FINAL

ANNUAL GROUNDWATER MONITORING REPORT 2006

TT-3548

NCDENR Incident Number: 23694
Marine Corps Base
Camp Lejeune, North Carolina

June 19, 2006

Prepared for:

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Contract Number: N62470-04-D-0205
Task Order: 0008

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LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater
2001 Guidelines	Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section (Effective July 1, 2001)
2L GWQS	NCAC T15A:02L Groundwater Quality Standards
AS	Air Sparge
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BN	Base/Neutral (extractables)
BNA	Base/Neutral/Acid (extractables)
BQL	Below Quantitation Limit
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
Cr	Chromium
CSA	Comprehensive Site Assessment
DIPE	Di-isopropyl Ether
DO	Dissolved Oxygen
DOD	Department of Defense
DPT	Direct Push Technology
DWQ	Division of Water Quality
DWM	Division of Waste Management
DTW	Depth to Water
EDB	Ethylene di-bromide
EMD	Environmental Management Division
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
EQB	Environmental Quality Branch
Fe	Iron
FID	Flame Ionization Detector
FT	Feet
GCL	Gross Contaminant Level
GIS	Geographic Information System
GPS	Global Positioning System
Guidelines Vol. II	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, Volume II, Petroleum Underground Storage Tanks (January 2, 1998)
HDPE	High Density Polyethylene
I/C	Industrial/Commercial
ID	Identification
I&E	Installations and Environment Department
IGWQS	Interim Groundwater Quality Standards
IPE	Isopropyl Ether
LSA	Limited Site Assessment
LUST	Leaking Underground Storage Tank
m	Meter
MADEP	Massachusetts Department of Environmental Protection
MCAS	Marine Corps Air Station
MCB	Marine Corps Base

MDL	Method Detection Limit
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MSCC	Maximum Soil Contaminant Concentration
MSL	Mean Sea Level
MTBE	Methyl tertiary butyl ether
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
NA	Not Analyzed
N/A	Not Applicable
NAVFAC	Naval Facilities Engineering Command Atlantic
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
OVA	Organic Vapor Analyzer
PAH	Polynuclear Aromatic Hydrocarbons
Pb	Lead
PPB	Parts Per Billion
PPM	Parts Per Million
PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
PVC	Polyvinyl chloride
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
Res	Residential
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVE	Soil Vapor Extraction
SVOC	Semi Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
US	United States
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons
WiRO	NCDENR Wilmington Regional Office

EXECUTIVE SUMMARY

The TT-3548 project site is located in the Tarawa Terrace II Housing Area of Marine Corps Base (MCB), Camp Lejeune, North Carolina. The building is a single-family residence and is located off Chosin Circle. It is currently abandoned and scheduled for demolition this summer. The former leaking underground storage tank system was a 550 gallon heating oil UST and associated piping used to heat the single family residence.

J.A. Jones Environmental, Inc. (J.A. Jones) removed the tank in August 2001. Approximately 3 cubic yards of TPH impacted soils were removed from the subsurface. J.A. Jones took soil samples from the center and each sidewall of the UST excavation. Volatile organic compounds (VOCs), semi-VOCs, and MADEP constituents were detected above applicable soil action limits; therefore a limited site assessment was conducted later at the site.

Mid-Atlantic Associates, Inc (Mid-Atlantic) conducted a Phase I Limited Site Assessment (LSA) for the site in 2002-2003. Mid-Atlantic collected three soil samples for laboratory analysis and installed and sampled one temporary groundwater monitoring well, USTTT35481070-MW01. Soil contaminants were identified above both the STGW and residential MSCCs. Groundwater contamination above 2L standards was not identified during the LSA.

As a result, CATLIN Engineers and Scientists (CATLIN) conducted a soil assessment report (SAR), dated December 29, 2004, to delineate the horizontal and vertical extent of soil contamination at the site. CATLIN confirmed the presence of MADEP constituents at the base and sidewalls of the excavation in excess of the Residential MSCCs. The soil contamination was present at depths of greater than eight feet BLS and within the boundary of the excavation area. CATLIN, therefore, recommended the excavation of impacted soils from a depth of six feet BLS to the water table.

CATLIN also sampled the site's groundwater during SAR activites and detected aliphatic and aromatic petroleum hydrocarbons in excess of the groundwater quality standards. They recommended that MCB Camp Lejeune monitor groundwater conditions on an annual basis until soil excavation was performed in 2009 or 2010.

Engineering and Environment, Inc. (EEI) and Sovereign Consulting Inc. (Sovereign) conducted the first and second annual groundwater sampling events at the project site, respectively. Groundwater at the site exhibited MADEP concentrations in excess of the North Carolina groundwater quality standards (NCGWQSs) during both sampling events. As a result, Sovereign recommends MCB Camp Lejeune continue the present sampling schedule and monitor groundwater conditions for MADEP VPH/EPH on an annual basis until soil excavation is performed.

