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CORRECTIVE MEASURES IMPLEMENTATION PLAN PHASE 1 GROUNDWATER SOURCE
DELINEATION MONITORING WELL INSTALLATION, AND SOIL SAMPLING SOLID WASTE
MANAGEMENT UNIT 39 (SWMU 39) ZONE A CNC CHARLESTON SC

6/1/2003
CH2M HILL

CORRECTIVE MEASURES IMPLEMENTATION 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

June 2003

Revision No. 0
Contract N62467-99-C-0960
158814.ZA.EX.01

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Scan Date 5-21-09
Operator AL
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**Certification Page for Corrective Measures Implementation Plan
(Revision 0) — SWMU 39, Zone A**

Phase I - Groundwater Source Delineation

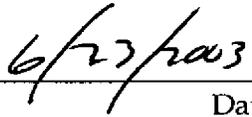
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.


Date

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1 Acronyms and Abbreviations

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

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 Corrective Measures Implementation Plan (CMIP) presents the technical approach for implementing corrective measures for groundwater at Solid Waste Management Unit (SWMU) 39. These corrective measures were selected in the *CMS Report for SWMU 39, Zone A, Revision 0* (CH2M-Jones, 2002b). 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 CMIP 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 Corrective Measures Implementation (CMI) groundwater remediation efforts.

1.1 Summary of Corrective Action Objectives

The CMIP will utilize the CA alternatives selected in the SWMU 39 CMS report to remediate chemicals of concern (COCs) present in 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 *CMS Work Plan, SWMU 39, Zone A, Revision 0* (CH2M-Jones, 2002a). No surface or subsurface soil COCs were identified at SWMU 39.

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

3 The Remedial Action Objectives (RAOs) identified in the CMS Report for SWMU 39
4 groundwater are:

5 1) to prevent ingestion and direct/dermal contact with groundwater having unacceptable
6 carcinogenic or non-carcinogenic risk;

7 2) to restore the aquifer to beneficial use, and

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

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

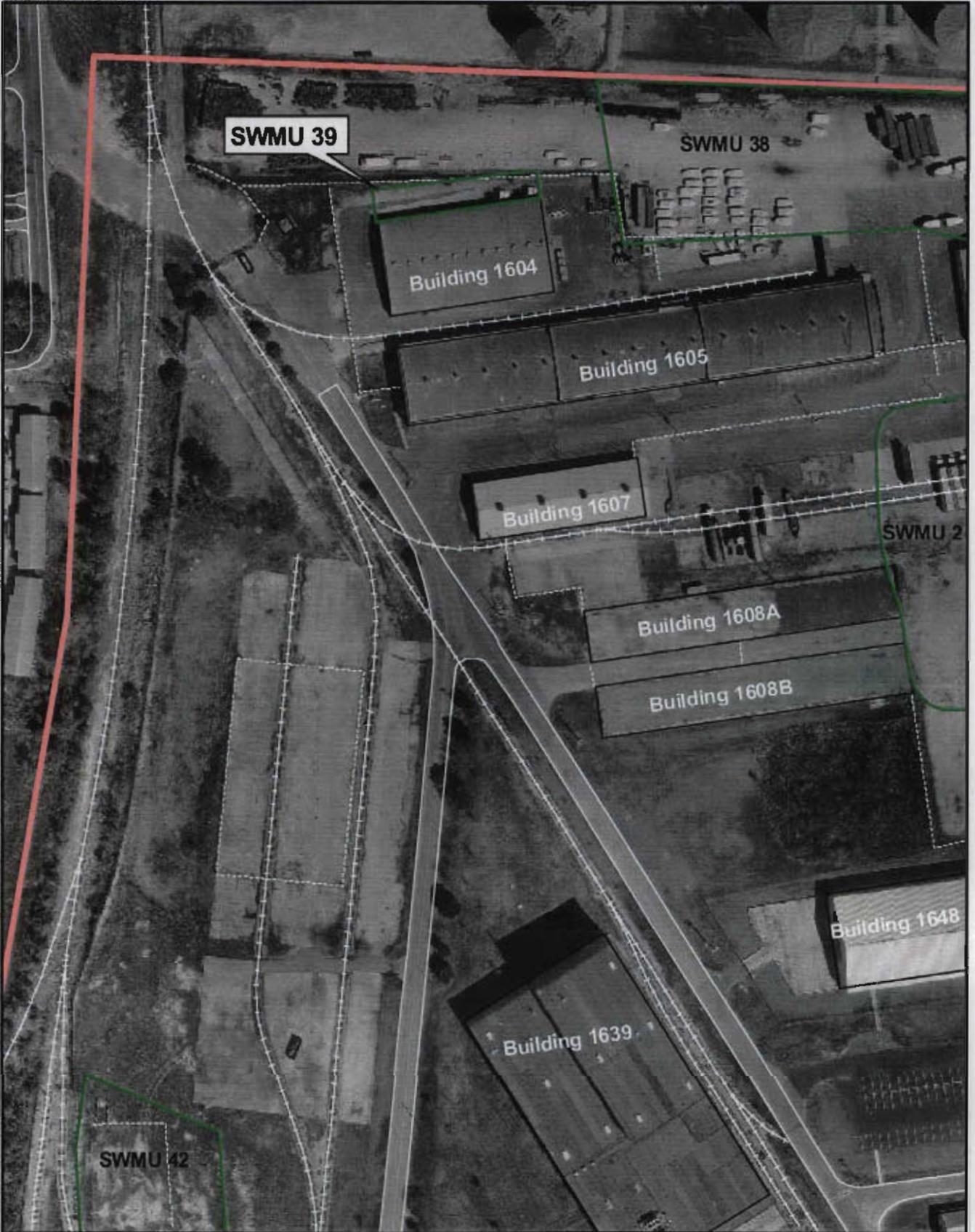
13 **1.1.1 Phasing of Corrective Measures Implementation**

