N61165.AR.003338
CNC CHARLESTON
5090.3a

CORRECTIVE MEASURES STUDY WORK PLAN SOLID WASTE MANAGEMENT UNIT 39 (SWMU 39) ZONE A CNC CHARLESTON SC

3/1/2002

CH2M HILL

CORRECTIVE MEASURES STUDY WORK PLAN

SWMU 39, Zone A

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

March 2002

Contract N62467-99-C-0960

Certification Page for Corrective Measures Study Work Plan (Revision 0) – SWMU 39, Zone A

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

South Carolina

Permit No. 21428

Dean Williamson, P.E.

3/28/2002

Date

Contents

Section **Page**

Acronyms and Abbreviations ..... **v**

1.0 Introduction **1-1**

1.1 Purpose of the CMS Work Plan 1-1

1.2 Organization of the CMS Work Plan 1-1

2.0 Conclusions from the *Zone A RFI Report, Revision 0* **2-1**

2.1 Surface Soil 2-2

2.2 Subsurface Soil 2-3

2.3 Groundwater 2-3

2.4 Site Hydrogeology 2-4

2.5 Surface Water 2-5

Table 2-1 SWMU 39 Selected Groundwater Monitoring Results (July 2000) 2-6

Figure 2-1 Location of SWMU 39, Zone A within the CNC 2-8

Figure 2-2 Monitoring Well Locations 2-9

Figure 2-3 Groundwater VOC Isocontour Map 2-10

Figure 2-4 Shallow Groundwater Contours 2-11

Figure 2-5 Intermediate Groundwater Contours 2-12

Figure 2-6 Deep Groundwater Contours 2-13

Figure 2-7 PCE Plume Model Results 2-14

Figure 2-8 TCE Plume Model Results 2-15

Figure 2-9 DCE Plume Model Results 2-16

3.0 COC Refinement **3-1**

3.1 Surface Soil COC Evaluation 3-1

3.1.1 Aluminum 3-2

3.1.2 Arsenic 3-2

3.1.3 BEQs 3-2

3.1.4 Beryllium 3-3

3.2 Subsurface Soil COC Evaluation 3-3

3.3 Groundwater COC Evaluation 3-3

3.3.1 Inorganics 3-3

3.3.2 Chlorinated VOCs 3-5

Contents, Continued

3.3.3 Petroleum Hydrocarbons 3-6
3.3.4 SVOCs 3-7
3.3.5 Other Chemicals 3-7
3.4 Summary of COCs Selected for the SWMU 39 CMS 3-8
Table 3-1 Groundwater and Soil COCs Identified for SWMU 39 in the *Zone A RFI Report, Revision 0* (EnSafe, 1998) 3-9
Table 3-2 SWMU 39 RFI Concentrations of Metals in Groundwater 3-10
Table 3-3 SWMU 39 RFI Dioxin Concentrations in Groundwater 3-16

4.0 Remedial Action Objectives and Proposed Media Cleanup Standards 4-1
4.1 Remedial Action Objectives 4-1
4.2 Remedial Goal Options and Media Cleanup Standards 4-1
Table 4-1 Proposed MCSs for VOCs in Groundwater at SWMU 39 4-2

5.0 Corrective Measures Technology Evaluation 5-1
5.1 Focused CMS Approach 5-1
5.2 Approach to Evaluating CMS Alternatives 5-2
5.3 CMS Report 5-4
Table 5-1 Outline of the Focused CMS Report for SWMU 39 5-5

6.0 Discussion of Potential Remedial Alternatives 6-1
6.1 Preliminary Conclusions from the Enhanced Reductive Dechlorination Pilot Test Using HRC® 6-1
6.2 Identification of Corrective Measure Technologies 6-2

7.0 References 7-1

Appendices

A Figures 10.4.1, 10.4.3 through10.4.6, and 10.2.29 from the *Zone A RFI Report, Revision 0* (EnSafe, 1998)

B RFI Detection Summary Tables for Constituents Detected in Soil and Groundwater at SWMU 39

C Figures from the Amerada Hess 2000 *Semi-Annual Progress Report*

D Geologic Cross Sections and Structural Contours of the Investigated Zone A Subsurface Hydrogeologic Units

Acronyms and Abbreviations

AST	Aboveground storage tank
ATSDR	Agency for Toxic Substances Disease Registry
BEQ	Benzo(a)pyrene equivalent
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylene
CA	Corrective Action
CMS	Corrective Measures Study
CNC	Charleston Naval Complex
COC	Chemical of concern
COPC	Chemical of potential concern
CPT	Cone penetrometer technology
CVOC	Chlorinated volatile organic compound
DAF	Dilution attenuation factor
DCA	Dichloroethane
DCE	Dichloroethene
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
EVS	Environmental Visualization System
ft bls	Foot below land surface
HI	Hazard index
HRC	Hydrogen-release compound
IDW	Investigation-derived waste
ILCR	Incremental lifetime cancer risk
MCS	Media cleanup standard
μg/L	Microgram per liter
mg/kg	Milligram per kilogrm
MNA	Monitored natural attenuation

Acronyms and Abbreviations, Continued

NAVBASE	Naval Base
PC	Personal computer
PCA	Tetrachloroethane
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
pg/L	Picrogram per liter
POL	Petroleum, oil, and lubricant
RAB	Restoration Advisory Board
RAO	Remedial action objectives
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RGO	Remedial goal option
SCDHEC	South Carolina Department of Health and Environmental Control
SSL	Soil screening level
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
TCDD	Tetrachlorodibenzodioxin
TCE	Trichloroethene
TEF	Toxicity equivalent factor
TEQ	Toxicity equivalent concentration
TPH	Total petroleum hydrocarbon
VC	Vinyl chloride
VOC	Volatile organic compound

CORRECTIVE MEASURES STUDY WORK PLAN

SWMU 39, Zone A

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

March 2002

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

Section 1.0

1.0 Introduction

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure (BRAC) Act, 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.

CNC Corrective Action (CA) activities are being conducted under the Resource Conservation and Recovery Act (RCRA); the South Carolina Department of Health and Environmental Control (SCDHEC) is the lead agency for CA activities at the site. 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 presents a Corrective Measures Study (CMS) Work Plan for Solid Waste Management Unit (SWMU) 39 in Zone A at the CNC.

This CMS Work Plan presents an approach for evaluating corrective action alternatives for the remediation of chlorinated solvents that are present in the groundwater at SWMU 39. Also contained herein are the proposed media cleanup standards (MCSs) for volatile organic compounds (VOCs) in groundwater.

1.1 Purpose of the CMS Work Plan

This CMS Work Plan evaluates and refines the findings for SWMU 39, as presented in the *Zone A RCRA Facility Investigation (RFI) Report, Revision 0* (EnSafe Inc. [EnSafe], 1998), particularly as they relate to the chemicals of concern (COCs) identified at SWMU 39 during the Zone A RFI. Each COC identified for SWMU 39 in the *Zone A RFI Report, Revision 0* is evaluated against current risk-based criteria to determine whether it presents an unacceptable risk to human health and the environment, and whether it should be retained or eliminated as a COC for further evaluation.

1.2 Organization of the CMS Work Plan

This CMS Work Plan consists of the following sections, including this introductory section:

1.0 Introduction —Presents the purpose of the CMS Work Plan, as well as relevant background information.

2.0 Conclusions from the *Zone A RFI Report, Revision 0* —Provides a site description of the SWMU 39 study area, and RFI conclusions regarding the extent of contamination and site hydrogeologic conditions.

3.0 COC Refinement —Re-evaluates the COCs identified in the *Zone A RFI Report, Revision 0* using current risk-based criteria, to determine which COCs warrant further corrective actions.

4.0 Remedial Action Objectives and Proposed Media Cleanup Standards —Presents the cleanup objectives and the media-specific goals that the remedial actions are designed to accomplish, in order to protect human health and the environment.

5.0 Corrective Measures Technology Evaluation —Presents various remedial technologies which will be screened in the CMS for applicability in site cleanup.

6.0 Discussion of Potential Remedial Alternatives – Presents a discussion of the potentially feasible corrective measure technologies that will be evaluated for applicability at this site.

7.0 References — Lists the references used in this document.

Appendix A contains figures from the *Zone A RFI Report, Revision 0*, which present the original RFI soil boring and groundwater sampling locations at SWMU 39.

Appendix B contains the detection summary tables for constituents detected in SWMU 39 area soil and groundwater during the RFI.

Appendix C contains figures from the Amerada Hess 2000 *Semi-Annual Progress Report*.

Appendix D contains geologic cross sections and structural contours of the Zone A subsurface hydrogeologic units being investigated.

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

Section 2.0

2.0 Conclusions from the *Zone A RFI Report, Revision 0*

SWMU 39 is the site of a former outdoor storage area for petroleum, oil, and lubricant (POL) drums along the north wall of Building 1604. Building 1604 is a large warehouse building located near the northern boundary of the CNC. SWMU 39 is bounded to the north by the Hess Oil tank farm, to the west by a road and railroad along the base boundary, to the south by railroad lines and buildings associated with SWMU 42, and to the east by buildings associated with SWMU 38 (see Figure 2-1).

A marine equipment company currently leases Building 1604 and stores boats and other marine equipment outdoors, north of the building. The original area on the north side of the building where drums were reportedly stored is now covered with asphalt pavement.

The SWMU 39 area was previously studied by EnSafe during the Zone A RFI, which was completed in 1998. A Monitored Natural Attenuation (MNA) study was completed in 1999. The results of the MNA study were reported in a CMS Technical Memorandum (EnSafe, 1999). The results of the RFI and the MNA study revealed a fairly widespread but diffuse occurrence of chlorinated VOCs (CVOCs) in the shallow, intermediate, and deep zones of the unconfined shallow (water table) aquifer.

In 2001, CH2M-Jones conducted a pilot test of enhanced in-situ biodegradation by injection of Hydrogen Release Compound® (HRC®) using technology developed by Regenesis, Inc. The results of this study will be presented in a subsequent report once the pilot test has been completed.

During the Zone A RFI, extensive soil and groundwater sampling was performed. Three separate rounds of surface/subsurface soil boring installation were conducted, with a total of 43 borings installed. Three of the soil borings were installed through the floor of Building 1604, directly south of SWMU 39. During the first event soil samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), metals, pesticides, polychlorinated biphenyls (PCBs) and total petroleum hydrocarbon (TPH). During the second sampling event soils were analyzed for TPH, with selected samples also analyzed for pesticide/PCBs and SVOCs. Samples from the third event were analyzed for VOCs. After the first round of soil sampling, 21 borings using Geoprobe™ technology were installed, with a subsurface soil sample and a shallow groundwater sample collected from each Geoprobe boring for

VOC analysis (see Figure 10.4.1 from the *Zone A RFI Report, Revision 0,* presented in Appendix A, for RFI soil boring and Geoprobe locations). The Geoprobe samples were analyzed for VOCs.

The groundwater sampling included the 21 Geoprobe samples, 15 shallow monitoring wells, five intermediate monitoring wells, eight deep monitoring wells, and a cone penetrometer technology (CPT) survey. Thirteen CPT boring installations were conducted in Zone A, and 16 borings were installed off-base along the neighborhood streets in the vicinity of the Virginia Avenue entrance to the base. Shallow groundwater samples from the CPT borings were collected and analyzed for VOCs. A total of 12 monitoring well sampling events were conducted between October 1995 and October 1997. See Figure 10.4.3 of the *Zone A RFI Report, Revision 0,* presented in Appendix A, for RFI monitoring well locations.

A summary table of chemicals detected in soil and groundwater in the SWMU 39 area during the RFI is presented in Appendix B; the results and conclusions are discussed further below.

2.1 Surface Soil

No VOCs were detected above their respective risk-based concentrations (RBCs) in surface soil samples collected at SWMU 39. Twenty-two SVOCs were detected in surface soils. Five of the SVOCs exceeded their RBCs; all exceedances were in the same sample, 039SB00501. This boring is located at the north edge of SWMU 39, in the area where subsurface free product was detected from the adjacent Hess operations. Refer to Figure 10.4.1 of Appendix A for the boring location, and Appendix C for Liquid Phase Hydrocarbon maps from the Amerada Hess 2000 *Semi-Annual Progress Report.*

No significant areas of CVOC soil contamination were identified during the RFI at SWMU 39 that could be acting as a continuing groundwater contamination source. CVOCs were not identified as COCs in soil in the RFI Human Health Risk Assessment (HHRA); only aluminum, arsenic, beryllium and benzo(a)pyrene equivalents (BEQs) were identified as COCs in soil. Arsenic and beryllium each exceeded their respective RBCs in surface soil sample 039SB00601; beryllium also exceeded the RBC in sample 039SB01001.

Figure 2-1 shows an aerial view of the area and the aboveground petroleum storage tanks (ASTs). The figures from the Amerada Hess September 2000 *Semi-Annual Progress Report* to SCDHEC showing the free product extent and the dissolved benzene, toluene, ethylbenzene, and xylene (BTEX) plume are presented in Appendix C.

2.2 Subsurface Soil

Benzene and ethylbenzene exceeded their soil screening levels (SSLs) in sample 039SB00802, which is located north of SWMU 39 near the fence (see Figure 10.4.1 in Appendix A for boring location). Naphthalene, fluorene, phenanthrene, and 2-methylnaphthalene were each detected in at least one sample, but no SVOCs were detected at concentrations exceeding their SSLs in subsurface soils. Mercury was detected in four lower interval soil samples at concentrations from 1.4 to 2.0 milligrams per kilogram (mg/kg), slightly exceeding the 1 mg/kg SSL (based on a dilution attenuation factor [DAF]=10). Cobalt was detected in seven subsurface soil samples, with concentrations ranging from 1.8 to 2.5 mg/kg.

No COCs were identified for subsurface soil at SWMU 39 in the *Zone A RFI Report, Revision 0*.

2.3 Groundwater

In groundwater, the following constituents were identified in the *Zone A RFI Report, Revision 0* as COCs:

- Aluminum, arsenic, benzene, beryllium, bis(2-ethylhexyl)phthalate (BEHP), chloroform, 1,1-dichloroethene (DCE), 1,2-DCE (total), cis-1,2-DCE, dioxin equivalents, manganese, 2-methylnaphthalene, naphthalene, 1,1,2,2-tetrachloroethene (PCE), PCE, thallium, and vinyl chloride (VC).

The most commonly occurring constituents in groundwater include PCE, TCE, cis/trans-1,2-DCE, and VC. CVOC concentrations have been observed to be somewhat variable and, in some cases, to have decreased during subsequent groundwater monitoring events. This trend was confirmed during the groundwater monitoring event conducted by CH2M-Jones in July 2000 for the facility-wide Groundwater Monitoring Plan.

During the RFI, maximum CVOC concentrations observed were in the 100 to 300 microgram per liter (μg/L) range in monitoring well clusters A039GW012 and A039GW013. Well cluster A039GW012 is located directly south of Building 1604; well cluster A039GW013 is located approximately 400 feet to the south, on the south side of Building 1607 (see Figure 2-2). Figure 2-3 presents a combined groundwater VOC isocontour map for PCE, TCE, and DCE based on 1999 and 2000 data.

The water quality data collected during CH2M-Jones's July 2000 groundwater monitoring field effort included results from well cluster A039GW013, and from new monitoring well

cluster A039GW023, which was recently installed to fill a data gap along the western CNC boundary. Analytical results are presented in Table 2-1. Well cluster A039GW023 is located approximately 600 feet southwest of Building 1604 (see Figure 2-2). The July 2000 data indicate that CVOC concentrations have decreased to less than 100 $\mu g/L$ at monitoring well cluster A039GW013, and that significant quantities of reductive dechlorination daughter product compounds such as DCE and VC are being produced at this location. At well A039GW023D, CVOC compounds are being detected in the 5 to 20 $\mu g/L$ range, indicating either a diffuse local source or the arrival of the leading edge of a dissolved phase VOC groundwater plume originating from the interior of the SWMU 39 area.

2.4 Site Hydrogeology

The site hydrogeology consists of a series of Quaternary interbedded sands and clays, varying in thickness from 21 to 56 feet in the SWMU 39 area. The sands and clays contain an unconfined (water table) aquifer system that overlies the Tertiary Ashley Formation.

The Ashley Formation is comprised of silts and clays and acts as an aquiclude for the water table aquifer. Monitoring wells are installed in shallow (10 to 15 feet below land surface [ft bls], intermediate (15 to 30 ft bls), and deep (30 to 50 ft bls) sandy zones of groundwater flow in the water table aquifer. The three zones are vertically interconnected, and converge into one hydrogeologic unit south of Building 1607. This hydrogeologic model is presented in a series of cross sections prepared by EnSafe for a SWMU 39 MNA Study (EnSafe, 1999), and included in Appendix D of this CMS Work Plan.

Typical groundwater elevation contours for the shallow, intermediate, and deep aquifer zones are presented in Figures 2-4 through 2-6, based upon measurements made in July 2001. The Zone A shallow groundwater flow direction has been consistently determined to be in a generally south-southeast direction, with a separate flow component to the southwest, toward an offsite wetland area associated with Noisette Creek. There is minimal tidal influence on groundwater levels, and flow velocities averaging 14 feet per year have been calculated by EnSafe, based on aquifer test results.

A shallow groundwater divide and radial recharge area appear to exist in the vicinity of Building 1648 (see Figure 2-4). The intermediate groundwater flow path is also generally to the southeast across Zone A. Groundwater flow in the deep zone of the aquifer is also generally to the southeast, but fewer data points exist south of Building 1648 to determine the fate of groundwater flowing through this area.

Based on available historic site maps, Building 1604 and nearby buildings were built in the 1943-1947 time frame. Using a conservative assumption that POL storage and releases occurred from the first day of operations, groundwater from SWMU 39 could have migrated up to approximately 800 feet downgradient by the present date. This estimated distance assumes no biodegradation or adsorption of VOCs in the aquifer, and does not assume a preferential subsurface flow path.

The MNA Study (EnSafe, 1999) reported that aquifer conditions conducive to natural bioremediation of CVOCs by reductive chlorination processes vary in Zone A. The EnSafe report indicated that conditions required generally become more favorable moving southward in Zone A. The groundwater quality data support the conclusion that the natural bioremediation of CVOCs is occurring to some degree in all zones of the shallow aquifer system in this area. Figure 2-2 shows all existing monitoring wells, comprising the RFI wells, wells installed during the MNA study, and wells installed during the HRC Injection Pilot Test.

A three-dimensional visualization of the dissolved VOC groundwater plume was created using the personal computer (PC)-based program Environmental Visualization System (EVS) to assist in understanding the shape of the plume. Figures 2-7 through 2-9 present views of the PCE, TCE and DCE plumes using this model.

2.5 Surface Water

During the RFI, sediments and surface water were sampled at six locations in Zone A southwest of Building 1605; the locations are shown in Figure 2-3. According to page 10.4.126 of the *Zone A RFI Report, Revision 0*, this work was performed in response to a Restoration Advisory Board (RAB) member concerns about the potential for contaminated groundwater to impact an offpost marsh to the southwest. Samples were analyzed for VOCs; no analytes were detected in surface water. Methylene chloride was the only compound detected in two of five sediment samples at 55 and 86 micrograms per kilogram ($\mu g/kg$), but was not judged to be an indicator of groundwater impact to the marsh.

TABLE 2-1
SWMU 39 Selected Groundwater Sampling Results (July 2000)
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Parameter	Sample Location	Result (µg/L)	Qualifier
1,1-Dichloroethene	A039G0013	0.58	J
1,1-Dichloroethane		1.3	J
Methylene chloride (Dichloromethane)		1.9	J
cis/trans-1,2-Dichloroethene		44	=
Tetrachloroethene		7	=
Trichloroethene		2.9	J
1,1-Dichloroethene	A039G013I	4.2	J
Benzene		0.84	J
1,1-Dichloroethane		7.2	=
Methylene chloride (Dichloromethane)		1.3	J
Vinyl chloride		25	=
Tetrachloroethene		83	=
Trichloroethene		51	=
1,1-Dichloroethene	A039G013D	5	=
Benzene		1.1	J
1,1-Dichloroethane		3.8	J
Methylene chloride (Dichloromethane)		1.3	J
1,1,2-Trichloroethane		5	=
Vinyl chloride		12	=
Tetrachloroethene		63	=
Trichloroethene		88	=
Methylene chloride (dichloromethane)	A039G0023	18	=
Acetone		13	=
Trichloroethene		0.45	J
Phenol		0.62	J
Methylene chloride (dichloromethane)		18	=

TABLE 2-1
SWMU 39 Selected Groundwater Sampling Results (July 2000)
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

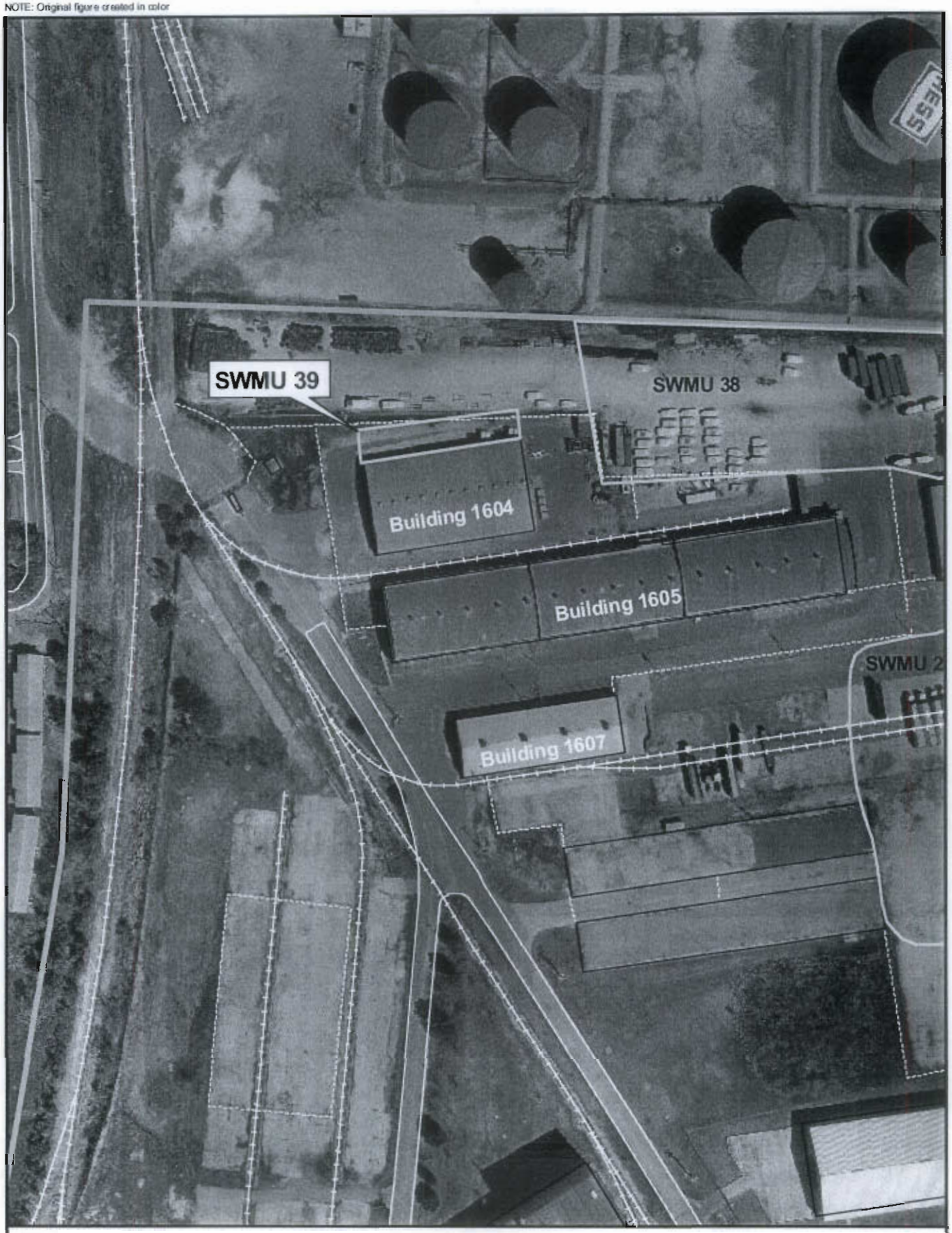
Parameter	Sample Location	Result (µg/L)	Qualifier
Vinyl chloride		4.9	J
cis/trans-1,2-Dichloroethene		15	=
Tetrachloroethene		27	=
Trichloroethene	A039G023D	20	=

= The compound was detected at the indicated value.

J Indicates that the compound was not detected and the concentration is an estimated value.

µg/L Micrograms per liter

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



AOC Boundary
SWMU Boundary
Buildings
Zone Boundary
Fence
Railroads
Roads

N

0 100 200 Feet

Figure 2-1
Site Location Map
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_A\swmu_39\aprs\swmu_39.apr, Date: 04 Mar 2002 9:26, User: AHOLECEK, Figure 2-1 - Figure 2-1 Site Location Map

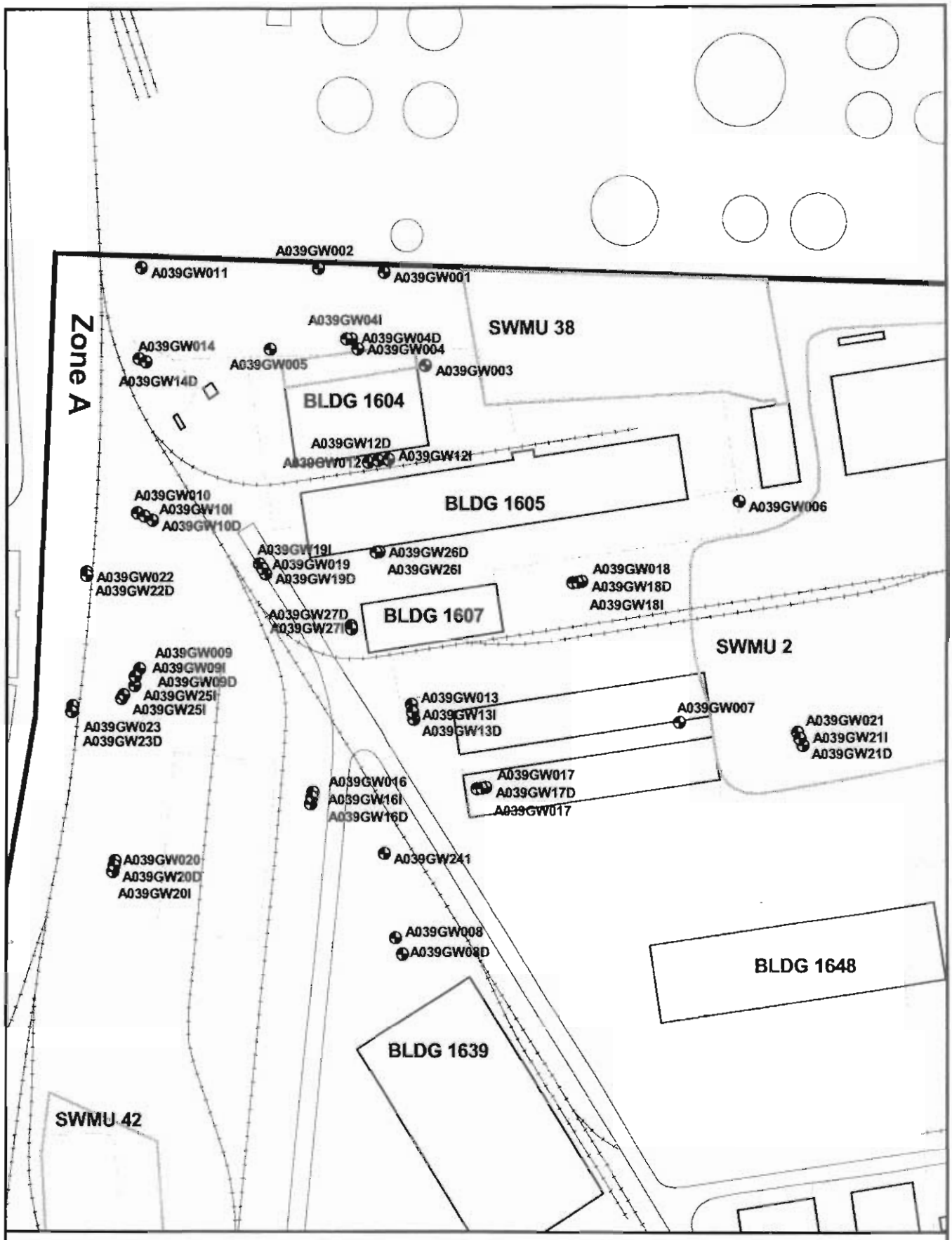
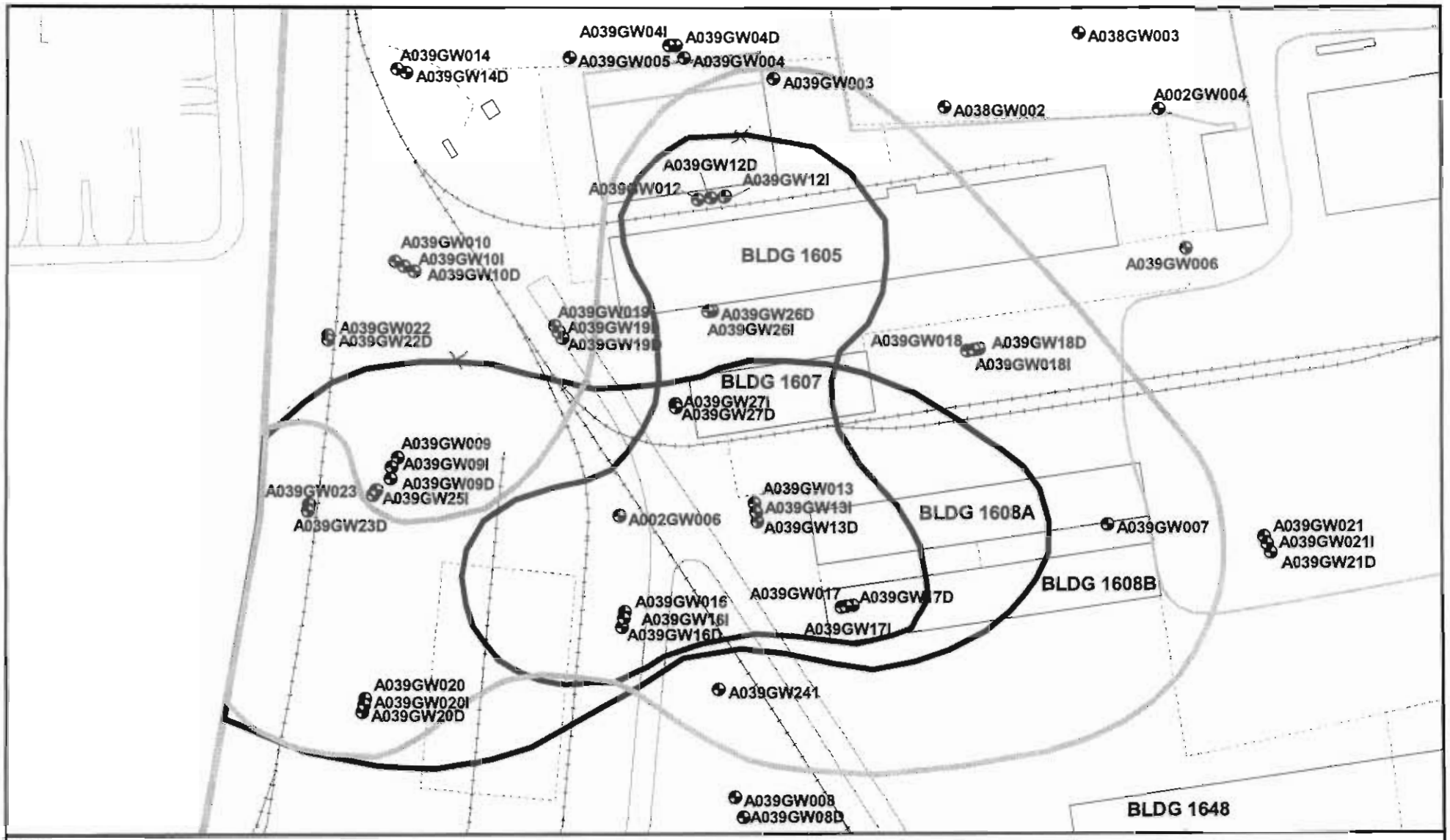


Figure 2-2
Monitoring Well Locations
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL



Dissolved VOC Contours
- PCE = 5 ug/l
- 1,2-DCE = 70 ug/l
- TCE = 5 ug/l
- Groundwater Well
- Fence
- Railroads
- Roads
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