1.0 TITLE PAGE

DATE OF REPORT: June 19, 2006
Facility I.D.: N/A UST Incident Number: 23694
Site Name: TT-3548
Site Location: Tarawa Terrace II, Marine Corps Base Camp Lejeune, North Carolina
Nearest City/Town: Camp Lejeune County: Onslow
Risk Classification: Low Risk Land Use Classification: Residential

UST Owner: Commanding Officer – MCB Camp Lejeune
I&E/EMD/EQB
PSC Box 20004
Address: MCB Camp Lejeune, NC 28542-0004 Phone: (910) 451-5068

UST Operator: Same as above
Address: Same as above Phone: Same as above

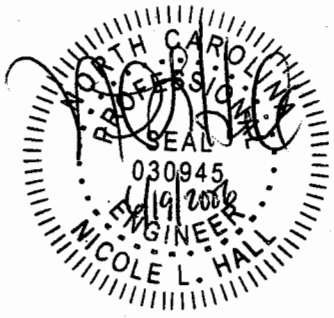
Property Owner: Same as above
Address: Same as above Phone: Same as above

Property Occupant: Military Housing Resident
Address: TT3548, Chosin Circle (TT II) Phone: Same as above

Consultant/Contractor: Sovereign Consulting Inc.
Address: 405 Oakmears Crescent, Suite 1
Virginia Beach, VA 23462 Phone: (757) 456-5093

Release Information

Date Discovered: August 7, 2001
Latitude: 34° 44' 7.4" N **Longitude:** 77° 23' 0.6" W
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (Piping/UST): UST and piping
Sizes and contents of UST system(s) from which the release occurred: The former system was a 550 gallon heating oil UST and associated piping used to heat the single family residence.



*I, **Nicole L. Hall** a Professional Engineer for Sovereign Consulting Inc., do certify that the information contained in this report is correct and accurate to the best of my knowledge.*

2.0 INTRODUCTION

The purpose of this report is to summarize data from a recent groundwater sampling event at the TT-3548 site located aboard MCB Camp Lejeune in the Tarawa Terrace II Housing area. The project's scope of work entailed gauging and sampling of one site monitoring well, USTTT3548-MW01, and analyzing the groundwater sample for petroleum constituents using EPA Method 602, 625, and the MADEP methods. Sampling was conducted based on the recommendations made in the site's SAR, dated December 29, 2004, performed by CATLIN Engineers and Scientists. Results of Sovereign's 2006 sampling event are presented in this report.

3.0 SITE HISTORY

The project site contained one 550 gallon heating oil UST with associated piping, which provided fuel to heat the single-family residence, TT-3548. The tank was removed in August 2001 by J.A. Jones Environmental Services, Inc. The tank closure report states the piping was previously removed by others. Upon removal of the tank, J.A. Jones personnel noted petroleum impact within the excavation. J.A. Jones, therefore, over-excavated the site. Final excavation limits measured 8 feet (length) by 5 feet (width) by 8 feet (depth). J.A. Jones collected confirmation soil samples from the base of the excavation and sidewalls and analyzed them for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, and volatile and extractable hydrocarbons by the MADEP Methods. VOCs and SVOCs were detected above the applicable STGW MSCCs, and MADEP fractions were detected above both the STGW and Residential MSCCS. J.A. Jones used sand backfill from the Base borrow pit to fill the excavation.

As a result of the detected contamination, MCB Camp Lejeune conducted a Phase I LSA per the NCDENR NORR dated February 15, 2002. Mid-Atlantic conducted the assessment, dated May 7, 2003, and found naphthalene, 2-methylnaphthalene, and 1,2,4-trimethylbenzene in excess of the applicable STGW MSCCs. C_9-C_{22} aromatic soil concentrations were also detected above both the STGW and Residential MSCCs. Groundwater at the site was also sampled and analyzed via EPA Methods 602 and 625, as well as the MADEP methods. There were no contaminants in excess of the NCGWQSs, and no free product was detected. Information collected during the LSA showed the site classified as a low risk site with residential land use.

A SAR was then conducted by CATLIN to delineate the horizontal and vertical extent of contamination at the site. The report, dated December 29, 2004, confirmed the presence of MADEP constituents at the base and sidewalls of the excavation in excess of the Residential MSCCs. VOCs and SVOCs were also detected; however, concentrations were below residential MSCCs, but above STGW MSCCs. Soil contamination was confirmed to be present at depths of greater than eight feet BLS and within the boundary of the excavation area.

CATLIN recommended the excavation of impacted soils from a depth of six feet BLS to the water table and subsequent treatment of the excavated soils at an off-site, permitted disposal facility. CATLIN also sampled the site's groundwater during SAR activities and detected aliphatic and aromatic petroleum hydrocarbons in excess of the groundwater quality standards. They recommended that MCB Camp Lejeune monitor groundwater conditions on an annual basis until soil excavation was performed. Soil excavation, as of the SAR, was to occur concurrent with housing demolition, which was planned for 2009 or 2010.

