J
	Cu	26.00 MG/KG	=		Cu	10.60 UG/L	J
	Fe	4300.00 MG/KG	=		Fe	4150.00 UG/L	J
	Hg	0.04 MG/KG	U		Hg	0.40 UG/L	U
	K	1580.00 MG/KG	J		K	825.00 UG/L	J
	Mg	3440.00 MG/KG	J		Mg	1190.00 UG/L	J
	Mn	318.00 MG/KG	=		Mn	18.70 UG/L	=
	Na	681.00 MG/KG	=		Na	1200.00 UG/L	J
	Ni	17.10 MG/KG	=		Ni	6.20 UG/L	J
	Pb	18.10 MG/KG	=		Pb	6.20 UG/L	J
	Sb	0.45 MG/KG	J		Sb	2.40 UG/L	U
	Se	0.15 MG/KG	U		Se	1.70 UG/L	U
	Sn	6.20 MG/KG	J		Sn	2.70 UG/L	U
	Tl	2.10 MG/KG	R		Tl	2.40 UG/L	U
	V	8.40 MG/KG	=		V	12.20 UG/L	J
	Zn	56.40 MG/KG	J		Zn	134.00 UG/L	J
109SB004T2	Ag	0.05 MG/KG	U	109SB004S2	Ag	0.50 UG/L	UJ
subsurface	Al	4130.00 MG/KG	=	subsurface	Al	475.00 UG/L	=
	As	2.10 MG/KG	J		As	2.00 UG/L	U
	Ba	10.60 MG/KG	J		Ba	194.00 UG/L	J
	Be	0.40 MG/KG	J		Be	0.90 UG/L	U
	Ca	6270.00 MG/KG	J		Ca	12400.00 UG/L	=
	Cd	0.03 MG/KG	UJ		Cd	0.30 UG/L	UJ
	Co	2.30 MG/KG	J		Co	0.50 UG/L	U
	Cr	10.90 MG/KG	J		Cr	1.30 UG/L	J
	Cu	3.60 MG/KG	=		Cu	1.40 UG/L	J
	Fe	4270.00 MG/KG	=		Fe	700.00 UG/L	J
	Hg	0.18 MG/KG	=		Hg	0.40 UG/L	U
	K	496.00 MG/KG	J		K	1070.00 UG/L	J
	Mg	795.00 MG/KG	J		Mg	807.00 UG/L	J
	Mn	30.60 MG/KG	=		Mn	10.70 UG/L	J
	Na	86.40 MG/KG	J		Na	854.00 UG/L	J
	Ni	3.90 MG/KG	J		Ni	1.10 UG/L	U
	Pb	4.90 MG/KG	=		Pb	3.50 UG/L	J
	Sb	0.24 MG/KG	UJ		Sb	5.30 UG/L	J
	Se	0.75 MG/KG	J		Se	3.30 UG/L	J
	Sn	2.90 MG/KG	J		Sn	6.20 UG/L	J
	Tl	0.24 MG/KG	R		Tl	2.40 UG/L	U
	V	10.80 MG/KG	=		V	6.50 UG/L	J
	Zn	15.40 MG/KG	J		Zn	31.90 UG/L	J

SWMU 109 SPLP Data

Sample no.		Concentration					SPLP	
109SB005T1	Ag	0.05	MG/KG	U	109SB005S1	Ag	0.50 UG/L	U
surface	Al	6810.00	MG/KG	=	surface	Al	27900.00 UG/L	J
	As	14.10	MG/KG	J		As	14.80 UG/L	=
	Ba	37.80	MG/KG	=		Ba	1330.00 UG/L	=
	Be	0.32	MG/KG	J		Be	0.90 UG/L	U
	Ca	252000.00	MG/KG	J		Ca	10300.00 UG/L	=
	Cd	1.20	MG/KG	=		Cd	3.00 UG/L	J
	Co	5.50	MG/KG	=		Co	7.00 UG/L	J
	Cr	41.40	MG/KG	J		Cr	41.90 UG/L	=
	Cu	84.20	MG/KG	=		Cu	33.50 UG/L	=
	Fe	10300.00	MG/KG	=		Fe	22900.00 UG/L	J
	Hg	0.38	MG/KG	=		Hg	0.40 UG/L	U
	K	1450.00	MG/KG	J		K	8560.00 UG/L	J
	Mg	2910.00	MG/KG	J		Mg	5230.00 UG/L	=
	Mn	331.00	MG/KG	=		Mn	84.20 UG/L	=
	Na	574.00	MG/KG	=		Na	28200.00 UG/L	=
	Ni	23.90	MG/KG	=		Ni	13.80 UG/L	J
	Pb	793.00	MG/KG	=		Pb	48.10 UG/L	=
	Sb	3.90	MG/KG	J		Sb	2.40 UG/L	U
	Se	0.31	MG/KG	J		Se	4.40 UG/L	U
	Sn	8.80	MG/KG	J		Sn	5.40 UG/L	J
	Tl	2.60	MG/KG	R		Tl	2.40 UG/L	UJ
	V	20.80	MG/KG	=		V	59.20 UG/L	=
	Zn	326.00	MG/KG	J		Zn	696.00 UG/L	=
109SB005T2	Ag	0.06	MG/KG	U	109SB005S2	Ag	0.50 UG/L	U
subsurface	Al	7380.00	MG/KG	=	subsurface	Al	20200.00 UG/L	J
	As	3.30	MG/KG	J		As	7.80 UG/L	J
	Ba	25.90	MG/KG	=		Ba	1010.00 UG/L	=
	Be	0.37	MG/KG	J		Be	0.90 UG/L	U
	Ca	4930.00	MG/KG	J		Ca	7930.00 UG/L	=
	Cd	0.03	MG/KG	UJ		Cd	0.30 UG/L	U
	Co	2.70	MG/KG	J		Co	2.10 UG/L	J
	Cr	13.00	MG/KG	J		Cr	26.10 UG/L	=
	Cu	9.80	MG/KG	=		Cu	15.60 UG/L	J
	Fe	6760.00	MG/KG	=		Fe	12700.00 UG/L	J
	Hg	0.06	MG/KG	=		Hg	0.40 UG/L	U
	K	561.00	MG/KG	J		K	14500.00 UG/L	J
	Mg	849.00	MG/KG	J		Mg	5760.00 UG/L	=
	Mn	46.70	MG/KG	=		Mn	83.40 UG/L	=
	Na	134.00	MG/KG	J		Na	76300.00 UG/L	=
	Ni	5.10	MG/KG	=		Ni	12.60 UG/L	J
	Pb	29.10	MG/KG	=		Pb	14.90 UG/L	=
	Sb	0.40	MG/KG	J		Sb	2.40 UG/L	U
	Se	0.97	MG/KG	J		Se	2.60 UG/L	U
	Sn	6.10	MG/KG	J		Sn	3.00 UG/L	J
	Tl	0.28	MG/KG	R		Tl	2.40 UG/L	UJ
	V	14.90	MG/KG	=		V	35.40 UG/L	J
	Zn	35.30	MG/KG	J		Zn	389.00 UG/L	=

