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INTERIM MEASURE WORK PLAN PHASE 1 GROUNDWATER SOURCE DELINEATION,
MONITORING WELL INSTALLATION AND SOIL SAMPLING SOLID WASTE MANAGEMENT
UNIT 39 (SWMU 39) ZONE A WITH TRANSMITTAL CNC CHARLESTON SC
9/18/2003
CH2M HILL

INTERIM MEASURE WORK PLAN

Phase 1 - Groundwater Source Delineation, Monitoring Well
Installation, and Soil Sampling - 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

September 2003

Contract N62467-99-C-0960

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*Revision No. 1
Contract N62467-99-C-0960
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September 18, 2003

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

Re: Interim Measure Work Plan (Revision 1) – SWMU 39, Zone A

Dear Mr. Scaturo:

Enclosed please find four copies of the Interim Measure Work Plan (Revision 1) for SWMU 39 in Zone A of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Bill Elliott. Please contact him at 335/335-5877, ext. 2477, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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

Certification Page for the Phase I – Source Area Interim Measure Work Plan (Revision 1) — 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

P.E. No. 21428



Dean Williamson, P.E.

9/17/2003
Date

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1 Acronyms and Abbreviations

2	BCT	BRAC Cleanup Team
3	BRAC	Base Realignment and Closure Act
4	CA	Corrective Action
5	CNC	Charleston Naval Complex
6	COC	Chemical of concern
7	CSAP	Comprehensive Sampling and Analysis Plan
8	CVOC	Chlorinated volatile organic compound
9	DCE	Dichloroethene
10	DPT	Direct-push technology
11	DQO	Data Quality Objectives
12	EDD	Electronic data deliverable
13	EnSafe	EnSafe Inc.
14	EPA	U.S. Environmental Protection Agency
15	ESDLOQCM	<i>Environmental Services Division Laboratory Operations and Quality</i>
16		<i>Control Manual</i>
17	ESDSOPQAM	<i>Environmental Services Division Standard Operating Procedures and</i>
18		<i>Quality Assurance Manual</i>
19	EVS	Environmental Visualization System
20	ft bls	Feet below land surface
21	ID	Identification
22	IDW	Investigation-derived waste
23	IM	Interim measure
24	ISCR	In situ chemical reduction
25	µg/L	Micrograms per liter
26	MCS	Media cleanup standard
27	MCL	Maximum contaminant level

1 **Acronyms and Abbreviations, Continued**

2	MNA	Monitored natural attenuation
3	msl	mean sea level
4	NAVBASE	Naval Base
5	OSWER	Office of Solid Waste and Emergency Response
6	PCE	Tetrachloroethene
7	PPE	Personal protective equipment
8	PVC	Polyvinyl chloride
9	QA/QC	Quality assurance/Quality control
10	RAO	Remedial action objective
11	RCRA	Resources Conservation and Recovery Act
12	RFI	RCRA Facility Investigation
13	RGO	Remedial goal option
14	SCDHEC	South Carolina Department of Health and Environmental Control
15	SOP	Standard operating procedure
16	SWMU	Solid waste management unit
17	TCE	Trichloroethene
18	TTA	Target treatment area
19	VOC	volatile organic compound
20	ZVI	Zero-valent iron
21	3-D	3-dimensional

Section 1.0

1.0 Introduction and Purpose

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 Phase I Source Area Interim Measure (IM) Work Plan presents the technical approach for implementing an IM activity for the suspected source area of chlorinated solvents in groundwater at Solid Waste Management Unit (SWMU) 39. This IM is consistent with the overall corrective measures approach described in the *Corrective Measures Study Report for SWMU 39, Zone A, Revision 0* (CH2M-Jones, 2002a). Additional information regarding SWMU 39, including history and description, site hydrogeology, and the nature and extent of the groundwater contamination, can also be found in the CMS Report.

In addition, this work plan describes additional proposed soil sampling around the concrete pads located between SWMUs 39 and 42; the installation of a deep monitoring well at the southern portion of SWMU 42 as previously agreed to by the BRAC Cleanup Team (BCT); and the installation of monitoring wells for downgradient plume monitoring during the long-term groundwater monitoring at the site.

1.1 Summary of Interim Measure Objectives

The work plan uses the overall CA approach selected in the SWMU 39 CMS report to remediate chemicals of concern (COCs) present in the source area of the surficial aquifer at SWMU 39. The COCs that were identified for SWMU 39 are chlorinated volatile organic chemicals (CVOCs), including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), 1,1-DCE, and vinyl chloride, as documented in the *Corrective*

1 *Measures Study Work Plan for SWMU 39, Zone A, Revision 0* (CH2M-Jones, 2002b). No surface
2 or subsurface soil COCs were identified at SWMU 39.

3 The location of SWMU 39 within Zone A is shown in Figure 1-1, and an aerial view of the
4 SWMU 39 area is presented in Figure 1-2.

5 The remedial action objectives (RAOs) identified in the CMS Report for SWMU 39
6 groundwater are as follows:

7 1) To prevent ingestion and direct/dermal contact with groundwater having unacceptable
8 carcinogenic or non-carcinogenic risk;

9 2) To restore the aquifer to beneficial use, and

10 3) To control offsite migration of the CVOC plume in groundwater to the extent practical.

11 The media cleanup standards (MCSs) chosen in the CMS for SWMU 39 groundwater were
12 the current U.S. Environmental Protection Agency (EPA) drinking water maximum
13 contaminant levels (MCLs). Meeting these MCSs after remediation is considered to be an
14 acceptable demonstration that the RAOs and remedial goal options (RGOs) have been met.

15 **1.1.1 Phasing of Interim Measure Activities**

16 The IM for the source area will be conducted in two phases. The first phase will entail
17 additional groundwater sampling to better define the vertical and horizontal dimensions of
18 the suspected groundwater source area near Buildings 1608A and 1608B, and to develop a
19 better estimate of the aquifer source volume to be treated during the second phase. The
20 results of the Phase I work will be used for the final design of the selected source control
21 treatment alternative to be employed in Phase II, as discussed briefly in the following
22 section.

23 In addition, additional monitoring wells needed to better assess the natural attenuation of
24 the CVOC plume will be installed as part of Phase I of the IM.

25 **1.2 Description of Source Area Interim Measure**

26 The CMS Report (CH2M-Jones, 2002a) evaluated applicable remedial alternative
27 technologies for addressing both the suspected CVOC source area and the CVOC plume. In
28 situ chemical reduction (ISCR) using zero-valent iron (ZVI) injection was selected as the
29 preferred source control measure, and monitored natural attenuation (MNA) was selected
30 for the CVOC plume. The complete alternatives analysis, remedial design criteria, and

1 implementation cost estimates used in the screening and selection process are presented in
2 the CMS Report. In order to expedite implementation of this source area treatment, the BCT
3 has agreed to perform this source area activity as an IM.

4 Prior to implementing the ISCR source control alternative with ZVI at SWMU 39, the
5 presence and size of the suspected source area must be confirmed. The suspected source
6 area will be investigated further with direct-push technology (DPT) sampling of the
7 intermediate and deep groundwater zones. This Phase I of the IM Work Plan investigation
8 will be focused at locations previously identified as having the highest total CVOC
9 groundwater concentrations, primarily in the deep zone of the surficial aquifer system.

10 The source area will be evaluated using a Geoprobe™ equipped DPT drill rig to collect
11 discrete depth groundwater samples to assess the presence of elevated CVOCs in
12 groundwater. Groundwater samples will be collected and analyzed for CVOCs at locations
13 identified as most likely containing significantly elevated CVOC concentrations. The results
14 will be used to refine the location and size of the contaminated zone requiring treatment
15 with ZVI injection in Phase II of the IM.

16 For further assessing MNA occurrence within the CVOC plume, additional monitoring
17 wells will be installed. The CMS for SWMU 39 identified potential locations for these
18 additional monitoring wells. The final locations of these wells are presented in Section 2.0.

19 Other activities to be performed as part of this Phase I of the IM include additional
20 delineation soil sampling in the area between SWMUs 39 and 42, and installation and
21 sampling of an additional deep zone monitoring well in the southwestern part of SWMU 42.