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

21 In addition, additional monitoring wells needed to better assess the natural attenuation of
22 the CVOC plume will also be installed as part of the Phase I CMI.

23 **1.2 Description of Corrective Measures Selected**

24 The *CMS Report for SWMU 39, Zone A, Revision 0* (CH2M-Jones, 2002b) evaluated applicable
25 remedial alternative technologies for addressing both the suspected CVOC source area and
26 the CVOC plume. In situ chemical reduction (ISCR) using zero-valent iron (ZVI) injection
27 was selected as the preferred source control measure, and monitored natural attenuation
28 (MNA) was selected for the CVOC plume. The complete alternatives analysis, remedial
29 design criteria, and implementation cost estimates used in the screening and selection
30 process are presented in the CMS Report.



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

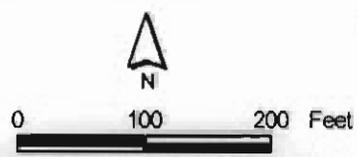


Figure 1-2
Aerial Photo View of SWMU 39 Area
SWMU 39, Zone A
Charleston Naval Complex

Section 2.0

2.0 Phase I Corrective Measures Implementation

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 which exceed 1,000 micrograms per liter ($\mu\text{g}/\text{L}$).

2.1.1 Sampling Rationale

In the SWMU 39 CMS Report, 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 here 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, six to ten 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, the Geoprobe™ sampler and rods will then be removed from the boring, a clean sampler/screen will be installed, and 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 VOC analysis by EPA SW-846 methods.

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

2.2 Additional Soil and Groundwater Sampling Approach

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

2.2.1 Soil Sampling

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

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

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

2.2.2 Monitoring Well Installation and Sampling

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

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

In addition, new intermediate and deep zone monitoring wells will be installed in Zone A during the Phase I CMI to augment the existing groundwater monitoring network. The new

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

11 **2.3 Well and Soil Boring Installation and Abandonment**

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

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

22 **2.4 SCDHEC Well Installation Request**

23 In accordance with Rule R.61-79.265, Subpart F of the South Carolina Hazardous Waste
24 Management Regulations and R.61-71 of the South Carolina Well Standards and
25 Regulations, a request for the advancement of the monitoring well/soil borings is required
26 to be submitted to SCDHEC two weeks prior to the scheduled activity. The written request
27 describes the purpose of the boring/well installation activity at SWMU 39, SWMU 42 and
28 AOC 505, presents well construction details, and presents a map showing the proposed
29 locations, and proposed abandonment techniques, as appropriate.

