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LETTER REPORT OF TECHNICAL REVIEW REMEDIATION MONITORING REPORT FOR ZONE I SITE 36 BUILDING NS-26 CNC CHARLESTON SC

02/01/2005

CH2M HILL

CH2M-JONES, LLC.

CH2MHILL
Constructors, Inc.

Mr. Andrew W. O'Conor
CH2M-Jones
1330 Kilo Street
North Charleston, SC 29405

February 14, 2005

Mr. Michael A. Bishop
SCDHEC
2600 Bull Street
Columbia, SC 29201-1708

Subject: Remediation Monitoring Report February 14, 2005
Site 36, Building NS26, Zone I
Site ID. No. 00944
Charleston Naval Complex

Dear Mr. Bishop:

CH2M-Jones has completed a Remediation Monitoring Report for the above-referenced site. Free product remains in affected wells at Sites 36. CH2M-Jones recommends that free product recovery utilizing oil-only absorbent sock continue in affected wells and an additional six inch well be installed in the source area. Continued groundwater monitoring should also be implemented on a semi-annual bases to monitor any contaminant migration. If you have any questions concerning the enclosed reports, please do not hesitate to call.

Sincerely,

CH2M HILL

Andrew W O'Conor
Geologist
843.200.3825

Remediation Monitoring Report
Site 36, Building NS26, Zone I
Charleston Naval Complex
North Charleston, South Carolina
SCDHEC Site ID No. 00944

Prepared by:

CH2MHILL
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Prepared for:

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P.O. Box 190010
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February 2005

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Site 36, Building NS26, Zone I

Charleston Naval Complex

North Charleston, South Carolina

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Acronyms and Abbreviations

bls	below land surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CA	Corrective Action
CAP	Corrective Action Plan
CNC	Charleston Naval Complex
COC	chemical of concern
DPT	direct-push technology
EPA	U.S. Environmental Protection Agency
ft BTOC	feet below top of casing
ft msl	ft above mean sea level
µg/L	micrograms per liter
MTBE	methyl-tert-butyl ether
NAVBASE	Naval Base
ppb	parts per billion
RBSL	risk-based screening level
SCDHEC	South Carolina Department of Health and Environmental Control
SVOC	semivolatile organic compound
Tetra Tech	Tetra Tech NUS, Inc.
UST	underground storage tank
VOC	volatile organic compound

1.0 Introduction

1.1 Background

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure Act, which regulates closure and transition of property to the community. The Charleston Naval Complex (CNC) was formed as a result of the dis-establishment of the Charleston Naval Shipyard and NAVBASE on April 1, 1996. Corrective Action (CA) activities for Site 36, Building NS26, Zone I are being conducted in accordance with the Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control (SCDHEC).

1.2 General Site Description

The CNC is located in the City of North Charleston, on the east and west bank of the Cooper River in Charleston County and Berkley County, South Carolina as shown in **Figure 1**. This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River. This site is located within the developed portion of the base.

Building NS26, a vehicle maintenance facility, was a part of the Navy's Shore Intermediate Activity Complex. UST NS26 was utilized to temporarily store used oil. The UST system was installed in 1958, which consisted of a 200-gallon steel tank located adjacent to Building NS26, approximately 60 feet from the northeastern corner of the building and approximately 107 feet from Cooper River (**Figure 2**).

Between December 15, 1996, and January 8, 1997, UST NS26, accessible piping, and contaminated soil encountered during the UST and piping excavations were removed from the site. The UST and piping excavations were back-filled with clean soil. A SCDHEC UST Assessment Report was completed by SPORTENVDETCHASN in 1997. Soil sampling conducted in the tank and piping excavations indicated naphthalene concentrations exceeding the Risk-Based Screening Level (RBSL) established by SCDHEC (Risk-Based

Corrective Action For Petroleum Release, January 5, 1998). Groundwater was not encountered in the excavations during the UST removal.

From June, through September, 1999, TTNUS completed a Rapid Assessment (RA) for Site 36. The Rapid Assessment Report (RAR), prepared by TTNUS, dated March 2000, was approved by SCDHEC on March 31, 2000. CH2M-Jones prepared a Corrective Action Plan (CAP), dated November, 2000, which was approved by SCDHEC on December 29, 2000. The CAP proposed the use of passive-floating intake skimmers, bioremediation and Aggressive Fluid Vapor Recovery (AFVR). The AFVR performed on June 17, 2003, was approved by SCDHEC, in-lieu of implementing passive-floating intake skimmers and bioremediation. The following section details free product recovery activities conducted to date.

2.0 Free Product Remedial Activities

2.1 Free Product Recovery (Bailing)

Free product was gauged and then recovered using a disposable bailer within two 1-inch diameter piezometers - U36GWP01 and U36GWP03 and one 2-inch diameter monitoring well – U36GW002. The recovery efforts were performed periodically from January 17, 2002, through July 10, 2002. Refer to CH2M-Jones LLC's August, 2004 Remediation report for free product thickness, recovery dates and quantities. Approximately 0.10 gallons of free product was recovered from CNC36-P01, 2.1 gallons from U36GWP03 and 1.0 gallon from U36GW002 during bailing activities. Recovered free product was containerized in a DOT-approved drum and stored within a locked compound at building 1824 on CNC.