22 The Phase II of the IM Work Plan, which will be submitted after the Phase I field work is
23 completed, will include detailed methodology for implementing the ZVI source control IM.

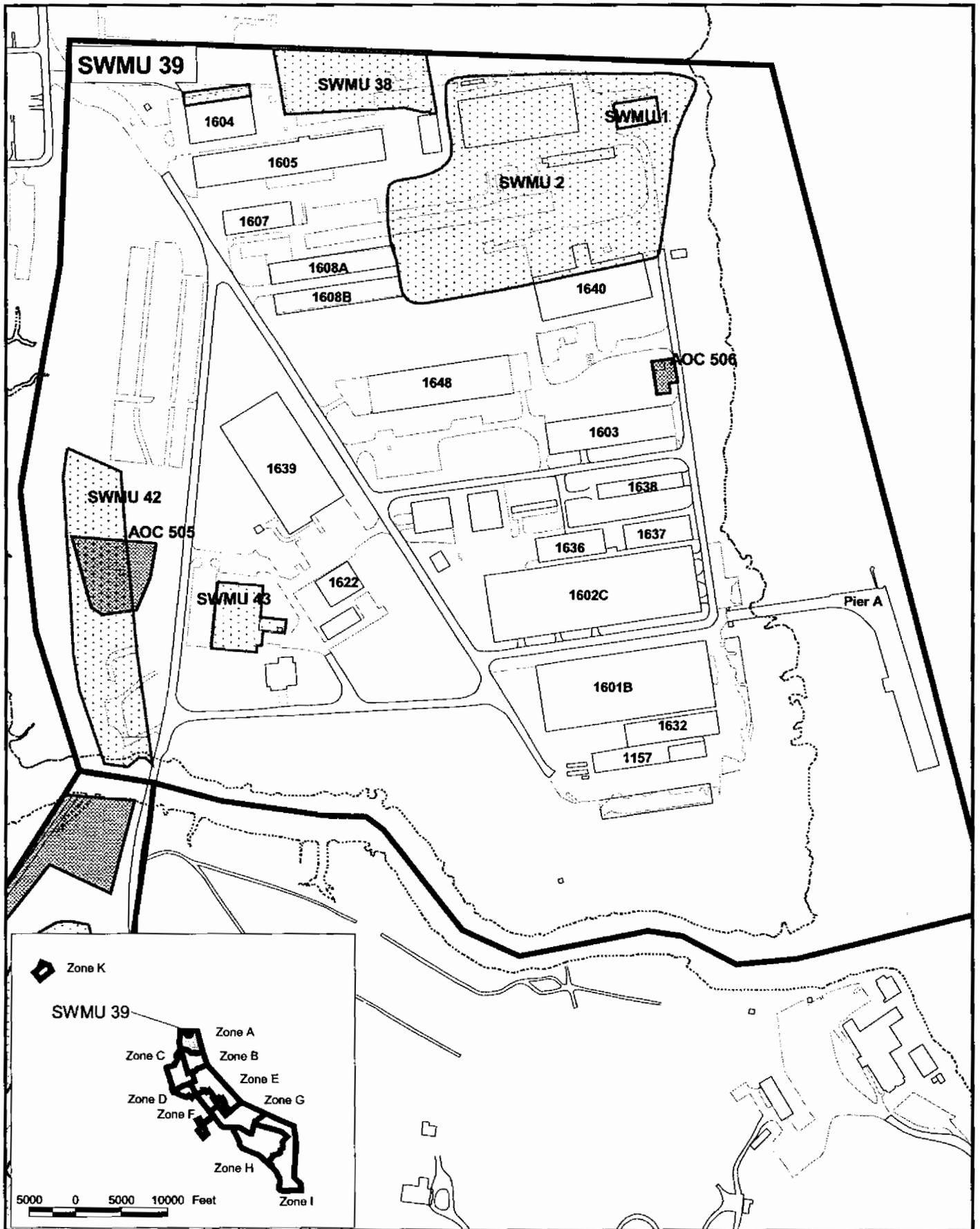
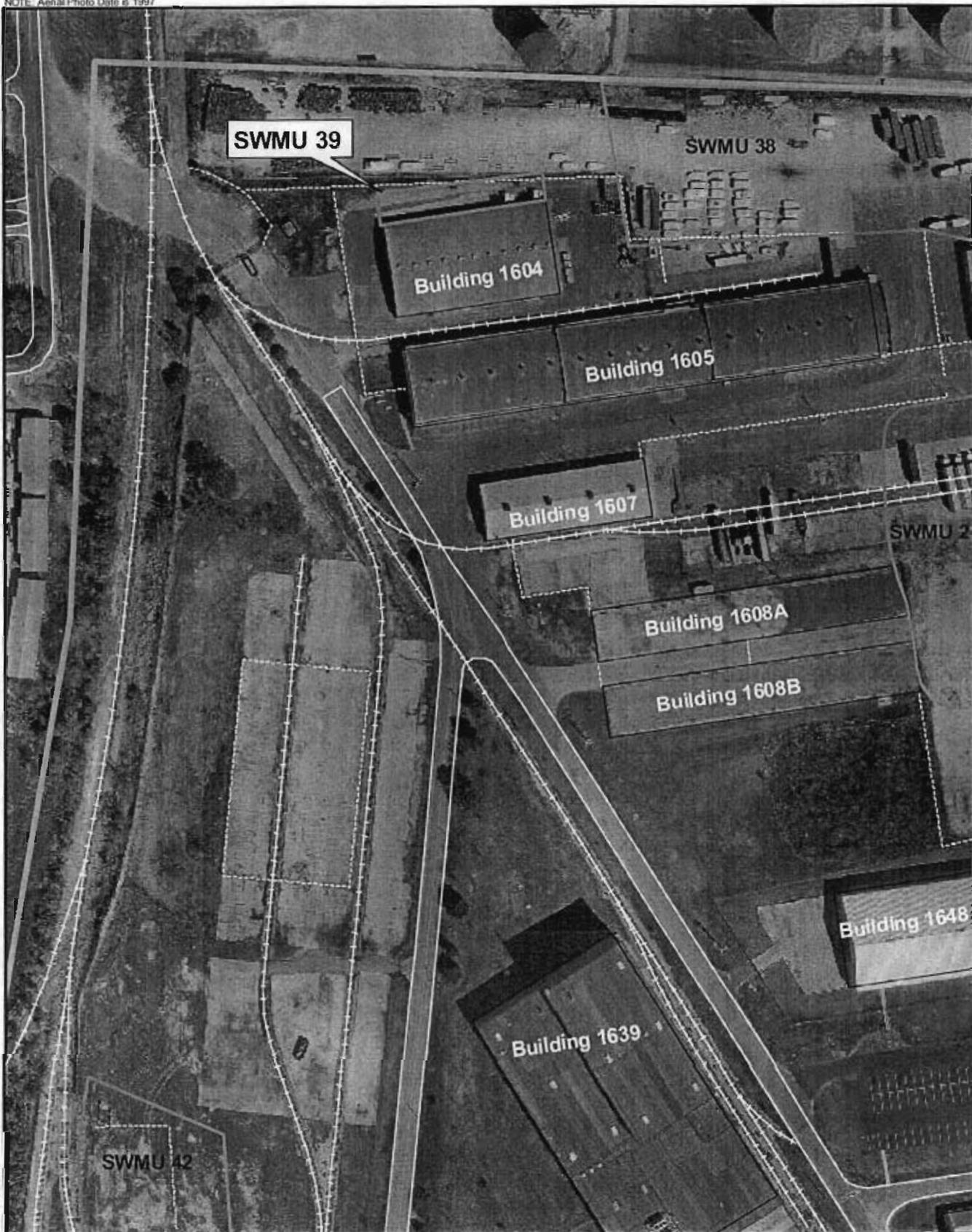


Figure 1-1
 Location of SWMU 39 in Zone A
 SWMU 39, Zone A
 Charleston Naval Complex

0 300 600 Feet

NOTE: Aerial Photo Date is 1997



-  SWMU Boundary
-  Buildings
-  Zone Boundary
-  Fence
-  Railroads
-  Roads



0 100 200 Feet



Figure 1-2
Aerial Photo View of SWMU 39 Area
SWMU 39, Zone A
Charleston Naval Complex

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Section 2.0

2.0 Phase I Interim Measure Activities

Previous investigations at SWMU 39 indicate that the highest levels of CVOCs in groundwater occur near Buildings 1608A and 1608B. Additional refinement of the extent of this source area is required prior to attempting to actively remediate it.