N

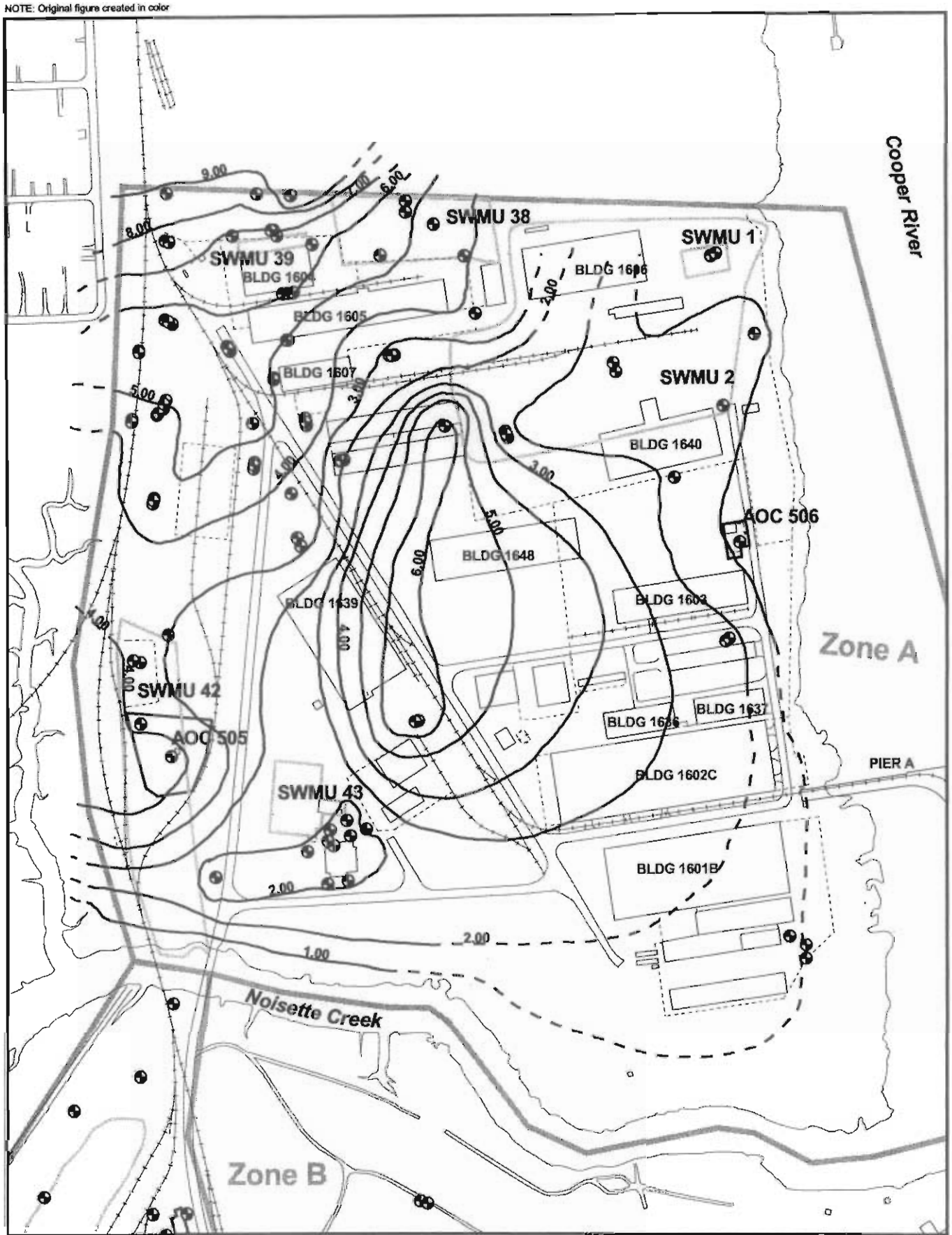
0 90 180 Feet

Figure 2-3
Groundwater VOC Isocontour Map
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_A\swmu_39\apr\swmu_39.apr, Date: 04 Mar 2002 9:02, User: AHOLECEK, Figure 2-3 - Figure 2-3 Groundwater VOC Isocontour Map

NOTE: Original figure created in color



Groundwater Well
Shallow Groundwater Contours
Fence
Railroads
Roads
Shoreline
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

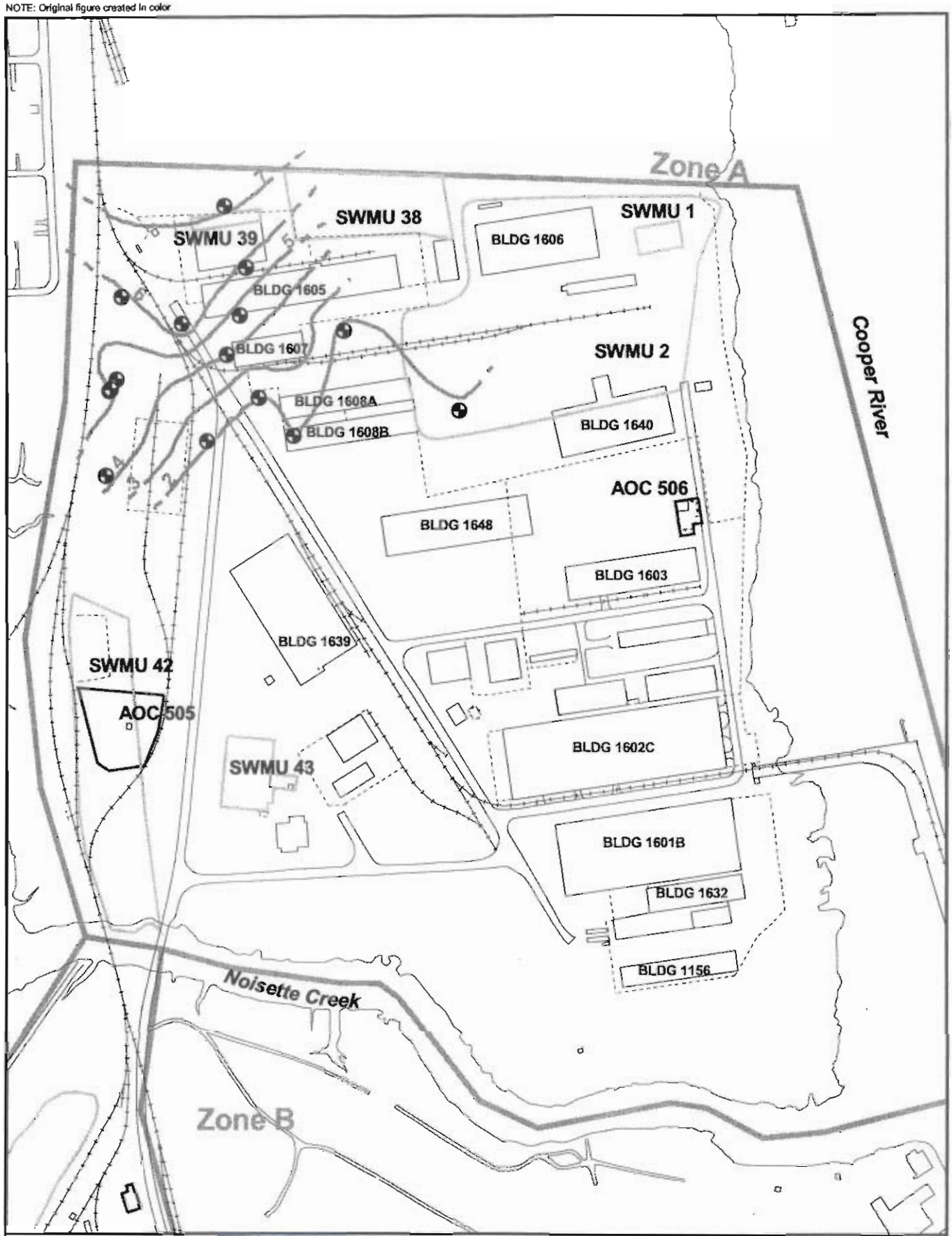
N

0 300 600 Feet

Figure 2-4
Shallow Groundwater Contours
Zone A
Charleston Naval Complex

CH2MHILL

NOTE: Original figure created in color



Intermediate Groundwater Contours (07/13/01) (ft msl)

- Known
- Inferred
- Fence
- Roads
- Shoreline
- Railroads
- Groundwater Well
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

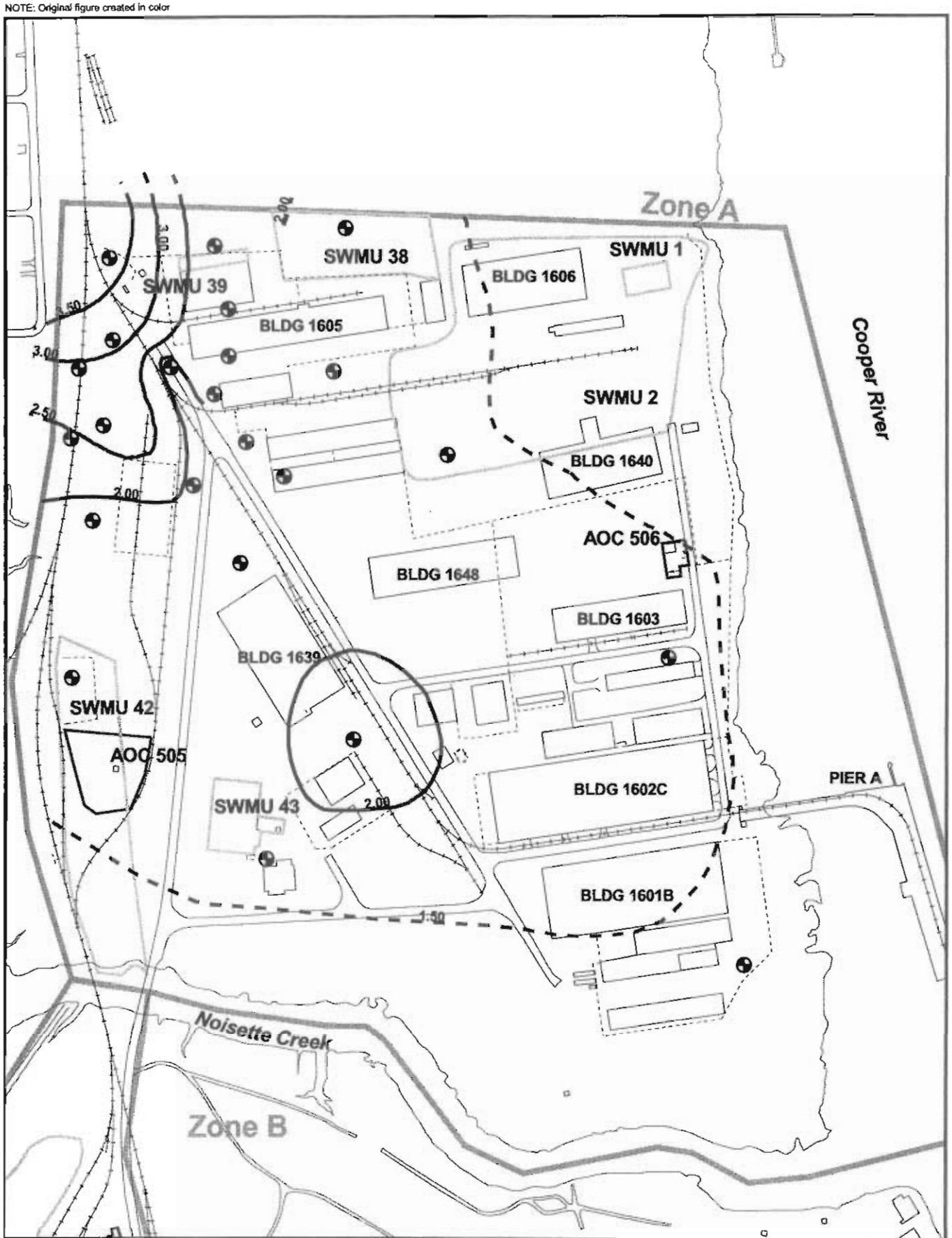
N

0 300 600 Feet

Figure 2-5
Intermediate Groundwater Contours
Zone A
Charleston Naval Complex

CH2MHILL

NOTE: Original figure created in color



Deep Groundwater Contours (07/13/01) (ftmsl)

- Known
- Inferred
- Fence
- Roads
- Shoreline
- Railroads
- Groundwater Well
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

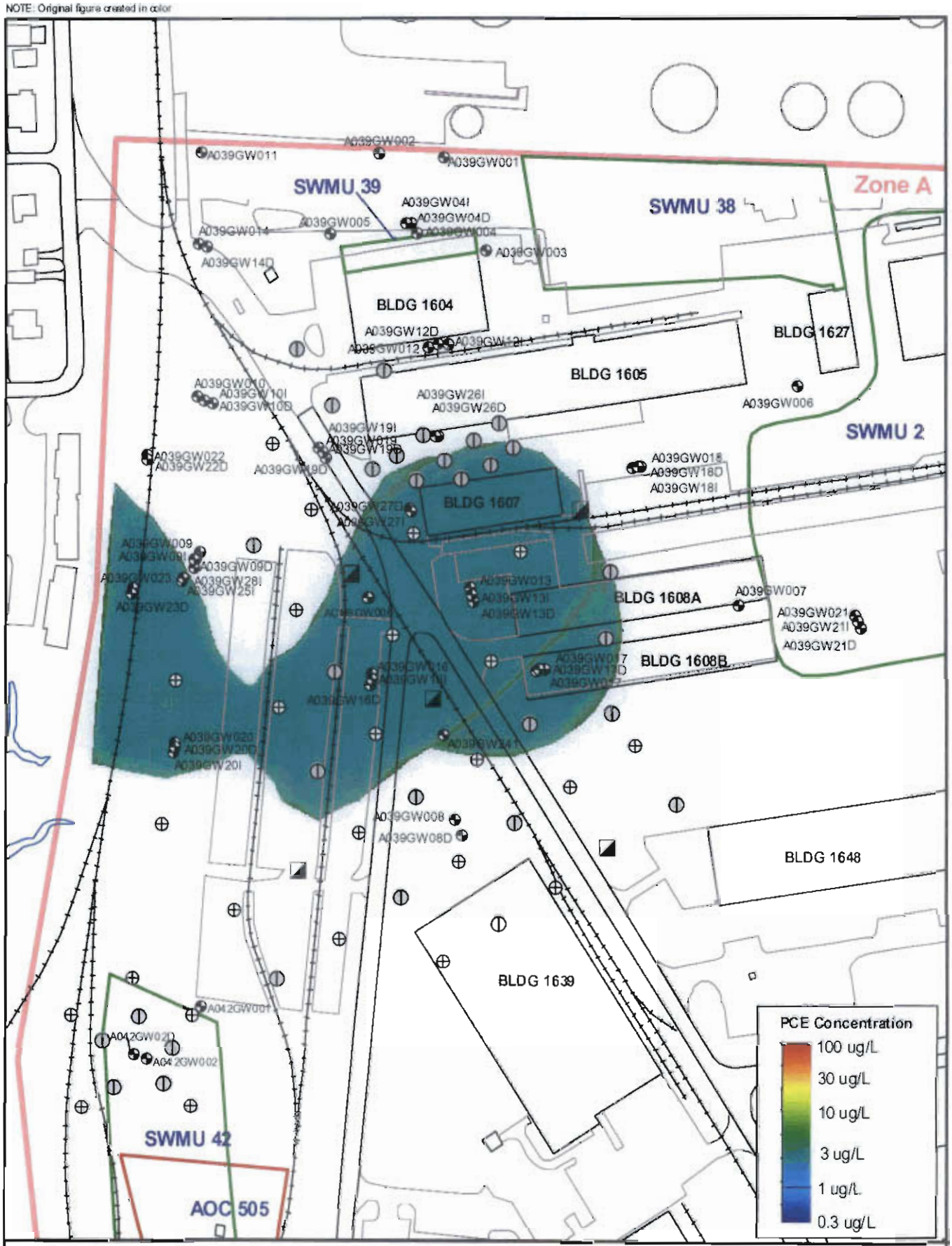
N

0 300 600 Feet

Figure 2-6
Deep Groundwater Contours
Zone A
Charleston Naval Complex

CH2MHILL

NOTE: Original figure created in color



DPT Locations with Lithologic Log
Groundwater Wells
Proposed Primary DPT Locations
Proposed Secondary DPT Locations
Railroads
Roads
Pavement
Shoreline
Surrounding Area
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 100 200 Feet

Figure 2-7
PCE Plume Model Results
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL

File Path: C:\Files\Projects\Zone A\swmu 39\arcd\swmu 39.apr, Date: 25 Mar 2002 10:26, User: AHOLCCEK, PCE - Figure 1 - PCE Concentration Plume

NOTE: Original figure created in color

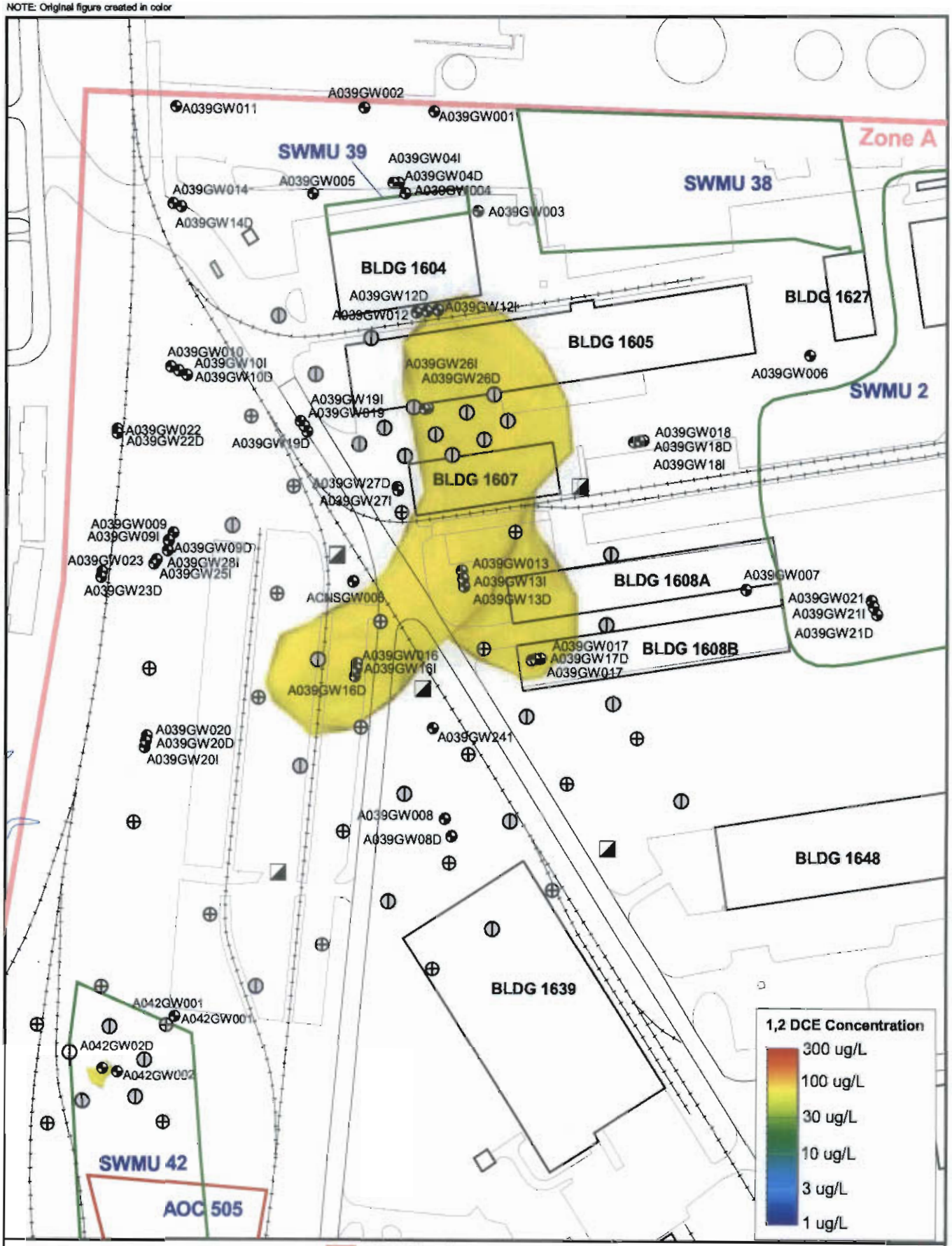


Figure 2-9
DCE Plume Model Results
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_A\swmu_39\apns\swmu_39.apr, Date: 19 Mar 2002 12:57, User: AHOLECEK, 1,2-PCE Contamination Plume - Figure x-x Map Title

Section 3.0

3.0 COC Refinement

This section discusses the COCs that were identified for SWMU 39 and documented in the *Zone A RFI Report, Revision 0* (EnSafe, 1998) as needing further evaluation through a CMS. The COCs identified in the *Zone A RFI Report, Revision 0* are presented and re-evaluated to select a final set of COCs to be addressed by this CMS. The proposed remedial action objectives (RAOs), MCSs, and remedial goal options (RGOs) for the COCs are presented in Section 4.0 for use in the corrective action alternatives screening process.

A risk assessment for SWMU 39 was performed and documented in the *Zone A RFI Report, Revision 0* (Section 10.4.13) for chemicals of potential concern (COPCs) that had been identified in the preliminary screening process. According to the RFI and risk assessment, environmental media at SWMU 39 that were impacted included surface soils and groundwater.

The RFI risk assessment evaluated exposure to surface soils onsite under both the unrestricted (residential) and site worker (industrial) re-use scenarios. For these scenarios, the incidental and dermal contact exposure pathways were evaluated.

In the RFI, any chemical contributing to a cumulative risk level of 1E-06 or greater and/or a cumulative hazard index (HI) greater than 1.0, and whose incremental lifetime cancer risk (ILCR) exceeds 1E-06 or whose hazard quotient exceeds 0.1, was considered a COC. This is conservative for carcinogenic compounds, because a cumulative risk level of 1E-04 and individual ILCR of 1E-06 is recommended by the U.S. Environmental Protection Agency (EPA) as a trigger level for establishing COCs.

COCs that were identified in the *Zone A RFI Report, Revision 0* for surface soils and groundwater are presented in Table 3-1, and are further refined in the following sections, with selection of final COCs for the SWMU 39 CMS. Data summary tables for constituents detected in surface soil, subsurface soil, and groundwater during the RFI are presented in Appendix B.

3.1 Surface Soil COC Evaluation

Aluminum, arsenic, BEQs, and beryllium were identified as COCs in surface soil at SWMU 39. None of the CVOCs found in groundwater at the site were identified as surface soil COCs, and the RFI Fate and Transport section states that no soil source for the groundwater

VOC contamination could be conclusively identified in the RFI. COCs identified in the RFI are discussed further below; data summary tables of detected chemicals are presented in Appendix B.

3.1.1 Aluminum

Aluminum was identified as a surface soil COC based on its contribution to the cumulative HI for site residents. A maximum aluminum concentration of 16,000 mg/kg was measured in sample location A039SB006, which is above the maximum Zone A grid-based background soil concentration of 11,800 mg/kg. The aluminum concentration in the subsurface soil sample at this location is 1,400 mg/kg. Aluminum concentrations in grid-based background samples from adjacent Zone B ranged from 6,320 to 55,500 mg/kg. Aluminum is a naturally occurring component of many clayey soils, and was not known to be stored, used, or disposed of at the SWMU 39 container storage area. The average aluminum concentration for surface soil samples collected at SWMU 39 during the RFI is 7,327 mg/kg. Based on these considerations, aluminum is not retained as a COC in surface soils at SWMU 39.

3.1.2 Arsenic

Arsenic was identified as a COC based on its contribution to the site resident and site worker ILCR, and to the cumulative HI from a single sample. Arsenic exceeded the 15 mg/kg SSL in one sample from boring A039SB006, at 17.9 mg/kg. This concentration is within the Zone A arsenic background range of 1.7 to 30 mg/kg for grid-based surface soil samples. No surface soil samples at SWMU 39 exceeded the maximum arsenic concentration detected in the Zone A grid (background) soil samples. Therefore, arsenic is not retained as a COC for surface soils at SWMU 39.

3.1.3 BEQs

The *Zone A RFI Report, Revision 0* evaluated this group of compounds following EPA Region IV guidance for surface soil direct exposures. The occurrence of the BEQs in soil above screening criteria at SWMU 39 is primarily confined to the area on the north side of Building 1604 , adjacent to the Hess Tank Farm, in borings A039SB005, A039SB008 and A039SB011 (see Figure 10.4.1 in Appendix A). The RBCs used as RFI screening criteria for BEQs were only exceeded in one surface soil sample, 039SB00501. Review of the RFI data for this sample indicate that TPH results indicate the presence of diesel fuel (diesel range organics) at 150 mg/kg.

The *Zone A RFI Report, Revision 0* states that four additional samples were collected around boring A039SB005 to determine the extent of the elevated BEQs, but that none of the other samples contained elevated levels of SVOCs. BEQs in surface soil are not recommended for further evaluation as a COC in the remedial alternatives analysis of this CMS.

3.1.4 Beryllium

Beryllium was detected in two of 15 surface soil samples, at concentrations of 0.24 and 0.45 mg/kg. Beryllium was not detected in grid-based surface soil samples in Zone A, but in adjacent Zone B, the 0.45 mg/kg detection would fall within the background range of concentrations of 0.28 to 1.7 mg/kg for surface soil. Beryllium is not known to have been a site-related chemical. Using a DAF of 10, the beryllium SSL for migration to groundwater is 31.5 mg/kg in soil. Currently, the EPA Region III residential (unrestricted) land use RBC for beryllium in surface soil is 160 mg/kg (HI=1.0), or 16 mg/kg at an HI=0.1. Because no beryllium concentrations exceed the current RBC or SSL (DAF=10), beryllium is not retained as a COC for surface soils at SWMU 39.

3.2 Subsurface Soil COC Evaluation

The *Zone A RFI Report, Revision 0* did not identify any COPCs or COCs for subsurface soils at SWMU 39. As in surface soils, the CVOCs found in site groundwater were not found in site subsurface soils at levels that could adversely affect groundwater. Therefore, no subsurface soil COCs are proposed for this CMS.

3.3 Groundwater COC Evaluation

The Zone A RFI risk assessment evaluated exposure to shallow groundwater at SWMU 39 using both the unrestricted and site worker scenarios. The inhalation and ingestion exposure pathways were evaluated, assuming that site groundwater will be used for potable and/or domestic purposes using unfiltered well water. Data summary tables showing chemicals detected in groundwater during the RFI are presented in Appendix B. Groundwater COCs identified in the *Zone A RFI Report, Revision 0* are listed in Table 3-1, and are discussed further below.

3.3.1 Inorganics

Arsenic, beryllium, manganese, and thallium were listed in the *Zone A RFI Report, Revision 0* as inorganic groundwater COCs.

Arsenic

Arsenic was detected in 51 of 79 RFI groundwater samples analyzed, with concentrations ranging from 2.1 to 109 micrograms per liter (μg/L). Arsenic exceeded the 50 μg/L drinking water maximum contaminant level (MCL) at least once in three shallow monitoring wells: A039GW004 (99.9 μg/L), A039GW005 (77.7 μg/L), and A039GW012 (109 μg/L); maximum detected concentrations are in parentheses. Table 3-2 presents a summary of arsenic, iron and manganese detections in SWMU 39 area groundwater. As the table shows, at all locations where elevated groundwater arsenic levels have been detected, iron concentrations are also significantly elevated; at some locations, manganese levels are also elevated, indicating that the metals are being mobilized into solution due to iron-reducing conditions in the groundwater. Grid-based background soil sampling indicates that arsenic occurs naturally in the soils of Zone A. Reducing groundwater conditions have been previously documented in Zone A by EnSafe during the CMS for MNA in 1999-2000, and by CH2M-Jones during the HRC Injection Pilot Test in 2001. Arsenic was not retained as a site-related soil COC in the *Zone A RFI Report, Revision 0*, and did not exceed drinking water MCLs in intermediate or deep SWMU 39 monitoring wells. For these reasons, arsenic is not retained as a groundwater COC at SWMU 39.

Beryllium

According to the *Zone A RFI Report, Revision 0*, beryllium was detected in six of 79 samples, with concentrations ranging from 0.215 to 1.2 μg/L. Review of the RFI data reveals that the 1.2 μg/L data point from monitoring well A039GW013 in the first sampling event is a "U" flagged data point, indicating that beryllium was not detected. The only detections of beryllium are sporadic "J" flagged (estimated) detections in wells A039GW004, A039GW006, A039GW8D, A039GW012D, and A039GW013 (see Table 3-2). All concentrations were below the 4 μg/L drinking water MCL. Therefore, beryllium is not retained as a groundwater COC at SWMU 39.

Manganese

Manganese was detected in 77 of 79 samples analyzed, at concentrations ranging from 5.6 to 3,100 μg/L. There is no EPA drinking water MCL for manganese, however the EPA tap water RBC is 73 μg/L. The base-wide background range of concentrations for manganese in shallow grid wells is 291 to 7,980 μg/L; the deep groundwater range is 269 to 9,030 μg/L. Manganese was detected in almost 100 percent of the Zone A RFI samples for SWMU 39 area, and the detected concentrations fall within the background ranges. Manganese is not known as a site-related contaminant at SWMU 39, is widely occurring as a natural mineral,

and was not identified as a COC in surface or subsurface soils. Therefore, manganese is not retained as a groundwater COC for SWMU 39.

Thallium

According to the *Zone A RFI Report, Revision 0*, thallium was detected in three of 79 samples, with concentrations ranging from 3.7 to 7.4 μg/L. Further review of the data indicates that these data points are reported with a "U" qualifier, indicating that thallium was not detected in these samples. The only detections of thallium in groundwater were a "J" (estimated) concentration of 1.7 μg/L in well A039GW04, and a 1.6 J μg/L in well A039GW008, both in a single 1998 sampling event (see Table 3-2). The EPA Primary Drinking Water MCL is 2 μg/L, and the CNC base-wide background range of concentrations in groundwater is 1.9 to 105 μg/L, with a mean detected concentration from all grid wells of 7.5 μg/L. Both of the measured "J" flagged values are below the MCL. Thallium was not identified as a COC in surface or subsurface soils. For these reasons, thallium is not believed to be a site related-contaminant, and is not retained as a COC for SWMU 39 groundwater.

3.3.2 Chlorinated VOCs

The CVOCs identified in the *Zone A RFI Report, Revision 0* as COCs are shown in Table 3-1. The existing RFI monitoring well clusters A039GW012 and A039GW013 have consistently displayed elevated concentrations of some combination of PCE, TCE, DCE, and/or VC in samples from the various aquifer zones, extending downgradient (to the south) from SWMU 39. The same chemicals are also present in additional monitoring wells installed during the MNA study and HRC Injection Pilot Test. Their widespread occurrence, distribution, and relative ratios all indicate an aging dissolved VOC contamination plume, and they should be retained as groundwater COCs.

Chloroform was listed in the RFI as a COC based on one detection out of 108 RFI groundwater samples analyzed for chloroform. The sample collected from monitoring well A039GW13D in November 1996 contained chloroform at 7 μg/L. During subsequent sampling events in 1997, 1998, and 1999, chloroform was not detected. The low-level single detection in only one well is not believed to be indicative of site-related contamination. Chloroform is not retained as a groundwater COC at SWMU 39.

1,1,2,2-tetrachloroethane (PCA) was reported in the RFI as a COPC for SWMU 39. Further review of the RFI data indicates that PCA was never detected in site groundwater; all results were less than the 5.0 μg/L detection limit, with either a "U" or "SU" qualifier, indicating

the that the chemical was not detected. For this reason, PCA is not considered a COC at SWMU 39.

1,2-dichloroethane (1,2-DCA) was reported as a SWMU 39 COPC in the *Zone A RFI Report, Revision 0*. Further review of the RFI data indicates that for all but two of the samples collected, the compound was not detected, with a reporting limit of 5.0 μg/L. However, for one sample collected in 1996 from well A039GW011 and one sample collected in 1997 from well A039GW04I, the reporting limit was lower than 5 μg/L (1.0 and 1.6 μg/L, respectively), and the samples were flagged with "J" qualifiers. 1,2-DCA was not detected in these wells or in any other wells during any subsequent sampling events. The MCL for 1,2-DCA is 5 μg/L. Because of the infrequency of detection, and because no exceedances of its MCL were noted, 1,2-DCA is not considered a COC for SWMU 39.

1,1-dichloroethene (1,1-DCE) was widely reported in the *Zone A RFI Report, Revision 0* as detected in groundwater with "J" qualifiers, but at concentrations below its EPA Primary Drinking Water MCL of 7 μg/L. Since the RFI, 1,1-DCE has been detected in monitoring wells A039GW12I (6.8 μg/L) and A039GW26I (9.5 μg/L). On this basis, 1,1-DCE is retained as a COC for further evaluation.

3.3.3 Petroleum Hydrocarbons

Benzene exceeded its 5 μg/L MCL in four shallow monitoring wells: A039GW001, A039GW005, A039GW011, and A039GW014. These four wells are all located near the CNC boundary north and west of SWMU 39, in the area where liquid phase hydrocarbon has been detected as part of the Amerada Hess investigation. A maximum concentration of 180 μg/L was reported in well A039GW011; the Hess report indicates that liquid phase hydrocarbon thickness of 0.2 feet was measured in well A039GW011 in August 2000 (see the Hess hydrocarbon thickness map presented in Appendix C). Based on these considerations, benzene is not believed to be related to Navy activities, and is not retained as a groundwater COC at SWMU 39.

During the Zone A RFI, total xylenes were detected in groundwater samples from shallow monitoring wells A039GW001, A039GW002, A039GW005, A039GW011, and A039GW014 in SWMU 39. Total xylenes were not detected in intermediate or deep monitoring wells. The maximum detection of total xylenes was 560 μg/L in monitoring well A039GW011. This well is located in the extreme northwest corner of Zone A, on the fence line, and adjacent to the Hess free product recovery unit. This well and the other three wells in which xylenes were detected all lie hydraulically upgradient of SWMU 39, and are within the petroleum hydrocarbon plume mapped as originating on Hess property (see Appendix C). The

observed concentrations have not exceeded the 10,000 μg/L EPA Primary Drinking Water MCL. Based on these considerations, total xylenes are not believed to be related to Navy activities, and are not retained as groundwater COCs at SWMU 39. The Navy's opinion is that the parties responsible for the release of the benzene and xylenes are responsible for addressing it where it has migrated onto the CNC property.

3.3.4 SVOCs

Naphthalene, 2-methylnaphthalene, and 4-methylphenol were identified in the RFI Risk Assessment as groundwater COCs based on a projected child resident non-carcinogenic hazard. The tap water RBC for naphthalene is 0.65 μg/L, and it was detected in shallow monitoring wells A039GW005, A039GW008, A039GW010, A039GW011 and A039GW014 above this level, as well as in A039GW08D and A039GW13I. With the exception of cluster A039GW008 near SWMU 42, these wells are located in the northwestern corner of Zone A, and the naphthalene detections are most likely attributable to the presence of liquid phase hydrocarbons from the Hess groundwater plume and liquid phase hydrocarbon product which is present in this area. The occurrence of 2-methylnaphthalene in Zone A groundwater is very similar to naphthalene, as this compound is a biodegradation product of naphthalene. The monitoring wells where CVOCs are most elevated do not show naphthalene exceedances. As with benzene, the Navy's opinion is that the responsibility for addressing the naphthalene remains with the parties responsible for its release. Naphthalene is not retained as a groundwater COC at SWMU 39.