2.2 Aggressive Fluid Vapor Recovery (AFVR)

On June 17, 2003, CH2M-Jones performed an AFVR event on piezometers U36GWP01, U36GWP03 and monitoring well U36GW002. EQ Industrial Services of Atlanta, Georgia, pumped a total of approximately 169 gallons of oily water from the two piezometers and one monitoring well using a vacuum truck. The oily water was consolidated with AFVR fluid extracted from SCDHEC Site Nos. 01311 and 01093 and containerized in a 3,000-gallon truck-mounted tank. The consolidated AFVR fluid from each site totaled approximately 760 gallons. The fluid was manifested as non-hazardous oily water and transported off site for

proper disposal. A copy of the disposal manifest is provide in the August 2004, Corrective Action Report .

2.3 Free Product Recovery (Absorbent Socks)

On October 3, 2003, piezometers U36GWP01 and U36GWP03 and monitoring well U36GW002 were gauged for the presence of free product, which was detected at each location. Oil-only absorbent socks with the capacity to absorb approximately 0.25 gallon of free product each were installed within the two piezometers and one well and replaced periodically. On December 12, 2003, while attempting to retrieve and replace the absorbent sock from Piezometer U36GWP01, the sock's lanyard broke. U36GWP01's screen and casing have been removed and the bore hole properly abandoned by EEG, Inc. During the last sampling event two addition wells, U36GW008 and U36GW001, had measurable free product. Absorbent socks were implemented on January 21 2005, in all two inch wells containing free product. A total of approximately 1.25 gallons of free product has been recovered from the two piezometers and one well using absorbent socks. Refer to the CH2M-Jones, November, 2004 AFVR Report for free product thickness, recovery dates and quantities.

3.0 Previous Investigations

3.2 Groundwater Sampling

CH2M-Jones, LLC, collected groundwater samples on July 18, 2002, from seven monitoring wells: Monitoring wells U36GW001, U36GW003, U36GW004, U36GW005, U36GW006, U36GW07D and U36GW008. Each well was analyzed for VOC and SVOC using U.S. Environmental Protection Agency (EPA) Methods 8260 and 8270C respectively. Groundwater analytical results for COCs were below detectable limits of the laboratory for each monitoring well with the exception of monitoring wells U36GW004 and U36GW008 which displayed concentrations of naphthalene above the risk-based screening levels (RBSLs). Due to the presence of free product ,three monitoring wells were not sampled, including U36GWP01, U36GWP03 and U36GW002. The sampling results indicated that the dissolved-phase plume had not been defined on the northwest side of the plume.

4.0 Groundwater Analytical Results 1-20-2005

Monitoring wells U36GW001, U36GW002, U36GW003, U36GW004, U36GW07D, U36GW008, U36GWP02, and 680GW004 were sampled on January 20, 2005, for VOC analysis using EPA Methods 8260B. Free product was detected during the sampling event in wells U36GW001, U36GW002, U36GW008, and U36GWP01. (**Figure 3**) Prior to collecting groundwater samples, each well was purged using a low-flow peristaltic pump. Water levels were measured and the volume of water in each well was calculated prior to purging activities. Groundwater parameters, including pH, conductivity, turbidity, temperature, dissolved oxygen and oxygen reduction potential, were measured following the purge of each well volume. Once the groundwater parameters became stable and at least three well volumes were removed, the groundwater samples were collected, placed on ice, and delivered to GEL Laboratories in Charleston, South Carolina. Field data sheets are presented in Appendix A.

Groundwater from purging was placed in a 55-gallon drum, labeled, and transported to the less-than-90-day storage area until final disposition. The approximately 23 gallons of purge water was generated at the site.

The ground water analytical results for COCs were below detectable limits of the laboratory for each monitoring well sampled: U36GW003, U36GW004, U36GW07D and 680GW004 . Groundwater analytical results for the January 20, 2005, sampling event are presented in Table 2 and graphically depicted in Figure 3. Analytical laboratory data sheets are 3.0 Conclusions and Recommendations

5.0 Potentiometric Surface

groundwater flow direction was interpreted from water level information from site monitoring wells prior to collecting groundwater samples on January 20, 2005. The water level data were applied to a scaled site plan with surveyed well locations and casing elevations. These data were used to produce groundwater contours across the site. Table 2 depicts the water level measurements and calculated groundwater elevations across the site. Figure 4 depicts the potentiometric surface map of the site based on the data presented in Table 2. The map depicts the groundwater flow in a northerly direction toward the Cooper River.

6.0 Conclusions and Recommendations

Piezometer U36GWP01 has been properly abandoned by a certified contractor per R.61-71: South Carolina Well Standards- April 2002.