2.1 Groundwater Source Delineation Technical Approach

The Phase I groundwater source delineation activities will involve installing additional DPT borings and collecting groundwater samples to attempt to provide more detail regarding the locations of CVOCs in groundwater at SWMU 39 that exceed 1,000 micrograms per liter ($\mu\text{g}/\text{L}$).

2.1.1 Sampling Rationale

In the CMS Report for SWMU 39, available monitoring well and DPT groundwater analytical data were compiled and subjected to geostatistical kriging in the Environmental Visualization System (EVS) 3-dimensional (3-D) visualization software package. The results, presented in Figures 2-1 and 2-2, depict interpretations of the horizontal and vertical extent of total CVOCs in groundwater at concentrations exceeding 1,000 $\mu\text{g}/\text{L}$.

The location and elevation of the surficial aquifer source area shown on Figures 2-1 and 2-2 includes an area adjacent to the north central portion of Building 1608A, designated Target Treatment Area (TTA) 1A, at a depth of approximately 48 to 50 feet below land surface (ft bls). A smaller area is also indicated by EVS adjacent to the south central portion of Building 1608B (known as TTA 1B), with an approximate depth of 47 to 48 ft bls.

New DPT borings will be positioned in a uniform grid along the north side of Building 1608A and along the south side of Building 1608B, centered around the previously detected high concentration and with an approximate horizontal spacing of 20 feet. Based on nearby DPT groundwater sampling results (borings A039GP074, A039GP095, and A039GP073), CVOC contamination is highest in the deep zone and is also present in the intermediate zone. The only COC detected in the shallow aquifer zone in these borings was cis-1,2-DCE, which was detected at 2 J $\mu\text{g}/\text{L}$ in boring A039GP095. Figures 2-3, 2-4, and 2-5 show the total CVOC concentrations in groundwater samples previously collected from the shallow, intermediate, and deep zones of the surficial aquifer, respectively.

2.1.2 DPT Groundwater Sampling Methodology

A Geoprobe™ equipped DPT drill rig will be used to recover groundwater samples. The Geoprobe™ stainless steel sampling screen (approximately 2-ft or 4-ft long) with retractable cover will be used to collect discrete groundwater samples for chemical analysis at multiple aquifer depth intervals within each boring.

Prior to collecting groundwater samples, one continuous lithologic core boring will be completed within the boundaries of both TTA 1A and TTA 1B to provide site-specific lithologic information regarding the occurrence of water-bearing strata and the depth to the Ashley Formation confining unit (expected at an approximate depth of 48 to 50 ft bls). The groundwater sample borings will be advanced to the intermediate and deep zones of the shallow aquifer system for sample collection.

Because CVOCs were not detected in the shallow zone of the surficial aquifer at the previous DPT borings in the TTAs, and because the goal is to identify the general size and morphology of the suspected deep source area, the shallow interval will not be sampled. DPT groundwater samples will be collected at one 4-ft interval in the intermediate zone (approximately 24 to 28 ft bls), and at up to three 2-ft intervals in the deep zone (approximately 36 to 38 ft bls, 40 to 42 ft bls, and 44 to 46 ft bls). The deepest sample will be collected just above the top of the Ashley Formation. The exact sampling depths will be based on local lithology. The proposed DPT groundwater sampling locations are presented in Figure 2-6. At TTA 1A, 6 to 10 borings will be advanced using a 20-ft square grid, as shown. For TTA 1B, four to eight borings will be advanced using a 15-ft square grid. The sampling stations will be designated A039GW115 through A039GP137.

The borings will be installed in a staged fashion. Initially, the first four to six borings at each location will be installed. After receipt of the groundwater CVOC analytical data from these borings, the specific additional borings that need to be installed will be determined.

The sampling will be conducted as the Geoprobe™ is advanced; the intermediate interval in each boring will be sampled first, then the Geoprobe™ sampler and rods will be removed from the boring and a clean sampler/screen will be installed, at which point the boring will be advanced to the deep sampling interval. Groundwater samples will be withdrawn with clean Teflon™ tubing and a peristaltic pump, placed directly into labeled sample containers, chilled, and shipped to the laboratory for volatile organic compound (VOC) analysis by EPA SW-846 methods.

1 Upon completion of sampling, each boring will be backfilled to the land surface with
2 cement-bentonite grout, and its location coordinates established by a licensed land surveyor.

3 **2.2 Additional Soil and Groundwater Sampling Approach**

4 Additional soil sampling in the area adjacent to the railroad lines between SWMUs 39 and
5 42 has been agreed upon in order to address concerns regarding potential impacts from
6 activities in this area. Additional groundwater monitoring wells also will be installed as
7 previously agreed upon to assess the VOC plume migration.

8 **2.2.1 Soil Sampling**

9 The surface and subsurface soils in the area of the concrete pads adjacent to the railroad
10 lines in the area between SWMUs 39 and 42 area may have been impacted by past storage
11 activities. The concrete paved area covers a portion of the ground west of Avenue D and
12 north of the original SWMU 42 boundary.

13 To investigate the potential for shallow soil contamination via runoff from the concrete area,
14 three soil borings will be installed in the low-lying grassy area adjacent to, and just west of,
15 the concrete pavement edge where stormwater runoff may have accumulated or infiltrated.
16 The proposed sample locations are shown on Figure 2-7. In each boring, a surface soil
17 sample (0 to 1 ft bls) and a subsurface soil sample (3 to 5 ft bls) will be collected. The
18 sampling stations will be designated A039SB069 through A039SB071.

19 The collected samples will be shipped to the subcontractor laboratory and analyzed for
20 VOCs and metals.

21 **2.2.2 Monitoring Well Installation and Sampling**

22 To improve monitoring of the groundwater CVOC plume in southern Zone A near Noisette
23 Creek, one new monitoring well will be installed in the deep interval of the surficial aquifer.
24 The well location selected by the BCT lies in the southwestern portion of Zone A and is
25 shown on Figure 2-8. The new well, designated A039GW29D, will be installed just above the
26 top of the Ashley Formation confining layer, estimated to occur at a depth of approximately
27 45 ft bls at this location. A 10-ft screen length will be used, resulting in a monitored interval
28 at approximately 35 to 45 ft bls, which is consistent with other existing deep zone
29 monitoring wells in the area.

1 Additionally, four new monitoring wells (two intermediate and two deep) will be installed
2 along the western boundary of the CNC to confirm that offsite migration of the CVOC
3 plume in this area is not occurring. These well locations are also shown in Figure 2-9.

4 In addition, new intermediate and deep zone monitoring wells will be installed in Zone A
5 during Phase I of the IM to augment the existing groundwater monitoring network. The
6 new wells will be positioned to provide additional information about the effectiveness of the
7 MNA remedial alternative at potential downgradient plume migration TTAs. The proposed
8 locations for the two new intermediate wells and three deep wells in relation to the Zone A
9 CVOC plume are shown on Figure 2-10. The wells will be screened to monitor the same
10 surficial aquifer intervals as nearby existing intermediate and deep zone monitoring wells.
11 All new monitoring wells will be installed and constructed using methods and materials
12 consistent with other existing Zone A monitoring wells (polyvinyl chloride [PVC] casing
13 and screen, locking cover, and protective barrier posts [bollards]). After the wells are
14 installed and developed, groundwater samples will be collected, shipped to the laboratory
15 and analyzed for VOCs using EPA SW-846 methods.

16 **2.3 Well and Soil Boring Installation and Abandonment**

17 A State of South Carolina certified well driller will be utilized for monitoring well
18 installation on this project. The driller will be supervised by a CH2M-Jones field
19 hydrogeologist or engineer who will be responsible for the conduct of all field activities. Soil
20 boring/well construction logs will be prepared documenting the geologic units encountered
21 and the details of well construction for submittal to SCDHEC.