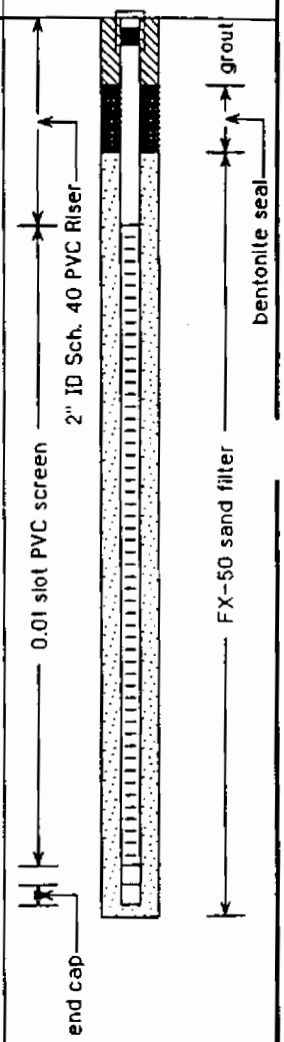
ENSAFE

Monitoring Well NBCF109002

Project: *ZONE F - Naval Base Charleston*	Coordinates: *2318364.0 E, 374943.5 N*
Location: *Charleston, SC*	Surface Elevation: *9.4 feet msl*
Started at *1750 on 05/11/99*	TOC Elevation: *9.23 feet msl*
Completed at *1930 on 05/11/99*	Depth to Groundwater: *3.85 feet TOC* Measured: *5-20-99*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon sampler*	Groundwater Elevation: *5.38 feet msl*
Drilling Company: *Alliance Environmental (SC cert. #889)*	Total Depth: *13.0 feet*
Geologist: *S. Tompkins*	Well Screen: *3.1 to 12.7 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface conditions: asphalt	
							SM	Sand: gray-brown; silty; trace clay.	8.2
			1		58		CL	Clay: gray; sandy.	7.4
									6.4
			2		50		CL	Clay: gray; sandy; soft; wet.	5.4
5									3.9
			3		75		CL	Clay: as above.	3.4
							SM/SC	Sand: dk. gray; fine; some silt; some clay; saturated.	2.7
			4		100		SC	Sand: dk. gray; fine; clayey; saturated.	1.4
10			5		100				
			6		100		SC/CL	Sand: lt. brown; fine; clayey w/ orange clay stringers.	2.1
									2.6
15									
20									

WELL DIAGRAM



Surface Soil -Hypothetical Future Industrial Worker Scenario
Charleston Navy Complex - ZoneF, SWMU 109

		Carcinogenic	Noncarcinogenic
Ingestion:			
CDI =	$\frac{Cs * IR * FI * EF * ED * CF}{BW * AT}$		
Cs =	Concentration in soil (mg/kg)	EPC	EPC
IR =	Ingestion Rate (mg/day)	50 a	50 a
FI =	Fraction Ingested (unitless)	1	1
EF =	Exposure Frequency (day/year)	250 a	250 a
ED =	Exposure Duration (year)	25 a	25 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	9125 a
Dermal:			
CDI =	$\frac{Cs * SA * AF * ABS * ET * EF * ED * CF}{BW * AT}$		
Cs =	Concentration in soil (mg/kg)	EPC	EPC
SA =	Surface Area (cm^2)	2679 c,d	2679 c,d
AF =	Soil-Skin Adherence Factor (mg/cm^2)	0.03 c,e	0.03 c,e
ABS =	Absorption Factor (unitless)	(Chemical Specific) f	(Chemical Specific) f
ET =	Exposure Time (8 hours per 8 hour workday)	1 b	1 b
EF =	Exposure Frequency (day/year)	250 a	250 a
ED =	Exposure Duration (year)	25 a	25 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	9125 a
Inhalation:		*for volatiles:*	
CDI =	$\frac{Cs * (1/PEF) * IR * ET * EF * ED}{BW * AT}$	$\frac{Cs * ((1/VFind)+(1/PEF)) * IR * ET * EF * ED}{BW * AT}$	
Cs =	Concentration in soil (mg/kg)	EPC	EPC
PEF =	Particulate Emission Factor (m^3/kg)	1.32E+09 g	1.32E+09 g
VFind =	Volatilization Factor (m^3/kg)	(Chemical Specific) h	(Chemical Specific) h
IR =	Inhalation Rate (m^3/day)	20 a	20 a
ET =	Exposure Time (8 hours per 8 hour workday)	1 b	1 b
EF =	Exposure Frequency (day/year)	250 a	250 a
ED =	Exposure Duration (year)	25 a	25 a
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	9125 a

References:

a = U.S. EPA, Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors" OSWER Directive 9285.6-03, March 25, 1991.

b = Time spent outdoors in the contaminated areas using best professional judgement, based on the nature of the activity.

c = U.S. EPA Exposure Factors Handbook, August 1997.

d = Surface area of 1/2 head, forearms and the hands of an adult worker.

e = Groundskeeper No2 (exposure scenario similar to urban horticulture center, campus grounds, arborteum), Exposure Factors Handbook, August 1996

f = In the absence of chemical specific data, EPA Region IV default values: 1% for organics, 0.1% for inorganics

g = Particulate emission factor (PEF), adapted from U.S.EPA, Soil Screening Guidance: Technical Background Document, May 1996.

h = Industrial volatilization factor (VFind) adapted from FDEP Brownfields Table 4, Chapter 62-777, F.A.C.,

Surface Soil -Hypothetical Future Industrial Worker Non-carcinogenic Scenario

Charleston Navy Complex - Zone F, SWMU 109

									Ingestion		Dermal		Inhalation	
Units	**Chemical**	**WOE**	**RfDo**	**RfDd**	**RfDi**	**EPC**	**ABSgi**	**DABS**	**CDI**	**HQ**	**CDI**	**HQ**	**CDI**	**HQ**
MG/KG	Chromium, total	A-D	1.50E+00	3.00E-02		4.72E+01	2%	0.001	2.31E-05	0.00002	3.71E-08	1.24E-06	7.00E-09	
MG/KG	Copper	D	3.70E-02	1.11E-02		2.09E+02	30%	0.001	1.02E-04	0.0028	1.64E-07	1.48E-05	3.10E-08	
MG/KG	Iron		3.00E-01	4.50E-02		1.92E+04	15%	0.001	9.37E-03	0.031	1.51E-05	3.35E-04	2.84E-06	
MG/KG	Mercury	D	3.00E-04	2.10E-05		1.87E+00	7%	0.001	9.15E-07	0.0030	1.47E-09	7.00E-05	2.77E-10	
MG/KG	Manganese	D	2.00E-02	8.00E-04	1.43E-05	3.36E+02	4%	0.001	1.64E-04	0.0082	2.64E-07	3.30E-04	4.98E-08	0.0035
MG/KG	Vanadium		7.00E-03	7.00E-05		2.72E+01	1%	0.001	1.33E-05	0.0019	2.14E-08	3.06E-04	4.04E-09	
	Hazard Index									**0.047**		**0.001**		**0.003**
												Total HI=	**0.052**	

Notes: WOE = Weight of Evidence; CDI = Chronic Daily Intake; EPC = Exposure Point Concentration; HQ = Hazard Quotient; HI = Hazard Inde:

SurfaceSoil - Future Residential Adult Scenario
Charleston Navy Complex - Zone F, SWMU 109

Ingestion:

Intake for non-carcinogenic compounds:

$$CDI = \frac{Cs * IR * FI * EF * ED * CF}{BW * AT}$$

Age-adjusted intake for carcinogenic compounds only:

$$CDI_{adj} = \frac{Cs * IR_{adj} * FI * EF * CF}{AT}$$

		Carcinogenic	Noncarcinogenic
Cs =	Concentration in soil (mg/kg)	RME	RME
IR =	Ingestion Rate (mg/day)	–	100 a
IRadj =	Age-adjusted Ingestion Rate [(mg-yr)/(kg-day)]	114 a	–
FI =	Fraction Ingested (unitless)	100%	100%
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	30 a	30 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	10950 a

Dermal:

Intake for non-carcinogenic compounds:

$$CDI = \frac{Cs * SA * AF * ABS * EF * ED * CF}{BW * AT}$$

Age-adjusted dose for carcinogenic compounds only:

$$CDI_{adj} = \frac{Cs * SA^{adj} * AF * ABS * EF * CF}{BW}$$

Cs =	Concentration in soil (mg/kg)	RME	RME
SA =	Surface Area (cm^2)	–	7612 c
SAadj =	Age-adjusted Skin Surface Area [(cm^2-yr)/(kg-day)]	4086 c	–
AF =	Soil-Skin Adherence Factor (mg/cm^2)	0.03 d	0.03 d
ABS =	Absorption Factor (unitless)	(Chemical Specific) e	(Chemical Specific) e
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	30 a	30 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	10950 a

Particulate/Volatile Inhalation:

Intake for non-carcinogenic compounds:

$$CDI = \frac{Cs * ((1/PEF)+(1/VF)) * IR * EF * ED}{BW * AT}$$

Age-adjusted intake for carcinogenic compounds only:

$$CDI_{adj} = \frac{Cs * ((1/PEF)+(1/VF)) * IR_{adj} * EF}{BW}$$

Cs =	Concentration in soil (mg/kg)	RME	RME
PEF =	Particulate Emission Factor (m^3/kg)	1.32E+09 f	1.32E+09 f
VF =	Volatilization Factor (m^3/kg)	(Chemical Specific) g	(Chemical Specific) g
IR =	Inhalation Rate (m^3/day)	–	20 a
IR_{adj} =	Age-adjusted Inhalation Rate [(m^3-yr)/(kg-day)]	13 a	–
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	30 a	30 a
BW =	Body Weight (kg)	70 a	70 a
AT =	Averaging Time (days)	25550 a	10950 a

References:

a = U.S. EPA, Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors" OSWER Directive 9285.6-03, March 25, 1991.

c = Surface area of hands, arms and legs of an adult (average of male and female mean SA), adapted from U.S.EPA, Exposure Factors Handbook, Vol. I,II,III, August 1996.

d = Groundskeeper No2 (exposure scenario similar to urban horticulture center, campus grounds, arborteum), Exposure Factors Handbook, August 1996

e = In the absence of chemical specific data, EPA Region IV default values: 1% organics, 0.1% inorganics

f = Particulate emission factor (PEF), adapted from U.S.EPA, Soil Screening Guidance: Technical Background Document, May 1996.

g = Residential volatilization factor (VFres) adapted from FDEP Brownfields Table 4, Chapter 62-777, F.A.C., December 1998.

Surface Soil - Future Residential Adult Non-carcinogenic Scenario

Charleston Navy Complex - Zone F, SWMU 109

								Ingestion		Dermal		Inhalation	
Units	**Chemical**	**WOE**	**RfDo**	**RfDd**	**RfDi**	**RME**	**ABS**	**CDI**	**HQ**	**CDI**	**HQ**	**CDI**	**HQ**
MG/KG	Chromium, total	A-D	1.50E+00	3.00E-02		4.72E+01	0.001	6.47E-05	0.00004	1.48E-07	4.92E-06	9.80E-09	
MG/KG	Copper	D	3.70E-02	1.11E-02		2.09E+02	0.001	2.86E-04	0.0077	6.54E-07	5.89E-05	4.34E-08	
MG/KG	Iron		3.00E-01	4.50E-02		1.92E+04	0.001	2.62E-02	0.087	5.99E-05	0.0013	3.97E-06	
MG/KG	Mercury	D	3.00E-04	2.10E-05		1.87E+00	0.001	2.56E-06	0.0085	5.85E-09	2.79E-04	3.88E-10	
MG/KG	Manganese	D	2.00E-02	8.00E-04	1.43E-05	3.36E+02	0.001	4.61E-04	0.023	2.45E-06	0.0031	6.98E-08	0.0049
MG/KG	Vanadium		7.00E-03	7.00E-05		2.72E+01	0.001	3.73E-05	0.0053	1.99E-07	2.84E-03	5.65E-09	
	Hazard Index								**0.13**		**0.01**		**0.005**
											Total HI =	**0.14**	

Notes: WOE = Weight of Evidence; CDI = Chronic Daily Intake; RME = Reasonable Maximum Exposure Concentration; HQ = Hazard Quotient; HI = Hazard Index

Surface Soil - Future Residential Child Scenario
Charleston Navy Complex - Zone F, SWMU 109

Ingestion:

$$CDI = \frac{Cs * IR * FI * EF * ED * CF}{BW * AT}$$

		Carcinogenic	Noncarcinogenic
Cs =	Concentration in soil (mg/kg)	RME	RME
IR =	Ingestion Rate (mg/day)	200 a	200 a
FI =	Fraction Ingested (unitless)	100%	100%
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	6 a	6 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	15 a	15 a
AT =	Averaging Time (days)	25550 a	2190 a

Dermal:

$$CDI = \frac{Cs * SA * AF * ABS * EF * ED * CF}{BW * AT}$$

Cs =	Concentration in soil (mg/kg)	RME	
SA =	Surface Area (cm^2)	3690 c	3690 c
AF =	Soil-Skin Adherence Factor (mg/cm^2)	0.15 d	0.15 d
ABS =	Absorption Factor (unitless)	(Chemical Specific) e	(Chemical Specific) e
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	6 a	6 a
CF =	Conversion Factor (kg/mg)	1.00E-06	1.00E-06
BW =	Body Weight (kg)	15 a	15 a
AT =	Averaging Time (days)	25550 a	2190 a

Particulate/Volatile Inhalation:

$$CDI = \frac{Cs * ((1/PEF)+(1/VF)) * IR * EF * ED}{BW * AT}$$

Cs =	Concentration in soil (mg/kg)	RME	RME
PEF =	Particulate Emission Factor (m^3/kg)	1.32E+09 f	1.32E+09 f
VF =	Volatilization Factor (m^3/kg)	(Chemical Specific) g	(Chemical Specific) g
IR =	Inhalation Rate (m^3/day)	15 a	15 a
EF =	Exposure Frequency (day/year)	350 a	350 a
ED =	Exposure Duration (year)	6 a	6 a
BW =	Body Weight (kg)	15 a	15 a
AT =	Averaging Time (days)	25550 a	2190 a

References:

a = U.S. EPA, Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors" OSWER Directive 9285.6-03, March 25, 1991.

c = Surface area of hands, arms, legs, and feet of a child (1-6 year average), adapted from U.S.EPA, Exposure Factors Handbook, Vol. I,II,III, August 1996.

d = Daycare Kids No1b (indoor exposure to linoleum, outdoor exposure to grass, bare earth, no shoes), Exposure Factors Handbook, August 1996

e = In the absence of chemical specific data, EPA Region IV default values: 1% for organics, 0.1% inorganics

f = Particulate emission factor (PEF), adapted from U.S.EPA, Soil Screening Guidance: Technical Background Document, May 1996.

g = Residential child volatilization factor (VFchild) adapted from FDEP Brownfields Table 4, Chapter 62-777, F.A.C., December 1998.