A measurable thickness of free product remains within piezometer U36GWP03 and monitoring well U36GW002. During groundwater assessment activities on January 20, 2005, CH2M-Jones noted free product in two additional site wells: U36GW001 and U36GW008. CH2M-Jones recommends that free product be removed from monitoring wells U36GW001, U36GW002 and U36GW008, as well as piezometer U36GWP03 utilizing absorbent socks. In addition a six inch recovery well will be installed in accordance with South Carolina Well Standards R.61-71-April 2002, northwest of monitoring well U36GW002. See Figure 2. The plume has been defined and remains in and around the old tank basin depicted it Figure 2. Monitoring wells 680GW004, U36GW003, U36GW004, U36GW005 and U36GW006 define the plume on all sides. Therefore, CH2M-Jones, LLC, also recommends semi-annual groundwater sampling of these wells in addition to continued free product recovery utilizing oil-only absorbent socks.

8.0 References

Tetra Tech NUS, Inc. [TTNUS] Rapid Assessment Report [RA], 2000.

Tables

Table 1
Groundwater Analytical Data

Monitoring Well	Measurement Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Naphthalene (µg/L)
Risk Based Screening Levels:		**5**	**1,000**	**700**	**10,000**	**25**
U36GW001	07/18/2002	2.1	11.3	2.4	13.8	1.9 **
	01/20/2005	NA	NA	NA	NA	NA
U36GW002	07/18/2002	NS	NS	NS	NS	NS
	01/20/2005	NA	NA	NA	NA	NA
U36GW003	07/18/2002	<1.0	<1.0	<1.0	<3.0	<1.0 **
	01/20/2005	<1.0	<1.0	<1.0	<3.0	<1.0
U36GW004	07/18/2002	.35J	4.4	5.9	17.4	27.5 **
	01/20/2005	<1.0	.41J	.52J	.46J	3.6
U36GW005	07/18/2002	1.0	1.0	1.0	3.0	<4.0 **
	01/20/2005	NS	NS	NS	NS	NS
U36GW006	07/18/2002	1.0	1.0	1.0	3.0	<1.0 **
	01/20/2005	NS	NS	NS	NS	NS
U36GW07D	07/18/2002	.44J	<1.0	<1.0	<3.0	<.96 **
	01/20/2005	<1.0	<1.0	<1.0	<3.0	<1.0
U36GW008	07/18/2002	7.1	27.2	8.4	55.4	146 **
	01/20/2005	NA	NA	NA	NA	NA
680GW004	07/18/2002	NA	NA	NA	NA	NA
	01/20/2005	<1.0	<1.0	.23J	<3.0	<1.0
U36GWPO1	07/18/2002	FP	FP	FP	FP	FP
	01/20/2005	Abandoned				
U36GWPO3	07/18/2002	FP	FP	FP	FP	FP
	01/20/2005	NA	NA	NA	NA	NA

NA Not Analyzed

NS Not Sampled

** Analyzed by EPA Method SVOC (SW8270C)

J Estimated value

D Analyte(s) quantified in an analysis performed at a secondary dilution factor.

< Below value at detection limit shown

µg/L Micrograms per Liter

Table 2

Groundwater and Monitoring Well Elevation Data

Monitoring Well ID	TOC Elevation (ft MSL)	Depth to Water (ft btoc))	Water Table Elevation (ft MSL)	Screen Length (ft)
U36GW001	9.66	5.96	3.7	10
U36GW002	9.47	5.9	3.57	10
U36GW003	8.94	5.50	3.44	10
U36GW004	9.58	6.01	3.57	10
U36GW07D	9.50	8.40	1.10	5
U36GW008	9.35	5.8	3.55	10
U36GWP03	9.73	6.00	3.73	10
680GW004	9.22	5.65	3.57	10

(ft) - Feet
(fbtoc) - Feet Below Top of Casing
(ft MSL) - Feet Mean Sea Level

Figures

Figure 1
Site Location Map
Site 36, Building NS26, Zone I
Charleston Naval Complex

File Path: C:\18gis\CNC\cnc-egis.apr, Date: 24 Aug 2004 10:23, User: AOCONOR, EGIS: Charleston Naval Complex - Figure 1 Site Location Map