2.5 Waste Management and Disposal

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

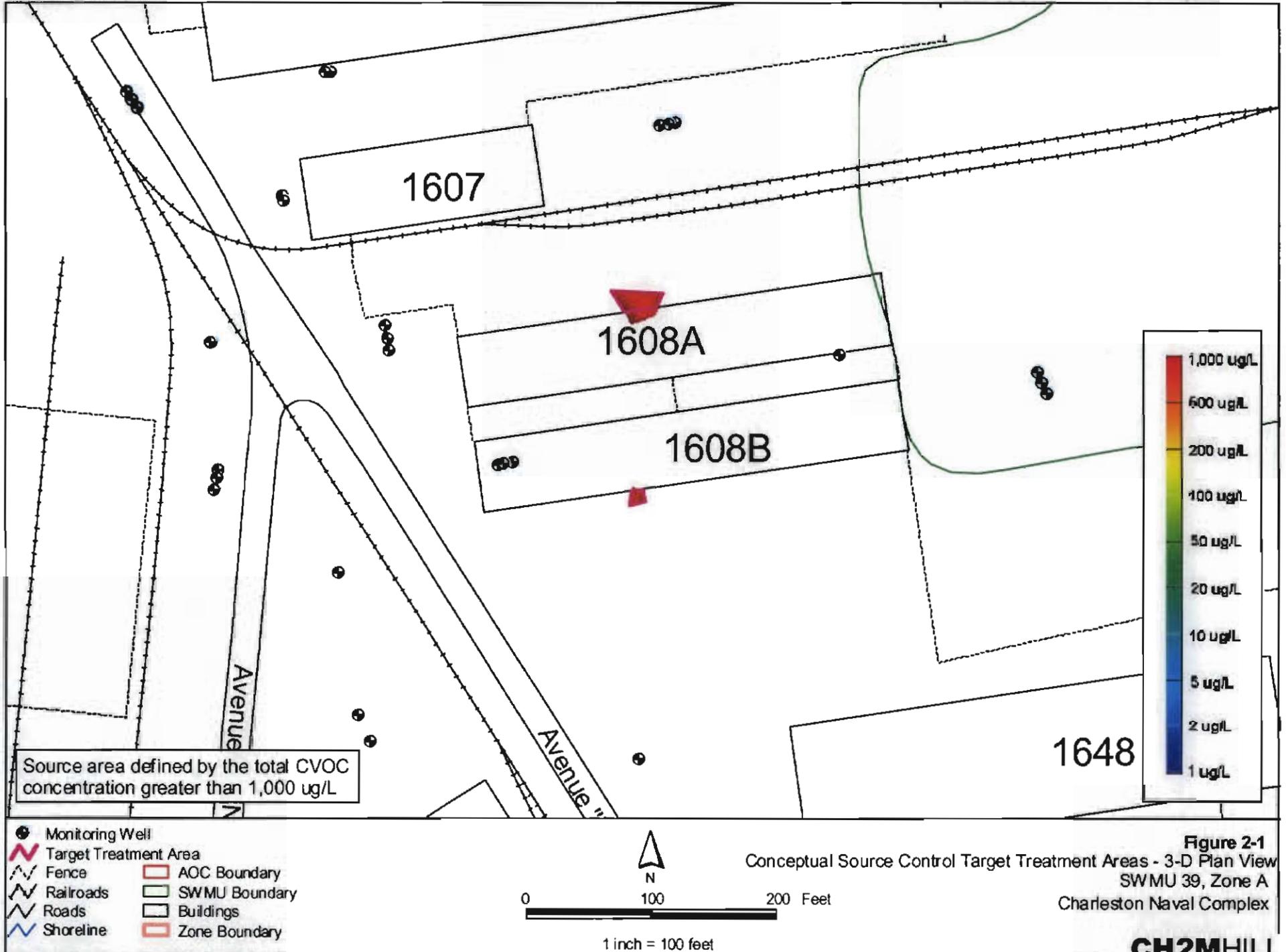
2.6 Sample Handling and Chain of Custody