22 Upon completion of sampling, soil borings will be filled to the land surface with bentonite
23 grout, in accordance with Rule 61-71.10.B of the South Carolina Well Standards and
24 Regulations. Soil boring and well locations will be marked with the station identification
25 (ID) for the survey team to establish horizontal location coordinates (and vertical elevations
26 relative to mean sea level [msl] for monitoring wells).

27 **2.4 SCDHEC Well Installation Request**

28 In accordance with Rule R.61-79.265, Subpart F of the South Carolina Hazardous Waste
29 Management Regulations and R.61-71 of the South Carolina Well Standards and
30 Regulations, a request for the advancement of the monitoring well/soil borings is required
31 to be submitted to SCDHEC two weeks prior to the scheduled activity. The written request
32 describes the purpose of the boring/well installation activity at SWMU 39, SWMU 42 and

1 AOC 505; presents well construction details; and presents a map showing the proposed
2 locations and proposed abandonment techniques, as appropriate.

3 **2.5 Waste Management and Disposal**

4 The investigation-derived waste (IDW) that is expected to be generated as part of this
5 investigation include pavement debris, soil cuttings, well purge water, equipment
6 decontamination wastes, and used personal protective equipment (PPE). As it is generated,
7 the IDW will be containerized in labeled 55-gallon drums and characterized in accordance
8 with South Carolina Hazardous Waste Management Regulations (SCDHEC R.61-79.261).
9 Filled containers will be transported to the less than 90-day storage facility located at
10 Building 1824. After analytical results have been received and reviewed, the containers will
11 be transported to a permitted and licensed facility for proper treatment/disposal.

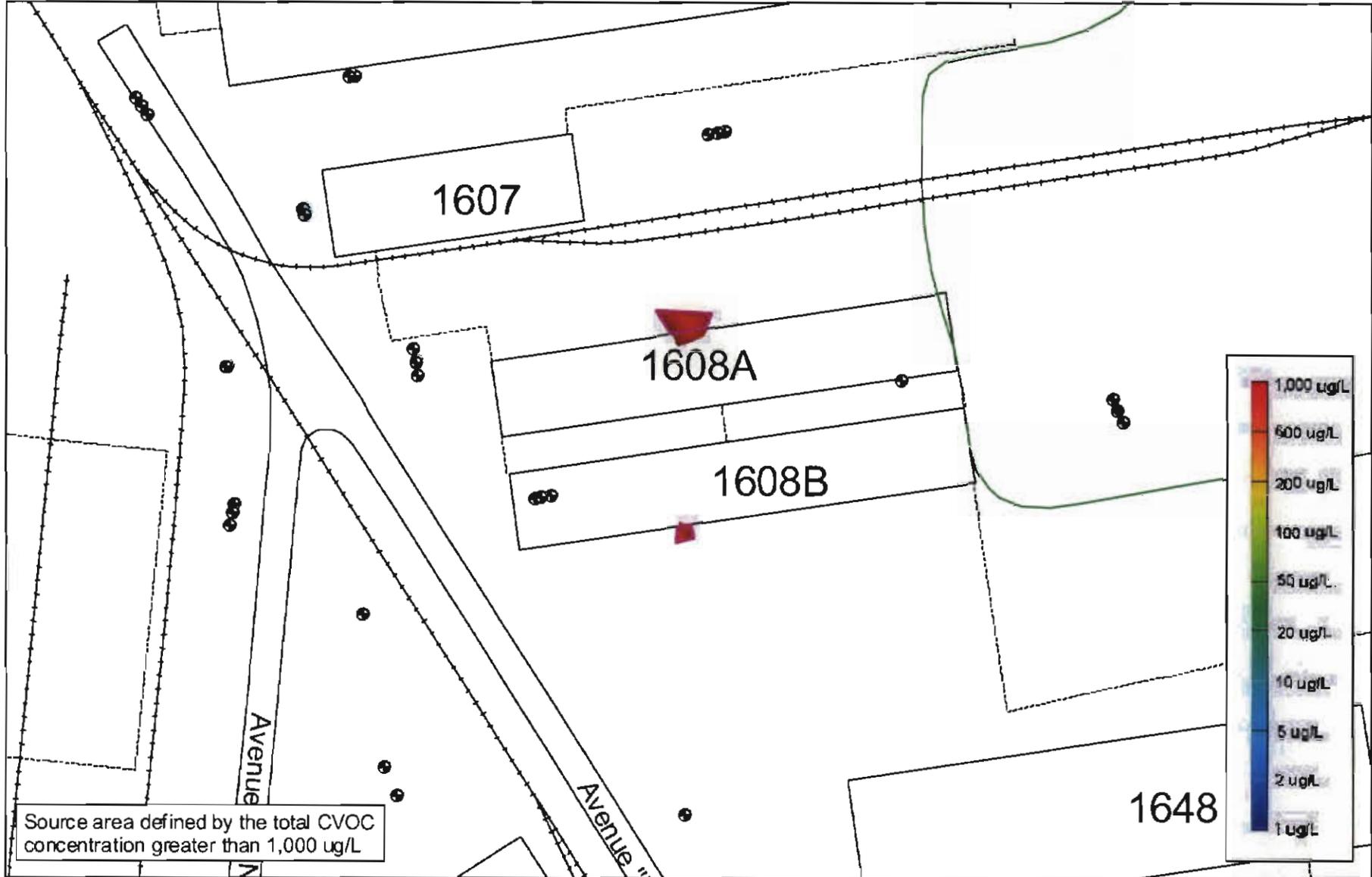
12 **2.6 Sample Handling and Chain of Custody**

13 Sample collection procedures and site conditions at the time of sampling will be
14 documented in a field logbook by the field team leader. Samples will be collected in
15 prepared containers supplied by the lab vendor, using preprinted chain of custody
16 logsheets and coolers for transport of the samples. Samples will be iced as appropriate and
17 transported by the sampling team to the lab for analysis, maintaining the chain of custody at
18 all times after sampling occurs and until the analysis is complete. Sample handling
19 procedures will adhere to the standard procedures described in the approved
20 Comprehensive Sampling and Analysis Plan (CSAP) portion of the CNC RCRA Facility
21 Investigation (RFI) Work Plan (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1994).

22 **2.7 Analysis of Samples**

23 The samples will be delivered to a subcontracted laboratory for chemical analysis of VOCs
24 by EPA SW-846 methods and/or standard operating procedures (SOP) for screening
25 methods to achieve EPA Level II data quality objectives (DQO). The subcontracted lab will
26 meet the EPA Level II DQO criteria specified in the approved CNC CSAP (EnSafe, 1996).
27 Sample analysis will be performed in accordance with the guidance in EPA's *Test Methods*
28 *for Evaluating Solid Waste, SW-846, Revision 4* (EPA, 1996), Office of Solid Waste and
29 Emergency Response (OSWER), and in the EPA *Environmental Services Division Laboratory*
30 *Operations and Quality Control Manual* (ESDLOQCM) (1997).