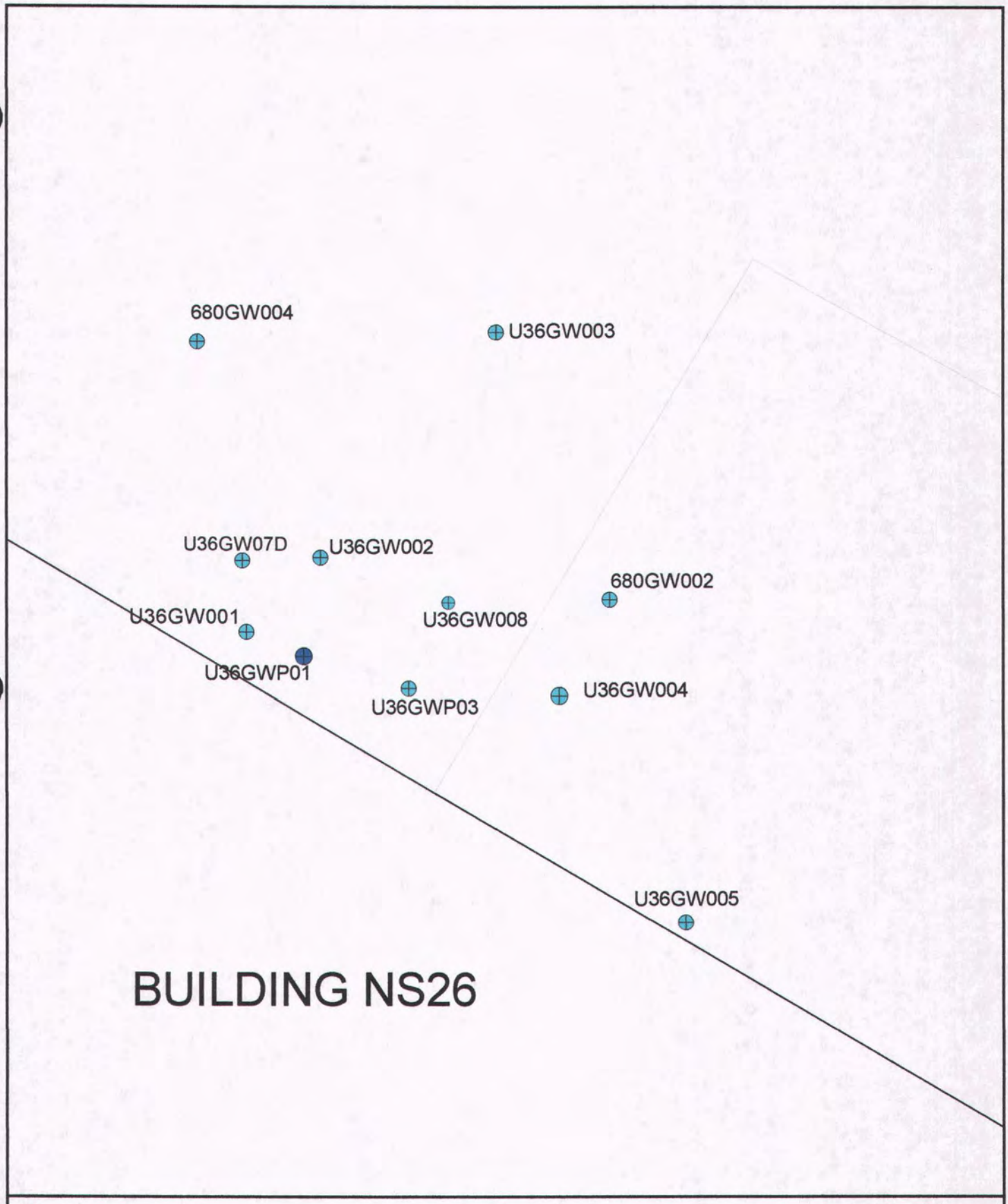

Figure 2
Site Map
Site 36, Building NS26, Zone I
Charleston Naval Complex

File Path: C:\18gis\CNC\cnc-egis.apr, Date: 14 Feb 2005 16:29, User: AOCONOR, EGIS: Charleston Naval Complex - Figure 2 Site Map