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

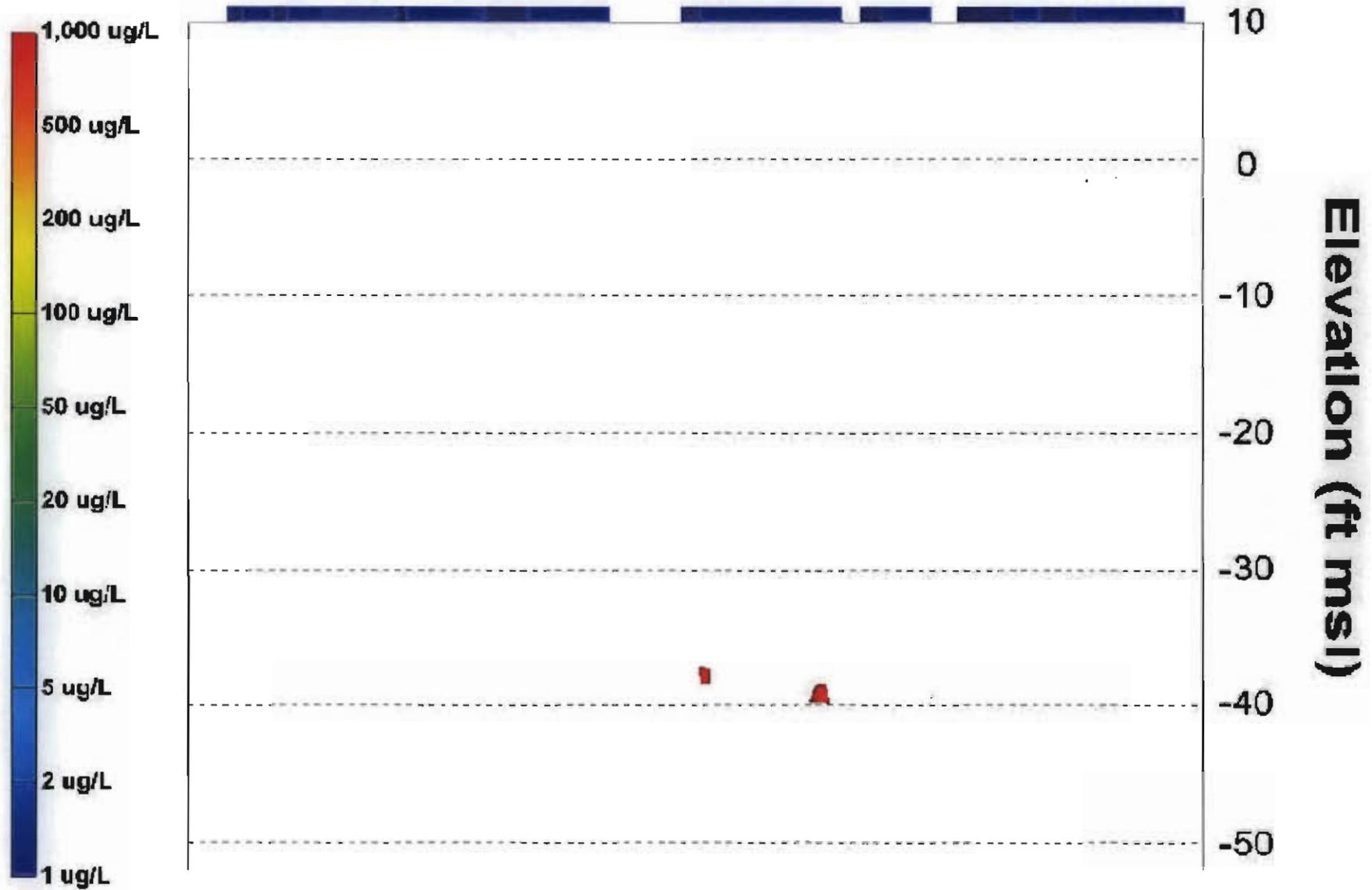
2.7 Analysis of Samples

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

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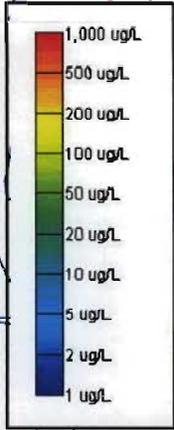
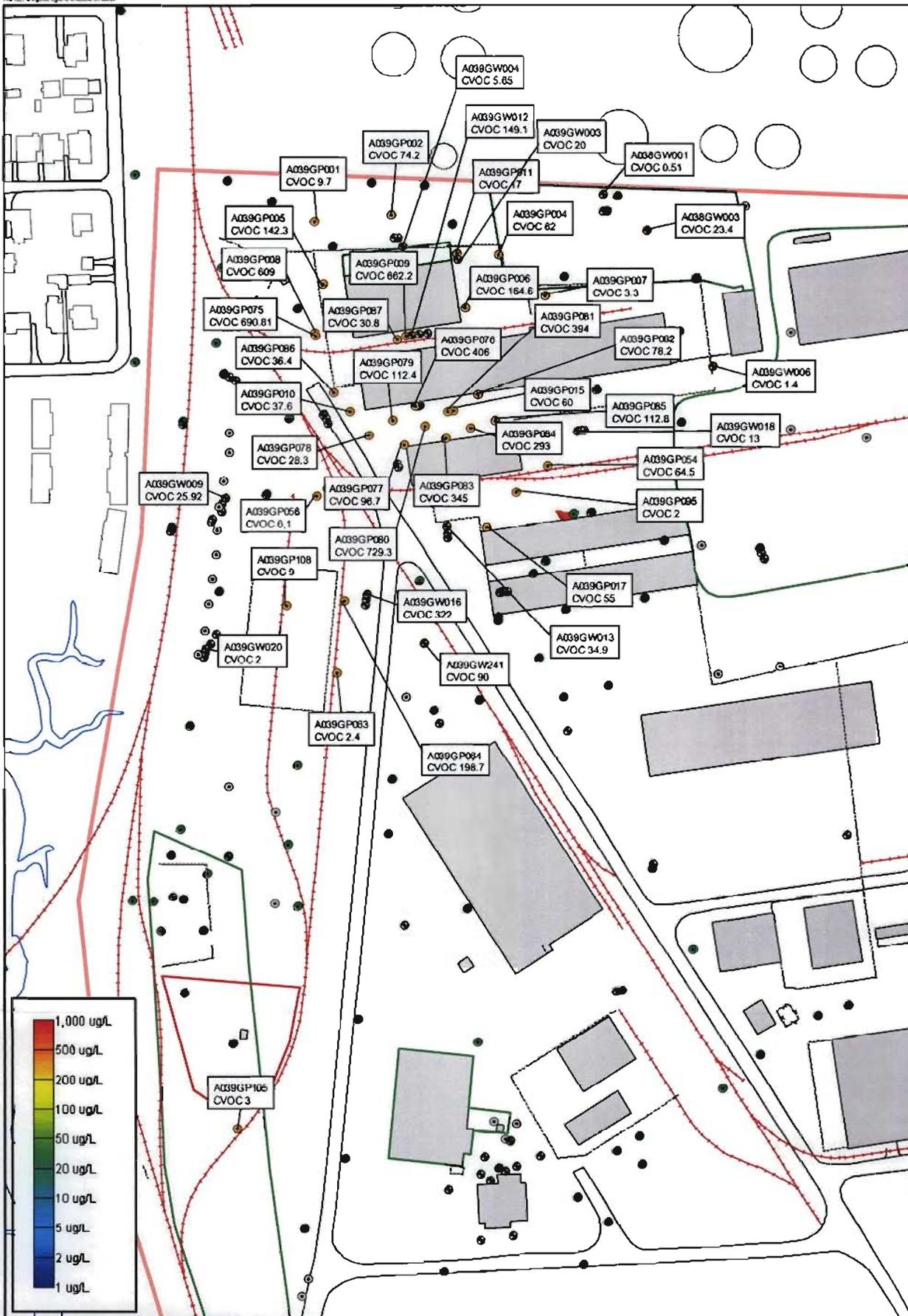
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Source area defined by the total CVOC concentration greater than 1,000 ug/L

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

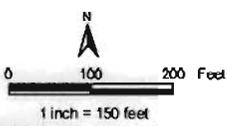
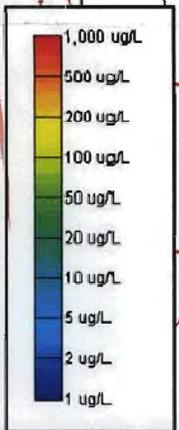


Figure 2-3
 Total CVOC Concentrations
 Surficial Aquifer - Shallow Zone
 SWMU 39, Zone A
 Charleston Naval Complex