Surface Soil - Future Residential Child Non-carcinogenic Scenario

Charleston Navy Complex - Zone F, SWMU 109

								Ingestion		Dermal		Inhalation	
Units	**Chemical**	**WOE**	**RfDo**	**RfDd**	**RfDI**	**RME**	**ABS**	**CDI**	**HQ**	**CDI**	**HQ**	**CDI**	**HQ**
MG/KG	Chromium, total	A-D	1.50E+00	3.00E-02		4.72E+01	0.001	6.03E-04	0.0004	1.67E-06	5.57E-05	3.43E-08	
MG/KG	Copper	D	3.70E-02	1.11E-02		2.09E+02	0.001	2.67E-03	0.072	7.40E-06	6.66E-04	1.52E-07	
MG/KG	Iron		3.00E-01	4.50E-02		1.92E+04	0.001	2.45E-01	0.82	6.78E-04	0.015	1.39E-05	
MG/KG	Mercury	D	3.00E-04	2.10E-05		1.87E+00	0.001	2.39E-05	0.080	6.62E-08	0.0032	1.36E-09	
MG/KG	Manganese	D	2.00E-02	8.00E-04	1.43E-05	3.36E+02	0.001	4.30E-03	0.21	1.19E-05	0.015	2.44E-07	0.017
MG/KG	Vanadium		7.00E-03	7.00E-05		2.72E+01	0.001	3.48E-04	0.050	9.64E-07	1.38E-02	#REF!	
	Hazard Index								**1.2**		**0.048**		**0.017**
											Total HI =	**1.30**	

Notes: WOE = Weight of Evidence; CDI = Chronic Daily Intake; RME = Reasonable Maximum Exposure Concentration; HQ = Hazard Quotient; HI = Hazard

Initial Comments and Responses on the Draft Final Zone F RFI Report Specific to SWMU 109
April 7, 1999
Clarifications inserted September 5, 2001

SCDHEC (Eric Cathcart) Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) NAVBASE Charleston February 26, 1999

SCDHEC Comment 1:

Soil sample blanks for the following areas contained detectable contaminants: SWMU 4, AOC 619, SWMU 36, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 611, AOC 613, AOC 616, AOC 617, and Grid soil samples. Groundwater blanks contained detectable contaminants for the following areas: AOC 619, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 613, GEL samples, Location 240, AOC 617, and Grid groundwater samples. These detections were noted in the volatile, semivolatile, and metals methods. In accordance with the Environmental Protection Agency, *Standard Operating Procedures* for sample collection, trace contaminants in field, trip, equipment, and distilled water blanks may indicate a problem with either decontamination procedures and/or cross contamination of samples during collection or transport. The RFI report should fully explain the existence of trace contaminants in blanks. Please revise the text to include this/these explanation(s).

EnSafe/Navy Response 1:

The Project Chemist has reviewed and evaluated the data and compiled the findings in the following memo to the Project Team for review and approval.

Memorandum

To:	Charleston Naval Complex Project Team
From:	Charlie Vernoy, EnSafe
Subject:	**Response to Comments on the Draft Zone F and K RFI Reports**
Date:	March 31, 1999

Several comments by the South Carolina Department of Health and Environmental Control (SCDHEC) on the Draft Zone F and K RFI Report discuss the context of the Data Validation section and how blank contamination can be further explained relevantly to specific site samples. This memo is intended to explain the data validation process and how it relates to blank contamination associated with the RFI report process for the Charleston Naval Complex (CNC) project and offer a resolution to stated comments. For demonstration purposes, AOC 607 in Zone F has been designated as the site to be addressed in this memo.

As part of the RFI process at CNC, chemical environmental samples undergo a third party data validation review process following USEPA Functional Guidelines. This process includes the review of analytical data generated at specific data quality objectives (DQOs) and making a determination of the validity of the results through implementation of the functional guidelines and providing professional judgement in the qualification of the data. DQOs include the collection and analysis of quality control (QC) blanks which are intended to identify possible contaminants that may be associated with the collection/analysis process.

To assess possible cross contamination from sampling procedures, deionized water, equipment, and field blanks are collected on a weekly basis per sampling event and trip blanks are submitted daily when volatile organic compounds (VOCs) are requested for analysis. The laboratory is also required to provide data on internal laboratory contamination and must analyze method blanks according to specific method requirements. The QC blanks and environmental samples are analyzed by the same methods and are routinely batched in the same Sample Delivery Group (SDG). A typical SDG includes a total of 20 samples. Batching QC and environmental samples together in the same SDG provides needed information to the data validator to make necessary decisions about the quality of the data. There are occasions when a sampling event at a particular site will have multiple SDGs and it becomes the responsibility of the data validator to incorporate the findings of QC blanks into other SDGs associated with the site.

Each SDG has its own data package incorporating the analytical results of samples and providing necessary QC data to make judgements about the validity of the data. When reviewing the data, the validator follows strict guidelines and must qualify sample data when appropriate. Contamination found in QC blank data is one aspect where qualification of data is necessary. Functional guidelines state that when contamination is found in QC blanks the validator must incorporate the findings to site samples where applicable. The way the validator applies the finding is through the "5x" or "10x" rule. The "5x" rule is taking the analytical result of the contaminant found in a QC blank and multiplying the result by five. If a compound is found in all associated blanks, then the highest result is subjected to the rule. The adjusted result is then compared to all site samples and if detections in site samples are less than the adjusted result of the blank contaminant, site sample detections are adjusted to non-detect. This rule covers all compounds except for acetone, methylene chloride, 2-butanone, and bis(2-ethylhexyl)phthalate, which are known laboratory and possible field sampling contaminants, where the "10x" rule will apply.

Upon completion of the data review process, the validator generates a validation report which includes the functional guideline checklist with instructions on qualifying data, actual data sheets of site samples showing data qualifiers, an electronic file of the site sample data with qualifiers, and a summary report outlining deficiencies noted and data qualifiers used. EnSafe reviews the report for consistency and electronically adds the data files to a database. Once the data is validated and added to the database it becomes final and is used in writing nature and extent, fate and transport, and risk assessment sections for RFI reports. As part of the Data Validation section in the CNC RFI reports, all SDG data validation summary reports and database spreadsheets are included for review.

As part of the RFI report process, all contaminants detected in site samples that are not validated to non-detect are to be mentioned in the nature and extent section and compared to regulatory limits such as risk-based concentrations, soil screening and maximum contaminant levels. In short, if an adjusted blank contaminant detection was not higher than the site sample detection, then the site sample result is reported in the RFI report. This result would then be reviewed as a possible chemical of potential concern (COPC) or chemical of concern (COC) and identified as such where applicable. The quarterly monitoring sampling program would help to determine if a COPC or COC was from cross contamination or actual detection.

Section 4.3 in the Zone F and K Draft RFI reports summarized blank contamination found in common multiple blanks associated with a particular site (usually first round sampling events). The sections did not list contaminations found in only one blank because of the assumption that it was a single occurrence and not part of a trend. The data validation summary reports listed all blank contamination per SDG but do not point out trends between the SDGs.