The chemical 4-methylphenol was only detected in monitoring well A039GW011 during the 4th, 5th, and 6th sampling events, at 14, 10 and 22 μg/L, respectively. All other samples were "U" flagged, or not detected. There is no MCL for 4-methylphenol; the tap water RBC is 18 μg/L, and only a single sample slightly exceeded this MCL during one sampling event. This occurrence at low levels in a single well is not indicative of site contamination, and is likely a biodegradation component of the naphthalene present in site groundwater. Therefore 4-methylphenol is not retained as a groundwater COC at SWMU 39.

3.3.5 Other Chemicals

Dioxin equivalents

Dioxin was identified as a COC in the *Zone A RFI Report, Revision 0* because the detection limits for all 34 samples analyzed for 2,3,7,8-tetrachlorodibenzodioxin (TCDD) exceeded the 0.3 picogram per liter (pg/L) drinking water MCL. All results were reported as "U" flagged, or not detected. Further review of the data indicates that several dioxin and furan

compounds were detected in groundwater (see Table 3-3). The individual compound detections were converted into toxicity equivalence concentration (TEQ) values using EPA guidance. This method assigns a 2,3,7,8-TCDD toxicity equivalence factor (TEF) to each of the polychlorinated dibenzodioxin and dibenzofuran compounds. The resulting TEQ values were compared to the 30 pg/L drinking water MCL for 2,3,7,8-TCDD. None of the RFI results exceed the 30 pg/L groundwater MCL. Although no site-specific anthropogenic background levels for TEQs were established for CNC, they are known to occur in the background of the urban environment (ATSDR, 1997). Therefore, TEQs are not retained as COCs for SWMU 39.

BEHP

There is no drinking water MCL for BEHP; the tap water RBC is 4.8 μg/L. BEHP was only detected in monitoring well A039GW001 during the third RFI sampling event, at 13 μg/L. BEHP detection limits routinely exceeded the tap water RBC for samples where the results were "U" flagged (usually 10 to 12 μg/L). BEHP is a commonly used plasticizer which is present in polyvinyl chloride (PVC) well pipe, well sampling equipment, sampling containers, and many other plastic items. BEHP was not known to be a site-related chemical at the POL storage area. Therefore, BEHP is not retained as a groundwater COC at SWMU 39.

3.4 Summary of COCs Selected for the SWMU 39 CMS

There are no surface or subsurface soil COCs selected for the SWMU 39 CMS. The CVOCs PCE, TCE, DCE, and VC are retained as groundwater COCs for further evaluation and remedial alternatives analysis in this CMS Work Plan.

TABLE 3-1
Groundwater and Soil COCs Identified for SWMU 39 in the *Zone A RFI Report, Revision 0*
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Medium	Chemical
Groundwater	Arsenic
	Beryllium
	Manganese
	Thallium
	Benzene
	1,2-Dichloroethane
	1,1-Dichloroethene
	cis-1,2-Dichloroethene
	1,2-Dichloroethene (total)
	Chloroform
	Dioxin (TCDD equivalent)
	Bis(2-ethylhexyl)phthalate
	2-Methylnaphthalene
	Xylene (m+p)
	4-Methylphenol
	Naphthalene
	1,1,2,2-Tetrachloroethane
	Tetrachloroethene
	Vinyl Chloride
Surface Soil	Aluminum
	Arsenic
	BEQs
	Beryllium
Subsurface Soil	None

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW001	039GW00101	12/6/95	43.8 =	36,600 J	904 =		
	039GW00102	4/23/96	34.6 =	31,900 =	932 =		
	039GW00103	6/20/96	39.1 =	28,300 =	794 =		
	039GW00104	10/7/96	36.7 =	31,200 =	969 =		
	039GW001C1	10/14/98	30.8 =	30,600 =	824 J		
A039GW002	039GW00201	12/5/95	33.1 =	9,330 J	1,240 =		
	039GW00202	4/23/96	40.7 =	8,700 =	1,120 =		
	039GW00203	6/20/96	48.1 =	7,250 =	1,070 =		
	039GW00204	10/8/96	43.6 =	7,880 =	1,100 =		
	039GW002C1	10/14/98	45.2 =	8,620 =	1,080 J		
A039GW003	039GW00301	12/6/95	ND	917 J	51.6 =		
	039GW00302	4/24/96	ND	3,260 =	57.3 =		
	039GW00303	6/20/96	3.3 J	640 =	63.5 =		
	039GW00304	10/8/96	ND	108 J	47.2 =		
	039GW003C1	10/16/98	ND	ND	52.5 =		
	039HW00301a	12/6/95	ND	1,860 J	53.7 =		
	039HW00302	4/24/96	ND	3,540 =	60 =		
	039HW00303	6/20/96	3.2 J	672 =	65.8 =		
	039HW00304	10/8/96	ND	ND	49.6 =		
	039HW003C1	10/16/98	ND	ND	51.9 =		
A039GW004	039GW00401	12/6/95	42.6 =	13,200 J	2,020 =		
	039GW00402	4/24/96	**51.4 J**	16,600 =	1,880 =		
	039GW00403b	6/21/96	46.3 =	13,500 =	1,910 J		
	039GW00404	10/9/96	48.4 =	12,700 =	1,810 =		
	039GW004C1	10/14/98	48.6 =	18,700 =	2,300 J		
A039GW005	039GW00501	12/6/95	**61.3 J**	54,400 J	2,050 =		
	039GW00502	4/24/96	**66.8 =**	57,200 =	2,040 =		
	039GW00503b	6/21/96	**74.9 =**	50,500 =	1,890 J		

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW005	039GW00504	10/9/96	**77.7 =**	47,100 =	1,840 =		
	039GW005C1	10/14/98	**76.6 =**	43,700 =	1,490 J		
A039GW006	039GW00604	10/10/96	ND	9,870 J	47.3 J	0.42 J	
	039GW00606	10/4/97	5.6 J	20,500 =	62.8 =		
	039GW006C1	10/15/98	2.8 J	15,900 =	45.8 J		
	039HW006C1	10/15/98	3.8 J	16,100 =	43.8 J		
A039GW007	039GW00704	10/11/96	3.3 J	5,090 J	41.5 J		
	039GW00706	10/5/97	9.6 J	12,200 =	58.4 =		
	039GW007C1	10/15/98	6 J	2,200 =	55.7 J		
A039GW008	039GW00804	10/11/96	9.3 J	8,720 J	257 J		
	039GW00806	10/4/97	17.3 J	22,200 =	156 =		
	039GW008A2	3/10/97	ND	11,400 =	532 =		
	039GW008C1	10/15/98	1.4 J	14,500 =	678 J		1.6 J
A039GW009	039GW00904	10/11/96	25.1 J	9,840 J	981 J		
	039GW00906	10/4/97	35.5 J	12,200 =	958 =		
	039GW009A2	3/10/97	17.8 =	7,780 =	769 =		
	039GW009C1	10/19/98	30.6 =	14,600 =	888 =		
A039GW010	039GW01004	10/11/96	ND	6,780 J	21.3 J		
	039GW01006	10/4/97	5.7 J	3,430 =	6 J		
	039GW010A2	3/11/97	**63.7 =**	36,300 =	95.5 =		
	039GW010C1	10/16/98	ND	1350 =	ND		
	039HW01006	10/4/97	4.3 J	1,340 =	5.2 J		
	039HW010A2	3/11/97	**62.9 =**	37,100 =	98.9 =		
A039GW011	039GW01104	10/15/96	2.8 J	28,500 J	37.7 J		
	039GW01106	10/5/97	5.2 J	27,300 =	24.6 =		
	039GW011C1	10/14/98	4 J	25,200 =	37.5 J		
	039HW01104a	10/10/96	2.2 J	28,300 =	36.9 =		

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW012	039GW01204	10/16/96	**107 J**	20,800 J	2,230 J		
	039GW01206	10/3/97	**109 =**	22,400 =	2,080 =		
	039GW012A2	3/12/97	**95.9 =**	20,000 =	2,680 =		
	039GW012C1	10/19/98	**132 =**	21,700 =	2,510 =		
	039GW012L2	5/14/01	ND	86.7 J	2,940 =		
A039GW013	039GW01301	2/7/97	14.4 =	18,300 =	135 =		
	039GW01306	10/5/97	5 J	6,800 =	157 =	0.40 J	
	039GW013A2	3/12/97	ND	550 =	16.1 =		
	039GW013C1	10/19/98	ND	658 =	29.3 =		
	039HW013L2	5/11/01	ND	ND	3.93 J		
A039GW014	039GW01401	2/6/97	23 =	32,900 =	67.7 =		
	039GW01406	10/5/97	33.1 J	33,100 =	84.7 =		
	039GW014A2	3/20/97	23.8 =	33,300 =	66 =		
	039GW014C1	10/16/98	36.5 =	31,600 =	78.8 =		
A039GW015	039GW01501	2/6/97	5.1 J	8,930 =	129 =		
	039GW01506	10/5/97	4.3 J	3,700 =	129 =	0.20 J	
	039GW015A2	3/20/97	ND	8,010 =	131 =		
	039GW015C1	10/19/98	2.9 J	4,330 =	99.9 =		
	039HW01506	10/5/97	6.6 J	3,760 =	130 =		
A039GW016	039GW016C1	10/17/98	3.8 J	1,390 =	727 =		
A039GW017	039GW017C1	10/19/98	8.9 J	18,700 =	111 =		
A039GW018	039GW018C1	10/17/98	6 J	6,800 =	302 =		
A039GW019	039GW019C1	10/17/98	16.3 =	35,400 =	400 =		
A039GW04D	039GW04D01	12/6/95	ND	395 J	91.5 =		
	039GW04D02	4/25/96	ND	264 =	106 =		
	039GW04D03b	6/21/96	ND	219 =	96.9 J		
	039GW04D04a	10/8/96	ND	168 =	103 =		

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW04D	039GW04DC1	10/14/98	ND	112 =	86.4 J		
A039GW04I	039GW04I06	10/4/97	40 J	785 =	41.9 =		1.7 J
	039GW04IC1	10/14/98	**99.9 =**	1,500 =	91.4 J		
A039GW08D	039GW08D04	10/15/96	14.3 J	18,600 J	2,180 J		
	039GW08D06	10/4/97	13.1 J	13,400 =	2,020 =	0.26 J	
	039GW08DA2	3/10/97	17.2 =	15,500 =	2,200 =	0.23 J	
	039GW08DC1	10/15/98	11.5 =	12,300 =	2,050 J		
A039GW09D	039GW09D06	10/4/97	ND	171 =	110 =		
	039GW09DA2	3/11/97	ND	213 =	119 =		
	039GW09DC1	10/19/98	ND	3,220 =	244 =		
	039HW09DC1	10/19/98	ND	3,090 =	249 =		
A039GW09I	039GW09I06	10/4/97	3.6 J	2,430 =	348 =		
	039GW09IA2	3/10/97	ND	2,320 =	350 =		
	039GW09IC1	10/19/98	3.1 J	2,270 =	346 =		
A039GW10D	039GW10D06	10/4/97	ND	635 =	76.9 =		
	039GW10DA2	3/11/97	ND	663 =	72.9 =		
	039GW10DC1	10/16/98	ND	677 =	52.4 =		
A039GW10I	039GW10I01	11/6/96	ND	2,200 =	ND		
	039GW10I06	10/4/97	26.5 J	8,350 =	2,990 =		
	039GW10IA2	3/11/97	25.6 =	9,050 =	3,100 =		
	039GW10IC1	10/16/98	29.7 =	10,000 =	2,860 =		
A039GW12D	039GW12D04	10/16/96	ND	931 J	45.3 J		
	039GW12DA2	3/12/97	ND	ND	9.1 J		
	039GW12DC1	10/19/98	ND	1,980 =	40.5 =	0.30 J	
	039GW12DL2	5/14/01	ND	ND	12 J		
A039GW12I	039GW121L2	5/14/01	ND	ND	582 =		
	039GW12I04	10/16/96	2.2 J	489 J	460 J		

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW12I	039GW12I06	10/3/97	4 J	616 =	535 =		
	039GW12IA2	3/11/97	ND	614 =	507 =		
	039GW12IC1	10/19/98	6.8 J	712 =	560 =		
A039GW13D	039GW13D06	10/5/97	2.1 J	66.8 J	42.3 =		
	039GW13DA2	3/12/97	ND	36.6 J	51.2 =		
	039GW13DC1	10/19/98	ND	139 =	ND		
	039GW13DL2	5/14/01	ND	ND	31.2 =		
A039GW13I	039GW131L2	5/11/01	ND	ND	129 =		
	039GW13I01b	11/5/96	ND	1,200 =	ND		
	039GW13I06	10/5/97	2.6 J	ND	ND		
	039GW13IA2	3/12/97	ND	568 =	586 =		
	039GW13IC1	10/19/98	ND	102 =	306 =		
A039GW14D	039GW14D01	2/6/97	ND	127 =	36.5 =		
	039GW14D06	10/5/97	2.3 J	526 =	32.1 =		
	039GW14DA2	3/21/97	ND	362 =	34 =		
	039GW14DC1	10/16/98	ND	704 =	29.9 =		
A039GW15D	039GW15D01	2/6/97	ND	567 =	145 =		
	039GW15D06	10/5/97	ND	558 =	161 =		
	039GW15DA2	3/20/97	ND	409 =	140 =		
	039GW15DC1	10/19/98	ND	567 =	152 =		
A039GW16D	039GW16DC1	10/17/98	ND	1,500 =	155 =		
A039GW16I	039GW16IC1	10/17/98	3 J	1,860 =	1,270 =		
A039GW17D	039GW17DC1	10/19/98	3.2 J	4,240 =	2,080 =		
A039GW17I	039GW17IC1	10/19/98	1.2 J	17,300 =	448 =		
A039GW18D	039GW18DC1	10/17/98	ND	1,200 =	178 =		

TABLE 3-2
SWMU 39 RFI Concentrations of Metals in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	Arsenic Result (µg/L)	Iron Result (µg/L)	Manganese Result (µg/L)	Beryllium Result (µg/L)	Thallium Result (µg/L)
A039GW18I	039GW18IC1	10/17/98	13.6 =	4,580 =	674 =		
	039HW18IC1	10/17/98	14.4 =	4,390 =	652 =		
A039GW19D	039GW19DC1	10/17/98	ND	320 =	82.6 =		
A039GW19I	039GW19IC1	10/17/98	2.7 J	2,770 =	525 =		
A039GW25I	039GW25IL2	5/16/01	ND	7.76 J	275 =		
A039GW28I	039GW28IL2	5/16/01	ND	ND	323 =		

= Indicates that the compound was detected, the reported concentration is equal to the sample concentration.

J Indicates that the compound was detected, the reported concentration is the estimated concentration.

µg/L Micrograms per liter

TABLE 3-3
SWMU 39 RFI Dioxin Concentrations in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	TEQ Concentration (pg/L[a])
A039GW001	039GW00104	10/07/96	3.9
A039GW002	039GW00204	10/08/96	2.0
A039GW003	039GW00304	10/08/96	1.8
A039GW003	039HW00301b	12/15/95	16.9
A039GW003	039HW00302	04/24/96	12.8
A039GW003	039HW00303	06/20/96	12.9
A039GW003	039HW00304	10/08/96	2.2
A039GW004	039GW00403a	06/20/96	12.4
A039GW004	039GW00404	10/09/96	7.6
A039GW005	039GW00503a	06/20/96	7.0
A039GW005	039GW00504	10/09/96	3.7
A039GW006	039GW00604	10/10/96	3.0
A039GW007	039GW00704	10/11/96	2.7
A039GW008	039GW00804	10/11/96	2.8
A039GW008	039GW008A2	03/10/97	3.0
A039GW009	039GW00904	10/11/96	2.3
A039GW009	039GW009A2	03/10/97	3.3
A039GW010	039GW01004	10/11/96	2.7
A039GW010	039GW010A2	03/11/97	2.6
A039GW010	039HW010A2	03/11/97	5.4
A039GW011	039GW01104	10/15/96	2.9
A039GW011	039HW01104b	10/15/96	2.6
A039GW012	039GW01204	10/16/96	6.6
A039GW012	039GW012A2	03/12/97	2.7
A039GW013	039GW013A2	03/12/97	2.8
A039GW04D	039GW04D03a	06/20/96	9.2
A039GW04D	039GW04D04b	10/09/96	1.7
A039GW08D	039GW08D04	10/15/96	2.9
A039GW08D	039GW08DA2	03/10/97	2.8
A039GW09D	039GW09DA2	03/11/97	2.7

TABLE 3-3
SWMU 39 RFI Dioxin Concentrations in Groundwater
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Station ID	Sample ID	Date Collected	TEQ Concentration (pg/L[a])
A039GW09I	039GW09IA2	03/10/97	2.1
A039GW10D	039GW10DA2	03/11/97	2.8
A039GW10I	039GW10IA2	03/11/97	2.9
A039GW12D	039GW12D04	10/16/96	6.5
A039GW12D	039GW12DA2	03/12/97	2.6
A039GW12I	039GW12I04	10/16/96	8.1
A039GW12I	039GW12IA2	03/11/97	2.1
A039GW13D	039GW13DA2	03/12/97	2.8
A039GW13I	039GW13IA2	03/12/97	2.7

[a] TEQ is the TCDD (2,3,7,8-tetrachlorodibenzodioxin) equivalent concentration in picograms per liter (pg/L).

In samples where TEQs were not detected, half the reporting limit was used in the TEQ calculation.

Section 4.0

4.0 Remedial Action Objectives and Proposed Media Cleanup Standards

This section discusses the RAOs of this CMS and presents proposed MCSs for VOCs in groundwater. Once the RAOs and MCSs are established, candidate remedial technologies and alternatives can be developed to meet these objectives.

4.1 Remedial Action Objectives

RAOs are medium-specific goals that the remedial actions are designed to accomplish in order to protect human health and the environment by preventing or reducing exposures under current and future land use conditions. The RAOs identified for the groundwater at SWMU 39 are: 1) to prevent ingestion and direct/dermal contact with groundwater having unacceptable carcinogenic or noncarcinogenic risk, and 2) to restore the aquifer to beneficial use. An additional RAO is to control offsite migration of the VOC plume in groundwater. No remedial actions are required for surface or subsurface soil at SWMU 39.

4.2 Remedial Goal Options and Proposed Media Cleanup Standards

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

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

The exposure medium of concern for SWMU 39 is CVOC-contaminated groundwater. Specific chemicals for which RGOs and MCSs are needed include PCE, TCE, cis-1,2-DCE, 1,1-DCE, and vinyl chloride (VC). The proposed MCSs for each of these chemicals is presented in Table 4-1.

TABLE 4-1
Proposed MCSs for VOCs in Groundwater at SWMU 39
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Chemical	Proposed MCS (µg/L)
Tetrachloroethene (PCE)	5
Trichloroethene (TCE)	5
Cis-1,2-Dichloroethene (cis-1,2-DCE)	70
1,1-Dichloroethene (1,1-DCE)	7
Vinyl Chloride (VC)	2

µg/L Micrograms per liter

Section 5.0

5.0 Corrective Measures Technology Evaluation

A focused CMS will be conducted that will evaluate the alternatives proposed to achieve the RAOs and MCSs for VOCs in groundwater at SMWU 39. Several remedial technologies will be evaluated for applicability. Passive as well as active technologies will be evaluated, and may include:

- Groundwater extraction and chemical/physical treatment;
- In-situ plume remediation by MNA;
- In-situ enhanced biodegradation with monitoring;
- In-situ source treatment with zero-valent iron; and
- Permeable reactive barriers or in-situ reactive zones.

5.1 Focused CMS Approach

The current extent of dissolved CVOCs in groundwater is yet not completely delineated in Zone A. This information will be acquired through a groundwater sampling effort prior to beginning the remedial alternatives screening process. A groundwater Sampling and Analysis Plan (SAP) has been submitted under separate cover; the sampling will refine understanding of dissolved CVOC distribution in SWMU 39 groundwater. In addition to completing the extent of the dissolved phase plume, additional groundwater samples will be collected in areas where it appears that chlorinated solvents may have been introduced into the subsurface, in an attempt to locate any residual source areas that may remain at the site.

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

1. Review existing and new site data and technical literature to identify and screen the various corrective measure alternatives for applicability. The results of the Geoprobe SAP will be considered when corrective measure alternatives are evaluated. In addition to those listed above, other corrective measure alternatives may also be evaluated in the CMS.

2. The preferred corrective measure alternative will then be selected .

3. The CMS methods and the preferred corrective measure alternative will be documented in the CMS report.

5.2 Approach to Evaluating Corrective Measure Alternatives

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

1. Protect human health and the environment.
2. Attain MCSs, which will generally be the RGOs.
3. Control the source of releases to minimize future releases that may pose a threat to human health and the environment.
4. Comply with applicable standards for the management of wastes generated by remedial activities.
5. Other factors include (a) long-term reliability and effectiveness; (b) reduction in toxicity, mobility, or volume of wastes; (c) short-term effectiveness; (d) implementability; and (e) cost.

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

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

Attain Media Cleanup Standards. The alternatives will be evaluated on the basis of their ability to achieve the RGOs defined in this CMS Work Plan. Another aspect of this criterion is the time frame to achieve the RGOs. Estimates of the time frame for the alternatives to achieve RGOs will be provided.

Control the Source of Releases. This standard deals with the control of releases of contamination from the source (the area in which the contamination originated).

Comply with Applicable Standards for Management of Wastes. This criterion deals with the management of wastes derived from implementing the alternatives; for example, treatment or disposal of well cuttings, contaminated groundwater, or excavated material from a source area.

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

a. Long-term reliability and effectiveness

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

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

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

c. Short-term effectiveness

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

d. Implementatiblity

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

e. Cost

A net present value of each alternative will be developed. These cost estimates will be used for the relative evaluation of the alternatives, not to bid or budget the work. The estimates will be based on information available at the time of the CMS and on a conceptual design of the alternative. They will be "order-of-magnitude" estimates with a generally expected accuracy of -50 percent to +100 percent for the scope of action described for each alternative. The estimates will be categorized into capital costs and operations and maintenance costs for each alternative.

5.3 CMS Report

The CMS Report will be prepared to present the identification, development, and evaluation of potential corrective measures for SWMU 39. A proposed outline of the report, as shown in Table 5-1, provides an example of the report format and content organization.

TABLE 5-1
Outline of Focused CMS Report for SWMU 39, Zone A
CMS Work Plan, SWMU 39, Zone A, Charleston Naval Complex

Section No.	Section Title
1.0	**Introduction**
1.1	Corrective Measures Study Purpose and Scope
1.2	Report Organization
1.3	Background Information
1.3.1	Facility Description
1.3.2	Site History and Background
1.3.2.1	Nature and Extent of Contamination
1.3.2.2	Summary of Risk Assessment
2.0	**Remedial Goal Objectives**
3.0	**Detailed Analysis of Focused Alternatives**
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Alternatives
3.3.1	Alternative 1
3.3.2	Alternative 2
3.3.3	Alternative 3
3.3.4	Alternative 4
3.3.5	Alternative 5
3.4	Detailed Analysis of Alternatives
3.4.1	Analysis of Alternative 1
3.4.2	Analysis of Alternative 2
3.4.3	Analysis of Alternative 3
3.4.4	Analysis of Alternative 4
3.4.5	Analysis of Alternative 5[a]
3.5	Comparative Analysis of Alternatives
4.0	**Recommended Remedial Alternative**
5.0	**References**
Appendix A	**Corrective Measure Alternative Cost Estimates[b]**
List of Tables	
List of Figures	

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

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

Section 6.0

6.0 Discussion of Potential Remedial Alternatives

During the CMS, the refined site hydrogeologic model from the additional groundwater investigations will be used to evaluate several groundwater remediation technology alternatives. The feasibility of using HRC to enhance the ongoing biological remediation of the aquifer has already been evaluated on a pilot scale following a work plan submitted in January of 2001, and is briefly discussed further in Section 6.1 below. Identification of other potentially applicable corrective measure technologies is discussed in Section 6.2. These technologies will be thoroughly evaluated and screened in the Phase II CMS.

6.1 Preliminary Conclusions from the Enhanced Reductive Dechlorination Pilot Test Using HRC

The CVOCs in groundwater can be biologically degraded by naturally occurring microorganisms. When CVOCs are naturally degraded under anaerobic conditions, the process is termed "reductive dechlorination." The microbes substitute a hydrogen atom for a chlorine atom on the CVOC molecule, thereby reducing the chlorination state of the compound. Addition of a suitable organic substrate such as HRC to the aquifer can increase the rate of dechlorination by one order of magnitude or more, ultimately producing a non-toxic ethene end-product (Regenesis, Inc., 2000).

CH2M-Jones conducted pilot-scale testing of HRC as a remedial alternative in 2001. The purpose of the test was to attempt to enhance the natural reductive dechlorination (bioremediation) of groundwater by injecting HRC into the subsurface. Using a direct-push technology (DPT) system, HRC was introduced into three subsurface test grids surrounding monitoring wells known to have previously detected CVOCs.

Based on the preliminary results of the pilot test to-date, HRC is not likely to be selected as the final full scale groundwater remedy. Although the HRC was observed to affect the site groundwater geochemistry in some areas, HRC did not consistently enhance the existing rate of natural attenuation during the nine-month test period. Natural attenuation of VOCs in groundwater by reductive dechlorination is still feasible and is occurring to some degree, but aquifer characteristics do not appear to be optimal for full-scale remediation of the VOC

plume via HRC. Pilot test data for the HRC testing will be provided once the final test results are received.

6.2 Identification of Corrective Measure Technologies

Corrective measure technologies that have the potential to reduce, eliminate, or control the unacceptable risk to human health and the environment to acceptable levels will be identified and screened.

A key element of the remedial approach to be developed for the SWMU 39 corrective measures will be the overall strategy for achieving the various RAOs. For example, a technology or remedial approach that may be effective in restoring the beneficial use of the aquifer by treating a residual source area may not be effective in precluding offsite migration of the plume near the site boundary. Thus it is likely that the selected remedial alternative will consist of one or a combination of source area treatment alternatives along with one or more alternatives designed to address the dissolved phase plume and control offsite migration.

The following preliminary list of technologies, presented below, was developed based upon the known site COCs and the RGOs desired for the site:

Groundwater Extraction/Treatment for Hydraulic Containment. This technology involves strategically placed groundwater extraction wells which are pumped to control groundwater gradients, creating a hydraulic barrier which prevents migration of contaminated groundwater off site. The extracted groundwater is treated to remove contaminants and can be re-injected at strategic locations to further enhance hydraulic containment in the aquifer, or can be discharged. This approach is often determined during a CMS or its implementation to be excessively expensive and may be dropped during its development if more cost-effective methods for achieving plume control are identified.

Monitored Natural Attenuation. This technology involves monitoring groundwater to evaluate naturally occurring aquifer processes such as biodegradation, dispersion, adsorption, and dilution of contaminants, which may be adequate to prevent migration of contamination away from SWMU 39. MNA could be one component of an overall plume control strategy for portions of the plume.

Enhanced In-Situ Biodegradation. This technology involves the injection of various electron donors or other materials into the aquifer to enhance natural biogradation rates of

chlorinated solvents in groundwater. Complete microbial dechlorination of PCE or TCE, for example, will yield a less toxic ethene endpoint compound in groundwater.

In-situ VOC Source Area or Plume Treatment by Zero-Valent Iron Injection. This technology involves injecting powdered granular iron into the aquifer to promote in-situ dechlorination of CVOCs. The process depends on the corrosion of the injected elemental iron particles to form ferrous iron and hydrogen, both of which are reducing agents for CVOCs in the saturated and vadose aquifer zones.

Permeable Reactive Barriers. This technology also involves zero-valent iron, but includes construction of a permeable reactive wall of granular or powdered iron below the water table to intercept and treat the dissolved phase VOC plume as the groundwater passes through it, but before it moves off site.

VOC Source Area Treatment by In-situ Oxidation. This approach involves in-situ treatment of VOCs by injection of a strong oxidant such as Fenton's reagent. This technology has been shown to be effective at the CNC for treating chlorobenzenes in groundwater.

Land Use Controls. Land use controls may be needed during the period before the MCSs are achieved. Such restrictions are likely to relate to control of zoning and groundwater use restrictions.

These, and potentially other technologies will be screened as remedial alternatives on the basis of their effectiveness, implementability, and cost.

Section 7.0

7.0 References

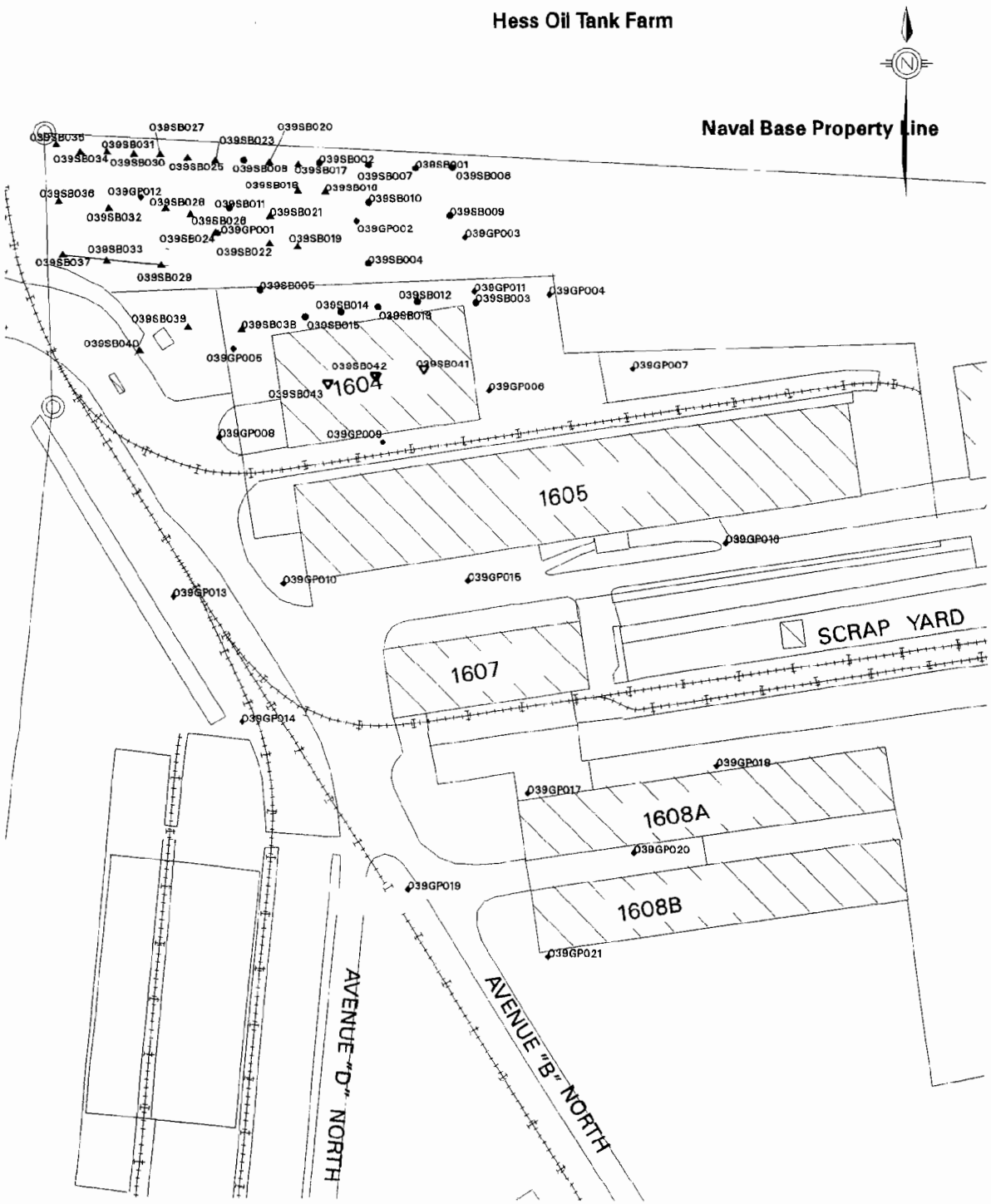
Agency for Toxic Substances and Disease Registry (ATSDR). *Toxicological Profile for TEQs*. U.S. Department of Health and Human Services, A Public Health Service. Atlanta, Georgia. 1997.

EnSafe Inc. *Zone A RCRA Facility Investigation Report, NAVBASE Charleston*. Revision 0. August 7, 1998.

EnSafe Inc. *Zone A SWMU 39 Corrective Measures Study Technical Memorandum on Monitored Natural Attenuation Feasibility, NAVBASE Charleston*. December 22, 1999.

Regenesis Bioremediation Products. *Accelerated Bioremediation of Chlorinated Compounds in Groundwater*. Copyright 2000.