- 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

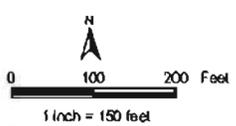
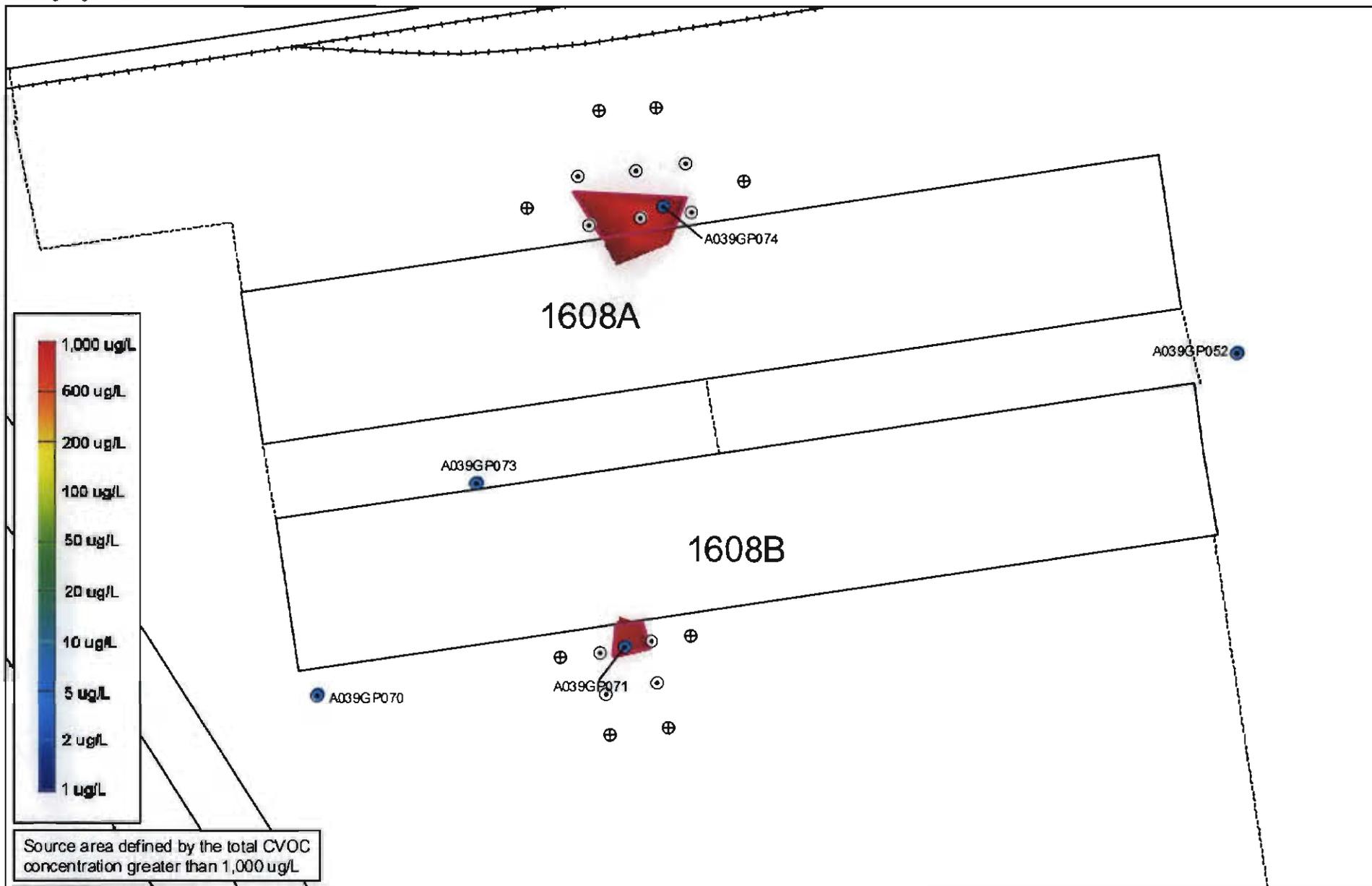


Figure 2-4
 Total CVOC Concentrations
 Surficial Aquifer - Intermediate Zone
 SWMU 39, Zone A
 Charleston Naval Complex

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

- ⊕ Proposed Primary DPT Sample Location
- ⊕ Proposed Contingency DPT Sample Location
- Existing DPT Sample Location
- Target Treatment Area
- Fence
- Buildings

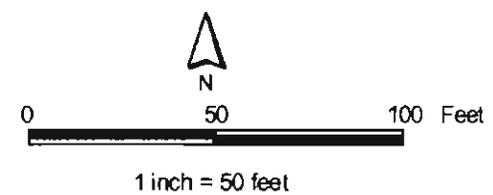


Figure 2-6
Source Delineation DPT Sample Locations
SWMU 39, Zone A
Charleston Naval Complex

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- Proposed Soil Boring
- Groundwater Well
- ▨ Fence
- ▨ Railroads
- ▨ Roads
- ▨ Shoreline
- ▭ SWMU Boundary
- ▭ Zone Boundary