In addressing comments concerning blank contamination at CNC, AOC 607 was used to demonstrate the association between field and method blank detections in all sampling events under the RFI in Zone F. Tables 1 and 2 list compounds detected and the ranges associated with the blanks. The asterisk denotes compounds that were detected in a blank but were not detected in a site sample.

Table 1 - Soil AOC 607

Field Blanks	*Range*
1234678-HxCDF	3.76-11.7 pg/L
123478-HxCDF	0.704-2.29 pg/L
123678-HxCDD	2.74-7.37 pg/L
123678-HxCDF	1.3 pg/L
123789-HxCDD	50.2-131 pg/L
234678-HxCDF	2.74-3.5 pg/L
2-Butanone	23 ug/L
Acetone	4-120 ug/L
Acetonitrile	2800-14000 ug/L
Aluminum	246 ug/L
Barium	16.7 ug/L
Benzyl Alcohol*	2 ug/L
Beryllium	0.31-.41 ug/L
Bromodichloromethane*	13 ug/L
Calcium	18.7 ug/L
Chloroform*	34 ug/L
Chromium	1 ug/L
Copper	0.75 ug/L
Cyanide	3.5 ug/L
Iron	596 ug/L
Magnesium	1340 ug/L
Manganese	13.3 ug/L
Mercury	0.11 ug/L
Methylene Chloride	1-14 ug/L
Napthalene	1 ug/L
Nickel	14 ug/L
N-Nitrosodimethylamine*	1-4 ug/L
OCDD	388-744 pg/L
OCDF	2.5-6.71 pg/L
Potassium	1320 ug/L
Sodium	6410 ug/L
Thallium	6.8 ug/L
Tin	2.8 ug/L
Toluene	2 ug/L
Vanadium	1.7 ug/L
Zinc	7.1-10.3 ug/L

Method Blanks	*Range*
1234678-HpCDD	3.67 pg/L
234678-HxCDF	3.15 pg/L
Acetone	2-12 ug/L
Aluminum	2.27 ug/L
Beryllium	.035-.039 ug/L
bis(2-Ethylhexy)lphthalate	45-53 ug/L
Butylbenzylphthalate	94 ug/L
Chloroform	1 ug/L
Chromium*	.155-.202 ug/L
Iron	4.9-6.27 ug/L
Lead	0.296 ug/L
Methylene Chloride	2-14 ug/L
OCDD	31 pg/L
Thallium	.425-4.76 ug/L
Tin	1.37-2.8 ug/L
Vanadium	0.052-.852 ug/L

Notes:

* Compounds not detected in any site samples.

Table 2 - Water AOC 607

Field Blanks	*Ranges*
1234678-HpCDD*	3-6 pg/L
234678-HxCDF*	3 pg/L
Acetone	3 ug/l
Aluminum	9.3-19.6 ug/L
Antimony	1.7-2.8 ug/L
Arsenic	2.2-2.5 ug/L
Barium	.34-.98 ug/L
BEHP*	1-110 ug/L
Bromodichloromethane*	2 ug/L
Calcium	39.2-99.8 ug/L
Chloroform*	1-7 ug/L
Chromium	1.5 ug/L
Cobalt	1.1 ug/L
Di-n-octyl phthalate*	9 ug/L
Iron	22.4-35.9 ug/L
Magesnium	49.8 ug/L
Manganese	.38-.72 ug/L
Methylene Chloride	6-19 ug/L
Nickel	1.8 ug/L
OCDD*	9 pg/L
OCDF*	4 pg/L
Potassium	690-699 ug/L
Silver	2.3-3.8 ug/L
Sodium	33.2-24700 ug/L
Tetrachloroethene	1-14 ug/L
Zinc	7.6 ug/L

Method Blanks	*Ranges*
1234789-HpCDF*	3.76 pg/L
234678-HxCDF*	6.45 pg/L
Acetone	3-7 ug/L
Aluminum	12-23.8 ug/L
Antimony	1.6-6.22 ug/L
Arsenic	2.53-2.67 ug/L
Barium	.35-2.55 ug/L
BEHP*	1-10 ug/L
Benzene*	1 ug/L
Benzoic acid	4 ug/L
Calcium	60.5 ug/L
Chloroform*	1-3 ug/L
Cobalt	1.24 ug/L
Copper	1.14-2.5 ug/L
Cyanide*	1.79-2.5 ug/L
Diethylphthalate*	1 ug/L
Heptachlor*	0.012 ug/L
Iron	20.1-32 ug/L
Lead	.91-1.4 ug/L
Magesnium	50.6-56.9 ug/L
Manganese	.5-1.2 ug/L
Methylene Chloride	2-17 ug/L
Nickel	.72-1 ug/L
OCDD*	7.35-11 pg/L
OCDF*	5.66 pg/L
Potassium	178 ug/L
Silver	1.44-1.94 ug/L
Sodium	27.5-107 ug/L
Tetrachloroethene	2 ug/L
Thallium	3.4-3.75 ug/L
Tin	19.6 ug/L
Toluene	2 ug/L
Vanadium	0.813 ug/L
Xylene*	1-2 ug/L
Zinc	7.61-10.2 ug/L

Notes:

* Compounds not detected in any site samples.

In reviewing the compounds for both lists, explanations can be made as to why certain compounds were detected. The majority of compounds that make the lists are inorganics. In comparing the method blank lists there was an increase of inorganic compounds detected in the water events as compared to the soil events. Detections generally ranged higher for the water event method blanks. The field blank lists showed virtually the same number of inorganic compounds for both soil and water events. In contrast to the method blanks, detections of common metals in the field blanks generally ranged higher for soil events. A possible reason for the high incident of metals in field blanks maybe the water from the North Charleston Water System which is used for the on-site carbon filtered/single canister deionized water system. The deionized system is routinely maintained by the Culligan company, but even working at optimal efficiency the system cannot filter out all compounds. The same can be said of the laboratories that use a carbon filtered/dual canister deionized system to filter water for the method blanks. Eliminating all metal detections from blank analyses is an insurmountable task and efforts to identify exact sources of metals are impossible.

The organic blank detections are easier to explain in some cases. For example, the VOCs bromodichloromethane and chloroform were detected in field blanks for the soil and water events and but just chloroform was detected in the method blanks. The two VOCs are common by-products of the chlorination process of municipal water systems. As noted in the tables, bromodichloromethane and chloroform were not detected in any site samples during water sampling events.

The chlorinated dioxin and dibenzofuran detections noted in the field and method blanks are common contaminants found in a dioxin lab. Due to the extremely low detection limits (parts per quadrillion) that a dioxin lab routinely meets due to current technology, it has become extremely difficult to decontaminate glassware down to non-detect levels. However, once the 2,3,7,8-TCDD Toxicity Equivalency Factors (TEFs) are applied to the results, the overall detections are minimal.

It is possible for acetone to be detected in samples because of the decontamination procedures at CNC that use isopropyl alcohol. Acetone being a contaminant of isopropyl alcohol. But the decontamination procedures used in the field are not what laboratories follow so the acetone detections in the method blanks must be from cross contamination in the lab. Acetone is used in laboratories as a solvent for the extraction of soils.

Methylene chloride is not used in decontamination procedures but was detected in field blanks as well as in method blanks. The explanation for this is that laboratories use methylene chloride when performing water extraction for semivolatile and pesticides analyses and very likely cross contamination with CNC samples has occurred. Methylene chloride has not been identified as a COC at AOC 607.