Appendix A



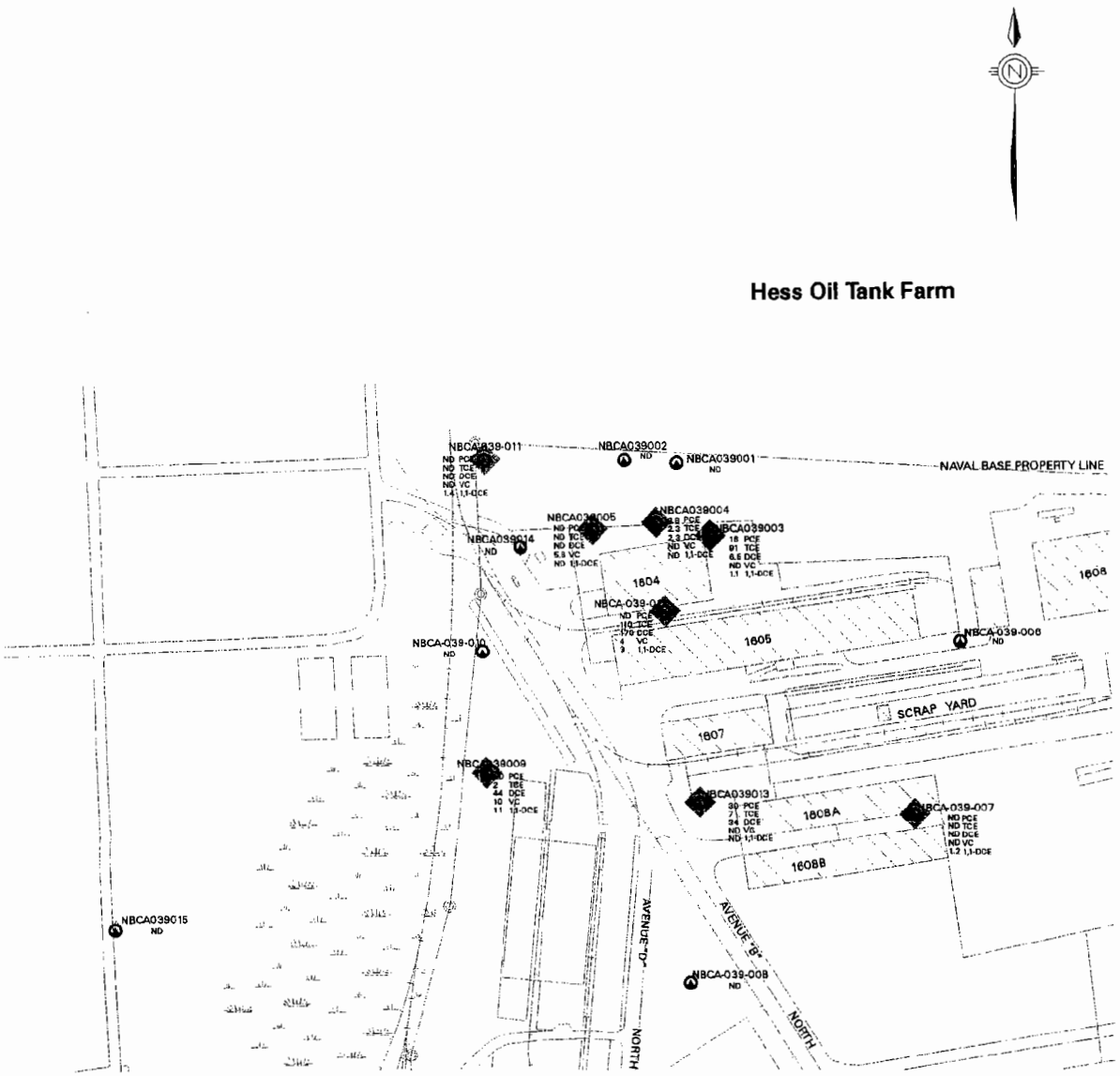
LEGEND

- 1st Round Soil Borings
- 2nd Round Soil Borings
- 3rd Round Soil Borings
- Geoprobe Borings

0 200 feet

Zone A RCRA Facility Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.4.1 - SWMU 39
Soil Sample Locations



LEGEND

0 400 feet

- Shallow Monitoring Well

PCE = Tetrachloroethene (RBC = 1.1 ppb)
TCE = Trichloroethene (RBC = 1.6 ppb)
DCE = cis - 1,2-dichloroethene (RBC = 61 ppb)
VC = Vinyl Chloride (RBC = 0.019 ppb)
1,1-DCE = 1,1-dichloroethene (RBC = 0.044 ppb)

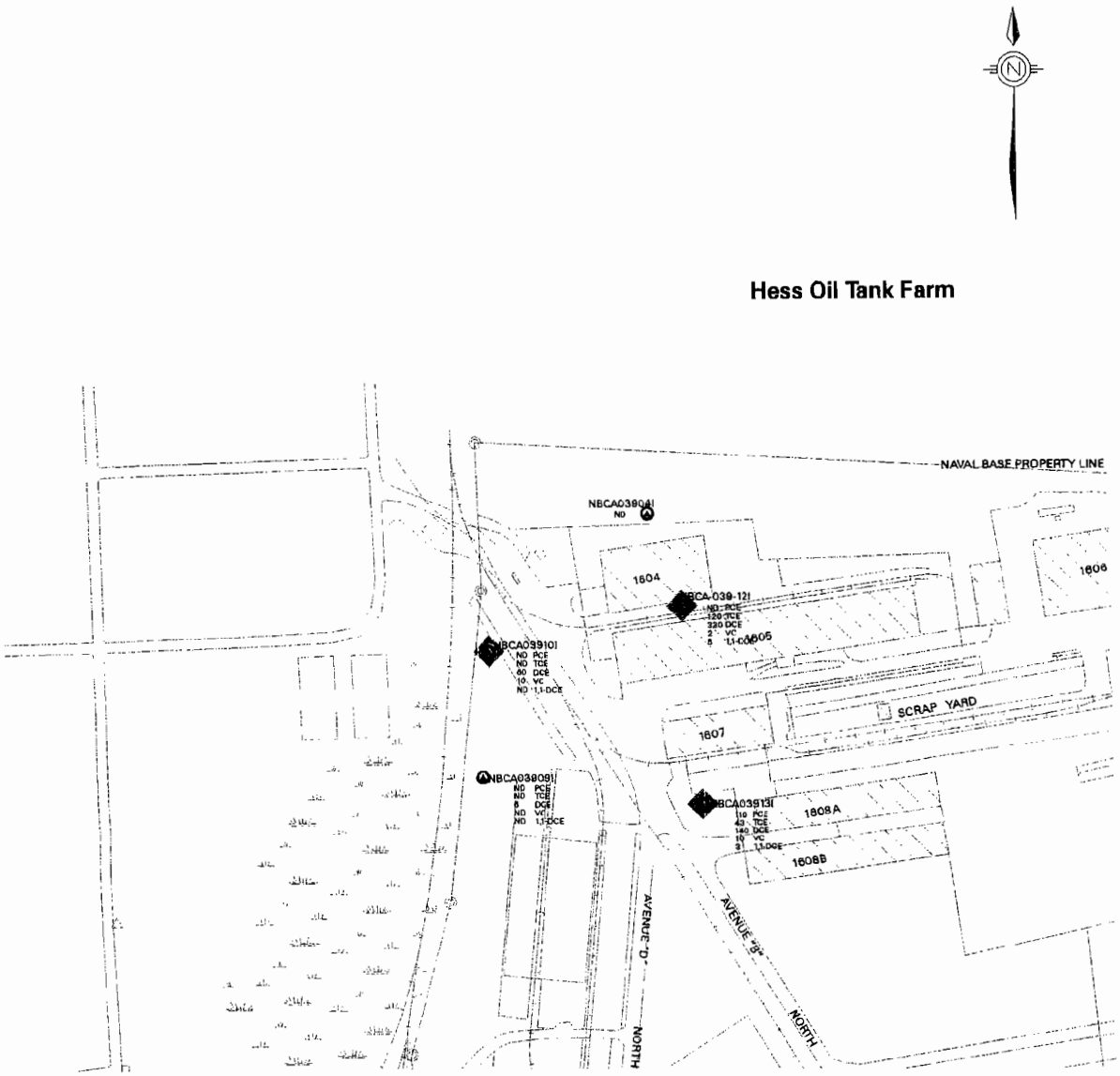
* ALL CONCENTRATIONS SHOWN ARE IN PARTS PER BILLION

ND = NOT DETECTED

ONE OR MORE OF THESE COMPOUNDS EXCEEDS ITS RBC

Zone A RCRA Facility Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.4.4 - SWMU 39
Chlorinated Solvent Maximum Detections in Shallow Groundwater



LEGEND

0 400 feet

Ⓐ Intermediate Monitoring Well

PCE = Tetrachloroethene (RBC = 1.1 ppb)

TCE = Trichloroethene (RBC = 1.6 ppb)

DCE = cis - 1,2-dichloroethene (RBC = 61 ppb)

VC = Vinyl Chloride (RBC = 0.019 ppb)

1,1-DCE = 1,1-dichloroethene (RBC = 0.044 ppb)

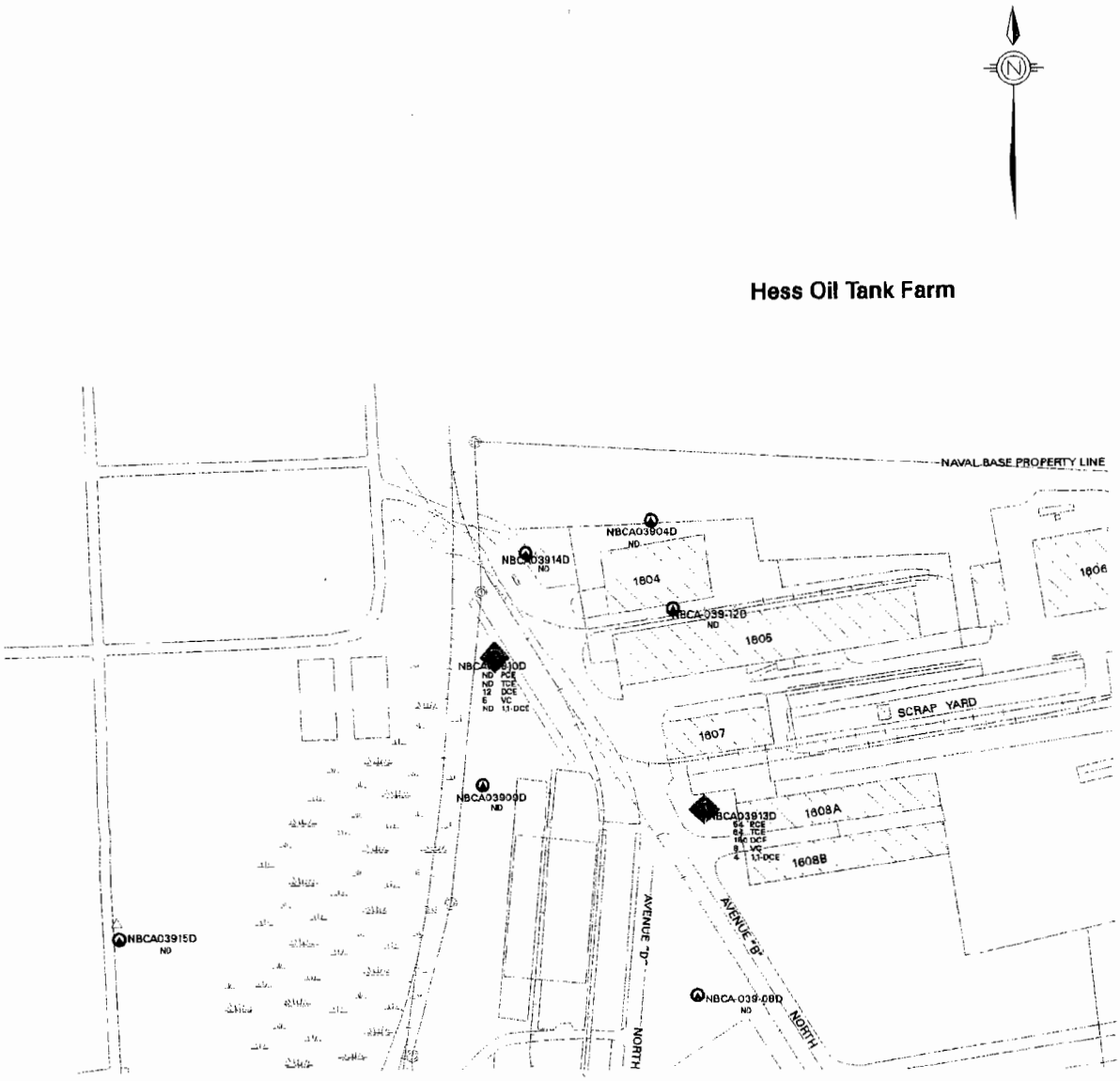
* ALL CONCENTRATIONS SHOWN ARE IN PARTS PER BILLION

ND = NOT DETECTED

ONE OR MORE OF THESE COMPOUNDS EXCEEDS ITS RBC

Zone A RCRA Facility Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.4.5 - SWMU 39
Chlorinated Solvent Maximum Detections in Intermediate Groundwater



LEGEND

0 400 feet

- Deep Monitoring Well

PCE = Tetrachloroethene (RBC = 1.1 ppb)
TCE = Trichloroethene (RBC = 1.6 ppb)
DCE = cis - 1,2-dichloroethene (RBC = 61 ppb)
VC = Vinyl Chloride (RBC = 0.019 ppb)
1,1-DCE = 1,1-dichloroethene (RBC = 0.044 ppb)

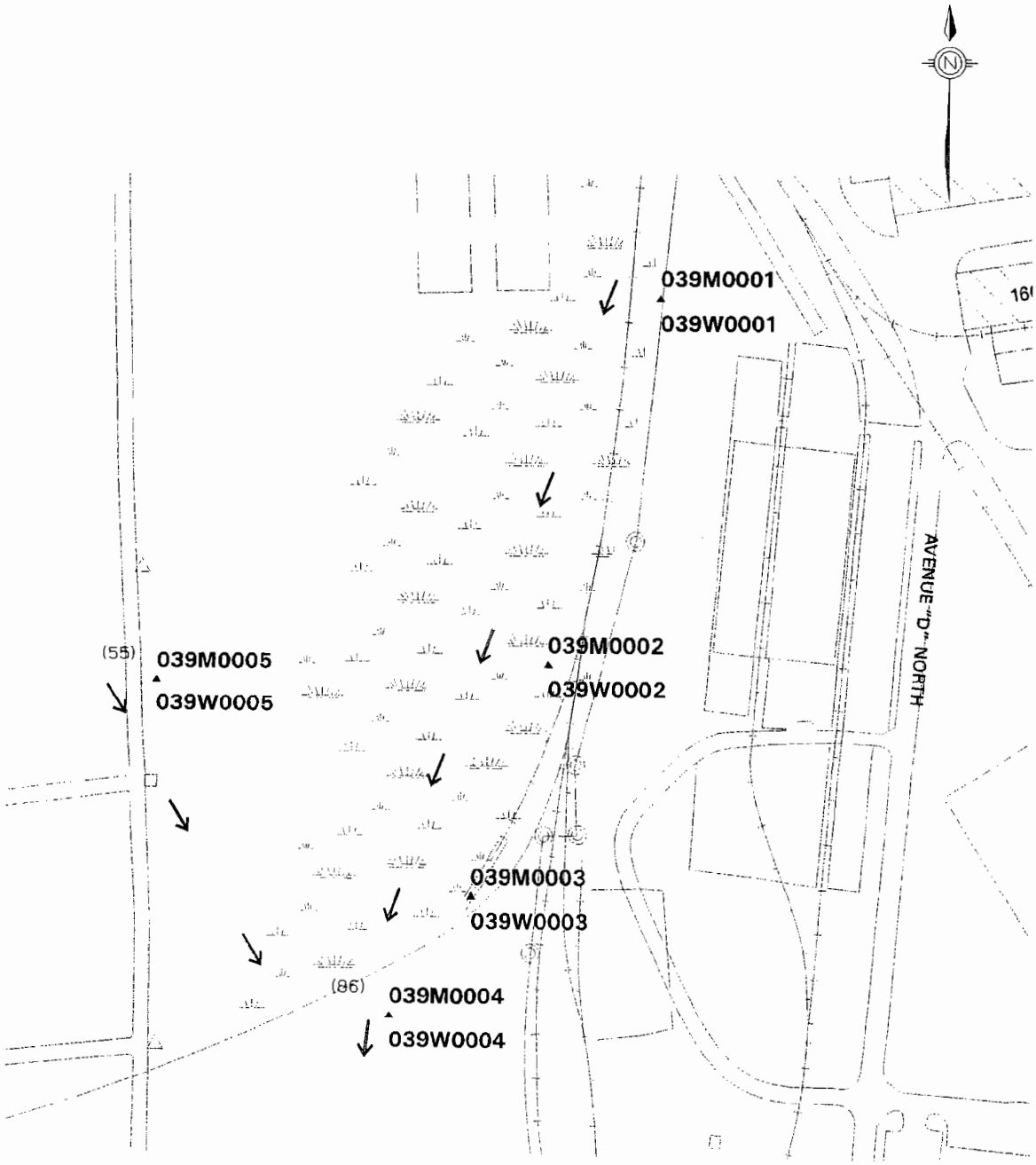
* ALL CONCENTRATIONS SHOWN ARE IN PARTS PER BILLION

ND = NOT DETECTED

ONE OR MORE OF THESE COMPOUNDS EXCEEDS ITS RBC

Zone A RCRA Facility Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.4.6 - SWMU 39
Chlorinated Solvent Maximum Detections in Deep Groundwater



LEGEND

- ▲ Sediment/Surface Water Sample Locations
- ← Approximate Direction of Surface Water Flow
- ## Methylene Chloride Detected in Sediments (ppb)

0 200 feet

Zone A RCRA Facility
Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.4.29 - SWMU 39 - Sediment Surface Water Sample Locations

Appendix B

10.4.4 Nature and Extent of Contamination in Groundwater

Due to the number of installation and sampling events, groundwater data for SWMU 39 has been uniquely formatted for presentation. There are fifteen locations of individual wells, well pairs, or well clusters. Tables 10.4.5 through 10.4.19 include summaries for both organic and inorganic groundwater analytical results for all samples collected at each of these locations. Appendix D is a complete analytical data report for all samples collected in Zone A, including those collected at SWMU 39.

Table 10.4.5
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-001

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)								
Benzene	25	36	47	35	110	0.36	NA	5
2-butanone (MEK)	3.3	<DL	<DL	<DL	<DL	1,900	NA	0
Ethylbenzene	10	7	9	10	34	1,300	NA	0
Toluene	<DL	2	3.9	2.2	4	750	NA	0
xylene (m+p)	<DL	59	68	81	<DL	12,000	NA	0
o-xylene	1.3	<DL	1.8	2.1	<DL	12,000	NA	0
xylene (total)	91	<DL	<DL	<DL	72	12,000	NA	0
SVOCs (μg/L)								
2-methylnaphthalene	<DL	—	5	<DL	4	1,500	NA	0
bis(2-ethylhexyl)-phthalate	<DL	—	<DL	13	<DL	4.8	NA	1
Metals (μg/L)								
Aluminum	197	—	<DL	117	<DL	37,000	3,210	0
Arsenic	43.8	—	34.6	39.1	36.7	0.045	7.4	4
Barium	36.7	—	<DL	27.6	30.6	2,600	104	0
Calcium	64,600	—	61,500	55,500	63,600	NA	NA	NA
Copper	<DL	—	<DL	<DL	2.1	1,500	15.7	0
Iron	36,600	—	31,900	28,300	31,200	NA	NA	NA
Magnesium	7,560	—	7,410	6,710	7,670	NA	NA	NA

Table 10.4.5
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-001

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
Manganese	904	—	932	794	969	840	577	3
Potassium	3,260	—	2,170	3,170	4,460	NA	NA	NA
Sodium	19,000	—	<DL	17,700	20,500	NA	NA	NA
Zinc	<DL	—	<DL	12.8	<DL	11,000	83.2	0
Other Parameters								
Chloride (mg/L)	—	—	—	7.8	<DL	NA	NA	NA
Sulfate (mg/L)	—	—	—	<DL	<DL	NA	NA	NA
TDS (mg/L)	—	—	—	70	256	NA	NA	NA
Hexavalent chromium (mg/L)	—	—	<DL	<DL	—	0.18	NA	0
TCDD TEQ [a] (pg/L)	—	—	—	—	1.47	0.43	NA	1
Pesticides	<DL	—	—	—	—	NA	NA	0
PCBs	<DL	—	—	—	—	NA	NA	0
TPH	<DL	—	—	—	—	NA	NA	NA

Notes:

a	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (12/95)
11	=	Interim sampling event (4/96)
02	=	Second-quarter sampling event (4/96)
03	=	Third-quarter sampling event (6/96)
04	=	Fourth-quarter sampling event (10/96)
—	=	Parameter not sampled.

Table 10.4.6
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-002

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)								
All compounds	<DL	<DL	<DL	<DL	<DL	NA	NA	0
SVOCs (μg/L)								
All compounds	<DL	—	<DL	<DL	<DL	NA	NA	0
Metals (μg/L)								
Aluminum	2,490	—	1,280	6,610	462	37,000	3,210	0
Arsenic	33.1	—	40.7	48.1	43.6	0.045	7.4	4
Barium	44.2	—	<DL	36.5	34.1	2,600	104	0
Calcium	70,000	—	59,900	52,700	52,800	NA	NA	NA
Chromium	8.3	—	<DL	<DL	<DL	180	8.7	0
Cobalt	8.7	—	<DL	9.5	3.4	2,200	**	0
Copper	9.8	—	<DL	<DL	1.2	1,500	15.7	0
Iron	9,330	—	8,700	7,250	7,880	NA	NA	NA
Lead	3.6	—	<DL	4.2	<DL	15.0 *	4.7	0
Magnesium	3,740	—	2,950	2,510	2,740	NA	NA	NA
Manganese	1,240	—	1,120	1,070	1,100	840	577	4
Potassium	1,920	—	<DL	3,170	2,170	NA	NA	NA
Sodium	18,500	—	<DL	14,600	13,800	NA	NA	NA
Vanadium	5.6	—	<DL	<DL	<DL	260	5.4	0
Zinc	66.1	—	<DL	6.5	<DL	11,000	83.2	0
Other Parameters								
Chloride (mg/L)	—	—	—	9.6	15	NA	NA	NA
Sulfate (mg/L)	—	—	—	22	18.4	NA	NA	NA
TDS (mg/L)	—	—	—	730	192	NA	NA	NA
Hexavalent chromium (mg/L)	—	—	<DL	<DL	—	0.18	NA	0

Table 10.4.6
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-002

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
TCDD TEQ [b] (pg/L)	—	—	—	—	0.11	0.43	NA	0
Pesticides	<DL	—	—	—	—	NA	NA	0
PCBs	<DL	—	—	—	—	NA	NA	0
TPH	<DL	—	—	—	—	NA	NA	NA

Notes:

a	=	Lead does not have an RBC or MCL. Therefore, the USEPA Treatment Technique Action Level of 15 μg/L has been substituted for the RBC.
b	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (12/95)
11	=	Interim sampling event (4/96)
02	=	Second-quarter sampling event (4/96)
03	=	Third-quarter sampling event (6/96)
04	=	Fourth-quarter sampling event (10/96)
—	=	Parameter not sampled.

Table 10.4.7
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-003

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)								
Tetrachloroethene	16	7	9.2	11.5	8	1.1	NA	5
Trichloroethene	41	44	49	91	30	1.6	NA	5
cis-1,2-dichloroethene	4.8	3	3	6.5	3	61	NA	0
1,1-dichloroethene	<DL	<DL	<DL	1.1	<DL	0.044	NA	1
1,1,2,2-tetrachloroethane	<DL	<DL	<DL	1.4	<DL	0.052	NA	1
Dibromochloromethane	<DL	<DL	5.5	<DL	<DL	730[a]	NA	0
1,2-dibromo-3-chloropropane	<DL	<DL	<DL	3	<DL	0.048	NA	1

Table 10.4.7
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-003

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
2-hexanone	<DL	<DL	<DL	4.4	<DL	1,500	NA	0
4-methyl-2-pentanone (MIBK)	<DL	<DL	<DL	3.3	<DL	2,900	NA	0
SVOCs (μg/L)								
bis(2-ethylhexyl) phthalate	<DL	—	<DL	<DL	2	4.8	NA	0
Metals (μg/L)								
Aluminum	707	—	1,940	217	87.8	37,000	3,210	0
Arsenic	<DL	—	<DL	3.3	<DL	0.045	7.4	0
Barium	26.7	—	<DL	23.2	23.9	2,600	104	0
Calcium	61,100	—	57,700	50,500	57,500	NA	NA	NA
Chromium	<DL	—	6.9	<DL	<DL	180	8.7	0
Cobalt	<DL	—	<DL	4.3	<DL	2,200	**	0
Copper	<DL	—	7.7	<DL	7.2	1,500	15.7	0
Iron	1,390	—	3,400	656	108	NA	NA	NA
Magnesium	3,820	—	3,830	4,050	3,420	NA	NA	NA
Manganese	52.7	—	58.7	64.7	48.4	840	577	0
Potassium	1,320	—	1,590	2,430	2,115	NA	NA	NA
Silver	<DL	—	<DL	<DL	1.1	180	**	0
Sodium	20,600	—	<DL	20,200	18,900	NA	NA	NA
Vanadium	4.1	—	7.0	<DL	0.83	260	5.4	0
Zinc	<DL	—	<DL	5.3	<DL	11,000	83.2	0
Other Parameters								
Chloride (mg/L)	13	—	—	15	12	NA	NA	NA
Sulfate (mg/L)	18	—	—	20	11.1	NA	NA	NA
TDS (mg/L)	240	—	—	440	212	NA	NA	NA
Hexavalent chromium (mg/L)	0.032	—	0.01	<DL	—	0.18	NA	0
TCDD TEQ[k] (pg/L)	<DL	—	0.14	<DL	0.37	0.43	NA	0

Table 10.4.7
SWMU 39 – Compounds Detected in Groundwater
Individual Well NBCA-039-003

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
Pesticides	<DL	—	—	—	—	NA	NA	0
PCBs	<DL	—	—	—	—	NA	NA	0
TPH	<DL	—	—	—	—	NA	NA	NA
Cyanide (μg/L)	—	—	<DL	—	—	180	NA	0

Notes:

a	=	Calculated according to the USEPA Region III, *Risk-Based Concentration Table, January-June 1996*, June 3, 1996 using a reference dose of 0.2 mg/kg-day in accordance with IRIS.
b	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (12/95)
11	=	Interim sampling event (4/96)
02	=	Second-quarter sampling event (4/96)
03	=	Third-quarter sampling event (6/96)
04	=	Fourth-quarter sampling event (10/96)
—	=	Parameter not sampled.

Table 10.4.8
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-004, NBCA-039-041, and NBCA-039-04D

	NBCA-039-004							NBCA-039-041						NBCA-039-04D					
mpound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC	Event "A1"	Event "01"	Event "05"	Event "06"	RBC	# of Samples Exceeding RBC	Event "01"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC
OCs (μg/L)																			
trachloroethene	<DL	1	3.8	1.7	<DL	NA	2	<DL	<DL	<DL	<DL	1.1	0	<DL	<DL	<DL	<DL	NA	0
chloroethene	<DL	1	2.3	1.6	<DL	NA	2	<DL	<DL	<DL	<DL	1.6	0	<DL	<DL	<DL	<DL	NA	0
1,2-hloroethene	<DL	1	2.3	1.2	<DL	NA	0	<DL	<DL	<DL	<DL	61	0	<DL	<DL	<DL	<DL	NA	0
-dichloroethane	<DL	<DL	<DL	<DL	<DL	NA	0	<DL	<DL	1	<DL	0.12	1	<DL	<DL	<DL	<DL	NA	0
1-hloroethane	<DL	<DL	<DL	1.3	<DL	NA	0	<DL	<DL	<DL	<DL	540	0	<DL	<DL	<DL	<DL	NA	0
utanone	3.2	<DL	<DL	<DL	<DL	NA	0	<DL	<DL	<DL	<DL	1,900	0	<DL	<DL	<DL	<DL	NA	0
bon disulfide	<DL	<DL	<DL	4.6	<DL	NA	0	<DL	<DL	<DL	<DL	1,000	0	<DL	<DL	<DL	<DL	NA	0
oroform	<DL	<DL	<DL	<DL	<DL	NA	0	8	<DL	<DL	<DL	0.15	1	<DL	<DL	<DL	<DL	NA	0
exanone	2	<DL	<DL	<DL	<DL	NA		<DL	<DL	<DL	<DL	1,500	0	<DL	<DL	<DL	<DL	NA	0
uene	<DL	<DL	<DL	<DL	<DL	NA	0	2	7	<DL	<DL	750	0	<DL	<DL	<DL	<DL	NA	0
OCs (μg/L)																			
compounds	<DL	--	<DL	<DL	<DL	NA	0	--	<DL	<DL	<DL	NA	0	<DL	<DL	<DL	<DL	NA	0
tals (μg/L)																			
minum	144	--	<DL	<DL	<DL	3,210	0	--	--	--	<DL	37,000	0	67.4	<DL	<DL	<DL	245	0

Table 10.4.8
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-004, NBCA-039-04I, and NBCA-039-04D

	NBCA-039-004							NBCA-039-04I						NBCA-039-04D					
Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC	Event "A1"	Event "01"	Event "05"	Event "06"	RBC	# of Samples Exceeding RBC	Event "01"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC
rsenic	42.6	–	51.4	46.3	48.4	7.4	4	–	–	–	40	0.045	1	<DL	<DL	<DL	<DL	11.1	0
arium	56.1	–	<DL	57.5	59.6	104	0	–	–	–	33.6	2,600	0	<DL	<DL	<DL	4.1	179	0
admium	<DL	–	<DL	<DL	<DL	**	0	–	–	–	<DL	18	0	<DL	<DL	3.0	<DL	**	0
alcium	57,000	–	54,700	52,500	51,400	NA	NA	–	–	–	67,600	NA	NA	53,500	54,800	50,700	51,000	NA	NA
opper	<DL	–	<DL	<DL	4.2	15.7	0	–	–	–	<DL	1,500	0	<DL	<DL	<DL	4.3	5.8	0
on	13,200	–	16,600	13,500	12,700	NA	NA	–	–	–	785	NA	NA	395	264	219	168	NA	NA
fagnesium	3,340	–	3,520	3,720	3,180	NA	NA	–	–	–	2,670	NA	NA	3,540	4,060	3,790	3,900	NA	NA
fanganese	2,020	–	1,880	1,910	1,810	577	4	–	–	–	41.9	840	0	91.5	106	96.9	103	2,690	0
lercury	<DL	–	<DL	<DL	<DL	**	0	–	–	–	0.17	11	0	<DL	<DL	<DL	<DL	**	0
ickel	<DL	–	<DL	<DL	<DL	**	0	–	–	–	1.1	730	0	<DL	<DL	<DL	<DL	21.1	0
otassium	1,460	–	<DL	<DL	1,950	NA	NA	–	–	–	1,670	NA	NA	649	<DL	<DL	1,440	NA	NA
ilver	<DL	–	<DL	<DL	<DL	**	0	–	–	–	<DL	180	0	<DL	<DL	<DL	5.2	**	0
odium	14,900	–	<DL	13,800	15,200	NA	NA	–	–	–	16,400	NA	NA	12,400	<DL	9,510	9,770	NA	NA
in	<DL	–	<DL	<DL	<DL	**	0	–	–	–	<DL	22,000	0	<DL	<DL	16.9	<DL	**	0
inc	<DL	–	<DL	4.9	<DL	83.2	0	–	–	–	94.4	11,000	0	<DL	<DL	<DL	<DL	66.2	0

Table 10.4.8
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-004, NBCA-039-04I, and NBCA-039-04D

	NBCA-039-004							NBCA-039-04I						NBCA-039-04D					
npound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC	Event "A1"	Event "01"	Event "05"	Event "06"	RBC	# of Samples Exceeding RBC	Event "01"	Event "02"	Event "03"	Event "04"	RC	# of Samples Exceeding RC and RBC
er Parameters																			
oride (mg/L)	–	–	–	11	9	NA	NA	–	–	–	–	NA	NA	16	–	15	15	NA	NA
fate (mg/L)	–	–	–	11	10.8	NA	NA	–	–	–	–	NA	NA	11	–	<DL	<DL	NA	NA
S (mg/L)	–	–	–	480	200	NA	NA	–	–	–	–	NA	NA	200	–	420	230	NA	NA
avalent omium (mg/L)	–	–	<DL	<DL	–	NA	0	–	–	–	–	0.18	NA	–	<DL	<DL	–	NA	0
DD TEQ * (pg/L)	–	–	–	0.42	0.58	NA	1	–	–	–	–	0.43	NA	–	–	0.42	0.04	NA	0
icides	<DL	–	–	–	–	NA	0	–	–	–	–	NA	NA	<DL	–	–	–	NA	0
ls	<DL	–	–	–	–	NA	0	–	–	–	–	NA	NA	<DL	–	–	–	NA	0
l	<DL	–	–	–	–	NA	0	–	–	–	–	NA	NA	<DL	–	–	–	NA	0

:

- = Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
- = Number of non-detects prevented determination of UTL.
- = Not applicable
- = Below detection limit
- = First-quarter sampling event (12/95), shallow and deep well.
- = Interim sampling event (4/96), shallow well
- = Second-quarter sampling event (4/96), shallow and deep well.
- = Third-quarter sampling event (6/96), shallow and deep well.
- = Fourth-quarter sampling event (10/96), shallow and deep well.
- = Interim sampling event (9/96), intermediate well.
- = First-quarter sampling event (11/96), intermediate well.
- = Third-quarter sampling event (7/97), intermediate well. No second-quarter sample collected.
- = Fourth-quarter sampling event (7/97), intermediate well.
- = Parameter not sampled.

This page intentionally left blank.

Table 10.4.9
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-005

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)								
Vinyl chloride	1.9	<DL	<DL	5.8	<DL	0.019	NA	2
1,1-dichloroethane	1.1	<DL	<DL	2	<DL	810	NA	0
Benzene	90	71	100	170	78	0.36	NA	5
Ethylbenzene	1.4	1	3	1.1	<DL	1,300	NA	0
Toluene	<DL	<DL	1.7	1.3	<DL	750	NA	0
xylene (m+p)	<DL	2	11	4.5	<DL	12,000	NA	0
o-xylene	<DL	<DL	1.5	1.9	<DL	12,000	NA	0
SVOCs (μg/L)								
Acenaphthene	<DL	—	<DL	<DL	2	2,200	NA	0
Anthracene	<DL	—	<DL	2.2	<DL	11,000	NA	0
bis(2-ethylhexyl)-phthalate	13	—	<DL	5.1	<DL	4.8	NA	2
Dibenzofuran	4.6	—	4.1	3.5	4	150	NA	0
Fluorene	4	—	3.9	2.7	4	1,500	NA	0
2-methylnaphthalene	13	—	23	14	3	1,500	NA	0
Naphthalene	9.1	—	64	35	<DL	1,500	NA	0
Phenanthrene	3	—	2.8	2.1	3	1,100*	NA	0
Metals (μg/L)								
Aluminum	1,380	—	760	287	<DL	37,000	3,210	0
Arsenic	61.3	—	66.8	74.9	77.7	0.045	7.4	4
Barium	50.6	—	<DL	43.9	46.9	2,600	104	0
Calcium	76,000	—	69,100	62,500	61,100	NA	NA	NA
Chromium	5.8	—	<DL	<DL	<DL	180	8.7	0
Copper	10.8	—	<DL	<DL	2	1,500	15.7	0
Iron	54,400	—	57,200	50,500	47,100	NA	NA	NA
Magnesium	5,360	—	4,440	3,750	3,970	NA	NA	NA
Manganese	2,050	—	2,040	1,890	1,840	840	577	4

Table 10.4.9
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-005

Compound	Event "01"	Event "11"	Event "02"	Event "03"	Event "04"	RBC	RC	# of Samples Exceeding RC and RBC
Potassium	1,390	—	1,620	<DL	1,850	NA	NA	NA
Sodium	18,900	—	<DL	14,200	15,400	NA	NA	NA
Zinc	65.2	—	<DL	3.6	<DL	11,000	83.2	0
Other Parameters								
Chloride (mg/L)	—	—	—	8.5	9	NA	NA	NA
Sulfate (mg/L)	—	—	—	<DL	<DL	NA	NA	NA
TDS (mg/L)	—	—	—	280	218	NA	NA	NA
Hexavalent chromium (mg/L)	—	—	<DL	<DL	—	0.18	NA	0
TCDD TEQ [b] (pg/L)	—	—	—	0.50	0.21	0.43	NA	1
Pesticides	<DL	—	—	—	<DL	NA	NA	0
PCBs	<DL	—	—	—	<DL	NA	NA	0
TPH — DRO (mg/L)	<DL	—	—	—	0.5	NA	NA	NA
TPH — GRO (mg/L)	<DL	—	—	—	3.5	NA	NA	NA
Cyanide (μg/L)	—	—	—	—	<DL	180	NA	0

Notes:

a	=	Phenanthrene does not have an RBC. Pyrene RBC used as surrogate.
b	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (12/95)
11	=	Interim sampling event (4/96)
02	=	Second-quarter sampling event (4/96)
03	=	Third-quarter sampling event (6/96)
04	=	Fourth-quarter sampling event (10/96)
—	=	Parameter not sampled.