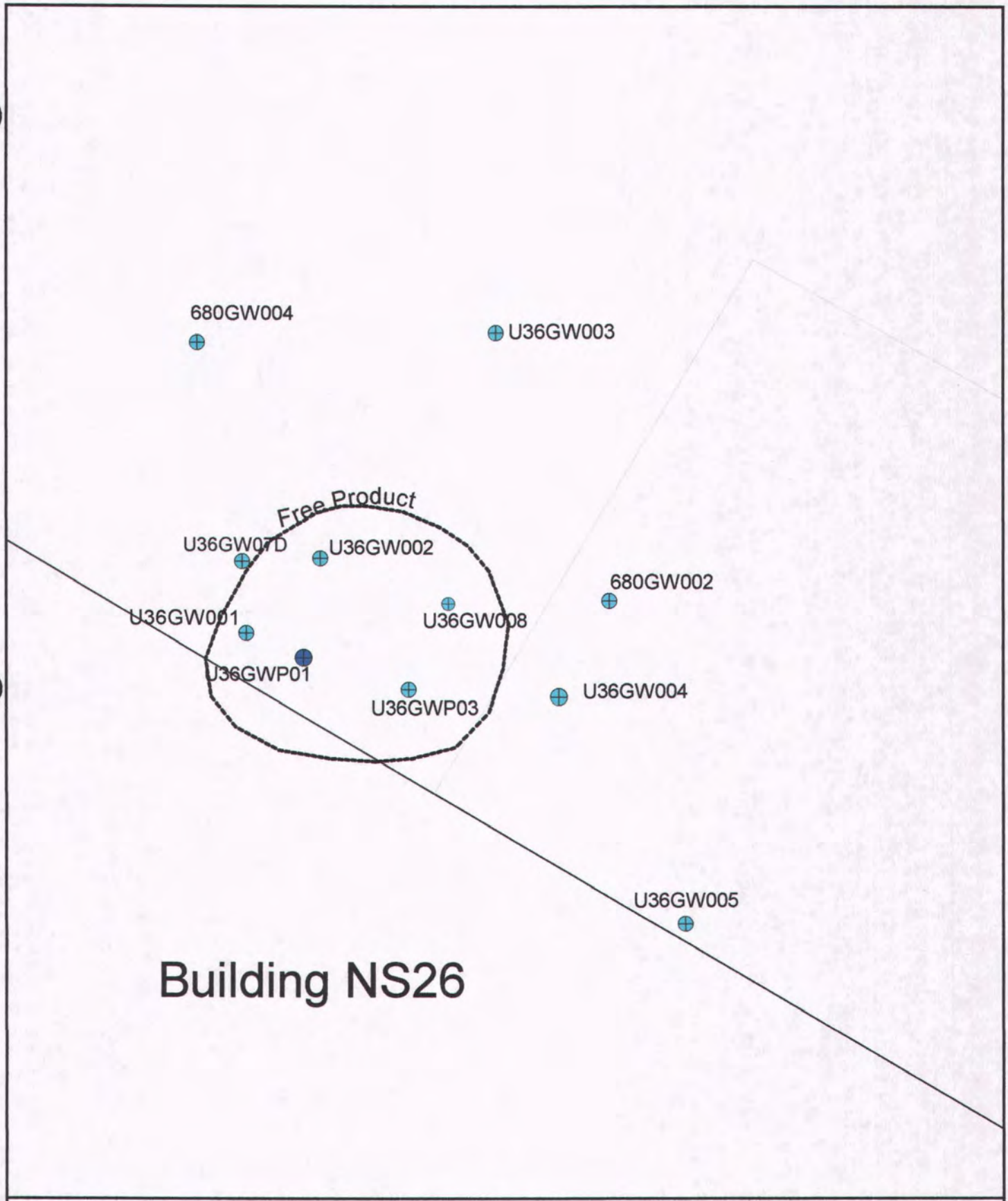

Figure 3
Free Product Plume Map
Site 36, Building NS26, Zone I
Charleston Naval Complex

File Path: c:\documents\ust program\ust ns 26a, zone i\ns 26 feb 2005\figure 2 site map.apr, Date: 14 Feb 2005 17:04, User: AOCONOR, EGIS: Charleston Naval Complex - Figure 3 Free Product Plume Map