NOTE: Original figure created in color



- Monitoring Well
- Target Treatment Area
- Fence
- Railroads
- Roads
- Shoreline
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

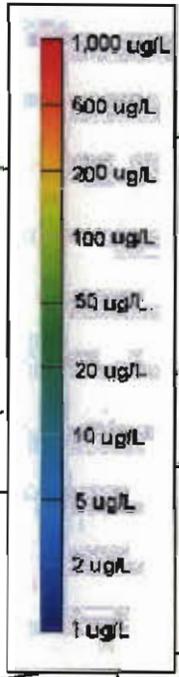
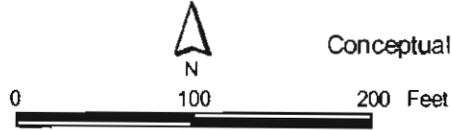
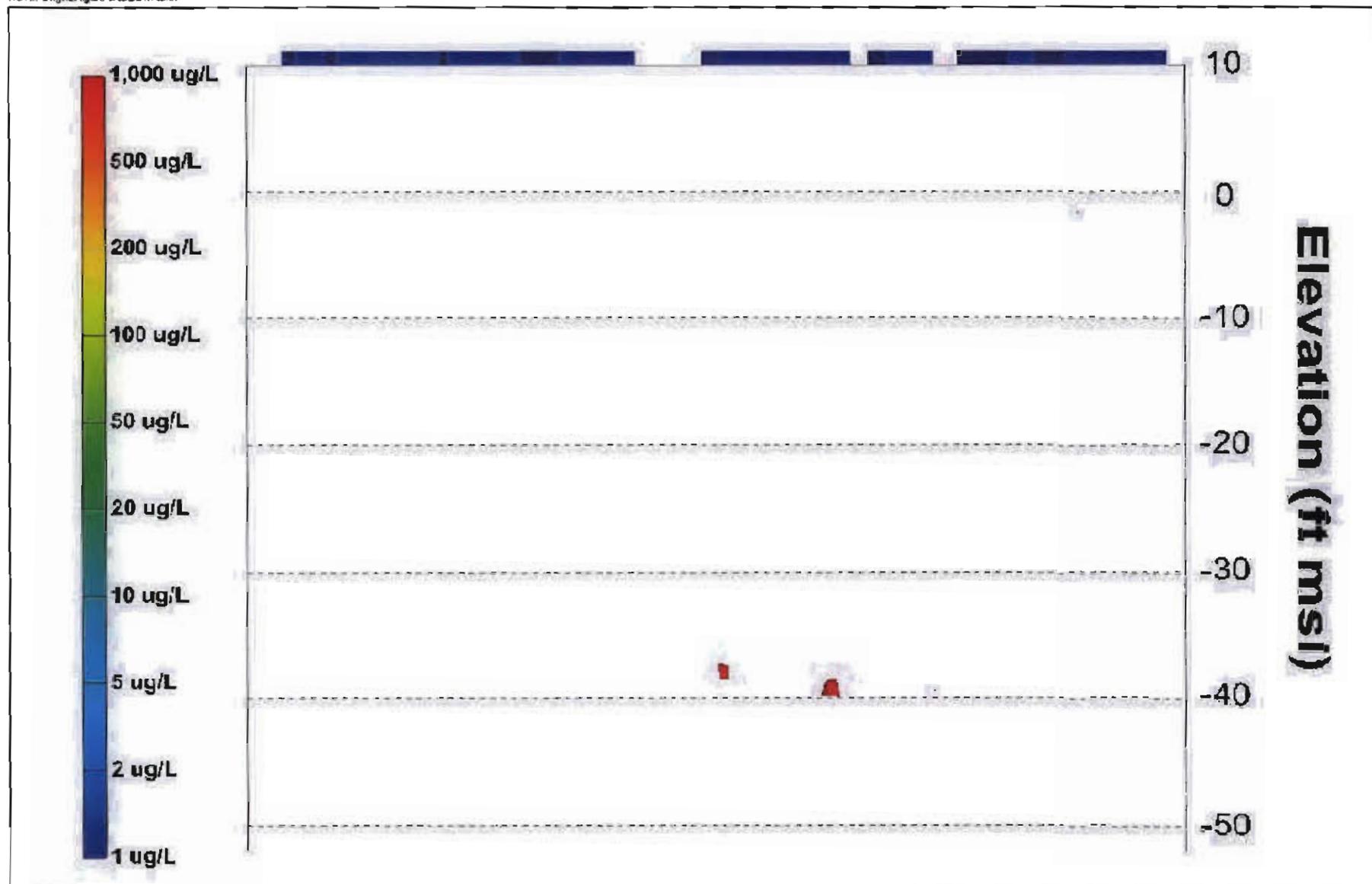


Figure 2-1
 Conceptual Source Control Target Treatment Areas - 3-D Plan View
 SWMU 39, Zone A
 Charleston Naval Complex

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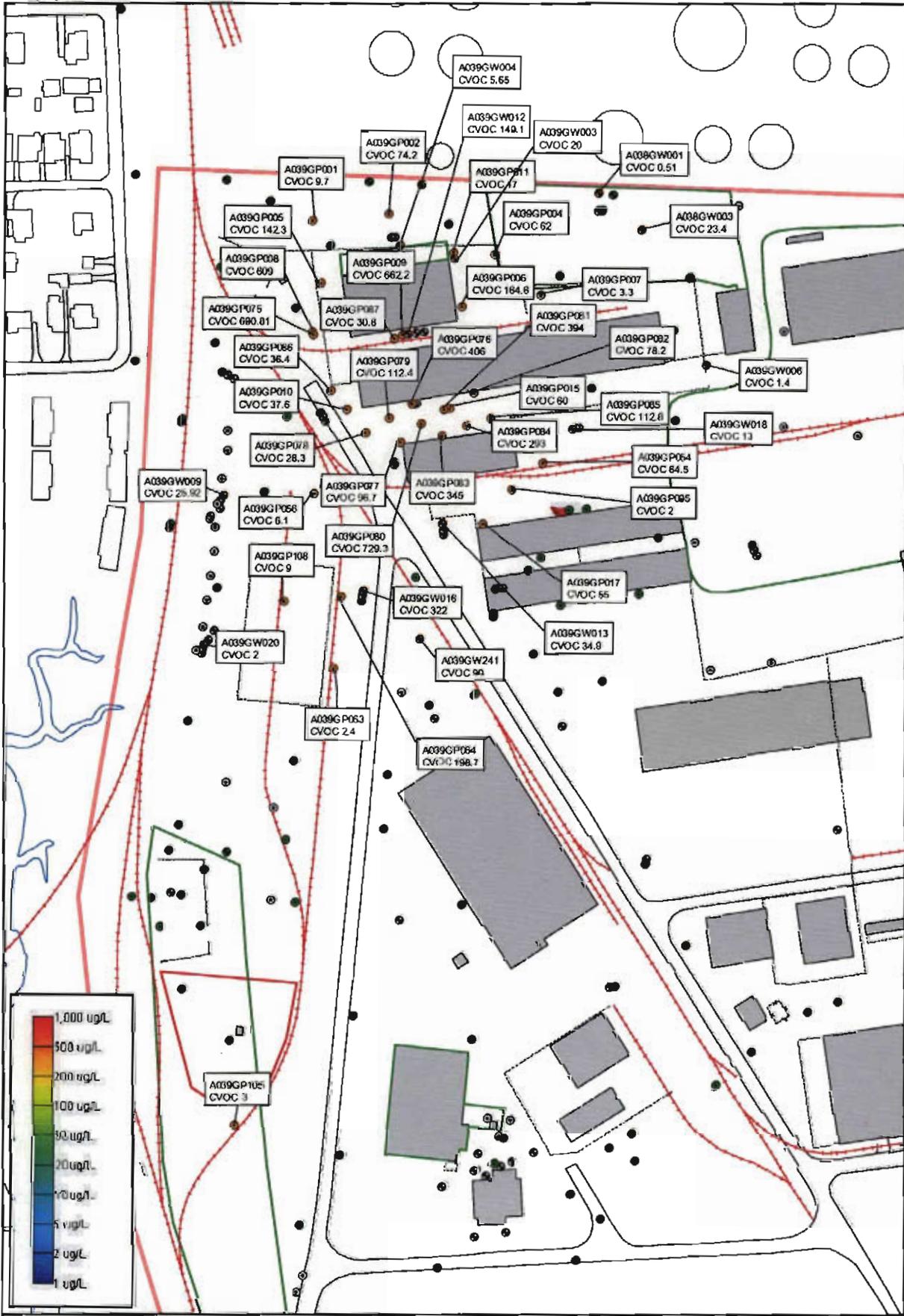
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Source area defined by the total CVOC concentration greater than 1,000 ug/L

Figure 2-2
Conceptual Source Control Target Treatment Areas - 3-D Profile (West View)
SWMU 39, Zone A
Charleston Naval Complex

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- Groundwater Well - Analyte Detected
- Groundwater Well - No Analyte Detected
- Groundwater Well - Not Sampled
- Groundwater Probe - Analyte Detected
- Groundwater Probe - No Analyte Detected
- Groundwater Probe - Not Sampled
- Fence
- Railroads
- Roads
- Shoreline
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