Table 10.4.10
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-006

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)							
Chlorobenzene	1.5	<DL	3	4	39	NA	0
SVOCs (μg/L)							
Benzoic acid	—	<DL	<DL	1	150,000	NA	0
Bis(2-ethylhexyl)phthalate	—	<DL	<DL	2	4.8	NA	0
Diethylphthalate	—	<DL	1	<DL	29,000	NA	0
Metals (μg/L)							
Aluminum	—	1,340	—	<DL	37,000	3,210	0
Arsenic	—	<DL	—	5.6	0.045	7.4	0
Barium	—	70.5	—	83.9	2,600	104	0
Cadmium	—	<DL	—	0.97	18	**	0
Calcium	—	35,300	—	40,000	NA	NA	NA
Chromium	—	2.2	—	<DL	180	8.7	0
Iron	—	9,870	—	20,500	NA	NA	NA
Lead	—	2.9	—	<DL	15.0 *	4.7	0
Magnesium	—	21,700	—	29,100	NA	NA	NA
Manganese	—	47.3	—	62.8	840	577	0
Mercury	—	<DL	—	1	11	**	0
Nickel	—	<DL	—	0.83	730	**	0
Potassium	—	42,000	—	30,600	NA	NA	NA
Sodium	—	255,000	—	347,000	NA	NA	NA
Vanadium	—	2.9	—	<DL	260	5.4	0

Table 10.4.10
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-006

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
Other Parameters							
Chloride (mg/L)	—	342	—	—	NA	NA	NA
Sulfate (mg/L)	—	<DL	—	—	NA	NA	NA
TDS (mg/L)	—	916	—	—	NA	NA	NA
TCDD TEQ [b] (pg/L)	—	0.03	—	—	0.43	NA	0

Notes:

a	=	Lead does not have an RBC or MCL. Therefore, the USEPA Treatment Technique Action Level of 15 μg/L has been substituted for the RBC.
b	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
0A	=	Interim sampling event (8/96)
04	=	First-quarter sampling event (10/96) for this well that was conducted during the fourth-quarter sampling event.
05	=	Third-quarter sampling event (7/97) for this well. No second-quarter sample collected.
06	=	Fourth-quarter sampling event (10/97) for this well.
—	=	Parameter not sampled.

Table 10.4.11
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-007

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)							
1,1-dichloroethene	1.2	<DL	<DL	<DL	0.044	NA	1
SVOCs (μg/L)							
All compounds	—	<DL	<DL	<DL	NA	NA	0
Metals (μg/L)							
Aluminum	—	<DL	—	72.2	37,000	3,210	0
Arsenic	—	3.3	—	9.6	0.045	7.4	1

Table 10.4.11
SWMU 39 – Compounds Detected in Groundwater
Individual Well NBCA-039-007

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
Barium	—	65.5	—	62.1	2,600	104	0
Cadmium	—	<DL	—	0.59	18	**	0
Calcium	—	107,000	—	103,000	NA	NA	NA
Iron	—	5,090	—	12,200	NA	NA	NA
Magnesium	—	25,800	—	21,400	NA	NA	NA
Manganese	—	41.5	—	58.4	840	577	0
Mercury	—	<DL	—	0.3	11	**	0
Nickel	—	<DL	—	0.87	730	**	0
Potassium	—	24,600	—	12,200	NA	NA	NA
Sodium	—	136,000	—	54,800	NA	NA	NA
Other Parameters							
Chloride (mg/L)	—	173	—	—	NA	NA	NA
Sulfate (mg/L)	—	<DL	—	—	NA	NA	NA
TDS (mg/L)	—	744	—	—	NA	NA	NA
TCDD TEQ [a] (pg/L)	—	0.28	—	—	0.43	NA	0

Notes:

a	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
0A	=	Interim sampling event (8/96)
04	=	First-quarter sampling event (10/96) for this well that was conducted during the fourth-quarter sampling event.
05	=	Third-quarter sampling event (7/97) for this well. No second-quarter sample collected.
06	=	Fourth-quarter sampling event (10/97) for this well.
—	=	Parameter not sampled.

This page intentionally left blank.

Table 10.4.12
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-008 and NBCA-039-08D

	NBCA-039-008								NBCA-039-08D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)															
Acetone	<DL	<DL	<DL	<DL	<DL	3,700	NA	0	<DL	13	<DL	<DL	<DL	NA	0
2-butanone	<DL	<DL	<DL	<DL	<DL	1,900	NA	0	<DL	<DL	18	<DL	<DL	NA	0
Carbon disulfide	<DL	<DL	<DL	<DL	<DL	1,000	NA	0	10	<DL	<DL	<DL	<DL	NA	0
SVOCs (μg/L)															
Acenaphthene	—	2	<DL	<DL	<DL	2,200	NA	0	—	<DL	<DL	<DL	<DL	NA	0
Dibenzofuran	—	<DL	<DL	<DL	<DL	150	NA	0	—	5	2	3	<DL	NA	0
Di-n-butylphthalate	—	<DL	<DL	<DL	<DL	3,700	NA	0	—	<DL	<DL	1	<DL	NA	0
Fluorene	—	<DL	<DL	<DL	6	1,500	NA	0	—	<DL	<DL	<DL	6	NA	0
2-methylnaphthalene	—	5	<DL	<DL	5	1,500	NA	0	—	<DL	<DL	<DL	5	NA	0
Naphthalene	—	110	13	4	<DL	1,500	NA	0	—	7	2	2	4	NA	0
Metals (μg/L)															
Aluminum	—	<DL	28.6	—	2,430	37,000	3,210	0	—	<DL	138	—	187	245	0
Arsenic	—	9.3	<DL	—	17.3	0.045	7.4	2	—	14.3	17.2	—	13.1	11.1	3

Table 10.4.12
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-008 and NBCA-039-08D

	NBCA-039-008								NBCA-039-08D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
Barium	—	45	50.8	—	51.6	2,600	104	0	—	36	20.6	—	16.8	179	0
Beryllium	—	<DL	<DL	—	<DL	0.016	**	0	—	<DL	0.23	—	0.26	**	2
Cadmium	—	<DL	<DL	—	1	18	**	0	—	<DL	<DL	—	0.63	**	0
Calcium	—	120,000	255,000	—	109,000	NA	NA	NA	—	39,700	27,300	—	239,000	NA	NA
Chromium	—	2.1	<DL	—	2.9	180	8.7	0	—	5.4	<DL	—	1.1	7.3	0
Cobalt	—	<DL	<DL	—	1.2	2,200	**	0	—	69.3	83.8	—	88.5	12.1	0
Iron	—	8,720	11,400	—	22,200	NA	NA	NA	—	18,600	15,500	—	13,400	NA	NA
Magnesium	—	53,200	77,100	—	51,700	NA	NA	NA	—	34,100	25,400	—	22,000	NA	NA
Manganese	—	257	532	—	156	840	577	0	—	2,180	2,200	—	2,020	2,690	0
Mercury	—	<DL	<DL	—	0.24	11	**	0	—	<DL	<DL	—	0.88	**	0
Nickel	—	<DL	<DL	—	3.4	730	**	0	—	5.6	11	—	11.5	21.1	0
Potassium	—	53,400	27,800	—	29,700	NA	NA	NA	—	9,930	3,420	—	2,730	NA	NA
Sodium	—	233,000	135,000	—	96,300	NA	NA	NA	—	82,800	22,100	—	12,700	NA	NA
Vanadium	—	2.5	2.5	—	3.8	260	5.4	0	—	2.9	<DL	—	<DL	10.9	0
Zinc	—	<DL	<DL	—	<DL	11,000	83.2	0	—	<DL	299	—	332	66.2	0

Table 10.4.12
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-008 and NBCA-039-08D

	NBCA-039-008								NBCA-039-08D						
Compound	**Event "0A"**	**Event "04"**	**Event "A2"**	**Event "05"**	**Event "06"**	**RBC**	**RC**	**# of Samples Exceeding RC and RBC**	**Event "0A"**	**Event "04"**	**Event "A2"**	**Event "05"**	**Event "06"**	**RC**	**# of Samples Exceeding RC and RBC**
Other Parameters															
Chloride (mg/L)	—	<DL	64.5	—	—	NA	NA	NA	—	140	23.3	—	—	NA	NA
Sulfate (mg/L)	—	580	502	—	—	NA	NA	NA	—	1,700	158	—	—	NA	NA
TDS (mg/L)	—	1,190	1,580	—	—	NA	NA	NA	—	592	348	—	—	NA	NA
TCDD TEQ[a] (pg/L)	—	0.05	0.06	—	—	0.43	NA	0	—	0.18	0.05	—	—	NA	0
TPH	—	—	<DL	—	—	NA	NA	NA	—	—	<DL	—	—	NA	NA

Notes:

a	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
0A	=	Interim sampling event (8/96)
04	=	First-quarter sampling event (10/96) for these wells that was conducted during the fourth-quarter sampling event.
A2	=	Second-quarter sampling event (3/97) for these wells.
05	=	Third-quarter sampling event (7/97) for these wells.
06	=	Fourth-quarter sampling event (10/97) for these wells.
—	=	Parameter not sampled.

Table 10.4.13
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-009, NBCA-039-09I, and NBCA-039-09D

	NBCA-039-009								NBCA-039-09I						NBCA-039-09D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
OCs (μg/L)																					
ichloroethene	1.7	2	2	1	2	1.6	NA	4	<DL	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
s-1,2-chloroethene	39	38	28	44	38	61	NA	0	2	<DL	4	5	6	0	<DL	<DL	<DL	<DL	<DL	NA	0
1-chloroethene	1.1	<DL	<DL	<DL	<DL	0.044	NA	1	<DL	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
inyl chloride	6.2	6	5	10	9	0.019	NA	5	<DL	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
1-chloroethane	1.1	<DL	<DL	<DL	<DL	810	NA	0	<DL	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
cetone	<DL	<DL	<DL	<DL	<DL	3,700	NA	0	9	<DL	<DL	<DL	<DL	0	11	<DL	<DL	<DL	<DL	NA	0
ethylene loride	<DL	<DL	<DL	<DL	<DL	4.1	NA	0	4	<DL	<DL	<DL	<DL	0	3	<DL	<DL	<DL	<DL	NA	0
oluene	<DL	<DL	<DL	<DL	<DL	750	NA	0	6	<DL	<DL	<DL	<DL	0	4	4	<DL	<DL	<DL	NA	0
VOCs (μg/L)																					
t-n-butyl thalate	–	<DL	<DL	3	<DL	3,700	NA	0	–	<DL	<DL	<DL	<DL	0	–	<DL	<DL	<DL	<DL	NA	0

Table 10.4.13
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-009, NBCA-039-09I, and NBCA-039-09D

	NBCA-039-009								NBCA-039-09I						NBCA-039-09D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
als (μg/L)																					
minum	–	<DL	28	–	<DL	37,000	3,210	0	–	–	<DL	–	<DL	0	–	–	18	–	<DL	243	0
mony	–	<DL	2.4	–	<DL	15	**	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	**	0
enic	–	25.1	17.8	–	35.5	0.045	7.4	3	–	–	<DL	–	3.6	1	–	–	<DL	–	<DL	11.1	0
um	–	27	35.6	–	22.7	2,600	104	0	–	–	5.6	–	6.0	0	–	–	4.9	–	4.5	179	0
nium	–	<DL	<DL	–	0.61	18	**	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	**	0
ium	–	45,900	48,600	–	39,900	NA	NA	NA	–	–	65,100	–	65,800	NA	–	–	42,400	–	47,100	NA	NA
mium	–	<DL	<DL	–	<DL	180	8.7	0	–	–	<DL	–	1.7	0	–	–	<DL	–	<DL	7.3	0
alt	–	<DL	3.1	–	6	2,200	**	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	12	0
	–	9,840	7,780	–	12,200	NA	NA	NA	–	–	2,320	–	2,430	NA	–	–	213	–	171	NA	NA
nesium	–	8,070	7,460	–	6,800	NA	NA	NA	–	–	6,200	–	6,080	NA	–	–	5,540	–	6,200	NA	NA
ganese	–	981	769	–	958	840	577	2	–	–	350	–	348	0	–	–	119	–	110	2,690	0
ury	–	<DL	<DL	–	0.18	11	**	0	–	–	<DL	–	0.43	0	–	–	<DL	–	<DL	**	0
el	–	<DL	<DL	–	<DL	730	**	0	–	–	<DL	–	1.3	0	–	–	<DL	–	<DL	21.1	0
sium	–	1,180	1,140	–	<DL	NA	NA	NA	–	–	1,700	–	1,490	NA	–	–	2,230	–	2,290	NA	NA

Table 10.4.13
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-009, NBCA-039-09I, and NBCA-039-09D

	NBCA-039-009								NBCA-039-09I						NBCA-039-09D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
dium	–	<DL	11,100	–	10,600	NA	NA	NA	–	–	24,200	–	21,200	NA	–	–	29,800	–	25,300	NA	NA
anadium	–	<DL	1.2	–	<DL	260	5.4	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	10.9	0
ther Parameters																					
hloride (mg/L)	–	<DL	5.3	–	–	NA	NA	NA	–	12	9.7	–	–	NA	–	–	19	–	–	NA	NA
lfate (mg/L)	–	<DL	5.9	–	–	NA	NA	NA	–	<DL	3	–	–	NA	–	–	2.4	–	–	NA	NA
DS (mg/L)	–	<DL	212	–	–	NA	NA	NA	–	–	328	–	–	NA	–	–	212	–	–	NA	NA
CDD TEQ ' g/L)	–	0.03	0.09	–	–	0.43	NA	0	–	–	0.04	–	–	0	–	–	0.04	–	–	NA	0
PH – GRO g/L)	–	–	6.3	–	–	NA	NA	NA	–	–	<DL	–	–	NA	–	–	<DL	–	–	NA	NA

es:

- = Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
- = Number of non-detects prevented determination of UTL.
- = Not applicable
- DL = Below detection limit
- = Interim sampling event (8/96) for this shallow well.
- = First-quarter sampling event (10/96) for this shallow well that was conducted during the fourth-quarter sampling event.
- = Interim sampling event (9/96), intermediate and deep wells.
- = First-quarter sampling event (11/96), intermediate and deep wells.
- = Second-quarter sampling event (3/97) for all three wells.
- = Third-quarter sampling event (7/97) for all three wells.
- = Fourth-quarter sampling event (10/97) for all three wells.
- = Parameter not sampled.

Table 10.4.14
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-010, NBCA-039-10I, and NBCA-039-10D

	NBCA-039-010								NBCA-039-10I							NBCA-039-10D							
pound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# > RC and RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# > RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# > RC and RBC
Cs (µg/L)																							
2-droethene	<DL	<DL	<DL	<DL	<DL	61	NA	0	<DL	60	48	42	44	39	0	<DL	6	7	8	12	11	NA	0
l chloride	<DL	<DL	<DL	<DL	<DL	0.019	NA	0	<DL	8	10	7	8	6	5	<DL	<DL	<DL	<DL	<DL	5	NA	1
-loroethane	1.1	<DL	<DL	<DL	<DL	540	NA	0	<DL	<DL	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	<DL	NA	0
ene	<DL	<DL	<DL	<DL	<DL	750	NA	0	<DL	4	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	<DL	NA	0
Cs (µg/L)																							
aphthene	–	<DL	2	<DL	<DL	2,200	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
yl alcohol	–	<DL	<DL	1	<DL	11,000	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
nzofuran	–	<DL	2	1	<DL	150	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
butyl late	–	<DL	<DL	3	<DL	3,700	NA	0	–	–	<DL	<DL	2	4	0	–	–	<DL	<DL	3	<DL	NA	0
ene	–	<DL	<DL	<DL	6	1,500	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
hyl alene	–	<DL	<DL	<DL	5	1,500	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
halene	–	4	<DL	5	5	1,500	NA	0	–	–	<DL	<DL	<DL	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0
l	–	<DL	<DL	8	<DL	22,000	NA	0	–	–	<DL	<DL	2	<DL	0	–	–	<DL	<DL	<DL	<DL	NA	0

Table 10.4.14
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-010, NBCA-039-10I, and NBCA-039-10D

	NBCA-039-010								NBCA-039-10I							NBCA-039-10D							
ompound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# > RC and RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# > RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# > RC and RBC
etals (μg/L)																							
uminum	–	<DL	778	–	235	17,000	3,210	0	–	–	–	35.3	–	<DL	0	–	–	–	16	–	<DL	243	0
senic	–	<DL	63.3	–	5.0	0.045	7.4	1	–	–	–	25.6	–	26.5	2	–	–	–	<DL	–	<DL	11.1	0
rium	–	31.5	24.5	–	42.7	2,600	104	0	–	–	–	23.4	–	23.2	0	–	–	–	12.3	–	11.1	179	0
dmium	–	<DL	<DL	–	0.41	18	**	0	–	–	–	<DL	–	0.37	0	–	–	–	<DL	–	<DL	**	0
lcium	–	19,200	19,800	–	23,100	NA	NA	NA	–	–	–	46,600	–	47,800	NA	–	–	–	60,300	–	60,200	NA	NA
balt	–	<DL	0.96	–	<DL	2,200	**	0	–	–	–	17.1	–	15.9	0	–	–	–	<DL	–	<DL	12	0
pper	–	<DL	2.2	–	<DL	1,500	15.7	0	–	–	–	<DL	–	<DL	0	–	–	–	<DL	–	<DL	5.8	0
on	–	6,780	36,700	–	2,390	NA	NA	NA	–	–	–	9,050	–	8,350	NA	–	–	–	663	–	635	NA	NA
agnesium	–	6,130	8,470	–	7,240	NA	NA	NA	–	–	–	6,440	–	6,450	NA	–	–	–	2,670	–	2,720	NA	NA
anganese	–	21.3	97.2	–	5.6	840	577	0	–	–	–	3,100	–	2,990	2	–	–	–	72.9	–	76.9	1,490	0
ercury	–	<DL	<DL	–	<DL	11	**	0	–	–	–	<DL	–	0.21	0	–	–	–	<DL	–	<DL	**	0
otassium	–	985	696	–	918	NA	NA	NA	–	–	–	938	–	849	NA	–	–	–	926	–	782	NA	NA
dium	–	<DL	5,760	–	2,970	NA	NA	NA	–	–	–	9,830	–	9,020	NA	–	–	–	14,000	–	12,100	NA	NA
anadium	–	0.51	2.2	–	<DL	260	5.4	0	–	–	–	<DL	–	<DL	0	–	–	–	<DL	–	<DL	10.9	0
nc	–	<DL	7.7	–	<DL	11,000	83.2	0	–	–	–	<DL	–	<DL	0	–	–	–	<DL	–	8.1	44.1	0

Table 10.4.14
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-010, NBCA-039-10I, and NBCA-039-10D

	NBCA-039-010								NBCA-039-10I							NBCA-039-10D							
mpound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# > RC and RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# > RBC	Event "B1"	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# > RC and RBC
ber Parameters																							
orida (mg/L)	–	<DL	2.8	–	–	NA	NA	NA	–	–	<DL	5.2	–	–	NA	–	–	7	7.8	–	–	NA	NA
fate (mg/L)	–	11.5	2.4	–	–	NA	NA	NA	–	–	<DL	0.65	–	–	NA	–	–	21.9	18	–	–	NA	NA
5 (ug/L)	–	<DL	92	–	–	NA	NA	NA	–	–	–	172	–	–	NA	–	–	–	208	–	–	NA	NA
DD TEQ [a] /L)	–	0.04	3.10	–	–	0.43	NA	1	–	–	–	0.06	–	–	0	–	–	–	0.07	–	–	NA	0
[illegible]	–	–	<DL	–	–	NA	NA	NA	–	–	–	<DL	–	–	NA	–	–	–	<DL	–	–	NA	NA

:

- Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
- Number of non-detects prevented determination of UTL.
- Not applicable
- Below detection limit
- Interim sampling event (8/96) for this shallow well.
- First-quarter sampling event (10/96) for this shallow well that was conducted during the fourth-quarter sampling event.
- Interim sampling event (9/96), intermediate and deep wells.
- Interim sampling event (9/96), intermediate and deep wells.
- First-quarter sampling event (11/96), intermediate and deep wells.
- Second-quarter sampling event (3/97) for all three wells.
- Third-quarter sampling event (7/97) for all three wells.
- Fourth-quarter sampling event (10/97) for all three wells.
- Parameter not sampled.

This page intentionally left blank.

Table 10.4.15
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-011

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)							
1,1,1-trichloroethane	1	<DL	<DL	<DL	540	NA	0
1,1-dichloroethene	1.4	<DL	<DL	<DL	0.044	NA	1
1,2-dichloroethane	1.6	4	<DL	<DL	0.12	NA	2
Chlorobenzene	<DL	<DL	<DL	2	39	NA	0
Benzene	620	190	140	150	0.36	NA	4
Ethylbenzene	190	170	160	140	1,300	NA	0
Toluene	140	24	10	11	750	NA	0
o-xylene	33	35	<DL	<DL	12,000	NA	0
Xylene (m+p)	380	<DL	<DL	<DL	12,000	NA	0
Xylene (total)	<DL	300	560	380	12,000	NA	0
Acetone	<DL	34	<DL	<DL	3,700	NA	0
2-butanone (MEK)	6.3	<DL	<DL	<DL	1,900	NA	0
2-hexanone	<DL	7	<DL	<DL	1,500	NA	0
4-methyl-2-pentanone (MIBK)	2.1	<DL	<DL	<DL	2,900	NA	0
SVOCs (μg/L)							
Acenaphthene	—	3	2	<DL	2,200	NA	0
Anthracene	—	5	<DL	<DL	11,000	NA	0
Benzoic acid	—	<DL	8	<DL	150,000	NA	0
Bis(2-ethylhexyl)phthalate (BEHP)	—	8	<DL	<DL	4.8	NA	1
Butylbenzylphthalate	—	<DL	2	<DL	7,300	NA	0
Dibenzofuran	—	9	6	<DL	150	NA	0
Diethylphthalate	—	11	<DL	<DL	29,000	NA	0

Table 10.4.15
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-011

Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
2,4-dimethylphenol	—	11	3	<DL	730	NA	0
Fluorene	—	8	6	8	1,500	NA	0
2-methylnaphthalene	—	260	210	95	1,500	NA	0
2-methylphenol	—	<DL	2	1	1,800	NA	0
4-methylphenol	—	15	10	22	180	NA	0
Naphthalene	—	420	300	120	1,500	NA	0
n-nitrosodiphenylamine	—	2	<DL	<DL	14	NA	0
Pentachlorophenol	—	<DL	2	<DL	0.56	NA	1
Phenanthrene	—	8	5	6	1,100*	NA	0
Metals (μg/L)							
Aluminum	—	137	—	239	37,000	3,210	0
Arsenic	—	2.5	—	5.2	0.045	7.4	0
Barium	—	9.0	—	6.6	2,600	104	0
Cadmium	—	<DL	—	1.2	18	**	0
Calcium	—	11,500	—	9,930	NA	NA	NA
Chromium	—	<DL	—	2.2	180	8.7	0
Iron	—	28,400	—	27,300	NA	NA	NA
Magnesium	—	2,930	—	2,700	NA	NA	NA
Manganese	—	37.3	—	24.6	840	577	0
Mercury	—	<DL	—	0.21	11	**	0
Potassium	—	1,990	—	1,210	NA	NA	NA
Sodium	—	<DL	—	7,570	NA	NA	NA
Vanadium	—	1.6	—	1.5	260	5.4	0

Table 10.4.15
SWMU 39 - Compounds Detected in Groundwater
Individual Well NBCA-039-011

* Compound	Event "0A"	Event "04"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC
Other Parameters							
Chloride (mg/L)	—	<DL	—	—	NA	NA	NA
Sulfate (mg/L)	—	<DL	—	—	NA	NA	NA
TDS (mg/L)	—	<DL	—	—	NA	NA	NA
TCDD TEQ [b] (pg/L)	—	0.35	—	—	0.43	NA	0

Notes:

a	=	Phenanthrene does not have an RBC. Pyrene RBC used as surrogate.
b	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
0A	=	Interim sampling event (8/96)
04	=	First-quarter sampling event (10/96) for this well that was conducted during the fourth-quarter sampling event.
05	=	Third-quarter sampling event (7/97) for this well. No second-quarter sample collected.
06	=	Fourth-quarter sampling event (10/97) for this well.
—	=	Parameter not sampled.

This page intentionally left blank.

Table 10.4.16
SWMU 39 – Compounds Detected in Groundwater
Well Cluster NBCA-039-012, NBCA-039-12I, and NBCA-039-12D

	NBCA-039-012								NBCA-039-12I						NBCA-039-12D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
Cs (μg/L)																					
chloroethene	72	92	110	94	90	1.6	NA	5	110	120	100	110	120	5	<DL	<DL	<DL	<DL	<DL	NA	0
1,2- hloroethene	140	130	170	160	120	61	NA	5	190	240	140	330	320	5	<DL	<DL	<DL	<DL	<DL	NA	0
s-1,2- loroethene	4	<DL	<DL	<DL	<DL	120	NA	0	1.7	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
loroethene	2.9	3	3	3	2	0.044	NA	5	5	5	4	5	6	5	<DL	<DL	<DL	<DL	<DL	NA	0
yl chloride	3.9	3	4	<DL	2	0.019	NA	4	<DL	<DL	<DL	<DL	2	1	<DL	<DL	<DL	<DL	<DL	NA	0
1- hloroethane	<DL	<DL	<DL	<DL	<DL	540	NA	0	10	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
loroethane	1.7	<DL	<DL	<DL	<DL	810	NA	0	2	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
zene	<DL	<DL	<DL	<DL	<DL	0.36	NA	0	1.3	<DL	<DL	1	1	3	<DL	<DL	<DL	<DL	<DL	NA	0
ylene ride	<DL	<DL	<DL	<DL	<DL	4.1	NA	0	2.8	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0
ene	<DL	<DL	<DL	<DL	<DL	750	NA	0	1.2	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	<DL	NA	0

Table 10.4.16
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-012, NBCA-039-12I, and NBCA-039-12D

	NBCA-039-012								NBCA-039-12I						NBCA-039-12D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
VOCs (μg/L)																					
enzyl alcohol	–	<DL	<DL	<DL	<DL	11,000	NA	0	–	<DL	<DL	2	<DL	0	–	<DL	<DL	<DL	<DL	NA	0
i-n-butyl-thalate	–	<DL	<DL	2	<DL	3,700	NA	0	–	<DL	<DL	2	<DL	0	–	<DL	<DL	2	<DL	NA	0
enol	–	<DL	<DL	3	<DL	22,000	NA	0	–	<DL	<DL	7	<DL	0	–	<DL	<DL	3	<DL	NA	0
etals (μg/L)																					
uminum	–	<DL	17	–	158	37,000	3,210	0	–	<DL	17.3	–	<DL	0	–	<DL	21.3	–	103	245	0
rsenic	–	107	95.9	–	109	0.045	7.4	3	–	2.2	<DL	–	4.0	2	–	<DL	<DL	–	<DL	11.1	0
rium	–	67.5	63.1	–	70.8	2,600	104	0	–	7.3	8.9	–	9.6	0	–	27.8	22.5	–	43.5	179	0
alcium	–	56,500	55,900	–	52,300	NA	NA	NA	–	78,500	74,500	–	75,600	NA	–	47,800	42,300	–	17,600	NA	NA
ermium	–	1.8	<DL	–	<DL	180	8.7	0	–	<DL	<DL	–	<DL	0	–	2.2	<DL	–	<DL	7.3	0
obalt	–	50.9	48.2	–	71.2	2,200	**	0	–	<DL	<DL	–	<DL	0	–	<DL	<DL	–	<DL	12	0
on	–	20,800	20,000	–	22,400	NA	NA	NA	–	489	614	–	616	NA	–	931	<DL	–	<DL	NA	NA
ead	–	<DL	<DL	–	<DL	15.0*	4.7	0	–	<DL	<DL	–	<DL	0	–	2.2	<DL	–	<DL	**	0
agnesium	–	4,320	4,170	–	4,620	NA	NA	NA	–	4,620	4,410	–	4,340	NA	–	5,960	5,150	–	2,080	NA	NA
anganese	–	2,230	2,680	–	2,080	840	577	3	–	460	507	–	535	0	–	45.3	9.1	–	<DL	2,690	0
ercury	–	<DL	<DL	–	0.12	11	**	0	–	<DL	<DL	–	<DL	0	–	<DL	<DL	–	<DL	**	0

Table 10.4.16
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-012, NBCA-039-12I, and NBCA-039-12D

	NBCA-039-012								NBCA-039-12I						NBCA-039-12D						
Compound	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "0A"	Event "04"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
kel	–	<DL	<DL	–	3.5	730	**	0	–	<DL	<DL	–	<DL	0	–	<DL	<DL	–	<DL	21.1	0
ssium	–	1,930	1,190	–	1,490	NA	NA	NA	–	1,850	1,560	–	2,100	NA	–	1,850	3,430	–	30,200	NA	NA
er	–	1.5	<DL	–	<DL	180	**	0	–	1.1	<DL	–	<DL	0	–	<DL	<DL	–	<DL	**	0
ium	–	<DL	14,200	–	<DL	NA	NA	NA	–	<DL	20,100	–	<DL	NA	–	<DL	30,300	–	<DL	NA	NA
adium	–	0.62	<DL	–	<DL	260	5.4	0	–	<DL	<DL	–	<DL	0	–	<DL	<DL	–	<DL	10.9	0
er Parameters																					
ride (mg/L)	–	<DL	9.8	–	–	NA	NA	NA	–	<DL	14.3	–	–	NA	–	<DL	34.5	–	–	NA	NA
ate (mg/L)	–	<DL	5.5	–	–	NA	NA	NA	–	20.1	18.2	–	–	NA	–	62.6	17.1	–	–	NA	NA
(mg/L)	–	<DL	224	–	–	NA	NA	NA	–	288	280	–	–	NA	–	252	244	–	–	NA	NA
)D TEQ [b] L)	–	0.02	0.04	–	–	0.43	NA	0	–	0.01	0.04	–	–	0	–	0.29	0.01	–	–	NA	0
	–	–	<DL	–	–	NA	NA	NA	–	–	<DL	–	–	NA	–	–	<DL	–	–	NA	NA

= Lead does not have an RBC or MCL. Therefore, the USEPA Treatment Technique Action Level of 15 μg/L has been substituted for the RBC.
= Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
= Number of non-detects prevented determination of UTL.
= Not applicable
= Below detection limit
= Interim sampling event (8/96) for all three wells.
= First-quarter sampling event (10/96) for all three wells that was conducted during the fourth-quarter sampling event.
= Second-quarter sampling event (3/97) for all three wells.
= Third-quarter sampling event (7/97) for all three wells.
= Fourth-quarter sampling event (10/97) for all three wells.
= Parameter not sampled.