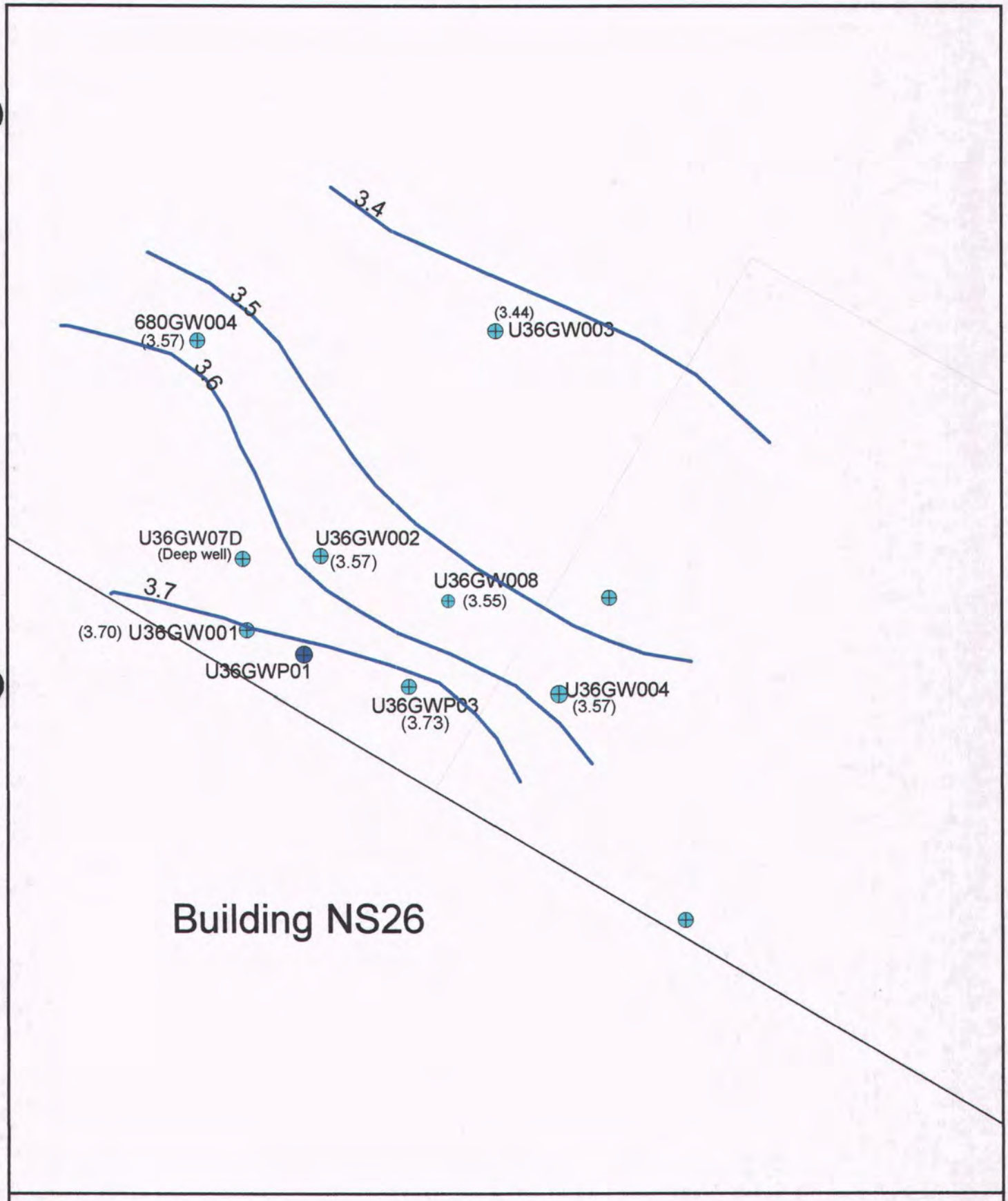

Figure 4
Groundwater Elevation Map 1-20-2005
Site 36, Building NS26, Zone I
Charleston Naval Complex

File Path: c:\documents\ust program\ust ns 26a, zone i\ns 26 feb 2005\figure 2 site map.apr, Date: 14 Feb 2005 16:52, User: AOCONOR, EGIS: Charleston Naval Complex - Figure 3 Groundwater Elevation Map 1-20-2005

Appendix A
Field Data Sheets

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW001 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	6.01				
DEPTH TO FP (FT):	5.96				
WELL DEPTH (FT):	12.67	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	6.66	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.08	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	3.25	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic	**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:
TIME ON:		BAILER VOL.. (gal) .25 / .33
FLOW RATE (gpm):		REQUIRED PULLS:
PUMP TIME (min):		VOL. PURGED (gals):
VOL. PURGED (gals):		OTHER:

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME						
VOL. (gal)						
pH (s.units)						
COND.(S/m)						
TURBIDITY(NTUs)						
TEMP.(C)						
DO.(mg/L)						
ORP(mV)						

OBSERVATIONS

COLOR:

ODOR:

COMMENTS:

SAMPLE DATE/ TIME:

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW002 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	5.98				
DEPTH TO FP (FT):	5.9				
WELL DEPTH (FT):	12.93	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	6.95	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.13	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	3.39	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic	**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:
TIME ON:		BAILER VOL.. (gal) .25 / .33
FLOW RATE (gpm):		REQUIRED PULLS:
PUMP TIME (min):		VOL. PURGED (gals):
VOL. PURGED (gals):		OTHER:

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME						
VOL. (gal)						
pH (s.units)						
COND.(S/m)						
TURBIDITY(NTUs)						
TEMP.(C)						
DO.(mg/L)						
ORP(mV)						

OBSERVATIONS

COLOR:

ODOR: Petroleum

COMMENTS: FREE PRODUCT
NO SAMPLE

SAMPLE DATE/ TIME:

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW003 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	5.5				
WELL DEPTH (FT):	12.8	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	7.3	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.18	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	3.56	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic		**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:	
TIME ON:	1020		BAILER VOL.. (gal)	.25 / .33
FLOW RATE (gpm):	0.22		REQUIRED PULLS:	
PUMP TIME (min):	15		VOL. PURGED (gals):	
VOL. PURGED (gals):	3.5		OTHER:	

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME	1021	1025	1030	1035		
VOL. (gal)	1	1	2	3		
pH (s.units)	6.9	7.18	7.23	7.24		
COND.(S/m)	1.28	1.27	1.28	1.32		
TURBIDITY(NTUs)	0	0	0	0		
TEMP.(C)	21.18	22.44	22.85	22.92		
DO.(mg/L)	1.51	0.41	0.48	0.43		
ORP(mV)	-249	-302	-338	-347		

OBSERVATIONS

COLOR: clear

ODOR: rotten odor

COMMENTS:

SAMPLE DATE/ TIME: 1036 / 1-20-05

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW004 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	6.01				
WELL DEPTH (FT):	12.65	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	6.64	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.08	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	3.24	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic		**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:	
TIME ON:	1049		BAILER VOL.. (gal)	.25 / .33
FLOW RATE (gpm):	0.2		REQUIRED PULLS:	
PUMP TIME (min):	16		VOL. PURGED (gals):	
VOL. PURGED (gals):	3.2		OTHER:	