Tetrachloroethene (PCE), also not used in decontamination procedures, was detected in the field and method blanks for the water events. AOC 607 has large PCE detections in the shallow and intermediate groundwater around building 1189 and it is very possible that cross contamination between samples as occurred. The detections for PCE do not affect the results found in the site samples.

The detections of benzene, toluene, and xylene are all below their respective method detection limits (MDLs) and cannot be verified as a true detection. The high detections of acetonitrile (an Appendix IX compound) occurred in two field blanks collected in 11/96. Both blanks were from the same SDG and no associated site samples had detections of the compound.

The phthalate compounds detected in both field and method blanks are commonly found in plastics found in disposable gloves and glassware. The phthalates that were detected in blanks during water events were not detected in any site samples. Phthalates were detected in the method blanks during soil events and not the field blanks leading to the speculation that phthalate contamination is caused by the laboratory.

CH2M-Jones Response Clarification:
See document "Response to Reply to Comment Responses" for revised EnSafe response.

SCDHEC (Johnny Tapia) Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) NAVBASE Charleston March 12, 1999

SCDHEC Comment 2:

Section 4.3. "Data Validation Reports" is an enumeration of the results and detections of blank samples in soil and groundwater. These results should be interpreted in a relevant and meaningful manner by describing if the blank detection means the contaminant is present in the sample, is a product of cross-contamination, etc. This would clarify the significance of the presence of certain contaminants in the samples collected at each unit. As written, contributes minimum value for the review of the document. Please revise this section.

EnSafe/Navy Response 2:

The Project Chemist will review and evaluate the data and compile the findings into a memo for the Project Team's review and approval. Please see response to E. Cathcart Comment #1.

CH2M-Jones Response Clarification:

No further clarification needed.

SCDHEC Comment 3:

Table 6.4 which calculates the Soil Screening Levels for the protection of groundwater needs to revise and recalculate the values for Thallium and Benzo(a)pyrene. The MCL values for the Target Leachate Concentration are not correct, therefore the calculated SSL values need to be verified. Please correct and consider implications throughout the report.

EnSafe/Navy Response 3:

The MCL value for benzo(a)pyrene in Table 6.4, used as the unadjusted target leachate concentration, is shown incorrectly as 0.002 mg/L; it should be 0.0002 mg/L, and will be corrected in the final report. The unadjusted target leachate concentration of 0.0005 mg/L shown for thallium is actually the MCLG rather than thallium's MCL of 0.002 (see column heading in table), and is therefore more conservative (lower) than the MCL. The *Soil Screening Guidance: User's Guide* specifies the use of a nonzero MCLG, MCL, or HBL (Equation 10, p. 29) to determine the target soil leachate concentration. In any event, neither of the calculated SSLs from Table 6.4 was used in the Section 10 screening tables. Because benzo(a)pyrene has an EPA-calculated SSL of 8 mg/kg (*Soil Screening Guidance: Technical Background Document*, Appendix A), that value was used in the tables. The EPA-calculated value of 0.7 mg/kg for thallium would have been used in the screening tables, except that thallium's background reference value of 1.24 mg/kg for subsurface soil was higher, and was therefore used instead. Sometime after the draft RFI report for Zone F was submitted, SCDHEC requested that background reference values for inorganics not be used in place of

corresponding SSLs in the fate and transport screening tables when they exceed the SSLs. Consequently, 0.7 mg/kg will be used as the SSL for thallium in the final RFI report.

CH2M-Jones Response Clarification:

SSLs for both Thallium and Benzo(a)pyrene are taken from the Soil Screening Guidance: Technical Background Document, adjusted for DAF = 10. CH2M-Jones does not agree that background values that exceed SSL values should not be considered in the assessment of COCs. Therefore, if background data indicate that background values exceed the SSL, these background data will also be used as screening levels in assessing whether a chemical may be a COC.

SCDHEC Comment 4:

The second paragraph of page 6.16 needs to be revised for the statements made about the use of the highest of background values (upper or lower soil) used as the screening alternative to SSLs. The same approach is mentioned for groundwater where the greater of shallow or deep background concentrations is used as an screening alternative to the tap water RBCs. Using this approach defeats the purpose of collecting two set of samples (upper and lower) to determine background reference concentrations and is not a conservative screening process. In addition, the same paragraph states that this approach is proposed based only on assumptions. The Screening process should continue as previously approved. Please revise this paragraph and consider implications throughout the report.

EnSafe/Navy Response 4:

Contaminant transport from soil to groundwater involves infiltration of rainwater into the soil followed by percolation downward through surface soil and subsurface soil (the vadose, or unsaturated zone), through the water table into the saturated zone (the unconfined aquifer). Each molecule of water is exposed to contaminants in both surface and subsurface soil as it moves downward to the aquifer. Because the migrating soil water is also exposed to background concentrations of soil constituents at each level, the only relevant background concentration for making comparisons to contaminant concentrations is the greater of the surface soil or subsurface soil values. Collecting background soil samples at both depths is necessary because most human health risk assessment applications require comparisons to background for surface soil only. Because of SCDHEC's request (see Response 3 above) that background values not be used in place of SSLs, however, this is a moot point.

As stated in the paragraph in question on page 6.16, the lithology of the surficial aquifer in Zone F is complex. Given the uncertainty about the interconnectedness of the portions of the aquifer encountered in each well, groundwater results from each depth (shallow or deep) will be screened only against background reference values from the corresponding depth for the final report.

CH2M-Jones Response Clarification:
See document "Response to Reply to Comment Responses" for revised EnSafe response.

SCDHEC Comment 5:

Please clarify in the text that according to EPA's latest guidance on dioxins the 1,000 ng/Kg (as 2,3,7,8-TCDD TEQs) is based on a residential cleanup level with a risk level of 1E-4. Please clarify also that this cleanup level is being used as a screening number due to the complex and time-consuming calculations involved with risk presented by dioxins. For instance page 7.7 needs this clarification. Please correct accordingly.

EnSafe/Navy Response 5:

The above clarifications will be made in the revised report with one exception. The 1,000 ng/kg PRG for 2,3,7,8-TCDD TEQs is based on an *industrial* scenario and a target risk of 1E-04.

CH2M-Jones Response Clarification (SWMU 109):

Dioxin detections in soil and sediment duplicate samples from SWMU 109 were at least 3 orders of magnitude lower than the 1,000 ng/kg TEQ PRG quoted and, therefore, were not considered to be of concern at the site.

SCDHEC Comment 6:

Page 7.10, "Summary of COPCs" paragraph makes the statement that "If no groundwater impacts were identified, the current soil concentrations were considered sufficiently protective of the underlying aquifer". The Department does not necessarily agree with this statement. Other factors as age of the unit, age of spills, type of contaminants present, barriers present (asphalt, concrete, etc.) would influence the presence of contaminants in groundwater. Please modify this statement and consider this factor when making this statement in reference to a specific unit.

EnSafe/Navy Response 6:

The factors mentioned above will be considered when evaluating soil's potential impact to the groundwater.

CH2M-Jones Response Clarification:

See document "Response to Reply to Comment Responses" for revised EnSafe response.

SCDHEC Comment 7:

It may be appropriate to determine a background reference concentration, at Zone F soil and groundwater, for chemicals considered essential nutrients specially for iron. This natural nutrient has been detected at higher concentrations than usual throughout this zone and may be of concern. An evaluation can not be properly done at this time without having an appropriate background concentration and it has been dismissed many times without further consideration. This should be corrected in the final RFI report.