Table 10.4.17
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-013, NBCA-039-13I, and NBCA-039-13D

	NBCA-039-013							NBCA-039-13I						NBCA-039-13D						
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
OCs (μg/L)																				
etrachloroethene	25	30	19	9	1.1	NA	4	64	110	85	110	100	5	19	33	46	54	43	NA	5
richloroethene	6	7	4	3	1.6	NA	4	20	22	41	43	22	5	45	56	79	84	70	NA	5
s-1,2-dichloroethene	32	34	26	22	61	NA	0	82	69	120	140	88	5	59	70	180	180	160	NA	4
1-dichloroethene	<DL	<DL	<DL	<DL	0.044	NA	0	2	<DL	2	3	2	4	1	<DL	3	4	4	NA	4
inyl chloride	<DL	<DL	<DL	<DL	0.019	NA	0	8	9	7	10	9	5	<DL	<DL	7	8	7	NA	3
1-dichloroethane	<DL	<DL	<DL	<DL	810	NA	0	2	<DL	<DL	<DL	<DL	0	<DL	<DL	<DL	<DL	3	NA	0
cetone	<DL	<DL	<DL	<DL	3,700	NA	0	<DL	<DL	<DL	<DL	<DL	0	6	<DL	<DL	<DL	<DL	NA	0
lethylene chloride	<DL	<DL	<DL	<DL	4.1	NA	0	<DL	<DL	<DL	<DL	<DL	0	3	<DL	<DL	<DL	<DL	NA	0
hloroform	<DL	<DL	<DL	<DL	0.15	NA	0	<DL	<DL	<DL	<DL	<DL	0	3	7	<DL	<DL	<DL	NA	2
VOCs (μg/L)																				
enzyl alcohol	<DL	<DL	<DL	<DL	11,000	NA	0	–	<DL	<DL	1	<DL	0	–	<DL	<DL	<DL	<DL	NA	0
iethylphthalate	<DL	<DL	1	<DL	29,000	NA	0	–	<DL	<DL	<DL	<DL	0	–	<DL	<DL	<DL	<DL	NA	0
aphthalene	<DL	<DL	<DL	<DL	1,500	NA	0	–	<DL	<DL	<DL	3	0	–	<DL	<DL	<DL	<DL	NA	0
henol	<DL	<DL	<DL	<DL	22,000	NA	0	–	<DL	<DL	<DL	2	0	–	<DL	<DL	<DL	<DL	NA	0

Table 10.4.17
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-013, NBCA-039-13I, and NBCA-039-13D

	NBCA-039-013							NBCA-039-13I						NBCA-039-13D						
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
als (µg/L)																				
minum	11,100	421	–	4,370	37,000	3,210	0	–	–	56.3	–	<DL	0	–	–	28.8	–	<DL	245	0
enic	14.4	<DL	–	5	0.045	7.4	1	–	–	<DL	–	2.6	1	–	–	<DL	–	2.1	11.1	0
ium	51.3	10.9	–	25.8	2,600	104	0	–	–	18.6	–	<DL	0	–	–	16	–	11	179	0
llium	<DL	<DL	–	0.4	0.016	**	1	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	**	0
nium	0.53	1	–	1.1	18	**	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	**	0
ium	19,100	13,700	–	13,000	NA	NA	NA	–	–	29,000	–	<DL	NA	–	–	59,900	–	43,500	NA	NA
nium	21.5	<DL	–	8.9	180	8.7	0	–	–	<DL	–	1	0	–	–	<DL	–	<DL	7.3	0
alt	7.4	1.1	–	10.8	2,200	**	0	–	–	1.3	–	<DL	0	–	–	<DL	–	<DL	12	0
per	11.9	2	–	10.9	1,500	15.7	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	5.8	0
	18,300	550	–	6,800	NA	NA	NA	–	–	568	–	<DL	NA	–	–	36.6	–	66.8	NA	NA
	16.5	<DL	–	<DL	15.0*	4.7	1	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	**	0
nesium	5,430	3,620	–	3,230	NA	NA	NA	–	–	4,470	–	<DL	NA	–	–	11,900	–	13,000	NA	NA
anese	135	16.1	–	157	840	577	0	–	–	586	–	<DL	0	–	–	51.2	–	42.3	2,690	0
ury	<DL	<DL	–	0.17	11	**	0	–	–	<DL	–	0.2	0	–	–	<DL	–	0.11	**	0
el	10.5	<DL	–	5.9	730	**	0	–	–	<DL	–	<DL	0	–	–	<DL	–	<DL	21.1	0
sium	2,560	1,560	–	1,630	NA	NA	NA	–	–	1,490	–	<DL	NA	–	–	2,960	–	2,830	NA	NA

Table 10.4.17
SWMU 39 - Compounds Detected in Groundwater
Well Cluster NBCA-039-013, NBCA-039-13I, and NBCA-039-13D

	NBCA-039-013							NBCA-039-13I						NBCA-039-13D						
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples > RC and RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	# of Samples > RBC	Event "A1"	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples > RC and RBC
odium	33,100	10,600	—	9,020	NA	NA	NA	—	—	17,100	—	<DL	NA	—	—	33,300	—	27,800	NA	NA
anadium	32.6	<DL	—	12.1	260	5.4	0	—	—	<DL	—	<DL	0	—	—	2.4	—	<DL	10.9	0
inc	104	85	—	90.8	11,000	83.2	0	—	—	<DL	—	<DL	0	—	—	<DL	—	<DL	66.2	0
ther Parameters																				
hloride (mg/L)	—	5.4	—	—	NA	NA	NA	—	<DL	8.6	—	—	NA	—	21	15.8	—	—	NA	NA
ulfate (mg/L)	—	39.7	—	—	NA	NA	NA	—	36.6	23.5	—	—	NA	—	42.7	34	—	—	NA	NA
DS (mg/L)	—	108	—	—	NA	NA	NA	—	—	144	—	—	NA	—	—	320	—	—	NA	NA
CDD TEQ [b] (pg/L)	—	0.09	—	—	0.43	NA	0	—	—	0.06	—	—	0	—	—	0.10	—	—	NA	0
PH	—	<DL	—	—	NA	NA	NA	—	—	<DL	—	—	NA	—	—	<DL	—	—	NA	NA
yanide (μg/L)	<DL	—	—	—	180	NA	0	—	—	—	—	—	NA	—	—	—	—	—	NA	NA
esticides	<DL	—	—	—	NA	NA	0	—	—	—	—	—	NA	—	—	—	—	—	NA	NA

es:

	=	Lead does not have an RBC or MCL. Therefore, the USEPA Treatment Technique Action Level of 15 μg/L has been substituted for the RBC.
	=	Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
	=	Number of non-detects prevented determination of UTL.
	=	Not applicable
DL	=	Below detection limit
	=	Interim sampling event (9/96) for intermediate and deep wells.
	=	First-quarter sampling event (11/96) for intermediate and deep wells and (2/97) for shallow well.
	=	Second-quarter sampling event (3/97) for all three wells.
	=	Third-quarter sampling event (7/97) for all three wells.
	=	Fourth-quarter sampling event (10/97) for all three wells.
	=	Parameter not sampled.

Table 10.4.18
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-014 and NBCA-039-14D

	NBCA-039-014							NBCA-039-14D					
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)													
Acetone	10	<DL	<DL	<DL	3,700	NA	0	<DL	<DL	<DL	<DL	NA	0
Benzene	8	23	6	3	0.36	NA	4	<DL	<DL	<DL	<DL	NA	0
Methylene chloride	5	<DL	<DL	<DL	4.1	NA	1	<DL	<DL	<DL	<DL	NA	0
SVOCs (μg/L)													
Benzoic acid	<DL	<DL	<DL	1	150,000	NA	0	<DL	<DL	<DL	<DL	NA	0
Dibenzofuran	2	<DL	2	<DL	150	NA	0	<DL	<DL	<DL	<DL	NA	0
Diethylphthalate	<DL	<DL	<DL	<DL	29,000	NA	0	<DL	<DL	2	<DL	NA	0
Fluorene	1	<DL	2	6	1,500	NA	0	<DL	<DL	<DL	<DL	NA	0
2-methylnaphthalene	11	<DL	2	6	1,500	NA	0	<DL	<DL	<DL	<DL	NA	0
Naphthalene	5	<DL	<DL	<DL	1,500	NA	0	<DL	<DL	<DL	<DL	NA	0
Phenanthrene	1	<DL	<DL	1	1,100*	NA	0	<DL	<DL	<DL	<DL	NA	0
Phenol	<DL	<DL	<DL	4	22,000	NA	0	<DL	<DL	<DL	<DL	NA	0
Metals (μg/L)													
Aluminum	408	<DL	--	194	37,000	3,210	0	46	<DL	--	<DL	243	0
Arsenic	23	23.8	--	33.1	0.045	7.4	3	<DL	<DL	--	2.3	11.1	0

Table 10.4.18
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-014 and NBCA-039-14D

	NBCA-039-014							NBCA-039-14D					
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
Barium	42.3	46.3	–	47.9	2,600	104	0	16.4	13	–	12.5	179	0
Cadmium	<DL	<DL	–	1.6	18	**	0	<DL	<DL	–	<DL	**	0
Calcium	51,500	48,900	–	50,700	NA	NA	NA	51,800	49,200	–	50,500	NA	NA
Copper	<DL	6.5	–	<DL	1,500	15.7	0	<DL	<DL	–	<DL	5.8	0
Iron	32,900	33,300	–	33,100	NA	NA	NA	127	362	–	526	NA	NA
Lead	3	<DL	–	<DL	15.0[b]	4.7	0	<DL	<DL	–	<DL	**	0
Magnesium	2,940	2,800	–	3,020	NA	NA	NA	2,230	1,990	–	2,000	NA	NA
Manganese	67.7	66	–	84.7	840	577	0	36.5	34	–	32.1	2,690	0
Mercury	<DL	<DL	–	0.16	11	**	0	<DL	<DL	–	0.16	**	0
Potassium	1,680	1,390	–	1,170	NA	NA	NA	<DL	947	–	<DL	NA	NA
Selenium	<DL	2.9	–	<DL	180	**	0	<DL	2.2	–	<DL	**	0
Sodium	13,200	13,900	–	11,700	NA	NA	NA	16,200	13,000	–	12,900	NA	NA
Vanadium	1.3	<DL	–	<DL	260	5.4	0	0.86	<DL	–	<DL	10.9	0
Other Parameters													
Chloride (mg/L)	–	<DL	–	–	NA	NA	NA	–	6	–	–	NA	NA
Sulfate (mg/L)	–	<DL	–	–	NA	NA	NA	–	33.3	–	–	NA	NA

Table 10.4.18
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-014 and NBCA-039-14D

	NBCA-039-014							NBCA-039-14D					
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
Cyanide (µg/L)	<DL	<DL	–	–	180	NA	0	<DL	<DL	–	–	NA	0
Pesticides	<DL	<DL	–	–	NA	NA	0	<DL	<DL	–	–	NA	0

Notes:

a	=	Phenanthrene does not have an RBC. Pyrene RBC used as surrogate.
b	=	Lead does not have an RBC or MCL. Therefore, the USEPA Treatment Technique Action Level of 15 µg/L has been substituted for the RBC.
**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (2/97) for both wells.
A2	=	Second-quarter sampling event (3/97) for both wells.
05	=	Third-quarter sampling event (7/97) for both wells.
06	=	Fourth-quarter sampling event (10/97) for both wells.
–	=	Parameter not sampled.

This page intentionally left blank.

Table 10.4.19
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-015 and NBCA-039-15D

	NBCA-039-015							NBCA-039-15D					
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
VOCs (μg/L)													
All compounds	<DL	<DL	<DL	<DL	NA	NA	0	<DL	<DL	<DL	<DL	NA	0
SVOCs (μg/L)													
Benzoic acid	<DL	<DL	<DL	2	150,000	NA	0	<DL	<DL	<DL	<DL	NA	0
Dibenz(a,h)anthracene	<DL	<DL	<DL	<DL	0.0092	NA	0	<DL	1	<DL	<DL	NA	1
Diethylphthalate	<DL	<DL	<DL	1	29,000	NA	0	<DL	<DL	<DL	<DL	NA	0
Metals (μg/L)													
Aluminum	104	201	–	84	37,000	3,210	0	411	<DL	–	<DL	245	0
Arsenic	5.1	<DL	–	5.5	0.045	7.4	0	<DL	<DL	–	<DL	11.1	0
Barium	731	820	–	792	2,600	104	0	12.8	11.6	–	9	188	0
Beryllium	<DL	<DL	–	0.22	0.016	**	1	<DL	<DL	–	<DL	**	0
Calcium	96,200	99,100	–	91,000	NA	NA	NA	48,500	45,800	–	49,600	NA	NA
Chromium	2.4	33.1	–	1.7	180	8.7	0	1.1	<DL	–	<DL	7.3	0
Copper	<DL	7.9	–	<DL	1,500	15.7	0	<DL	4.3	–	<DL	5.8	0
Iron	8,930	8,010	–	3,730	NA	NA	NA	567	409	–	558	NA	NA
Magnesium	275,000	320,000	–	272,000	NA	NA	NA	15,100	13,700	–	15,300	NA	NA
Manganese	129	131	–	130	840	577	0	145	140	–	161	2,690	0

Table 10.4.19
SWMU 39 - Compounds Detected in Groundwater
Well Pair NBCA-039-015 and NBCA-039-15D

	NBCA-039-015							NBCA-039-15D					
Compound	Event "01"	Event "A2"	Event "05"	Event "06"	RBC	RC	# of Samples Exceeding RC and RBC	Event "01"	Event "A2"	Event "05"	Event "06"	RC	# of Samples Exceeding RC and RBC
Mercury	<DL	<DL	—	0.19	11	**	0	<DL	<DL	—	0.11	**	0
Nickel	1.1	<DL	—	0.82	730	**	0	1.4	<DL	—	<DL	21.1	0
Potassium	100,000	180,000	—	106,000	NA	NA	NA	9,180	12,000	—	8,270	NA	NA
Silver	<DL	9.8	—	<DL	180	**	0	<DL	<DL	—	<DL	**	0
Sodium	2,830,000	2,590,000	—	2,410,000	NA	NA	NA	120,000	102,000	—	120,000	NA	NA
Tin	<DL	60.1	—	<DL	22,000	**	0	<DL	<DL	—	<DL	**	0
Vanadium	0.54	<DL	—	<DL	260	5.4	0	1.3	<DL	—	<DL	10.9	0
Other Parameters													
Chloride (mg/L)	—	5,490	—	—	NA	NA	NA	—	190	—	—	NA	NA
Sulfate (mg/L)	—	<DL	—	—	NA	NA	NA	—	53.5	—	—	NA	NA
Cyanide (µg/L)	24.7	30	—	—	180	NA	0	<DL	<DL	—	—	NA	0
Pesticides	<DL	<DL	—	—	NA	NA	0	<DL	<DL	—	—	NA	0

Notes:

**	=	Number of non-detects prevented determination of UTL.
NA	=	Not applicable
<DL	=	Below detection limit
01	=	First-quarter sampling event (2/97) for both wells.
A2	=	Second-quarter sampling event (3/97) for both wells.
05	=	Third-quarter sampling event (7/97) for both wells.
06	=	Fourth-quarter sampling event (10/97) for both wells.
—	=	Parameter not sampled.

Analytical Data Summary

	StationID	A039SB001		A039SB001		A039SB001	
	SampleID	039SB00101 (0-1ft)		039SB00101DL (0-1ft)		039SB00102 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/11/1995		10/12/1995		10/12/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg			450	=	35	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg					3.7	J
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg					4	J
Toluene	ug/Kg	1.5	J				
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB002		A039SB002		A039SB003	
	SampleID	039SB00201 (0-1ft)		039SB00202 (3-5ft)		039SB00301 (0-1ft)	
	DateCollected	10/2/1995		10/2/1995		10/3/1995	
	DateExtracted						
	DateAnalyzed	10/11/1995		10/11/1995		10/15/1995	
	SDGNumber	L5506		L5506		L5510	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	46	=	49	=	19	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg	6.3	J				
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg					2.3	J
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB003		A039SB004		A039SB004	
	SampleID	039SB00302 (3-5ft)		039SB00401 (0-1ft)		039SB00402 (3-5ft)	
	DateCollected	10/3/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/15/1995		10/12/1995		10/12/1995	
	SDGNumber	L5510		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	15	=	11	=	14	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg					2.3	J
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg	1.4	J				
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB005		A039SB006		A039SB006	
	SampleID	039SB00502 (3-5ft)		039SB00601 (0-1ft)		039SB00602 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/12/1995		10/12/1995		10/12/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	25	=	12	J	38	J
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg					4.2	J
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg					3.2	J
Toluene	ug/Kg			1.8	J		
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg					92	J
m+p Xylene	ug/Kg					9300	=
o-Xylene	ug/Kg					1600	=
Xylenes, Total	ug/Kg						

	StationID	A039SB006		A039SB007		A039SB007	
	SampleID	039SB00602DL (3-5ft)		039SB00701 (0-1ft)		039SB00702 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/12/1995		10/15/1995		10/13/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg			21	=	12	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg	9300	=				
o-Xylene	ug/Kg	1600	=				
Xylenes, Total	ug/Kg						

	StationID	A039SB008		A039SB008		A039SB009	
	SampleID	039SB00802 (3-5ft)		039SB00802DL (3-5ft)		039SB00901 (0-1ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/13/1995		10/14/1995		10/15/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	140	J			11	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg	990	=	990	=		
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg	22000	J	22000	=		
m+p Xylene	ug/Kg	48000	J	48000	=		
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB009		A039SB010		A039SB010	
	SampleID	039SB00902 (3-5ft)		039SB01001 (0-1ft)		039SB01002 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/13/1995		10/13/1995		10/13/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	45	=	48	=	65	=
Carbon Disulfide	ug/Kg					1.8	J
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg	4.6	J			5	J
cis-1,2-Dichloroethylene	ug/Kg					11	=
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg			1.6	J		
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB011		A039SB011		A039SB011	
	SampleID	039SB01101 (0-1ft)		039SB01102 (3-5ft)		039SB01102DL (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted						
	DateAnalyzed	10/13/1995		10/13/1995		10/14/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg			25	=		
Acetone	ug/Kg	74	=	38	=		
Carbon Disulfide	ug/Kg	1.2	J				
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg	11	J				
cis-1,2-Dichloroethylene	ug/Kg	200	=				
1,2-Dichloroethene (total)	ug/Kg	4.1	J	4.5	J		
1,1,1-Trichloroethane	ug/Kg			160	=		
Benzene	ug/Kg			61	=		
Trichloroethylene (TCE)	ug/Kg	37	=			1000	=
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg	2.3	J				
Tetrachloroethylene (PCE)	ug/Kg	170	=			18000	=
Ethylbenzene	ug/Kg	150	=			22000	=
m+p Xylene	ug/Kg	300	=			35000	=
o-Xylene	ug/Kg			63	=		
Xylenes, Total	ug/Kg						

	StationID	A039SB012		A039SB012		A039SB013	
	SampleID	039SB01201 (0-1ft)		039SB01202 (3-5ft)		039SB01301 (0-1ft)	
	DateCollected	10/3/1995		10/3/1995		10/3/1995	
	DateExtracted						
	DateAnalyzed	10/15/1995		10/15/1995		10/15/1995	
	SDGNumber	L5510		L5510		L5510	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	17	=	8.7	J	47	=
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg						
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg	1.9	J				
m+p Xylene	ug/Kg	1.8	J				
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB013		A039SB014		A039SB014	
	SampleID	039SB01302 (3-5ft)		039SB01401 (0-1ft)		039SB01402 (3-5ft)	
	DateCollected	10/3/1995		10/3/1995		10/3/1995	
	DateExtracted						
	DateAnalyzed	10/15/1995		10/15/1995		10/15/1995	
	SDGNumber	L5510		L5510		L5510	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	11	J	21	=		
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg					51	=
1,2-Dichloroethene (total)	ug/Kg						
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg					2.3	J
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg	1.3	J				
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

Analytical Data Summary

	StationID	A039SB015		A039SB015		A039SB042	
	SampleID	039SB01501 (0-1ft)		039SB01502 (3-5ft)		039SB04202 (3-5ft)	
	DateCollected	10/3/1995		10/3/1995		9/16/1996	
	DateExtracted						
	DateAnalyzed	10/15/1995		10/15/1995		9/21/1996	
	SDGNumber	L5510		L5510		26960	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg	32	=				
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg			3.5	J		
1,2-Dichloroethene (total)	ug/Kg					20	=
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg					1	J
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg						

	StationID	A039SB043		A039SB043		A039SB047	
	SampleID	039SB04301 (0-1ft)		039SB04302 (3-5ft)		039SB04701 (0-1ft)	
	DateCollected	9/16/1996		9/16/1996		10/12/1998	
	DateExtracted						
	DateAnalyzed	9/21/1996		9/21/1996		10/16/1998	
	SDGNumber	26960		26960		ECZA01	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg						
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg						
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg					18	J
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg	10	=	2	J		
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg	3	J				
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg						
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg					1.3	J

	StationID	A039SB048		A039SB049		A039SB050	
	SampleID	039SB04801 (0-1ft)		039SB04901 (0-1ft)		039SB05001 (0-1ft)	
	DateCollected	10/12/1998		10/12/1998		10/12/1998	
	DateExtracted						
	DateAnalyzed	10/16/1998		10/16/1998		10/16/1998	
	SDGNumber	ECZA01		ECZA01		ECZA01	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg			110	=		
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg			300	=	150	J
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg	39	=	25	=	46	J
1,1-Dichloroethane	ug/Kg			25	=		
Methyl ethyl ketone (2-Butanone)	ug/Kg			81	=	24	J
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg			0.96	J		
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg			0.94	J		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg	3	J	3.8	J	3.1	J
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg	1.3	J	2	J		
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg	4.8	J	5.4	=	2.5	J

	StationID	A039SB051		A039SB052		A039SB054	
	SampleID	039SB05101 (0-1ft)		039SB05201 (0-1ft)		039SB05401 (0-1ft)	
	DateCollected	10/12/1998		10/13/1998		10/13/1998	
	DateExtracted						
	DateAnalyzed	10/16/1998		10/16/1998		10/16/1998	
	SDGNumber	ECZA01		ECZA01		ECZA01	
Parameter	**Units**						
Vinyl chloride	ug/Kg	130	J				
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg	7.3	J				
Acetone	ug/Kg	130	J	150	=		
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg					1.4	J
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg			14	J		
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg	3800	J	0.74	J		
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg	460	J				
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg					2.1	J
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg	5.5	J			3.2	J

	StationID	A039SB055		A039SB057		A039SB060	
	SampleID	039SB05501 (0-1ft)		039SB05701 (0-1ft)		039SB06001 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998	
	DateExtracted						
	DateAnalyzed	10/16/1998		10/16/1998		10/16/1998	
	SDGNumber	ECZA01		ECZA01		ECZA01	
Parameter	**Units**						
Vinyl chloride	ug/Kg						
Chloroethane	ug/Kg						
1,1-Dichloroethene	ug/Kg						
Acetone	ug/Kg						
Carbon Disulfide	ug/Kg						
Methylene Chloride	ug/Kg	36	=				
1,1-Dichloroethane	ug/Kg						
Methyl ethyl ketone (2-Butanone)	ug/Kg						
cis-1,2-Dichloroethylene	ug/Kg						
1,2-Dichloroethene (total)	ug/Kg	4.3	J	35	=	2.4	J
1,1,1-Trichloroethane	ug/Kg						
Benzene	ug/Kg						
Trichloroethylene (TCE)	ug/Kg			1.1	J		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg						
Toluene	ug/Kg						
Tetrachloroethylene (PCE)	ug/Kg						
Ethylbenzene	ug/Kg	0.91	J				
m+p Xylene	ug/Kg						
o-Xylene	ug/Kg						
Xylenes, Total	ug/Kg	3.4	J				

	StationID	A039SB061	
	SampleID	039SB06101 (0-1ft)	
	DateCollected	10/13/1998	
	DateExtracted		
	DateAnalyzed	10/16/1998	
	SDGNumber	ECZA01	
Parameter	**Units**		
Vinyl chloride	ug/Kg		
Chloroethane	ug/Kg		
1,1-Dichloroethene	ug/Kg		
Acetone	ug/Kg		
Carbon Disulfide	ug/Kg		
Methylene Chloride	ug/Kg		
1,1-Dichloroethane	ug/Kg		
Methyl ethyl ketone (2-Butanone)	ug/Kg		
cis-1,2-Dichloroethylene	ug/Kg		
1,2-Dichloroethene (total)	ug/Kg	0.79	J
1,1,1-Trichloroethane	ug/Kg		
Benzene	ug/Kg		
Trichloroethylene (TCE)	ug/Kg		
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/Kg		
Toluene	ug/Kg		
Tetrachloroethylene (PCE)	ug/Kg		
Ethylbenzene	ug/Kg		
m+p Xylene	ug/Kg		
o-Xylene	ug/Kg		
Xylenes, Total	ug/Kg		

	StationID	A039SB005		A039SB005		A039SB008		A039SB008	
	SampleID	039SB00501 (0-1ft)		039SB00501DL (0-1ft)		039SB00801 (0-1ft)		039SB00802 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/12/1995		10/12/1995		10/12/1995		10/12/1995	
	DateAnalyzed	10/16/1995		10/17/1995		10/16/1995		10/16/1995	
	SDGNumber	L5506		L5506		L5506		L5506	
Parameter	**Units**								
Naphthalene	ug/Kg								
2-Methylnaphthalene	ug/Kg					730	J		
Acenaphthylene	ug/Kg	730	J						
Acenaphthene	ug/Kg	300	J					4300	=
Dibenzofuran	ug/Kg							6700	=
Fluorene	ug/Kg	320	J					10000	=
Phenanthrene	ug/Kg	6500	=			300	J	12000	=
Anthracene	ug/Kg	1100	=					1100	=
Flouranthene	ug/Kg			15000	=				
Pyrene	ug/Kg	11000	=					890	=
Benzyl Butyl Phthalate	ug/Kg								
Benzo(a)Anthracene	ug/Kg	4000	=						
Chrysene	ug/Kg	6900	=						
bis(2-Ethylhexyl) Phthalate	ug/Kg								
Di-n-octylphthalate	ug/Kg								
Benzo(b)Fluoranthene	ug/Kg	6200	=						
Benzo(k)Fluoranthene	ug/Kg	3800	=						
Benzo(a)Pyrene	ug/Kg	3500	=						
Indeno(1,2,3-c,d)pyrene	ug/Kg	2700	=						
Dibenz(a,h)anthracene	ug/Kg	950	=						
Benzo(g,h,i)Perylene	ug/Kg	2900	=						
Carbazole	ug/Kg	960	=						

	StationID	A039SB008		A039SB009		A039SB011		A039SB011	
	SampleID	039SB00802DL (3-5ft)		039SB00901 (0-1ft)		039SB01101 (0-1ft)		039SB01102 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/12/1995		10/12/1995		10/12/1995		10/12/1995	
	DateAnalyzed	10/17/1995		10/16/1995		10/16/1995		10/16/1995	
	SDGNumber	L5506		L5506		L5506		L5506	
Parameter	**Units**								
Naphthalene	ug/Kg	47000	=			1100	=		
2-Methylnaphthalene	ug/Kg	150000	=			1700	=		
Acenaphthylene	ug/Kg								
Acenaphthene	ug/Kg							2800	=
Dibenzofuran	ug/Kg							4800	=
Fluorene	ug/Kg							7400	=
Phenanthrene	ug/Kg					200	J	14000	J
Anthracene	ug/Kg							1500	=
Flouranthene	ug/Kg					350	J	380	J
Pyrene	ug/Kg					290	J	1200	=
Benzyl Butyl Phthalate	ug/Kg								
Benzo(a)Anthracene	ug/Kg					150	J		
Chrysene	ug/Kg					170	J	150	J
bis(2-Ethylhexyl) Phthalate	ug/Kg			210	J	6200	=		
Di-n-octylphthalate	ug/Kg								
Benzo(b)Fluoranthene	ug/Kg								
Benzo(k)Fluoranthene	ug/Kg								
Benzo(a)Pyrene	ug/Kg								
Indeno(1,2,3-c,d)pyrene	ug/Kg								
Dibenz(a,h)anthracene	ug/Kg								
Benzo(g,h,i)Perylene	ug/Kg								
Carbazole	ug/Kg								

	StationID	A039SB011		A039SB022		A039SB024		A039SB049	
	SampleID	039SB01102DL (3-5ft)		039SB02201 (0-1ft)		039SB02401 (0-1ft)		039SB04901 (0-1ft)	
	DateCollected	10/2/1995		3/27/1996		3/27/1996		10/12/1998	
	DateExtracted	10/12/1995		4/2/1996		4/2/1996		10/16/1998	
	DateAnalyzed	10/17/1995		4/4/1996		4/4/1996		10/30/1998	
	SDGNumber	L5506		25080		25080		EN008	
Parameter	**Units**								
Naphthalene	ug/Kg	40000	=			91	J		
2-Methylnaphthalene	ug/Kg	140000	=			230	J	110	J
Acenaphthylene	ug/Kg								
Acenaphthene	ug/Kg								
Dibenzofuran	ug/Kg								
Fluorene	ug/Kg								
Phenanthrene	ug/Kg					78	J	80	J
Anthracene	ug/Kg								
Flouranthene	ug/Kg					86	J		
Pyrene	ug/Kg					78	J		
Benzyl Butyl Phthalate	ug/Kg			44	J				
Benzo(a)Anthracene	ug/Kg					46	J		
Chrysene	ug/Kg					67	J	73	J
bis(2-Ethylhexyl) Phthalate	ug/Kg			770	=	82	J	460	=
Di-n-octylphthalate	ug/Kg			49	J				
Benzo(b)Fluoranthene	ug/Kg					49	J		
Benzo(k)Fluoranthene	ug/Kg					39	J		
Benzo(a)Pyrene	ug/Kg								
Indeno(1,2,3-c,d)pyrene	ug/Kg								
Dibenz(a,h)anthracene	ug/Kg								
Benzo(g,h,i)Perylene	ug/Kg								
Carbazole	ug/Kg								

	StationID	A039SB052		A039SB053		A039SB054		A039SB055	
	SampleID	039SB05201 (0-1ft)		039SB05301 (0-1ft)		039SB05401 (0-1ft)		039SB05501 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998		10/13/1998	
	DateExtracted	10/24/1998		10/24/1998		10/24/1998		10/24/1998	
	DateAnalyzed	11/12/1998		11/12/1998		11/12/1998		11/9/1998	
	SDGNumber	EN009		EN009		EN009		EN009	
Parameter	**Units**								
Naphthalene	ug/Kg								
2-Methylnaphthalene	ug/Kg								
Acenaphthylene	ug/Kg								
Acenaphthene	ug/Kg								
Dibenzofuran	ug/Kg								
Fluorene	ug/Kg								
Phenanthrene	ug/Kg								
Anthracene	ug/Kg								
Flouranthene	ug/Kg								
Pyrene	ug/Kg								
Benzyl Butyl Phthalate	ug/Kg								
Benzo(a)Anthracene	ug/Kg								
Chrysene	ug/Kg								
bis(2-Ethylhexyl) Phthalate	ug/Kg	69	J	43	J	87	J	760	J
Di-n-octylphthalate	ug/Kg								
Benzo(b)Fluoranthene	ug/Kg								
Benzo(k)Fluoranthene	ug/Kg								
Benzo(a)Pyrene	ug/Kg								
Indeno(1,2,3-c,d)pyrene	ug/Kg								
Dibenz(a,h)anthracene	ug/Kg								
Benzo(g,h,i)Perylene	ug/Kg								
Carbazole	ug/Kg								

	StationID	A039SB056		A039SB057		A039SB059		A039SB060	
	SampleID	039SB05601 (0-1ft)		039SB05701 (0-1ft)		039SB05901 (0-1ft)		039SB06001 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998		10/13/1998	
	DateExtracted	10/24/1998		10/24/1998		10/24/1998		10/24/1998	
	DateAnalyzed	11/9/1998		11/9/1998		11/9/1998		11/5/1998	
	SDGNumber	EN009		EN009		EN009		EN009	
Parameter	Units								
Naphthalene	ug/Kg								
2-Methylnaphthalene	ug/Kg								
Acenaphthylene	ug/Kg								
Acenaphthene	ug/Kg								
Dibenzofuran	ug/Kg								
Fluorene	ug/Kg								
Phenanthrene	ug/Kg								
Anthracene	ug/Kg								
Flouranthene	ug/Kg					45	J		
Pyrene	ug/Kg					47	J		
Benzyl Butyl Phthalate	ug/Kg								
Benzo(a)Anthracene	ug/Kg								
Chrysene	ug/Kg								
bis(2-Ethylhexyl) Phthalate	ug/Kg	98	J	390	J			100	J
Di-n-octylphthalate	ug/Kg								
Benzo(b)Fluoranthene	ug/Kg					38	J		
Benzo(k)Fluoranthene	ug/Kg								
Benzo(a)Pyrene	ug/Kg								
Indeno(1,2,3-c,d)pyrene	ug/Kg								
Dibenz(a,h)anthracene	ug/Kg								
Benzo(g,h,i)Perylene	ug/Kg								
Carbazole	ug/Kg								

	StationID	A039SB10I	
	SampleID	039SB10I02 (3-5ft)	
	DateCollected	9/16/1996	
	DateExtracted	9/18/1996	
	DateAnalyzed	9/23/1996	
	SDGNumber	26960	
Parameter	**Units**		
Naphthalene	ug/Kg	8000	=
2-Methylnaphthalene	ug/Kg	23000	=
Acenaphthylene	ug/Kg		
Acenaphthene	ug/Kg		
Dibenzofuran	ug/Kg		
Fluorene	ug/Kg	730	J
Phenanthrene	ug/Kg	590	J
Anthracene	ug/Kg		
Flouranthene	ug/Kg		
Pyrene	ug/Kg		
Benzyl Butyl Phthalate	ug/Kg		
Benzo(a)Anthracene	ug/Kg		
Chrysene	ug/Kg		
bis(2-Ethylhexyl) Phthalate	ug/Kg		
Di-n-octylphthalate	ug/Kg		
Benzo(b)Fluoranthene	ug/Kg		
Benzo(k)Fluoranthene	ug/Kg		
Benzo(a)Pyrene	ug/Kg		
Indeno(1,2,3-c,d)pyrene	ug/Kg		
Dibenz(a,h)anthracene	ug/Kg		
Benzo(g,h,i)Perylene	ug/Kg		
Carbazole	ug/Kg		

	StationID	A039SB005		A039SB006		A039SB008		A039SB008	
	SampleID	039SB00501 (0-1ft)		039SB00601 (0-1ft)		039SB00801 (0-1ft)		039SB00802 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/12/1995		10/12/1995		10/12/1995		10/12/1995	
	DateAnalyzed	10/20/1995		10/20/1995		10/22/1995		10/22/1995	
	SDGNumber	L5506		L5506		L5506		L5506	
Parameter	**Units**								
Diesel	mg/Kg	150	=	48	=	1300	=	19000	=
Gasoline	mg/Kg					380	=	9500	=
Gasoline	ug/Kg								

	StationID	A039SB011		A039SB011		A039SB017		A039SB019	
	SampleID	039SB01101 (0-1ft)		039SB01102 (3-5ft)		039SB01702 (3-5ft)		039SB01902 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		3/27/1996		3/27/1996	
	DateExtracted	10/12/1995		10/12/1995					
	DateAnalyzed	10/21/1995		10/22/1995		4/2/1996		4/2/1996	
	SDGNumber	L5506		L5506		25080		25080	
Parameter	**Units**								
Diesel	mg/Kg			14000	=				
Gasoline	mg/Kg	79	=	7900	=				
Gasoline	ug/Kg					25500	J	8.3	J