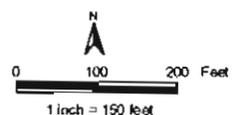
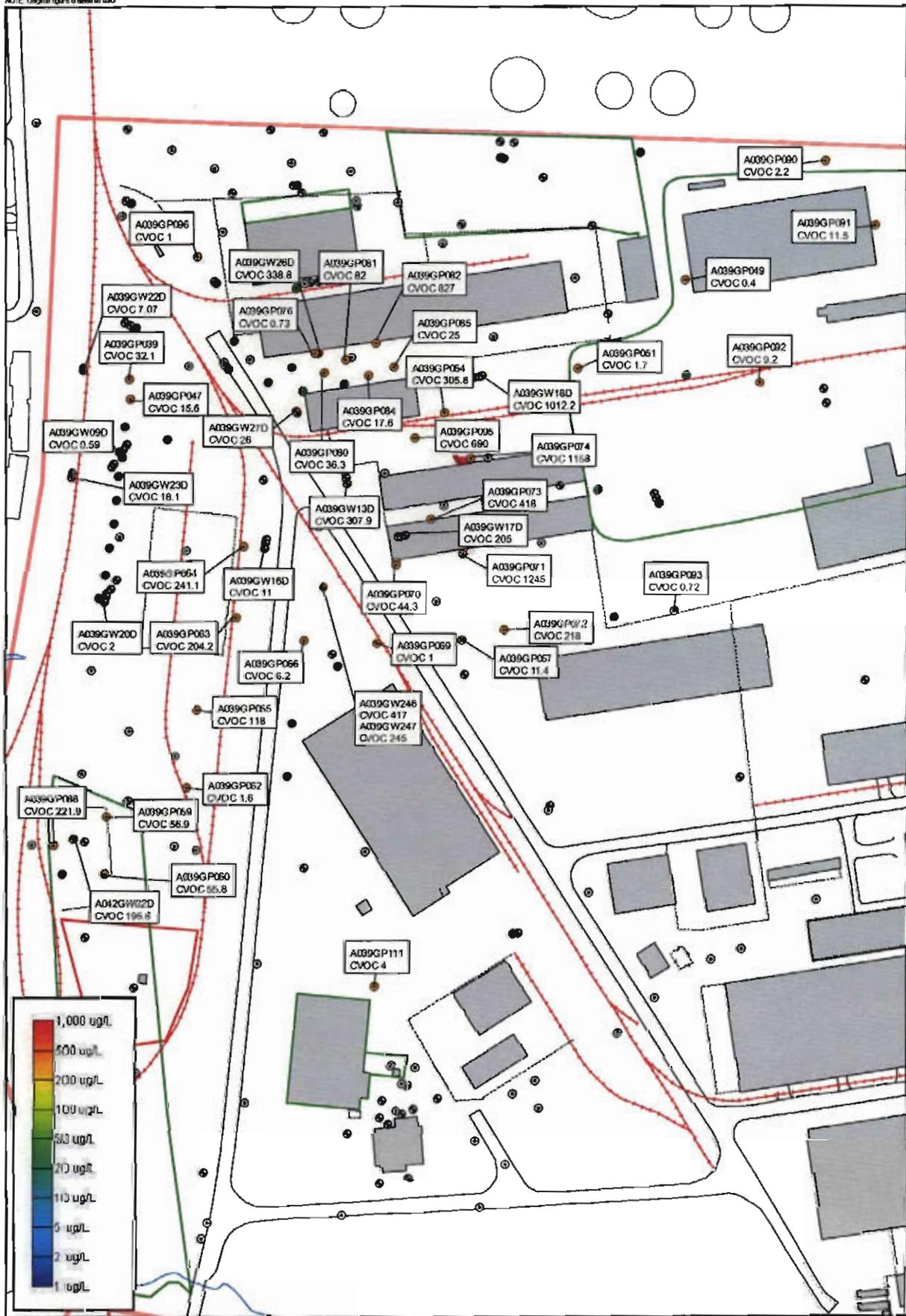


Figure 2-3
 Total CVOC Concentrations
 Surficial Aquifer - Shallow Zone
 SWMU 39, Zone A
 Charleston Naval Complex



- Groundwater Well - Analyte Detected
- Groundwater Well - No Analyte Detected
- Groundwater Well - Not Sampled
- Groundwater Probe - Analyte Detected
- Groundwater Probe No Analyte Detected
- Groundwater Probe - Not Sampled
- Fence
- Railroads
- Roads
- Shoreline
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

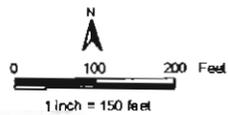
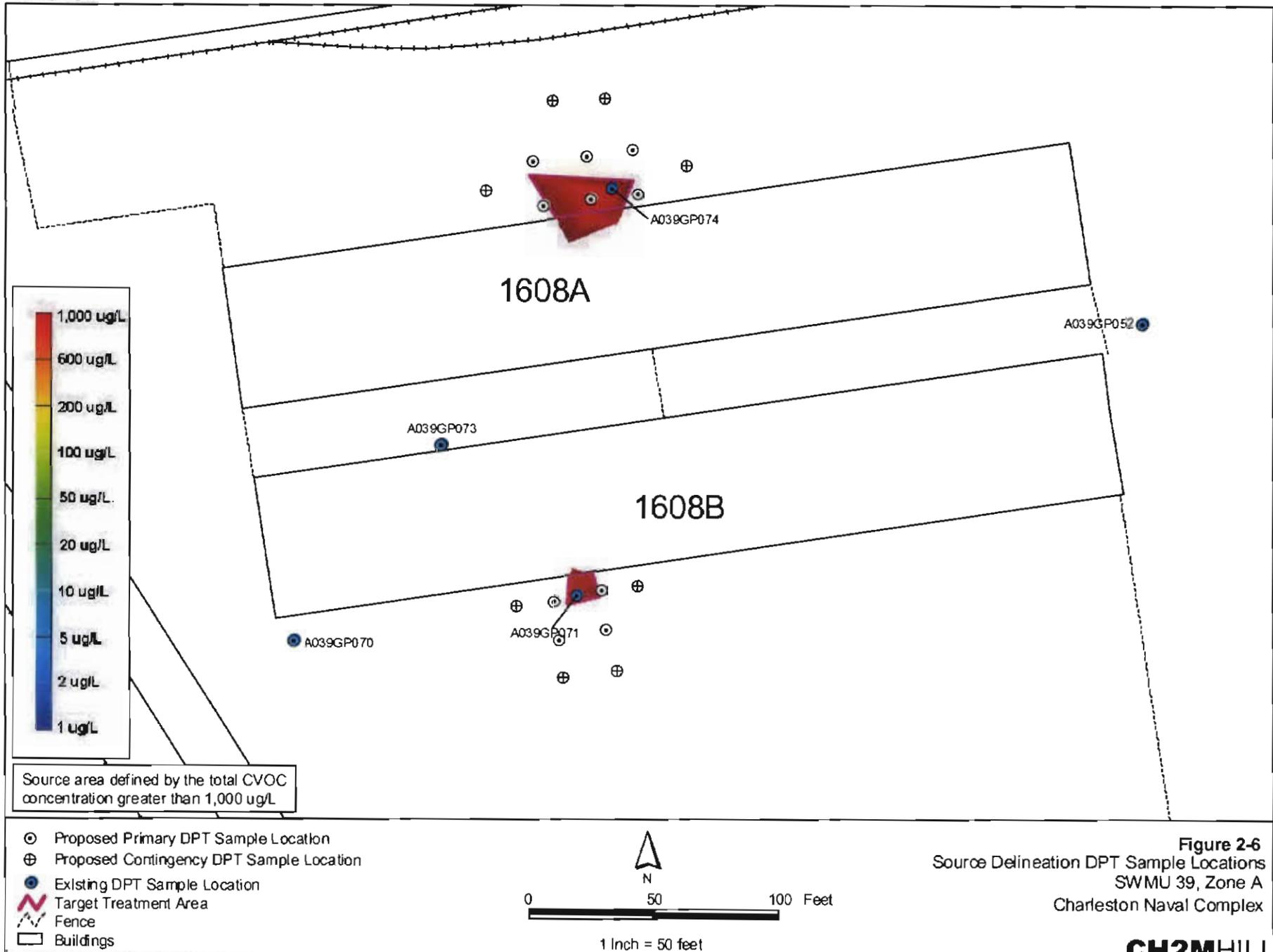