EnSafe/Navy Response 7:

Printouts of iron detections in both soil and groundwater exhibit smooth distributions with one high anomalous concentration in each case. Iron in soil samples appears to correlate closely with aluminum, indicating that high

concentrations of both metals are related to high percentages of clay in the sample. Scatterplots of iron vs. aluminum would help confirm this interpretation, and would also make it possible to identify individual samples with genuinely anomalous high iron concentrations.

Agreed, a background concentration should be developed for iron. Since iron is an essential nutrient, there is no clear guidance for iron risk assessment for human health and therefore no clear risk based remedial alternatives to the background concentration. For sites with iron reported at concentrations above the background reference concentration it is highly recommended that the Project Team develop a framework for managing such sites. However, it will be necessary to do so with a minimum of risk based decision making tools.

CH2M-Jones Response Clarification:

Background concentrations for iron are identified from grid samples from combined Zones F and G. The following concentrations will be used for screening:

Iron in Grid Samples – Zones F and G combined					
Media	*No. of Samples*	*Units*	*Min Detect*	*Max Detect*	*2 x Mean*
Shallow Groundwater	*21*	*ug/L*	*2000*	*62,300*	*46,850*
Deep Groundwater	*20*	*ug/L*	*38*	*18,300*	*12,679*
Surface Soil	*15*	*Mg/Kg*	*3570*	*32,700*	*26,896*
Subsurface Soil	*13*	*Mg/Kg*	*3110*	*58,100*	*31,289*

SCDHEC Comment 8:

This comment is applicable to all units in Zone F. The Risk uncertainty section generally summarizes all detections and explain contributing or mitigating factors to be considered when reaching a decision on the fate of the unit. Since groundwater contamination is assessed based mainly on the first quarter of groundwater sampling, mitigating or contributing factors, such as results of subsequent rounds of groundwater sampling that confirm or refute possible contamination, should be acknowledged. Also, new contaminants detected should be mentioned. Please review the report.

EnSafe/Navy Response 8:

The Navy agrees and will evaluate all available data for incorporation into the final report.

SCDHEC Comment 17 (SWMU 109):

The soil at this unit has demonstrated to have elevated levels of BEQs and metals in two defined areas. Sediments were sampled at a nearby catch basin (109M003) that also detected high levels of constituents exceeding RBCs and background values. There is a probable connection between the surface soil and sediments produced by runoff. Additionally, there is only one well in relation with this unit that, which according to the GW flowmaps, appears not to be properly located to be able to intercept any type of groundwater

contamination derived from the operations at this unit. Groundwater sampling should be re-evaluated at this unit. The catch basin should be considered for cleanup.

EnSafe/Navy Response 17:

The stormwater catch basin received runoff from the SWMU 109 area which is completely asphalt paved. The pavement would preclude any site soil from impacting the sewer. In addition, the Zone I RFI should address these detections. Since our field investigation, the Environmental Detachment Charleston has removed the sediment from the catch basins. The highest detections of SVOCs and metals occurred at SB004. Concentrations of several SVOCs were elevated but none exceeded it SSL.

Also at SB004, concentrations of arsenic and chromium exceeded SSLs. To address this data gap the Navy proposes to install and sample one additional shallow well directly downgradient of SB004. This well should be sampled for SVOCs and metals.

CH2M-Jones Response Clarification:

Additional well F109GW002 was installed east of F109SB004 and sampled. Data indicate that groundwater has not been impacted by the presence of SVOCs or metals in surface media.

Response to Reply to Comments on the Draft Final Zone F RFI Report
June 25, 1999

SCDHEC (Eric Cathcart) Reply to Comments
Received 7 April 1999 on The Zone F Draft RCRA Facility
Investigation Report (dated 31 December 1998)
Charleston Naval Complex

SCDHEC Comment 1:

Soil sample blanks for the following areas contained detectable contaminants: SWMU 4, AOC 619, SWMU 36, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 611, AOC 613, AOC 616, AOC 617, and Grid soil samples. Groundwater blanks contained detectable contaminants for the following areas: AOC 619, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 613, GEL samples, Location 240, AOC 617, and Grid groundwater samples. These detections were noted in the volatile, semivolatile, and metals methods. In accordance with the Environmental Protection Agency, *Standard Operating Procedures* for sample collection, trace contaminants in field, trip, equipment, and distilled water blanks may indicate a problem with either decontamination procedures and/or cross contamination of samples during collection or transport. The RFI report should fully explain the existence of trace contaminants in blanks. Please revise the text to include this/these explanation(s).

EnSafe/Navy Response 1:

The Project Chemist has reviewed and evaluated the data and compiled the findings in the following memo to the Project Team for review and approval.

Memorandum

To:	Charleston Naval Complex Project Team
From:	Charlie Vernoy, EnSafe
Subject:	**Response to Comments on the Draft Zone F and K RFI Reports**
Date:	March 31, 1999

Contents of the memorandum not included. Refer to original comment letter.

SCDHEC Response:

The presence of tetrachloroethene in the field and method blanks for groundwater samples and the Navy's suggestion that cross contamination may have occurred between samples for AOC 607 concerns the Department. The Navy should make every effort to prevent cross contamination in future samples. Field personnel should review the procedures for sample collection and shipment as noted in CVA Final Comprehensive Sampling and Analysis Plan dated 30 August 1994 and the EPA Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual.

The Navy's explanation for the high incident of metals in the field blanks should be validated through water quality data from the North Charleston Water System. The data report should be submitted within ninety days of receipt of this letter.

EnSafe/Navy Response:

EnSafe will contact the City of North Charleston to inquire if such data is available and, if so, obtain a copy for comparison to the metals detected in Zone F field blanks.

CH2M-Jones Response Clarification:

Data from the City for the time period during the described sampling is not available for comparison.

SCDHEC (Johnny Tapia) Reply to Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) Charleston Naval Complex

SCDHEC Comment 4:

The second paragraph of page 6.16 needs to be revised for the statements made about the use of the highest of background values (upper or lower soil) used as the screening alternative to SSLs. The same approach is mentioned for groundwater where the greater of shallow or deep background concentrations is used as an screening alternative to the tap water RBCs. Using this approach defeats the purpose of collecting two set of samples (upper and lower) to determine background reference concentrations and is not a conservative screening process. In addition, the same paragraph states that this approach is proposed based only on assumptions. The Screening process should continue as previously approved. Please revise this paragraph and consider implications throughout the report.

EnSafe/Navy Response 4:

The text will be modified to clarify that only SSLs will be used for the initial fate and transport screening. Inorganic SSL exceedances will be compared to background concentrations for discussion purposes only. Because the migration path, soil-to-groundwater, crosses through both soil intervals, the greater background will be used for this comparison.

As stated in the paragraph in question on page 6.16, the lithology of the surficial aquifer in Zone F is complex. Given the uncertainty about the interconnectedness of the portions of the aquifer encountered in each well, groundwater results from each depth (shallow or deep) will be screened only against background reference values from the corresponding depth for the final report.