	StationID	A039SB020		A039SB021		A039SB021		A039SB022	
	SampleID	039SB02002 (3-5ft)		039SB02101 (0-1ft)		039SB02102 (3-5ft)		039SB02201 (0-1ft)	
	DateCollected	3/27/1996		3/27/1996		3/27/1996		3/27/1996	
	DateExtracted								
	DateAnalyzed	4/2/1996		4/2/1996		4/2/1996		4/4/1996	
	SDGNumber	25080		25080		25080		25080	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg								
Gasoline	ug/Kg	46800	J	261	=	2110000	J	38	=

	StationID	A039SB024		A039SB024		A039SB025		A039SB025	
	SampleID	039SB02401 (0-1ft)		039SB02402 (3-5ft)		039SB02501 (0-1ft)		039SB02502 (3-5ft)	
	DateCollected	3/27/1996		3/27/1996		3/26/1996		3/26/1996	
	DateExtracted								
	DateAnalyzed	4/4/1996		4/2/1996		4/1/1996		4/1/1996	
	SDGNumber	25080		25080		25061		25061	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg								
Gasoline	ug/Kg	33	=	7.16	J	1640	J	52100	=

	StationID	A039SB026		A039SB027		A039SB027		A039SB028	
	SampleID	039SB02601 (0-1ft)		039SB02701 (0-1ft)		039SB02702 (3-5ft)		039SB02802 (3-5ft)	
	DateCollected	3/27/1996		3/26/1996		3/26/1996		3/27/1996	
	DateExtracted								
	DateAnalyzed	4/2/1996		4/1/1996		4/1/1996		4/3/1996	
	SDGNumber	25080		25061		25061		25080	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg								
Gasoline	ug/Kg	39.2	J	52400	J	10.4	J	47700	=

	StationID	A039SB029		A039SB030		A039SB030		A039SB031	
	SampleID	039SB02902 (3-5ft)		039SB03001 (0-1ft)		039SB03002 (3-5ft)		039SB03101 (0-1ft)	
	DateCollected	3/27/1996		3/26/1996		3/26/1996		3/26/1996	
	DateExtracted								
	DateAnalyzed	4/3/1996		4/1/1996		4/2/1996		4/1/1996	
	SDGNumber	25080		25061		25061		25061	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg								
Gasoline	ug/Kg	98800	=	25900	J	41.2	J	23300	=

	StationID	A039SB031		A039SB032		A039SB032		A039SB033	
	SampleID	039SB03102 (3-5ft)		039SB03201 (0-1ft)		039SB03202 (3-5ft)		039SB03301 (0-1ft)	
	DateCollected	3/26/1996		3/27/1996		3/27/1996		3/28/1996	
	DateExtracted								
	DateAnalyzed	4/1/1996		4/3/1996		4/3/1996		4/3/1996	
	SDGNumber	25061		25080		25080		25095	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg							0.009	J
Gasoline	ug/Kg	80500	J	5.7	J	49.1	J		

	StationID	A039SB033		A039SB034		A039SB035		A039SB035	
	SampleID	039SB03302 (3-5ft)		039SB03402 (3-5ft)		039SB03501 (0-1ft)		039SB03502 (3-5ft)	
	DateCollected	3/28/1996		3/27/1996		3/27/1996		3/27/1996	
	DateExtracted								
	DateAnalyzed	4/2/1996		4/3/1996		4/3/1996		4/3/1996	
	SDGNumber	25095		25080		25080		25080	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg	0.088	J						
Gasoline	ug/Kg			86100	=	18.7	=	19500	=

Analytical Data Summary

	StationID	A039SB036		A039SB036		A039SB037		A039SB037	
	SampleID	039SB03601 (0-1ft)		039SB03602 (3-5ft)		039SB03701 (0-1ft)		039SB03702 (3-5ft)	
	DateCollected	3/28/1996		3/28/1996		3/28/1996		3/28/1996	
	DateExtracted								
	DateAnalyzed	4/2/1996		4/4/1996		4/4/1996		4/2/1996	
	SDGNumber	25095		25095		25095		25095	
Parameter	**Units**								
Diesel	mg/Kg								
Gasoline	mg/Kg	0.86	J	5.29	J	0.035	J	16	J
Gasoline	ug/Kg								

	StationID	A039SB039		A039SB039		A039SB040	
	SampleID	039SB03901 (0-1ft)		039SB03902 (3-5ft)		039SB04001 (0-1ft)	
	DateCollected	3/28/1996		3/28/1996		3/28/1996	
	DateExtracted						
	DateAnalyzed	4/4/1996		4/4/1996		4/4/1996	
	SDGNumber	25095		25095		25095	
Parameter	**Units**						
Diesel	mg/Kg						
Gasoline	mg/Kg	0.018	=	0.009	J	0.018	=
Gasoline	ug/Kg						

Analytical Data Summary

	StationID	A039SB002		A039SB007		A039SB008	
	SampleID	039SB00201 (0-1ft)		039SB00701 (0-1ft)		039SB00801 (0-1ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/14/1995		10/14/1995		10/14/1995	
	DateAnalyzed	10/23/1995		10/23/1995		10/24/1995	
	SDGNumber	L5506		L5506		L5506	
Parameter	**Units**						
PCB-1260 (Arochlor 1260)	ug/Kg	1100	=	98	=	26	=

	StationID	A039SB003		A039SB004		A039SB006		A039SB009	
	SampleID	039SB00301 (0-1ft)		039SB00401 (0-1ft)		039SB00601 (0-1ft)		039SB00901 (0-1ft)	
	DateCollected	10/3/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/15/1995		10/14/1995		10/14/1995		10/14/1995	
	DateAnalyzed	10/23/1995		10/24/1995		10/23/1995		10/24/1995	
	SDGNumber	L5510		L5506		L5506		L5506	
Parameter	**Units**								
Alpha-chlordane	ug/Kg					10	J		
Dieldrin	ug/Kg								
Endrin Aldehyde	ug/Kg							6.7	=
Gamma-chlordane	ug/Kg					24	J		
Heptachlor	ug/Kg								
p,p'-DDD	ug/Kg	5	=			22	J	9.6	=
p,p'-DDE	ug/Kg	35	=	53	J	9.3	J		
p,p'-DDT	ug/Kg			18	=			8.4	=

	StationID	A039SB009		A039SB010		A039SB011		A039SB011	
	SampleID	039SB00902 (3-5ft)		039SB01001 (0-1ft)		039SB01101 (0-1ft)		039SB01102 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/14/1995		10/14/1995		10/14/1995		10/14/1995	
	DateAnalyzed	10/24/1995		10/24/1995		10/24/1995		10/24/1995	
	SDGNumber	L5506		L5506		L5506		L5506	
Parameter	**Units**								
Alpha-chlordane	ug/Kg								
Dieldrin	ug/Kg								
Endrin Aldehyde	ug/Kg								
Gamma-chlordane	ug/Kg								
Heptachlor	ug/Kg								
p,p'-DDD	ug/Kg	4.5	=	6.9	=	16	=		
p,p'-DDE	ug/Kg			4.9	J	9.9	J		
p,p'-DDT	ug/Kg					11	=	520	J

	StationID	A039SB016		A039SB025	
	SampleID	039SB01601 (0-1ft)		039SB02501 (0-1ft)	
	DateCollected	3/27/1996		3/26/1996	
	DateExtracted	3/29/1996		3/28/1996	
	DateAnalyzed	4/5/1996		4/5/1996	
	SDGNumber	25080		25061	
Parameter	**Units**				
Alpha-chlordane	ug/Kg	1.8	J		
Dieldrin	ug/Kg	13	J		
Endrin Aldehyde	ug/Kg				
Gamma-chlordane	ug/Kg				
Heptachlor	ug/Kg			2	J
p,p'-DDD	ug/Kg				
p,p'-DDE	ug/Kg				
p,p'-DDT	ug/Kg	17	J	3.6	J

	StationID	A039SB001		A039SB001		A039SB002		A039SB002	
	SampleID	039SB00101 (0-1ft)		039SB00102 (3-5ft)		039SB00201 (0-1ft)		039SB00202 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/5/1995		10/5/1995		10/5/1995		10/5/1995	
	DateAnalyzed	10/13/1995		10/13/1995		10/13/1995		10/13/1995	
	SDGNumber	L5506S		L5506S		L5506S		L5506S	
Parameter	**Units**								
Aluminum	mg/Kg	5490	=	1340	=	5210	=	8050	=
Antimony	mg/Kg								
Arsenic	mg/Kg	2.3	J			1.9	J		
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	12.9	J	3.2	J	14.5	J	14.4	J
Beryllium	mg/Kg								
Cadmium	mg/Kg								
Calcium	mg/Kg	81500	J	3220	J	23400	J	799	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	7.6	=	3.1	=	7.3	=	9.5	=
Cobalt	mg/Kg	3	J	1.6	J				
Copper	mg/Kg	4.8	J	1	J	10.9	=	1.4	J
Iron	mg/Kg	7380	=	1210	=	4250	=	4790	=
Lead	mg/Kg	9.7	=	1.9	=	13	=	4.3	=
Magnesium	mg/Kg	1260	=	144	J	577	J	433	J
Manganese	mg/Kg	107	=	6	=	36.5	=	7.6	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg								
Nickel	mg/Kg	5.8	J			4.2	J		
Potassium	mg/Kg	368	J	231	J	286	J	260	J
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	256	J	183	J	232	J	214	J
Thallium	mg/Kg								
Vanadium	mg/Kg	7.5	J	2	J	7.9	J	9.8	J
Zinc	mg/Kg	23.2	=	3.4	J	23.5	=	8.2	=

	StationID	A039SB003		A039SB003		A039SB004		A039SB004	
	SampleID	039SB00301 (0-1ft)		039SB00302 (3-5ft)		039SB00401 (0-1ft)		039SB00402 (3-5ft)	
	DateCollected	10/3/1995		10/3/1995		10/2/1995		10/2/1995	
	DateExtracted	10/11/1995		10/11/1995		10/5/1995		10/5/1995	
	DateAnalyzed	10/22/1995		10/22/1995		10/13/1995		10/13/1995	
	SDGNumber	L5510S		L5510S		L5506S		L5506S	
Parameter	**Units**								
Aluminum	mg/Kg	12500	=	3680	=	5630	=	8520	=
Antimony	mg/Kg								
Arsenic	mg/Kg	4.6	=	1.3	J	5	J	1.1	J
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	18.5	J	17	J	36.1	J	18.7	J
Beryllium	mg/Kg								
Cadmium	mg/Kg								
Calcium	mg/Kg	27800	=	725	J	2080	J	871	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	24	=	7.4	=	9.2	=	13.3	=
Cobalt	mg/Kg	4.1	J	2.5	J	2.7	J	1.8	J
Copper	mg/Kg	3.1	J	1.3	J	17	=	4.2	J
Iron	mg/Kg	12200	=	3080	=	5760	=	6770	=
Lead	mg/Kg	8.8	=	2.2	=	21.1	=	3.9	=
Magnesium	mg/Kg	1230	=	313	J	412	J	635	J
Manganese	mg/Kg	28.8	=	5	=	35.8	=	13.2	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg					0.19	=		
Nickel	mg/Kg	5.4	J			6.5	J		
Potassium	mg/Kg					351	J	289	J
Selenium	mg/Kg	1.1	J						
Silver	mg/Kg								
Sodium	mg/Kg	249	J	214	J	217	J	222	J
Thallium	mg/Kg								
Vanadium	mg/Kg	23.2	=	5.2	J	13.3	=	14.3	=
Zinc	mg/Kg	19.4	=	4.4	J	33	=	14.7	=

	StationID	A039SB005		A039SB005		A039SB006		A039SB006	
	SampleID	039SB00501 (0-1ft)		039SB00502 (3-5ft)		039SB00601 (0-1ft)		039SB00602 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/5/1995		10/5/1995		10/5/1995		10/5/1995	
	DateAnalyzed	10/13/1995		10/13/1995		10/13/1995		10/13/1995	
	SDGNumber	L5506S		L5506S		L5506S		L5506S	
Parameter	**Units**								
Aluminum	mg/Kg	4750	=	7880	=	16000	=	1400	=
Antimony	mg/Kg								
Arsenic	mg/Kg	7.3	=			17.9	=		
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	22.8	J	22.2	J	37.8	J	4.9	J
Beryllium	mg/Kg					0.45	J		
Cadmium	mg/Kg								
Calcium	mg/Kg	136000	J	4290	J	13800	J	354	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	14	=	8.4	=	24.1	=	2.1	J
Cobalt	mg/Kg	1.9	J			3.3	J		
Copper	mg/Kg	15.8	=	0.9	J	17.6	=		
Iron	mg/Kg	5880	=	3900	=	16300	=	1560	=
Lead	mg/Kg	108	=	3.2	=	35.8	=	1.7	=
Magnesium	mg/Kg	1710	=	547	J	1800	=	111	J
Manganese	mg/Kg	107	=	12.9	=	191	=	4.3	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg	2.8	=			0.15	=	1.5	=
Nickel	mg/Kg	9.8	=			8.8	J		
Potassium	mg/Kg	495	J			813	J		
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	287	=	218	J	349	J	197	J
Thallium	mg/Kg								
Vanadium	mg/Kg	11.2	J	6.7	J	31.4	=	2	J
Zinc	mg/Kg	268	=	9.2	=	112	=	7.9	=

	StationID	A039SB007		A039SB007		A039SB008		A039SB008	
	SampleID	039SB00701 (0-1ft)		039SB00702 (3-5ft)		039SB00801 (0-1ft)		039SB00802 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/5/1995		10/5/1995		10/5/1995		10/5/1995	
	DateAnalyzed	10/13/1995		10/13/1995		10/13/1995		10/13/1995	
	SDGNumber	L5506S		L5506S		L5506S		L5506S	
Parameter	**Units**								
Aluminum	mg/Kg	5590	=	7550	=	7610	=	3770	=
Antimony	mg/Kg								
Arsenic	mg/Kg	3.9	=			1.4	J		
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	23.2	J	14.9	J	15.6	J	8.1	J
Beryllium	mg/Kg								
Cadmium	mg/Kg								
Calcium	mg/Kg	71500	J	1230	J	3300	J	226	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	8.4	=	9.1	=	10.2	=	4.5	=
Cobalt	mg/Kg	3.2	J	2.1	J	1.7	J		
Copper	mg/Kg	32.2	=	6.1	=	2.5	J		
Iron	mg/Kg	8150	=	3570	=	5990	=	2070	=
Lead	mg/Kg	12	=	5.2	=	8	=	3.4	=
Magnesium	mg/Kg	1450	=	485	J	357	J	196	J
Manganese	mg/Kg	110	=	10.7	=	13.2	=	3.6	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg	1.5	=	1.8	=	1.7	=	2	=
Nickel	mg/Kg	4.3	J						
Potassium	mg/Kg	304	J			301	J		
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	267	J	199	J	203	J	220	J
Thallium	mg/Kg								
Vanadium	mg/Kg	9.9	J	6.7	J	11.7	J	3.9	J
Zinc	mg/Kg	34.9	=	48.1	=	13.3	=	4.2	J

	StationID	A039SB009		A039SB009		A039SB010		A039SB010	
	SampleID	039SB00901 (0-1ft)		039SB00902 (3-5ft)		039SB01001 (0-1ft)		039SB01002 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/2/1995		10/2/1995	
	DateExtracted	10/5/1995		10/5/1995		10/5/1995		10/5/1995	
	DateAnalyzed	10/13/1995		10/13/1995		10/13/1995		10/13/1995	
	SDGNumber	L5506S		L5506S		L5506S		L5506S	
Parameter	**Units**								
Aluminum	mg/Kg	11200	=	8980	=	8160	=	7880	=
Antimony	mg/Kg								
Arsenic	mg/Kg	3.6	=	2.2	J	6.5	=	1.1	J
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	41.7	J	23.7	J	37	J	15.5	J
Beryllium	mg/Kg					0.24	J		
Cadmium	mg/Kg								
Calcium	mg/Kg	3830	J	1260	J	33000	J	2850	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	13.8	=	10	=	15.8	=	9.8	=
Cobalt	mg/Kg	2	J	2.1	J	3.5	J	2.3	J
Copper	mg/Kg	6.5	=	2.1	J	13.1	=	2.2	J
Iron	mg/Kg	9280	=	6770	=	8200	=	4730	=
Lead	mg/Kg	29	=	5.6	=	47.3	=	4.4	=
Magnesium	mg/Kg	587	J	467	J	1010	J	451	J
Manganese	mg/Kg	26.2	=	27	=	56.5	=	10.8	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg	1.3	=						
Nickel	mg/Kg	5.8	J	4.4	J	8.3	J		
Potassium	mg/Kg	383	J	398	J	632	J	262	J
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	204	J	235	J	219	J	218	J
Thallium	mg/Kg								
Vanadium	mg/Kg	16	=	11.9	J	14.7	=	8.7	J
Zinc	mg/Kg	21	=	8.5	=	33.4	=	40.4	=

	StationID	A039SB011		A039SB011		A039SB012		A039SB012	
	SampleID	039SB01101 (0-1ft)		039SB01102 (3-5ft)		039SB01201 (0-1ft)		039SB01202 (3-5ft)	
	DateCollected	10/2/1995		10/2/1995		10/3/1995		10/3/1995	
	DateExtracted	10/5/1995		10/5/1995		10/11/1995		10/11/1995	
	DateAnalyzed	10/13/1995		10/13/1995		10/22/1995		10/22/1995	
	SDGNumber	L5506S		L5506S		L5510S		L5510S	
Parameter	**Units**								
Aluminum	mg/Kg	6750	=	4570	=	9370	=	6910	=
Antimony	mg/Kg								
Arsenic	mg/Kg	5	=			3.8	=	5.1	=
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	29.3	J	13.2	J	10.7	J	16.7	J
Beryllium	mg/Kg								
Cadmium	mg/Kg								
Calcium	mg/Kg	6970	J	888	J	4270	=	274	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	10.2	=	7.5	=	19.9	=	14.2	=
Cobalt	mg/Kg	1.8	J			1.4	J	1.9	J
Copper	mg/Kg	13.1	=	0.88	J	1.6	J	1.7	J
Iron	mg/Kg	10200	=	3110	=	9390	=	9900	=
Lead	mg/Kg	42	=	3.8	=	9.3	=	3.1	=
Magnesium	mg/Kg	431	J	281	J	710	J	484	J
Manganese	mg/Kg	50.9	=	8.7	=	11.2	=	5.6	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg	1.4	=	1.4	=				
Nickel	mg/Kg	6	J						
Potassium	mg/Kg	198	J	147	J				
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	197	J	202	J	184	J	211	J
Thallium	mg/Kg								
Vanadium	mg/Kg	9.5	J	6	J	20.5	=	15.2	J
Zinc	mg/Kg	24.8	=	7.5	=	9.6	=	7.2	=

	StationID	A039SB013		A039SB013		A039SB014		A039SB014	
	SampleID	039SB01301 (0-1ft)		039SB01302 (3-5ft)		039SB01401 (0-1ft)		039SB01402 (3-5ft)	
	DateCollected	10/3/1995		10/3/1995		10/3/1995		10/3/1995	
	DateExtracted	10/11/1995		10/11/1995		10/11/1995		10/11/1995	
	DateAnalyzed	10/22/1995		10/22/1995		10/22/1995		10/22/1995	
	SDGNumber	L5510S		L5510S		L5510S		L5510S	
Parameter	**Units**								
Aluminum	mg/Kg	12800	=	9890	=	7600	=	7600	=
Antimony	mg/Kg								
Arsenic	mg/Kg	3.7	=	2	J	2.7	=	1.3	J
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	20.1	J	20.8	J	18.4	J	18.4	J
Beryllium	mg/Kg								
Cadmium	mg/Kg								
Calcium	mg/Kg	7070	=	791	J	3960	=	766	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	23.6	=	18.1	=	10.7	=	12.2	=
Cobalt	mg/Kg	2.4	J	1.6	J	2.5	J	1.5	J
Copper	mg/Kg	2.2	J	4.5	J	2.3	J	1.8	J
Iron	mg/Kg	11100	=	8780	=	6070	=	4810	=
Lead	mg/Kg	10.8	=	5.1	=	6.6	=	4.2	=
Magnesium	mg/Kg	994	J	830	J	595	J	634	J
Manganese	mg/Kg	17.4	=	12.5	=	31.9	=	11.1	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg								
Nickel	mg/Kg	5.1	J			3.3	J	3.6	J
Potassium	mg/Kg								
Selenium	mg/Kg	0.73	J			0.68	J		
Silver	mg/Kg								
Sodium	mg/Kg	232	J	243	J	199	J	223	J
Thallium	mg/Kg								
Vanadium	mg/Kg	21.2	=	18.9	J	11.2	J	9.2	J
Zinc	mg/Kg	14.6	=	30	=	11	=	8.2	=

	StationID	A039SB015		A039SB015		A039SB047		A039SB048	
	SampleID	039SB01501 (0-1ft)		039SB01502 (3-5ft)		039SB04701 (0-1ft)		039SB04801 (0-1ft)	
	DateCollected	10/3/1995		10/3/1995		10/12/1998		10/12/1998	
	DateExtracted	10/11/1995		10/11/1995		10/22/1998		10/22/1998	
	DateAnalyzed	10/22/1995		10/22/1995		10/27/1998		10/27/1998	
	SDGNumber	L5510S		L5510S		EN008		EN008	
Parameter	**Units**								
Aluminum	mg/Kg	5740	=	7560	=	3840	J	1090	J
Antimony	mg/Kg								
Arsenic	mg/Kg	3.9	=	2.3	J	1.1	=	0.82	J
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	14.8	J	23	J	15.1	J	7.5	J
Beryllium	mg/Kg					0.17	J	0.05	J
Cadmium	mg/Kg								
Calcium	mg/Kg	1870	=	539	J	186	J	72.9	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	8.4	=	12.7	=	3.7	=	2.4	=
Cobalt	mg/Kg			2	J	0.75	J		
Copper	mg/Kg	1.5	J	2.6	J	2	J	0.49	J
Iron	mg/Kg	5740	=	5850	=	2270	J	1120	J
Lead	mg/Kg	4	=	3.3	=	9.4	=	2.4	=
Magnesium	mg/Kg	286	J	678	J	155	J	63	J
Manganese	mg/Kg	11.3	=	7.8	=	10.1	J	6	J
Mercury, SPLP	ug/L								
Mercury	mg/Kg					0.05	=		
Nickel	mg/Kg			4.4	J	1.9	J		
Potassium	mg/Kg					103	J	62.5	J
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	195	J	206	J	13.3	J	6.7	J
Thallium	mg/Kg								
Vanadium	mg/Kg	11.5	J	16.1	J	5.1	J	2.8	J
Zinc	mg/Kg	4.9	=	7.9	=	37.5	J		

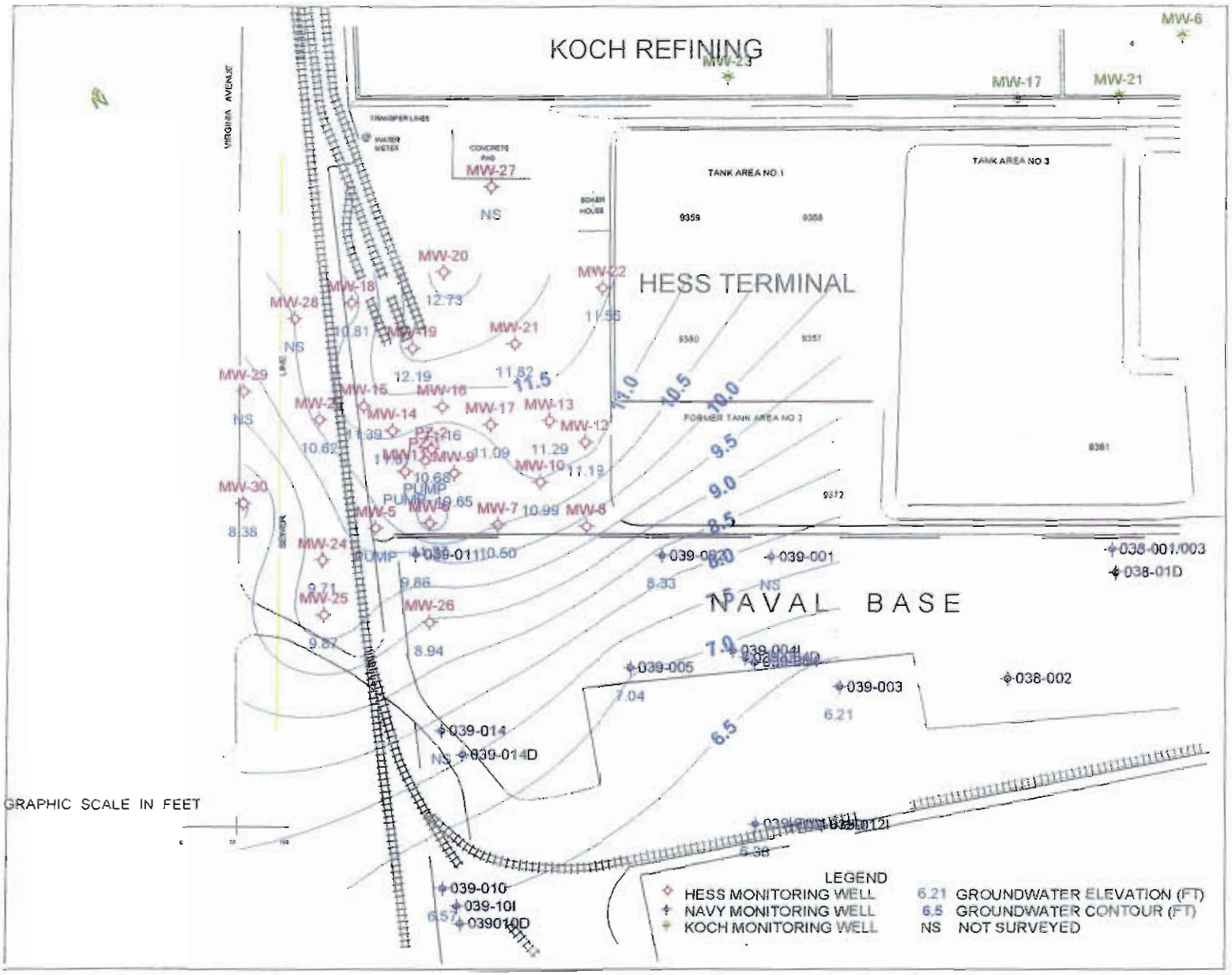
	StationID	A039SB049		A039SB050		A039SB051		A039SB051	
	SampleID	039SB04901 (0-1ft)		039SB05001 (0-1ft)		039SB05101 (0-1ft)		039SB05101 (0-1ft)	
	DateCollected	10/12/1998		10/12/1998		10/12/1998		10/12/1998	
	DateExtracted	10/22/1998		10/22/1998		10/22/1998		10/22/1998	
	DateAnalyzed	10/27/1998		10/27/1998		10/26/1998		10/27/1998	
	SDGNumber	EN008		EN008		EN008		EN008	
Parameter	**Units**								
Aluminum	mg/Kg	1170	J	6830	J			4360	J
Antimony	mg/Kg								
Arsenic	mg/Kg	0.83	J	2.6	=			8.1	=
Barium, SPLP	ug/L					599	=		
Barium, TCLP	ug/L							1280	=
Barium	mg/Kg	8.3	J	20.3	=			125	=
Beryllium	mg/Kg	0.04	J	0.13	J			0.37	J
Cadmium	mg/Kg								
Calcium	mg/Kg	115	J	1900	J			7210	J
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	2.7	=	9.5	=			18.9	=
Cobalt	mg/Kg							2.8	J
Copper	mg/Kg	1.8	J	1.7	J			35	=
Iron	mg/Kg	1500	J	6980	J			11300	J
Lead	mg/Kg	12.2	=	8.7	=			92	=
Magnesium	mg/Kg	68.8	J	364	J			349	J
Manganese	mg/Kg	5	J	19	J			31.2	J
Mercury, SPLP	ug/L					3.3	=		
Mercury	mg/Kg	0.05	=	0.06	=			0.09	=
Nickel	mg/Kg			1.8	J			8.2	=
Potassium	mg/Kg	67.8	J	253	J			454	J
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg	13.3	J	36.2	J			465	J
Thallium	mg/Kg	0.24	J					0.2	J
Vanadium	mg/Kg	3.1	J	14.6	=			19.2	=
Zinc	mg/Kg	6.9	J	8.8	J			102	J

	StationID	A039SB052		A039SB053		A039SB054		A039SB055	
	SampleID	039SB05201 (0-1ft)		039SB05301 (0-1ft)		039SB05401 (0-1ft)		039SB05501 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998		10/13/1998	
	DateExtracted	10/23/1998		10/23/1998		10/23/1998		10/23/1998	
	DateAnalyzed	10/27/1998		10/27/1998		10/27/1998		10/27/1998	
	SDGNumber	EN009		EN009		EN009		EN009	
Parameter	**Units**								
Aluminum	mg/Kg	5090	=	6100	=	1940	=	22200	=
Antimony	mg/Kg							3.4	J
Arsenic	mg/Kg	2.1	=	2.2	=	0.96	J	7.7	=
Barium, SPLP	ug/L								
Barium, TCLP	ug/L								
Barium	mg/Kg	21.4	=	19.7	J	5.4	J	22.9	=
Beryllium	mg/Kg	0.16	J	0.12	J	0.06	J	0.43	J
Cadmium	mg/Kg	0.28	J						
Calcium	mg/Kg							1100	=
Chromium, TCLP	ug/L								
Chromium, Total	mg/Kg	6	=	5.8	=	7.7	=	44.8	=
Cobalt	mg/Kg	0.85	J	1.1	J			2.9	J
Copper	mg/Kg	2.5	=			1.5	J	4.3	=
Iron	mg/Kg	4220	=	3360	=	1970	=	25300	=
Lead	mg/Kg	9.1	=	5.4	=	17.3	=	9.3	=
Magnesium	mg/Kg	193	J	232	J	145	J	2070	=
Manganese	mg/Kg	18.9	=	7.1	=	7	=	32.8	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg	0.08	=	0.06	=			0.09	=
Nickel	mg/Kg	1.9	J	2.8	J	0.85	J	4.2	J
Potassium	mg/Kg							1300	=
Selenium	mg/Kg								
Silver	mg/Kg	0.48	J	0.86	J			0.56	J
Sodium	mg/Kg							87	J
Thallium	mg/Kg							0.26	J
Vanadium	mg/Kg	7.3	=	5.8	=	3.3	J	54.6	=
Zinc	mg/Kg	7.4	=			20.5	=	24.3	=

	StationID	A039SB056		A039SB057		A039SB057		A039SB057	
	SampleID	039SB05601 (0-1ft)		039SB05701 (0-1ft)		039SB05701 (0-1ft)		039SB05701 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998		10/13/1998	
	DateExtracted	10/23/1998		10/21/1998		10/22/1998		10/23/1998	
	DateAnalyzed	10/27/1998		10/26/1998		10/27/1998		10/27/1998	
	SDGNumber	EN009		EN009		EN009		EN009	
Parameter	**Units**								
Aluminum	mg/Kg	6100	=					15100	=
Antimony	mg/Kg								
Arsenic	mg/Kg	2.2	=					6.6	=
Barium, SPLP	ug/L			272	=				
Barium, TCLP	ug/L					294	=		
Barium	mg/Kg	12.6	J					17.4	J
Beryllium	mg/Kg	0.14	J					0.31	J
Cadmium	mg/Kg								
Calcium	mg/Kg								
Chromium, TCLP	ug/L					8.3	J		
Chromium, Total	mg/Kg	8.9	=					27.3	=
Cobalt	mg/Kg	0.81	J					1.7	J
Copper	mg/Kg	1.3	J					2.5	J
Iron	mg/Kg	5890	=					24300	=
Lead	mg/Kg	4	=					8.3	=
Magnesium	mg/Kg	421	J					1010	=
Manganese	mg/Kg	9.7	=					16.5	=
Mercury, SPLP	ug/L								
Mercury	mg/Kg							0.05	=
Nickel	mg/Kg	1.7	J					3.2	J
Potassium	mg/Kg	281	J					637	=
Selenium	mg/Kg								
Silver	mg/Kg								
Sodium	mg/Kg								
Thallium	mg/Kg	0.19	J					0.34	J
Vanadium	mg/Kg	12.1	=					44.2	=
Zinc	mg/Kg	6.6	=					14.3	=