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME	1050	1054	1059	1104		
VOL. (gal)		1	2	3		
pH (s.units)	7.55	7.31	7.33	7.28		
COND.(S/m)	0.495	0.548	0.82	1.2		
TURBIDITY(NTUs)	0	40	46	14.5		
TEMP.(C)	18.69	18.98	19.32	19.6		
DO.(mg/L)	5.3	2.04	0.67	0.33		
ORP(mV)	-225	-247	-301	-338		

OBSERVATIONS

COLOR: clear

ODOR: rotten

COMMENTS: stain

SAMPLE DATE/ TIME: 1-20-5 / 1105

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW07D **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	8.4				
WELL DEPTH (FT):	35.92	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	27.52	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	4.48	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	13.45	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic		**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:	
TIME ON:	1340		BAILER VOL.. (gal)	.25 / .33
FLOW RATE (gpm):	0.22		REQUIRED PULLS:	
PUMP TIME (min):	60		VOL. PURGED (gals):	
VOL. PURGED (gals):	13.4		OTHER:	

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME	1341	1400	1420	1440		
VOL. (gal)	I	1	2	3		
pH (s.units)	7.28	6.91	6.86	6.84		
COND.(S/m)	31.5	33.1	33.2	33.7		
TURBIDITY(NTUs)	11.5	144	25	7		
TEMP.(C)	20.81	21.88	21.92	21.95		
DO.(mg/L)	5.6	0.24	0.47	0.4		
ORP(mV)	-378	-406	-406	-408		

OBSERVATIONS

COLOR: clear

ODOR: rotten

COMMENTS:

SAMPLE DATE/ TIME: 1-20-05 / 1441

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GW008 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	6.04				
DEPTH TO FP (FT):	5.81				
WELL DEPTH (FT):	13	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	6.96	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.13	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	3.4	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic	**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:
TIME ON:		BAILER VOL.. (gal) .25 / .33
FLOW RATE (gpm):		REQUIRED PULLS:
PUMP TIME (min):		VOL. PURGED (gals):
VOL. PURGED (gals):		OTHER:

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME						
VOL. (gal)						
pH (s.units)						
COND.(S/m)						
TURBIDITY(NTUs)						
TEMP.(C)						
DO.(mg/L)						
ORP(mV)						

OBSERVATIONS

COLOR:

ODOR:

COMMENTS: FREE PRODUCT

SAMPLE DATE/ TIME:

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: U36GWP03 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	7.1				
DEPTH TO FP (FT):	6				
WELL DEPTH (FT):	11.81	2 IN.		0.1632	
WATER COLUMN (FT):	=	4 IN.		0.6528	
GAL/FT OF CASING	0.1632	6 IN.		1.4688	
CASING VOLUME (GAL)	=	8 IN.		2.611	
NO. OF VOLUMES min.(3)	x	10 IN.		4.0797	
PURGE VOLUME (GAL)	=	12 IN.		5.8748	

METHOD OF PURGING

PUMP: Peristaltic	**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:
TIME ON:		BAILER VOL.. (gal) .25 / .33
FLOW RATE (gpm):		REQUIRED PULLS:
PUMP TIME (min):		VOL. PURGED (gals):
VOL. PURGED (gals):		OTHER:

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME						
VOL. (gal)						
pH (s.units)						
COND.(S/m)						
TURBIDITY(NTUs)						
TEMP.(C)						
DO.(mg/L)						
ORP(mV)						

OBSERVATIONS

COLOR:

ODOR:

COMMENTS: Free Product
No Sample

SAMPLE DATE/ TIME:

CH2MHILL

WELL PURGE AND SAMPLING FIELD SHEET

WELL NUMBER: 680GW004 **SITE:** Site 36, Building NS26, Zone I

FIELD CREW: Andrew O'Conor

		CASING DIAMETER		GAL/FT OF CASING	
DEPTH TO WATER (FT):	5.65				
WELL DEPTH (FT):	14	**2 IN.**		**0.1632**	
WATER COLUMN (FT):	8.35	**4 IN.**		**0.6528**	
GAL/FT OF CASING	0.1632	**6 IN.**		**1.4688**	
CASING VOLUME (GAL)	1.36	**8 IN.**		**2.611**	
NO. OF VOLUMES min.(3)	3	**10 IN.**		**4.0797**	
PURGE VOLUME (GAL)	4.08	**12 IN.**		**5.8748**	

METHOD OF PURGING

PUMP: Peristaltic		**OTHER:**	**BAILER** : TEFLON, SS ,OTHER:	
TIME ON:	1455		BAILER VOL.. (gal)	.25 / .33
FLOW RATE (gpm):	0.25		REQUIRED PULLS:	
PUMP TIME (min):	13		VOL. PURGED (gals):	
VOL. PURGED (gals):	4		OTHER:	