SCDHEC Comment 6:

Page 7.10, "Summary of COPCs" paragraph makes the statement that "If no groundwater impacts were identified, the current soil concentrations were considered sufficiently protective of the underlying aquifer". The Department does not necessarily agree with this statement. Other factors as age of the unit, age of spills, type of contaminants present, barriers present (asphalt, concrete, etc.) would influence the presence of contaminants in groundwater. Please modify this statement and consider this factor when making this statement in reference to a specific unit.

EnSafe/Navy Response 6:

The Navy agrees and will revise the text in Section 7. Site specific factors potentially affecting the soil-to-groundwater pathway will be identified and discussed as appropriate for the site. This information will be added to the fate and transportation subsections of Section 10 text.

CH2M-Jones Response Clarification:

CH2M-Jones is screening soil parameters for COPCs using the soil screening process as agreed upon with SCDHEC.

SCDHEC Comment 17:

The soil at this unit has demonstrated to have elevated levels of BEQs and metals in two defined areas. Sediments were sampled at a nearby catch basin (109M003) that also detected high levels of constituents exceeding RBCs and background values. There is a probable connection between the surface soil and sediments produced by runoff. Additionally, there is only one well in relation with this unit that, which according to the GW flowmaps, appears not to be properly located to be able to intercept any type of groundwater contamination derived from the operations at this unit. Groundwater sampling should be re-evaluated at this unit. The catch basin should be considered for cleanup.

EnSafe/Navy Response 17:

The stormwater catch basin received runoff from the SWMU 109 area which is completely asphalt paved. The pavement would preclude any site soil from impacting the sewer. Since our field investigation, the Environmental Detachment Charleston has removed the sediment from the catch basins.

The highest detections of SVOCs and metals occurred at 109SB004 with elevated concentrations at 109SB005. No SVOCs exceeded their SSLs.

To address this data gap, the Navy has installed and sampled one additional shallow well directly downgradient of 109SB004. This well was sampled for VOCs, SVOCs, metals, and pesticides/PCBs. This data should be available in early July 1999. Monitoring well 109001 is directly downgradient of 109SB005. Although concentrations of arsenic, beryllium, and vanadium in soil were elevated, none exceeded their generic SSLs or were detected above tap water RBCs or MCLs in well 109001.

CH2M-Jones Response Clarification:

Groundwater samples at SWMU 109 do not contain any COPCs. No further clarification is needed.

SCDHEC (Susan Byrd) Reply to Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) Charleston Naval Complex

SCDHEC Comment 1:

Section 6.2.1, Page 6.11, Line 20

The text states that the soil-to-groundwater migration pathway was assessed using generic SSLs that assume a DAF of 20, rather than site specific SSLs. A vague description was given for the justification of the DAF value used; however, a more thorough explanation as to why the DAF value of 20 was selected, including site specific parameters, should be discussed in this section. A table showing the comparative site specific values should be included.

EnSafe/Navy Response 1:

Because of the number of sites in each zone, fate and transport evaluation consists of a conservative, first-look screening followed by a more detailed look at the potential problem chemicals identified in the screening. In keeping with the preliminary nature of the screening, generic DAFs of 10 or 20 have been used to calculate SSLs for protection of groundwater. Normally, a DAF of 20 is used, as recommended in the 1996 USEPA Soil Screening Guidance. Where hydrogeological conditions indicate that a more conservative value is appropriate, a DAF of 10 is used. For example, DAFs of 10 were used for the Naval Annex in Zone K because sediments there are almost entirely permeable sand, and for Zone I because groundwater levels are very close to the surface and the horizontal gradient is unusually low. Fate and transport evaluation for Zone E was carried out differently than for other zones: recognizing that groundwater would not be used as drinking water in this industrial area, the focus was on potential threats to surface water in the Cooper River. To make up for this less conservative approach to groundwater, the DAF was arbitrarily lowered from 20 to 10, although hydrogeological conditions would have justified using 20. The decision to use a DAF of 20 was not dependant on site specific parameters. The rationale for using a DAF of 20 for Zone G is presented in Section 6.3.

CH2M-Jones Response Clarification:

As agreed to by the BCT, DAFs of 1 for VOCs and 10 for other parameters have been used for initial screening. Site-specific DAFs have been calculated for chemicals that exceed initial SSL screening values.

SCDHEC Comment 2:

Section 6.2.1, Page 6.16, Line 1

The text state that the greater of the background reference values for surface soil and subsurface soil was used as the screening alternatives to SSLs for inorganics. Using the highest background reference value does not seem to be a conservative approach for background comparison. An explanation should be given to support the statement that the higher background value is always relevant. Also, the approach of comparing surface soils to subsurface soils is not supported due to the influence to "natural occurring" surface soils from the Naval activities such as land covering with dredge materials. To resolve

comparing "apples to oranges", compare surface soil background levels solely to surface soil samples and subsurface soil background levels to subsurface samples.

EnSafe/Navy Response 2:

The text will be modified to clarify that only SSLs will be used for the initial fate and transport screening. Because the migrating soil water is exposed to background concentrations of soil constituents at each level, the only relevant background concentration for fate and transport comparisons is the greater of the surface soil or subsurface soil values. The surficial soil (less that 5 feet bgs) throughout Zone G is an extremely heterogeneous composite of native soil and dredge spoil and other fill materials. It would not be feasible to accurately identify, characterize and determine background concentrations for each soil type encountered.

CH2M-Jones Response Clarification:

As agreed to by the BCT, if background samples were collected in areas not impacted by Navy activities, the range of background values is indicative of concentrations not directly related to specific site activities. Site data will be compared to the background range to evaluate COPCs.

SCDHEC Comment 3:

Section 7.3.4, Page 7.8, Line 22
The terms "significantly greater" is vague and should be defined more clearly or deleted from the text.

EnSafe/Navy Response 3:

The adjective "significantly" will be deleted from the revised text.

SCDHEC Comment 4:

Section 7.3.9, Page 7.19, Line 16
The text states that parameters not having RBC values were not included in the CDI calculation data. EPA Risk Assessment Guidance for Superfund recommends alternative measures when toxicity values are not available. An alternative measure should be implemented in order to prevent deleting values from the calculations.

EnSafe/Navy Response 4:

Parameters that do not have corresponding RBCs due to the lack of approved toxicological data were not included in the CDI calculations. For Zone F media, only essential nutrients were not included due to a lack of quantitative toxicity values. Perhaps SCDHEC and/or the CNC Project Team could assist in identifying the necessary toxicity values.

SCDHEC Comment 5:

Section 8.0, Page 8.1, Lines 2-10
A better justification should be provided for not conducting the Ecological Risk Assessment since receptors were identified in the text. The fact that no Zone F AECs were identified in earlier investigations could be one rationale. Emphasis should be placed on the size of the areas and the unlikeliness that the species identified reside in the areas for prolonged periods of time. Further justification as to why the habitat is considered "limited" should be provided.

EnSafe/Navy Response 5:

The text will be modified to more fully justify the decision not to conduct a Ecological Risk Assessment based on a lack of AECs in Zone F.

SCDHEC Comment 6:

Section 10.1
It would be very helpful to have a map at the beginning of each SWMU and AOC section showing the location of each SWMU or AOC within Zone F. The maps provided in each section are larger scale maps of the SWMUs and AOCs which do not show their locations within the entire Zone.

EnSafe/Navy Response 6:

This information is provided as Figure 1-2 in Volume I of the RFI.

CH2M-Jones Response Clarification:

A location map will be provided at the beginning of each AOC or SWMU section of individual RFI Report Addendum.