Figure 2-5
 Total CVOC Concentrations
 Surficial Aquifer - Deep Zone
 SWMU 39, Zone A
 Charleston Naval Complex

NOTE: Original figure created in color



Source area defined by the total CVOC concentration greater than 1,000 ug/L

Figure 2-6
Source Delineation DPT Sample Locations
SWMU 39, Zone A
Charleston Naval Complex

CH2MHILL

NOTE: Original figure created in color

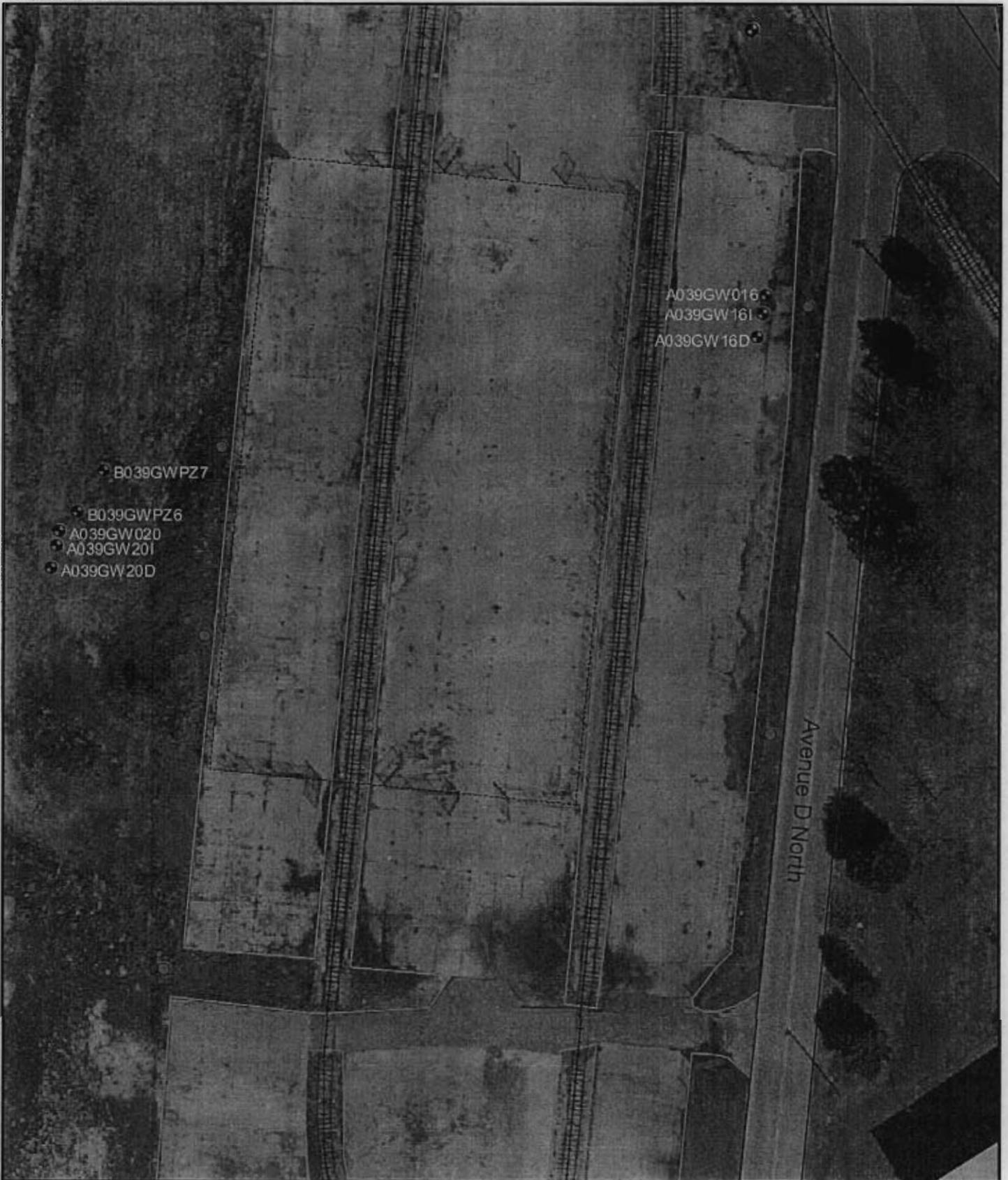


Figure 2-7
New Soil Sample Locations
SWMU 42 and AOC 505, Zone A
Charleston Naval Complex

- Proposed Soil Boring
- Groundwater Well

- ∩ Fence
- ∩ Railroads
- ∩ Roads
- ∩ Shoreline

- SWMU Boundary
- Zone Boundary

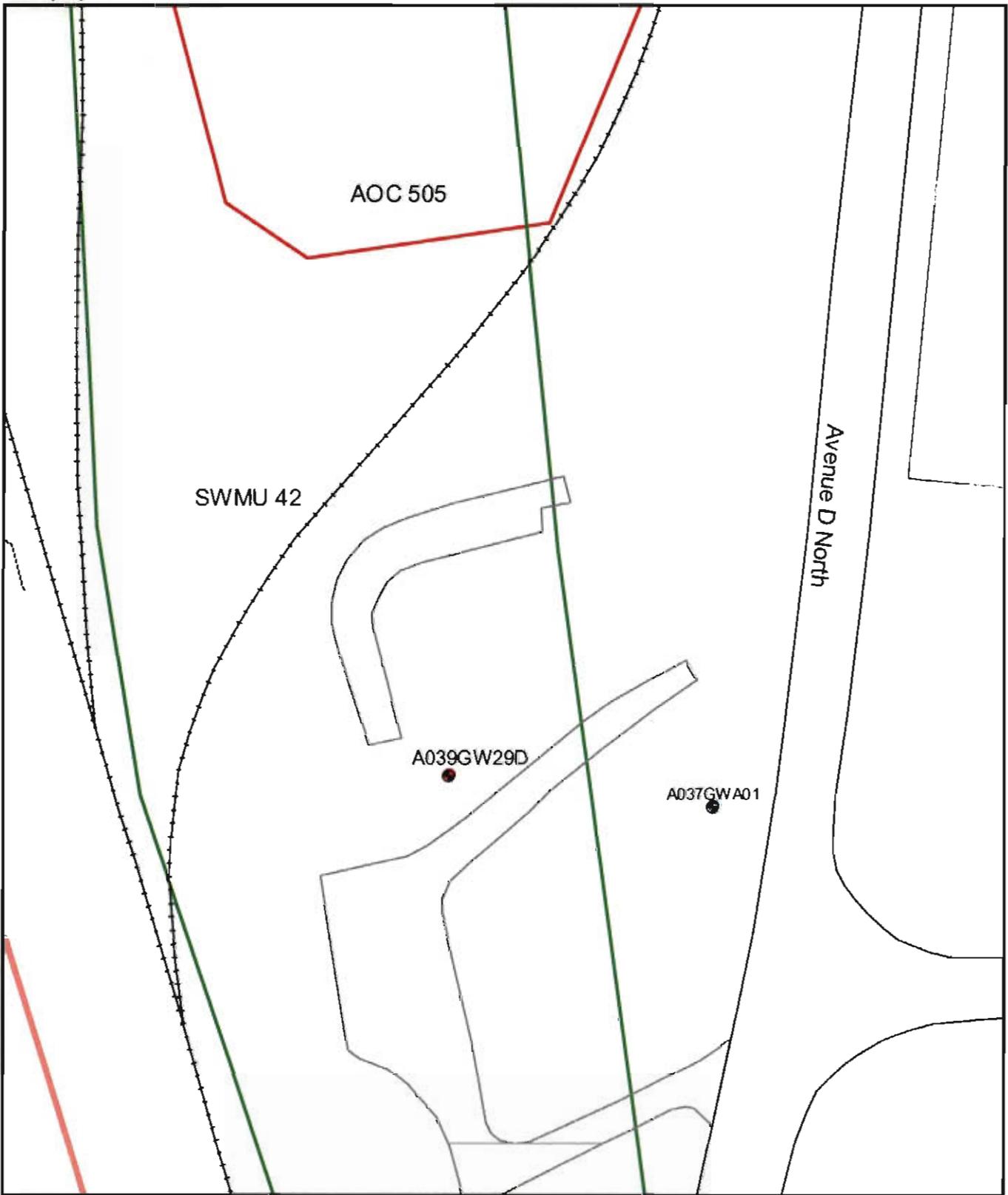


50 0 50 Feet

1 inch = 50 feet

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NOTE: Original figure created in color