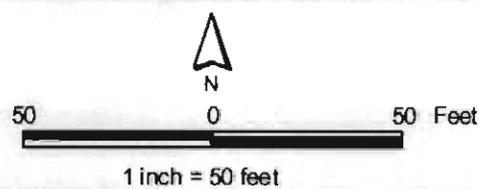
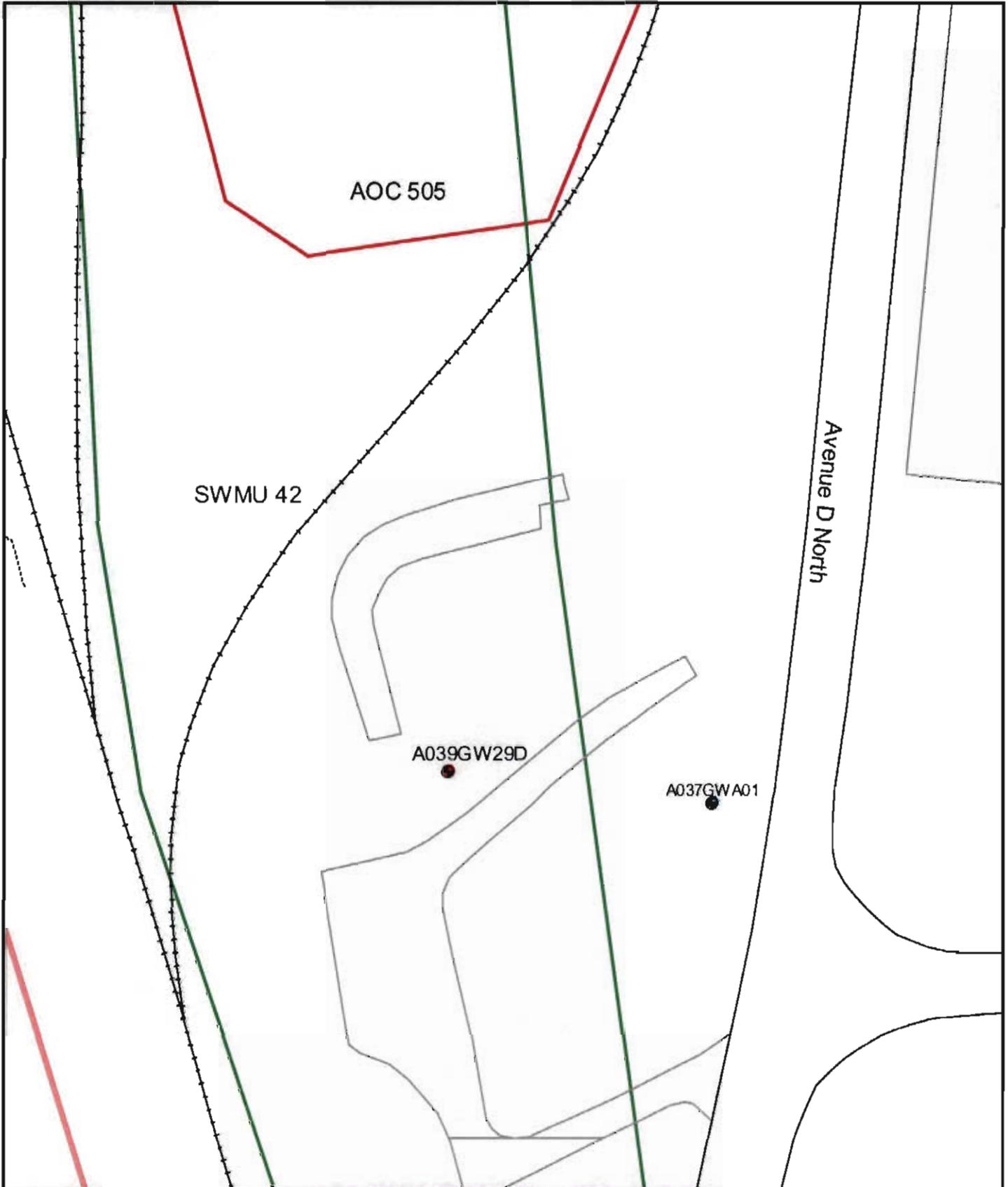


Figure 2-7
New Soil Sample Locations
SWMU 42 and AOC 505, Zone A
Charleston Naval Complex