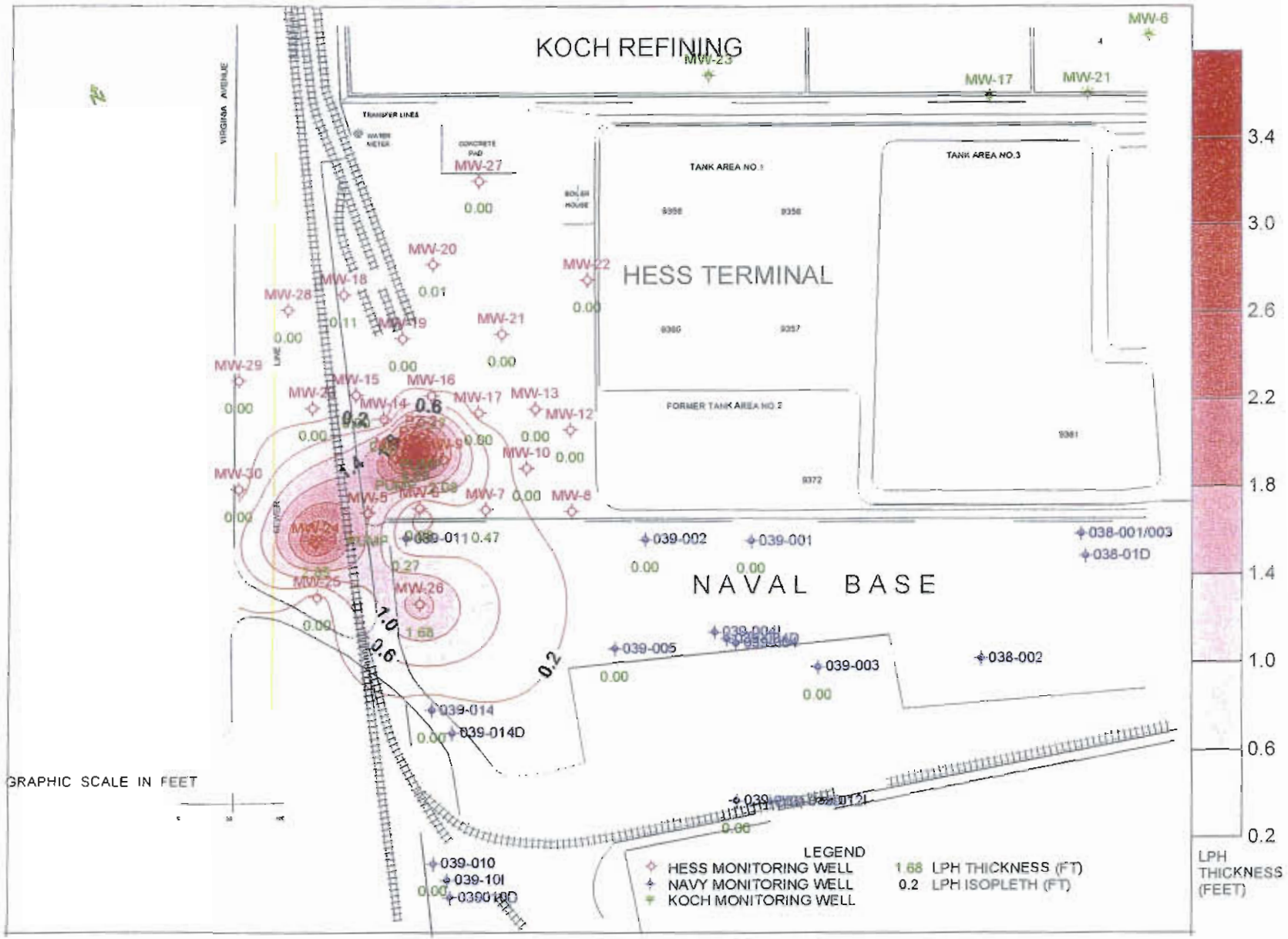
	StationID	A039SB059		A039SB060		A039SB061	
	SampleID	039SB05901 (0-1ft)		039SB06001 (0-1ft)		039SB06101 (0-1ft)	
	DateCollected	10/13/1998		10/13/1998		10/13/1998	
	DateExtracted	10/23/1998		10/23/1998		10/23/1998	
	DateAnalyzed	10/27/1998		10/27/1998		10/27/1998	
	SDGNumber	EN009		EN009		EN009	
Parameter	**Units**						
Aluminum	mg/Kg	3160	=	3710	=	7400	=
Antimony	mg/Kg						
Arsenic	mg/Kg	5	=	1.1	=	3.3	=
Barium, SPLP	ug/L						
Barium, TCLP	ug/L						
Barium	mg/Kg	23.7	=	19	J	14.8	J
Beryllium	mg/Kg	0.14	J	0.12	J	0.16	J
Cadmium	mg/Kg			0.2	J		
Calcium	mg/Kg	13900	=			1270	=
Chromium, TCLP	ug/L						
Chromium, Total	mg/Kg	8.3	=			11.6	=
Cobalt	mg/Kg	1.3	J	0.64	J	0.97	J
Copper	mg/Kg	37.7	=	1.1	J	2.7	=
Iron	mg/Kg	5050	=	2310	=	11900	=
Lead	mg/Kg	26.4	=	6.3	=	6.3	=
Magnesium	mg/Kg	285	J	81.5	J	414	J
Manganese	mg/Kg	33.2	=	43.2	=	10.4	=
Mercury, SPLP	ug/L						
Mercury	mg/Kg	0.31	=	0.05	=	0.06	=
Nickel	mg/Kg	4.6	=	1.3	J	1.3	J
Potassium	mg/Kg					384	J
Selenium	mg/Kg						
Silver	mg/Kg	0.61	J				
Sodium	mg/Kg						
Thallium	mg/Kg						
Vanadium	mg/Kg	7.2	=	4.5	J	19.9	=
Zinc	mg/Kg	40.9	=			7.4	=

Appendix C



Filename: 0900MAPS.PPT

CORPORATION	GROUNDWATER POTENTIOMETRIC MAP AUGUST 6, 2000 GAUGING DATA			AMERADA HESS CORPORATION CHARLESTON SOUTH TERMINAL CHARLESTON, SOUTH CAROLINA
	Figure: 2B	Drawn By: DSF	Date: 9-20-00	Scale: As Shown



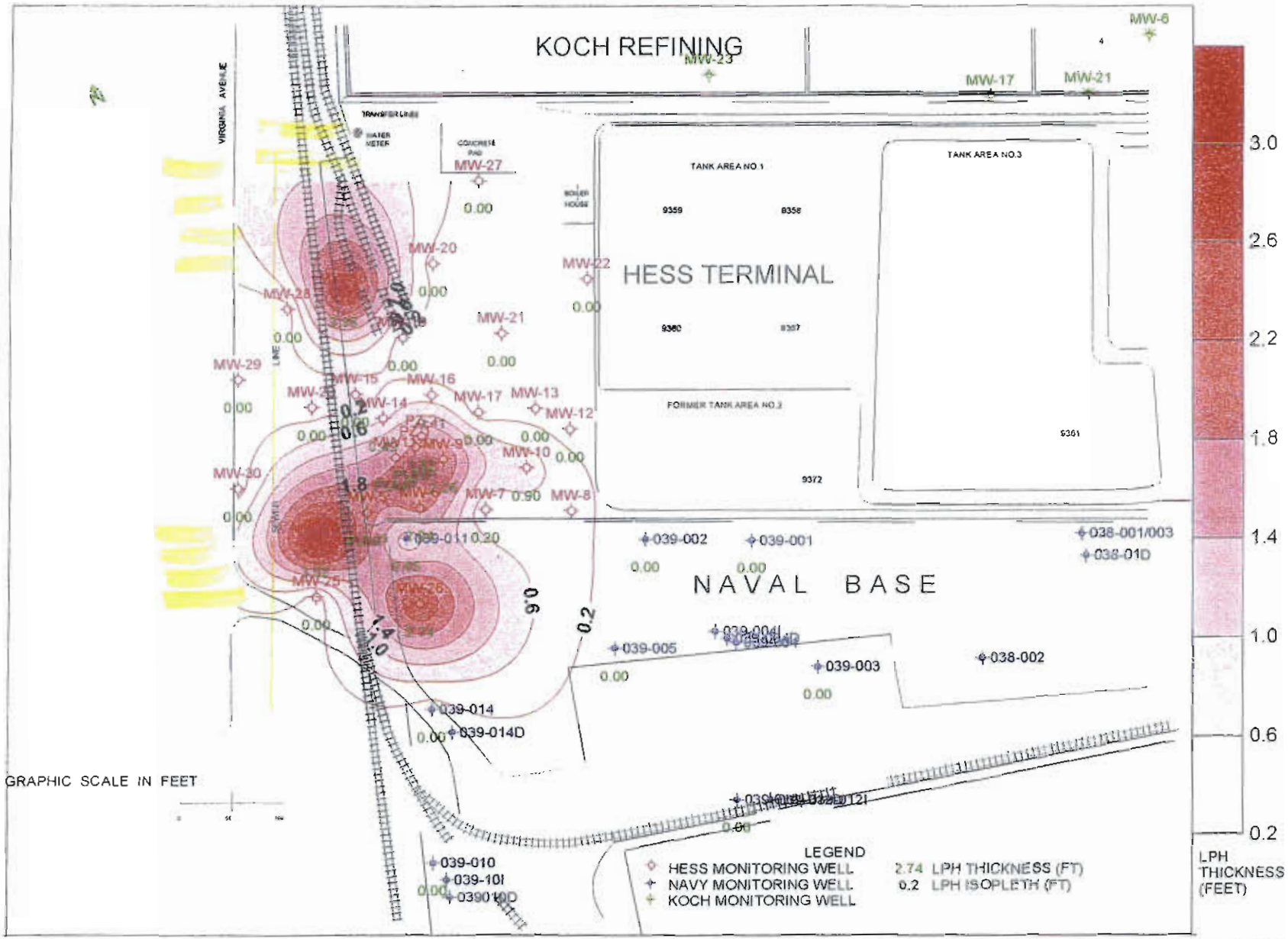
Filename: 0900MAPS.PPT

IT CORPORATION

LIQUID PHASE HYDROCARBON ISOPLETH MAP
MAY 18, 2000 GAUGING DATA

Figure: 3A	Drawn By: DSF	Date: 9-20-00	Scale: As Shown

AMERADA HESS CORPORATION
CHARLESTON SOUTH TERMINAL
CHARLESTON, SOUTH CAROLINA



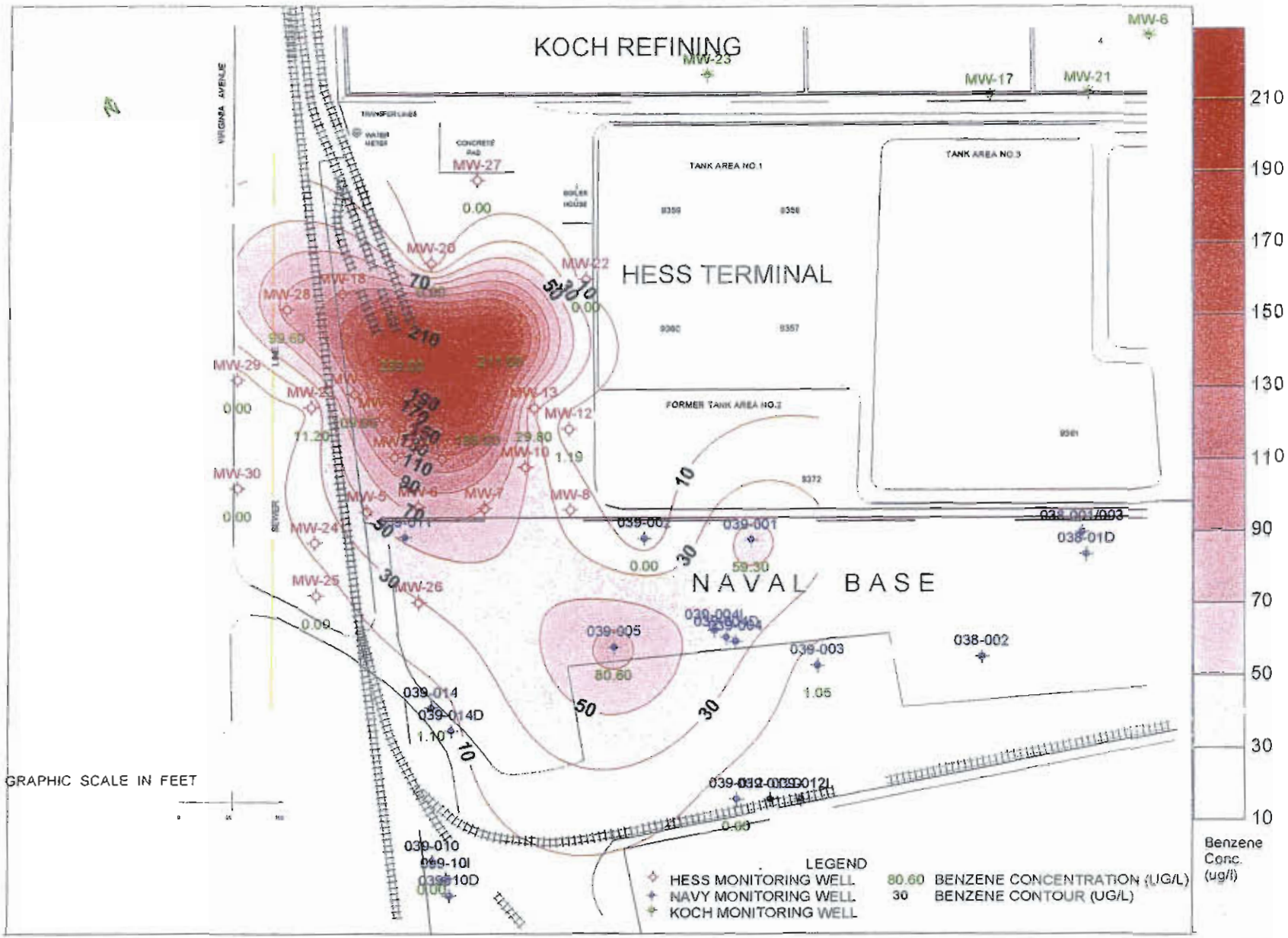
Filename: 0900MAPS.PPT

IT CORPORATION

LIQUID PHASE HYDROCARBON ISOPLETH MAP
AUGUST 6, 2000 GAUGING DATA

AMERADA HESS CORPORATION
CHARLESTON SOUTH TERMINAL
CHARLESTON, SOUTH CAROLINA

Figure: 3B	Drawn By: DSF	Date: 9-20-00	Scale: As Shown



Filename: 0900MAPS.PPT

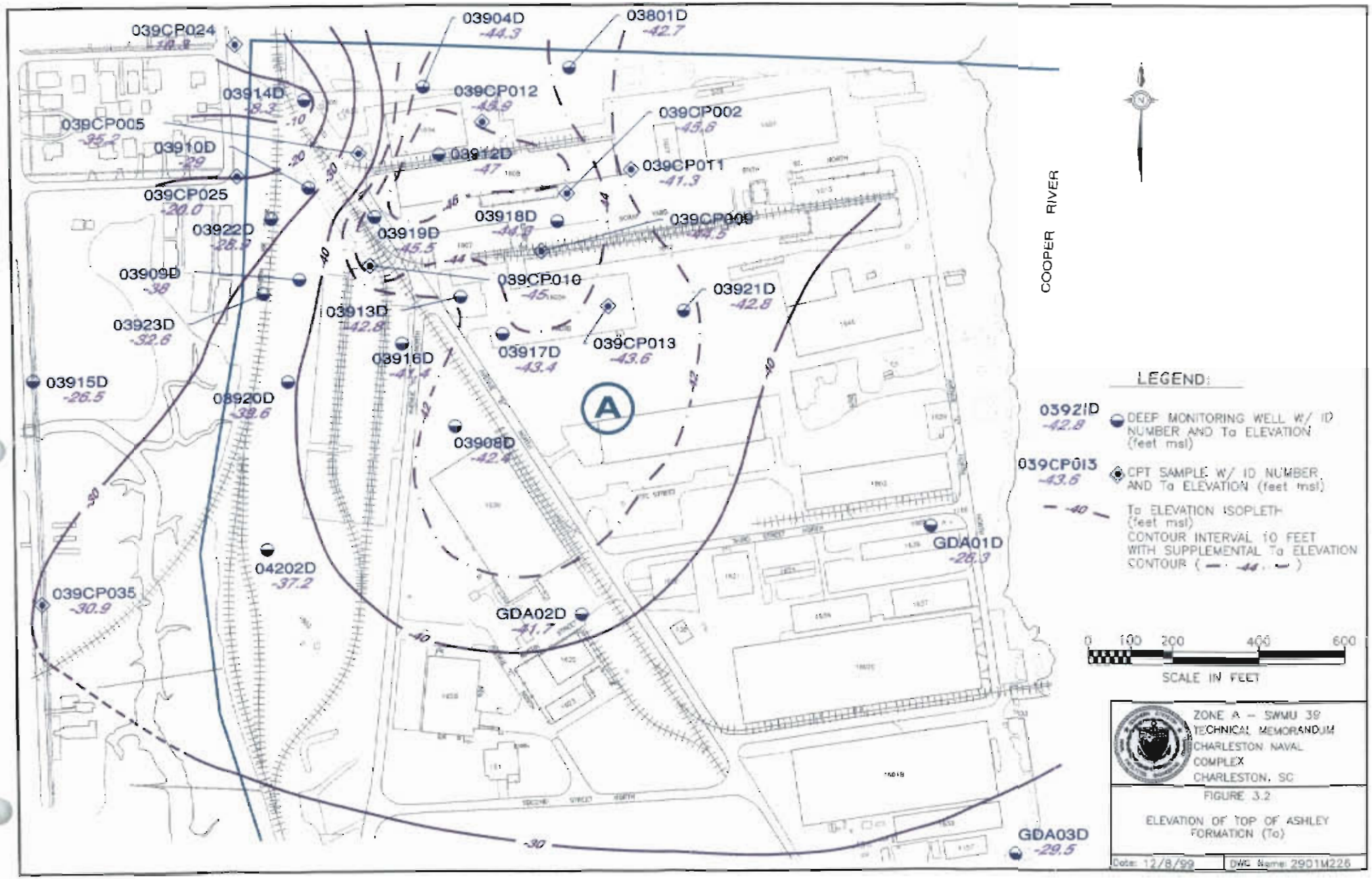
ITT CORPORATION

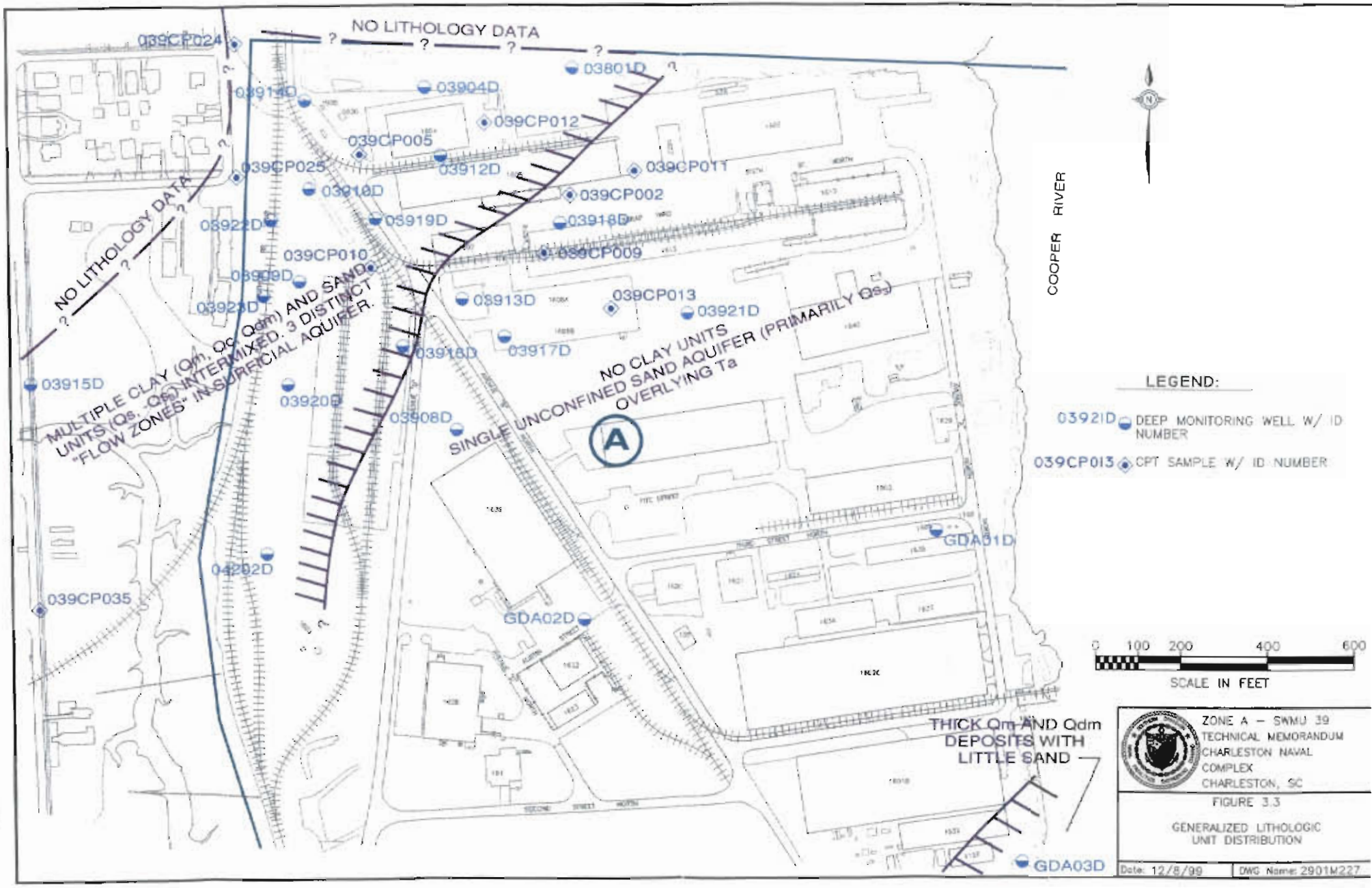
BENZENE ISOPLETH MAP
AUGUST 2000 DATA

AMERADA HESS CORPORATION
CHARLESTON SOUTH TERMINAL
CHARLESTON, SOUTH CAROLINA

Figure: 4	Drawn By: DSF	Date: 9-20-00	Scale: As Shown

Appendix D


039CP024
03904D
-44.3
03801D
-42.7
03914D
039CP012
039CP002
-45.6
039CP005
-35.2
03910D
-29
03912D
-47
039CP011
-41.3
039CP025
-20.0
03918D
-44.9
039CP009
-44.5
03922D
-28.9
03919D
-45.5
03909D
-38
039CP010
-45
03921D
-42.8
03923D
-32.6
03913D
-42.8
039CP013
-43.6
03917D
-43.4
03916D
-41.4
03915D
-26.5
03920D
-38.6
A
03908D
-42.4
GDA01D
-26.3
04202D
-37.2
039CP035
-30.9
GDA02D
-41.7
GDA03D
-29.5
COOPER RIVER
LEGEND:
03921D
-42.8
DEEP MONITORING WELL W/ ID NUMBER AND To ELEVATION (feet msl)
039CP013
-43.6
CPT SAMPLE W/ ID NUMBER AND To ELEVATION (feet msl)
-40
To ELEVATION ISOPLETH (feet msl)
CONTOUR INTERVAL 10 FEET
WITH SUPPLEMENTAL To ELEVATION CONTOUR (-44)
0 100 200 400 600
SCALE IN FEET
ZONE A - SWMU 39
TECHNICAL MEMORANDUM
CHARLESTON NAVAL COMPLEX
CHARLESTON, SC
FIGURE 3.2
ELEVATION OF TOP OF ASHLEY FORMATION (To)
Date: 12/8/99
DWG Name: 2901M226


NO LITHOLOGY DATA
NO LITHOLOGY DATA
039CP024
03914D
03904D
03801D
039CP012
039CP005
03912D
039CP011
039CP025
03910D
039CP002
03922D
03919D
03918D
039CP009
039CP010
03909D
03923D
03913D
039CP013
03921D
03916D
03917D
03915D
03920D
03908D
MULTIPLE CLAY (Qm, Qc, Qdm) AND SAND UNITS (Qs, Qss) INTERMIXED. 3 DISTINCT "FLOW ZONES" IN SURFICIAL AQUIFER.
SINGLE UNCONFINED SAND AQUIFER (PRIMARILY Qss)
NO CLAY UNITS
OVERLYING Ta
A
COOPER RIVER
GDA01D
04202D
039CP035
GDA02D
GDA03D
THICK Qm AND Qdm DEPOSITS WITH LITTLE SAND
LEGEND:
03921D DEEP MONITORING WELL W/ ID NUMBER
039CP013 CPT SAMPLE W/ ID NUMBER
0 100 200 400 600
SCALE IN FEET
ZONE A – SWMU 39
TECHNICAL MEMORANDUM
CHARLESTON NAVAL COMPLEX
CHARLESTON, SC
FIGURE 3.3
GENERALIZED LITHOLOGIC UNIT DISTRIBUTION
Date: 12/8/99
DWG Name: 2901M227

LITHOSTRATIGRAPHIC UNITS

Fill — UNDIFFERENTIATED MADE-GROUND CONSISTING OF SAND AND INORGANIC CLAY

QUATERNARY AGE

Qpm — FLUFFY MUD; DARK GREY TO BLACK, VERY SOFT, ORGANIC RICH, CLAYEY SILT. THIS UNIT PRIMARILY ASSOCIATED WITH CURRENT MOSQUITO CREEK DEPOSITION.

Q_3 SERIES

Qp — PEAT; BROWN, RECENTLY VEGETATION/MARSH GRASSES.

Qc — INORGANIC CLAYS; VARIABLE COLORATION, BUT TYPICALLY ORANGE-BROWN TO BLUE GREEN.

Qcs$_3$ — INTERBEDDED CLAY AND SAND.

Qs$_3$ — SAND; OLIVE-BROWN TO ORANGE-BROWN, OCCASIONALLY LIGHT GREY TO TAN, PREDOMINANTLY VERY FINE TO FINE WITH SOME GRADING TO COARSE.

Q_2 SERIES

Qm — MARSH CLAY; DARK GREY TO BLACK, SOFT, ORGANIC-RICH SILTY CLAY/CLAYEY SILT. OCCASIONALLY CONTAINS THIN SANDY LAMINAE OR DECAYING MARSH GRASSES.

Qcs$_2$ — INTERBEDDED ORGANIC-RICH CLAY AND DARK GREY SAND.

Qs$_2$ — SAND; GREY TO DARK GREY, VERY FINE TO FINE AND AT TIMES SILTY. MAY HAVE SOME SHELL FRAGMENTS.

Q_1 SERIES

Qdm — DEWATERED MARSH CLAY; DARK GREY TO BLACK, WITH A GREENISH CAST (TAN), ORGANIC-RICH SILTY CLAY/CLAYEY SILT. OCCASIONALLY MAY CONTAIN THIN SANDY LAMINAE.

Qcs$_1$ — INTERBEDDED ORGANIC-RICH CLAY AND DARK GREY SAND.

Qs$_1$ — SAND; GREY TO DARK GREY; FINE TO COARSE, AND TYPICALLY CONTAINING SHELL FRAGMENTS AND PHOSPHATE NODULES. MAY INCLUDE A THIN SILTY, CLAYEY HAD INTERVAL AT THE BASAL CONTACT WITH UNDERLYING ASHLEY FORMATION.

TERTIARY AGE

Ta — SILT; TYPICALLY OLIVE BROWN, (SLATE), NOISE, CALCAREOUS, ASHLEY FORMATION.

LEGEND:

DEEP MONITORING WELL W/ ID NUMBER

CPT BORING W/ ID NUMBER

(A) STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

GEOLOGIC CONTACTS – DASHED WHERE INFERRED

MEAN SEA LEVEL (MSL) DATUM

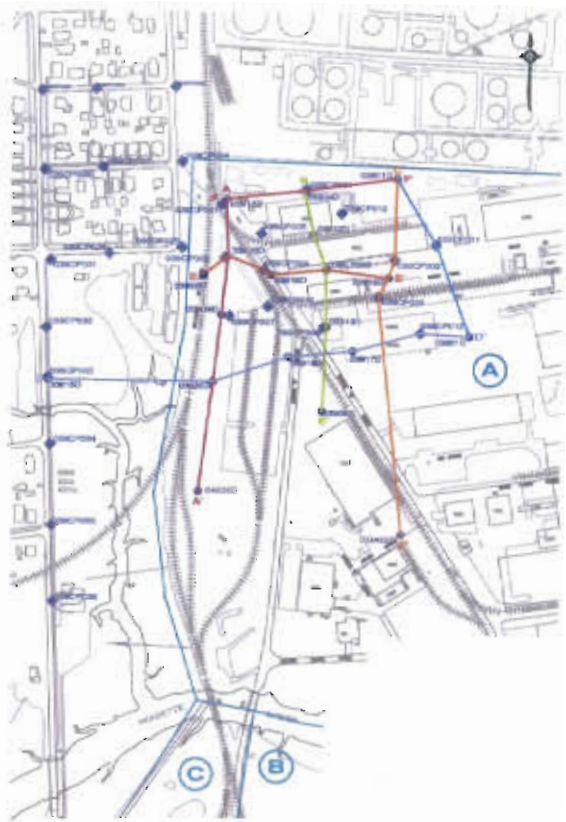
WELL BORING/SCREENED INTERVAL

F F — INTERSECTING CROSS-SECTION

10 / 0 — VERTICAL SCALE: 1" = 10'-0"

VERTICAL EXAGGERATION: 1 : 10

0 / 100 — HORIZONTAL SCALE: 1" = 100'-0"



KEY MAP FOR
LITHOSTRATIGRAPHIC SECTIONS

0 100 200 400 600
SCALE IN FEET

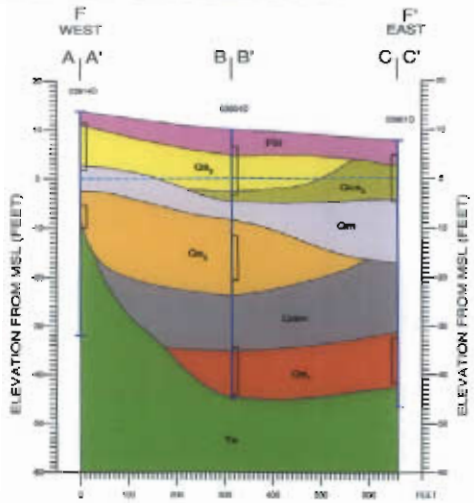
REVISIONS		
Rev. Number	Rev. Date	Rev. Sym
Rev. Number	Rev. Date	Rev. Sym
Rev. Number	Rev. Date	Rev. Sym
Rev. Number	Rev. Date	Rev. Sym
Rev. Number	Rev. Date	Rev. Sym

ZONE A – SWMU 39
TECHNICAL MEMORANDUM
CHARLESTON NAVAL COMPLEX

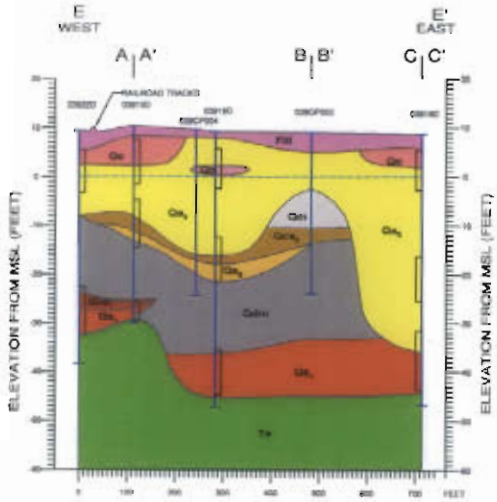
CHARLESTON, SC

FIGURE 2-1A
LITHOSTRATIGRAPHIC CROSS-SECTIONS
WITH MONITORING WELLS AND CPT POINTS

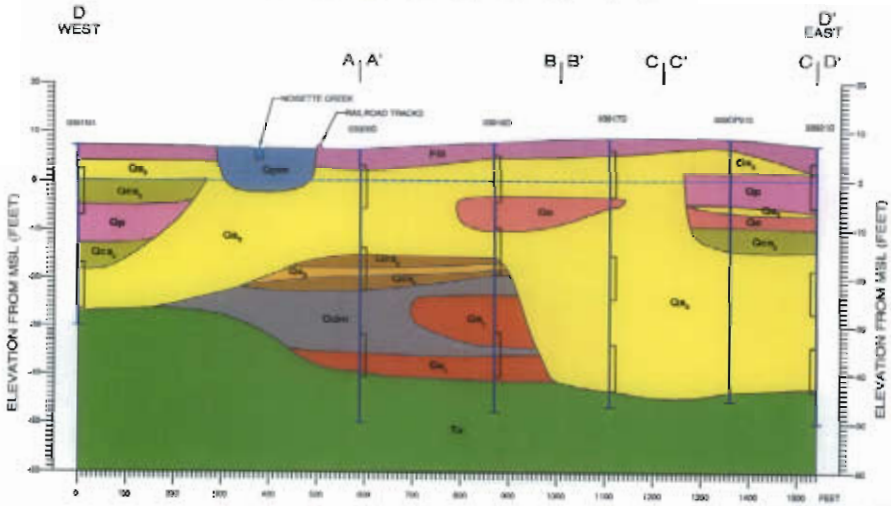
Dr by:	M. ENGLE	Dr by:	–
Ck by:	FLANDERS	Proj. Mgr.:	HAUSKNECHT
Date:	03/15/99	DWG Name:	2SW1AEC1
Sheet:	1	of:	3



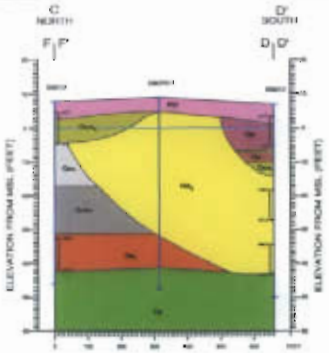
CROSS-SECTION F-F'



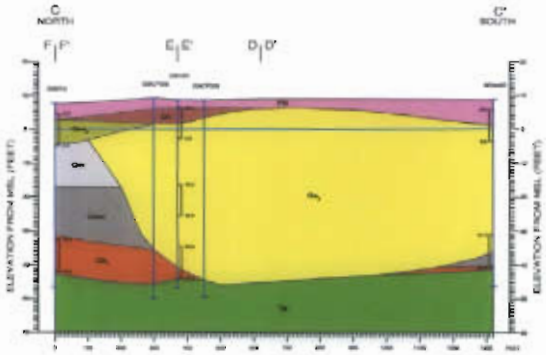
CROSS-SECTION E-E'



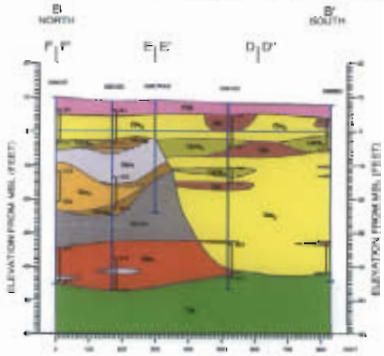
CROSS-SECTION D-D'



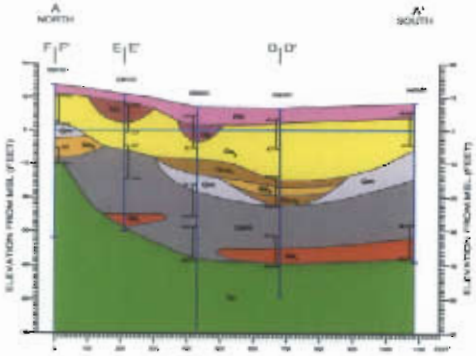
CROSS-SECTION C-D'



CROSS-SECTION C-C'



CROSS-SECTION B-B'



CROSS-SECTION A-A'