- Proposed Deep Monitoring Well
- Groundwater Well
- - - Fence
- / - / Railroads
- / - / Roads
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Zone Boundary

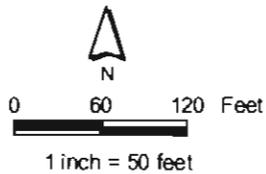


Figure 2-8
New Well Locations
SWMU 42 and AOC 505, Zone A
Charleston Naval Complex

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NOTE: Original figure created in color



- Proposed Intermediate Monitoring Well
- Proposed Deep Monitoring Well
- Monitoring Well
- Target Treatment Area
- ⚡ Fence
- ⚡ Railroads
- ⚡ Roads
- ⚡ Shoreline
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Buildings
- ▭ Zone Boundary

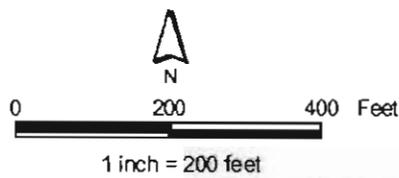


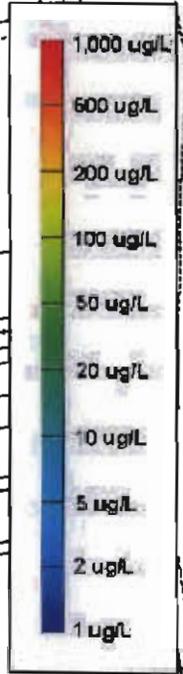
Figure 2-9
 Conceptual Property Boundary Contaminant
 Migration Control Target Treatment Area
 SWMU 39, Zone A
 Charleston Naval Complex

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NOTE: Original figure created in color



3-D Plan View is Depiction of Total CVOC Distribution at 50 ug/L



- Proposed Intermediate Monitoring Well
- Proposed Deep Monitoring Well
- Monitoring Well
- Target Treatment Area
- ⚡ Fence
- ⚡ Railroads
- ⚡ Roads
- ⚡ Shoreline
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Buildings
- ▭ Zone Boundary

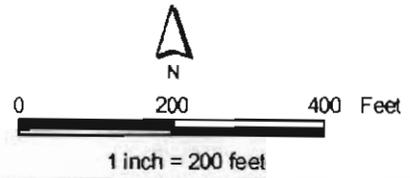


Figure 2-10
 Conceptual Downgradient Contaminant Migration Control Target Treatment Areas
 SWMU 39, Zone A
 Charleston Naval Complex

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Section 3.0

1 **3.0 Project Management**

2 The IM will be conducted by the CH2M-Jones team under the supervision of the Navy and
3 the guidance of SCDHEC. CH2M-Jones will be responsible for procuring, coordinating, and
4 supervising all subcontractor labor necessary to complete the work, such as drilling,
5 surveying, and laboratory analysis of samples. As members of the BCT, the Navy and
6 SCDHEC both have review and approval authority for all plans and reports generated in
7 support of this IM. The CH2M-Jones Engineer of Record for this IM will be Dean
8 Williamson, P.E. The primary point of contact for the IM field work and reporting will be
9 Bill Elliott. The various project management requirements for successful completion of this
10 work are discussed in more detail below.

11 **3.1 Quality Assurance Requirements**

12 The field work and laboratory work conducted as part of the SWMU 39 IM will be
13 performed in accordance with the requirements of the approved CSAP (EnSafe, 1996) and
14 the EPA ESDSOPQAM (1996).

15 The overall DQOs are EPA Level III DQO for contaminant identification and quantification.
16 The required field and QA/QC samples will be collected as required by the CSAP.
17 Subcontractor data will be validated by the CH2M-Jones project chemist prior to final
18 interpretation and submittal.

19 **3.2 Data Management Requirements**

20 The field data documentation procedures and laboratory data deliverables will be in
21 accordance with the approved CSAP and the ESDSOPQAM. Field documentation includes
22 site photographs, field sampling logbooks, sample shipping chain of custody forms, soil
23 boring logs, well construction forms and diagrams. Lab documentation includes raw data,
24 instrument calibration logs, sample custody forms, validation summary reports, and final
25 data deliverables.

26 **3.3 Reporting Requirements**

27 After completion of the field work, lab analysis of samples, and screening of analytical
28 results, the Phase I information will be used to refine the Phase II IM approach for the

1 source area treatment by ZVI injection, and a Phase II IM Work Plan will be prepared and
2 submitted. The Phase I results will be presented as an appendix to the Phase II Work Plan.
3 After completion of the Phase II source area and downgradient plume IM field activities, a
4 Revision 0 IM Report will be prepared and submitted to the BCT for review and comment.
5 BCT comments will be addressed in writing, and revised document pages or a full Revision
6 1 IM Report will be prepared and submitted for review.

7 **3.4 Health and Safety Requirements**

8 CH2M-Jones places significant emphasis on the health and safety of our personnel,
9 subcontractors, and the local community. All field work completed as part of this IM will be
10 performed in accordance with the CH2M-Jones Site-Specific Health and Safety Plan (CH2M-
11 Jones, 2000). Personnel working at the site will be required to comply with EPA Level D PPE
12 requirements, as specified in the Health and Safety Plan. Once all personnel have arrived at
13 the site as part of the mobilization for this CMI, a project briefing and health and safety
14 orientation meeting will be held; daily "tailgate" safety meetings will be conducted to
15 address any site-specific issue encountered during work.

Section 4.0

1 **4.0 Project Schedule**

2 The field work for Phase I of the IM is targeted to occur in September 2003, with an
3 approximate duration of two weeks. The laboratory turnaround schedule for producing
4 data reports is expected to be approximately four weeks from time of sampling. Data
5 quality review, flagging of data, and data validation are expected to require approximately
6 two weeks after receipt of the electronic data deliverable (EDD) from the lab. Data analysis
7 and the Phase II IM Work Plan preparation are expected to require approximately 30 days
8 following receipt of final validated data, placing an approximate report submittal date in
9 November 2003.

Section 5.0

1 **5.0 References**

- 2 CH2M-Jones. *Corrective Measures Study Report for SWMU 39, Zone A*. Revision 0. October 4,
3 2002a.
- 4 CH2M-Jones. *Corrective Measures Study Work Plan for SWMU 39, Zone A*. Revision 0. May 29,
5 2002b.
- 6 EnSafe Inc./Allen & Hoshall. *Final Comprehensive RFI Work Plan*. May 31, 1994.
- 7 EnSafe Inc./Allen & Hoshall. *Final Comprehensive Sampling and Analysis Plan, NAVBASE*
8 *Charleston*. July 30, 1996.
- 9 EnSafe Inc. *Zone A RCRA Facility Investigation Report, NAVBASE Charleston*. Revision 0.
10 August 7, 1998.
- 11 U.S. Environmental Protection Agency. *Environmental Services Division Laboratory Operations*
12 *and Quality Control Manual*. EPA, Environmental Services Division. 1996.
- 13 U.S. Environmental Protection Agency. *Environmental Services Division Standard Operating*
14 *Procedures and Quality Assurance Manual*. EPA, Region IV, Environmental Services Division.
15 1996.
- 16 U.S. Environmental Protection Agency. *Test Methods for Evaluating Solid Waste*. EPA-SW-
17 846, 3rd Revision. 1997.