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

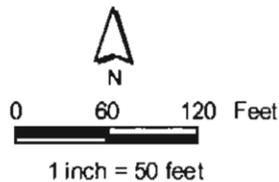
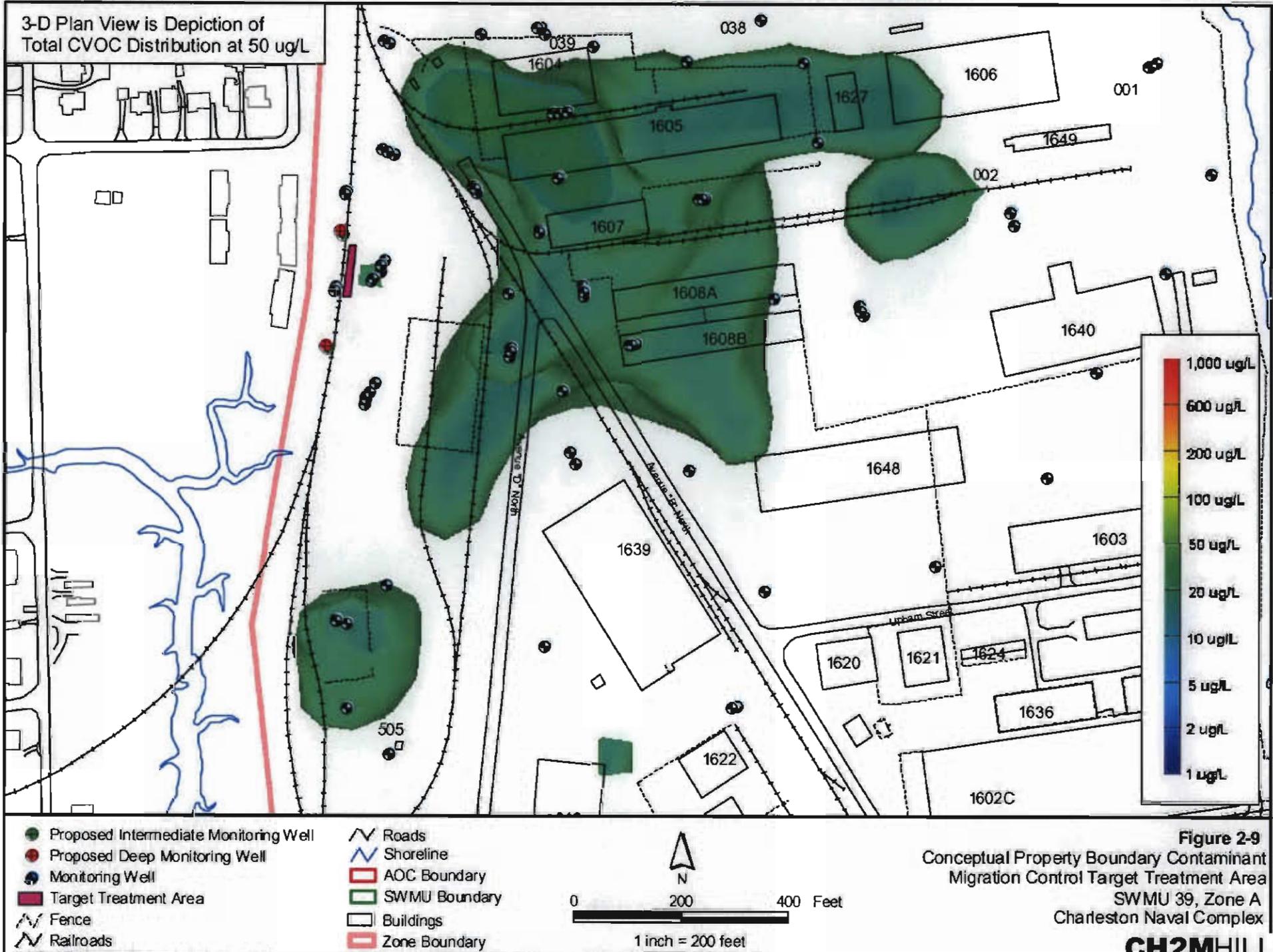


Figure 2-8
New Well Locations
SWMU 42 and AOC 505, Zone A
Charleston Naval Complex

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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 CMIP will be conducted by the CH2M-Jones team under the supervision of the Navy
3 and the guidance of SCDHEC. CH2M-Jones will be responsible for procuring, coordinating
4 and 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 CMI. The CH2M-Jones Engineer of Record for this RFI will be Dean
8 Williamson, P.E. The primary point of contact for the CMI 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 CMIP 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 for the RFI are EPA Level III DQO for contaminant identification and
16 quantification. The required field and QA/QC samples will be collected as required by the
17 CSAP. Subcontractor data will be validated by the CH2M-Jones Project Chemist prior to
18 final interpretation and submittal.

19 **3.2 Data Management Requirements**

20 The CMI 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 CMI approach for the

1 source area treatment by ZVI injection, and a Phase II CMIP 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 CMI field activities, a
4 Revision 0 CMI 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 CMI 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 CMIP will
10 be performed in accordance with the CH2M-Jones Site-Specific Health and Safety Plan
11 (CH2M-Jones, 2000). Personnel working at the site will be required to comply with EPA
12 Level D PPE requirements, as specified in the Health and Safety Plan. Once all personnel
13 have arrived at the site as part of the mobilization for this CMI, a project briefing and health
14 and safety orientation meeting will be held; daily "tailgate" safety meetings will be
15 conducted to address any site specific issue encountered during work.

1 **4.0 Project Schedule**

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

1 5.0 References

- 2 CH2M-Jones. *Corrective Measures Study Work Plan, SWMU 39, Zone A*. Revision 0. May 29,
3 2002a.
- 4 CH2M-Jones. *Corrective Measures Study Report, SWMU 39, Zone A*. Revision 0. October 4,
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.