FIELD PARAMETERS	**FIELD MEASUREMENTS**					
	Initial	1st	2nd	3rd	5th	6th
TIME	1456	1501	1506	1513		
VOL. (gal)	1	1	2	3		
pH (s.units)	7.83	7.24	7.15	7.1		
COND.(S/m)	1.82	1.52	1.85	2.01		
TURBIDITY(NTUs)	0	0	4.2	8.4		
TEMP.(C)	20.15	21.22	21.33	21.4		
DO.(mg/L)	5.15	0.45	0.34	0.28		
ORP(mV)	-366	-374	-380	-384		

OBSERVATIONS

COLOR: clear

ODOR:

COMMENTS:

SAMPLE DATE/ TIME: 1-20-05 / 1514

Appendix B
Analytical Data

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZIU36-071202-01 page 1 of 2

Laboratory: GEL	Site Name: Zone H, Site 36 (UST Bldg. NS26) SCDHEC No. 00944
Project Name: Charleston Navy Complex	
Project Number: 158814.PM.04	TAT: standard
Project Manager:	QA Level: 2
Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605	
ATL: 115 Perimeter Center Place NE, Suite 700, Atlanta, GA 30346-12	
Send Report To: see last page of COC	EDD: CNC format

Lab Batch/SDG: 1292517.

Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	VOCs (SW8260) + Naphthalene (3 - 40ml vial, HC)	Comments
U36GW001P1	IU36GW001	CNC36MW-01				WG			Free Product
U36GW002P1	IU36GW002	CNC36MW-02				WG			Free Product
001 U36GW003P1	IU36GW003	CNC36MW-03			1-20-05 / 1036	WG	3	X	
002 U36GW004P1	IU36GW004	CNC36MW-04			1-20-05 / 1105	WG	3	X	
003 U36HW004P1	IU36GW004	CNC36MW-04			1-20-05 / 1105	WG	3	X	
004 U36GW07DP1	IU36GW07D	CNC36MW7D			1-20-05 / 1441	WG	3	X	
U36GW008P1	IU36GW008	CNC36MW-08				WG			Free Product
005 680GW004P1	680GW004	680GW004			1-20-05 / 1514	WG	3	X	
U36GWP03P1	IU36GWP03	CNC36-P03				WG			Free Product
006 U36EW001P1	IU36EW001				1-20-05 / 1530	WQ	3	X	
007 U36TW001P1	IU36TW001				Lab Supplied	WQ	3	X	

Sampled By: Andrew O'Conor Date/Time: 1-20-05

Relinquished by: [signature] Date/Time: 1-20-05/1650

Additional Samplers:

Received By Lab: Date/Time

Received By: [signature] 1-20-05 Date/Time 1650

Relinquished by: Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Remarks:

Temperature: 3°C

UST VOC list

Reports

Receipt Exceptions:

Herb Kelly/GNV - 1 hardcopy, 1 CD
Andrew O'Conor

Herb Kelly
3011 SW Williston Rd
Gainesville, FL 32608
Ph: (352) 335 - 5877 ext.2572
Fax: (352) 271 - 4811

Andrew O'Conor
1330 Kilo St.
North Charleston, SC 29405
Ph: 843-740-9033
Fax: 843-740-9135

Receipt Exceptions: _____

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

680GW004P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251005

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V259

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/02/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	0.23	J
95-47-6	o-Xylene	1.0	U
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	3.0	U
91-20-3	Naphthalene	1.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36GW004P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251002

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V256

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/02/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	0.41	J
100-41-4	Ethylbenzene	0.52	J
95-47-6	o-Xylene	0.46	J
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	0.46	J
91-20-3	Naphthalene	3.6	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36HW004P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251003

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V257

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/02/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	0.61	J
100-41-4	Ethylbenzene	0.74	J
95-47-6	o-Xylene	0.94	J
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	0.94	J
91-20-3	Naphthalene	6.9	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36GW07DP1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251004

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V258

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/02/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
95-47-6	o-Xylene	1.0	U
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	3.0	U
91-20-3	Naphthalene	1.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36GW003P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251001

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V255

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/02/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
95-47-6	o-Xylene	1.0	U
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	3.0	U
91-20-3	Naphthalene	1.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36EW001P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251006

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V414

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/03/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
95-47-6	o-Xylene	1.0	U
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	3.0	U
91-20-3	Naphthalene	1.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

U36TW001P1

Lab Name: GEL, LLC. Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 129251

Matrix: (soil/water) WATER Lab Sample ID: 129251007

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 1V415

Level: (low/med) LOW Date Received: 01/20/05

% Moisture: not dec. _____ Date Analyzed: 02/03/05

GC Column: RTX-VOLATILES ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	tert-Butyl methyl ether	1.0	U
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
95-47-6	o-Xylene	1.0	U
----------	m,p-Xylenes	2.0	U
1330-20-7	Xylenes (total)	3.0	U
91-20-3	Naphthalene	1.0	U