As a result of the approved recommendations made by CATLIN in the SAR, Engineering and Environment, Inc. conducted the first annual groundwater sampling event in 2005. Sovereign performed the second annual sampling event of monitoring well USTTT3548-MW01 in January 2006. This report summarizes the details and findings associated with the Sovereign sampling event.

4.0 SITE REMEDIATION

The former 550-gallon UST system was closed by removal in August 2001 by J.A. Jones. Subsequently, NCDENR required Marine Corps Base, Camp Lejeune to perform a Phase I Limited Site Assessment (LSA) at the site since petroleum contamination was detected during the removal. This section presents an overview of the soil and groundwater assessments performed during tank closure through the July 2005 sampling event.

4.1 SOIL

TANK REMOVAL

Following removal of the UST, confirmation soil samples were collected from each side of the excavation and the base. Both TPH and risk based methods were performed. Sample results exceeded the state action limits for TPH, as well as applicable STGW MSCCs. MADEP constituents were also detected above residential MSCCs within the tank basin. Applicable tank closure information is located in Appendix A.

PHASE I LIMITED SITE ASSESSMENT

Mid-Atlantic conducted soil sampling activities during the Phase I LSA which was performed in 2003. Three soil samples were submitted for laboratory analysis. One from the former fuel line and two from the former tank basin. Naphthalene, 2-Methylnaphthalene, and 1,2,4-Trimethylbenzene were detected in excess of the applicable STGW MSCCs, and C_9-C_{22} aromatic soil concentrations were detected above Residential MSCCs. Phase I LSA data is also in Appendix A.

SOIL ASSESSMENT REPORT

CATLIN conducted a soil assessment at the site to determine the horizontal and vertical extent of soil contamination identified during tank closure and the Phase I LSA. Samples were obtained from the center and sidewalls of the tank basin, as well as three locations approximately seven feet outside of the excavation area.

VOCs and SVOCs were detected in the tank basin samples at concentrations above the STGW MSCCs, but below the residential MSCCs. MADEP compounds were detected above the applicable residential MSCCs in the center of the basin as well as the sidewalls. The three soil samples outside of the tank basin, however, did not exhibit MADEP VPH/EPH hydrocarbon fraction concentrations above laboratory quantitation limits. Soil contamination was confined to within tank basin boundaries.

4.2 GROUNDWATER

PHASE I LIMTED SITE ASSESSMENT

Groundwater at the project site was sampled during the Phase I LSA. Mid-Atlantic installed a temporary monitoring well in July 2002. They subsequently sampled the well and analyzed the sample for VOCs, SVOCs, and MADEP parameters using EPA Methods 602, 625, and MADEP VPH/EPH, respectively. While contaminants were detected, concentrations were below the applicable NCGWQSs. In addition, there was no measurable free product.

SOIL ASSESSMENT REPORT

CATLIN installed a permanent monitoring well, USTTT3548-MW01, in the tank basin in August 2004. No measurable free product was identified in the well. A sample from this well was obtained and sent for analysis per EPA Methods 602 and 625, as well as MADEP VPH and EPH. Ethylbenzene and total xylenes were detected in the sample; however, concentrations were below the applicable 2L standards. MADEP hydrocarbon fractions were identified in the well at concentrations exceeding the applicable groundwater quality standards.

EEI GROUNDWATER GAUGING AND SAMPLING EVENT

EEI conducted the first groundwater monitoring event as recommended in the CATLIN SAR. Field personnel gauged and sampled well USTTT3548-MW01 in July 2005. No measurable free product was observed. While toluene and phenanthrene were detected in the sample, concentrations were below NCGWQSs. MADEP constituents were all below quantitation limits, with the exception of the C_9-C_{22} aromatics with a concentration of <240 µg/L. This is considered just above the groundwater quality standard of 210 µg/L.

5.0 ANNUAL SAMPLING

Upon submittal of the SAR to NCDENR in January 2005, they approved the report's recommendations and agreed to the sampling of USTTT3548-MW01 on an annual basis until the recommended soil excavation was done. As a result, Sovereign conducted the follow on groundwater sampling event in January 2006. The intent of the sampling event was to assess the current groundwater quality.

Sovereign gauged and sampled the well on January 19, 2006. The static groundwater depth was 13.11 feet from top of casing, and no free product was detected in the well during the site visit. Sovereign purged and sampled the well, then sent the samples under chain of custody for analysis to SGS/Paradigm Analytical Laboratories Inc. (SGS) in Wilmington, NC (NC Certification Number 481). The lab tested the groundwater sample for VOCs, SVOCs, and MADEP hydrocarbons using EPA Methods 602 and 625, as well as the MADEP methods. Laboratory reports and chain of custody documentation are included in Appendix B. There were no 602 compounds detected above the laboratory quantitation limits. EPA Method 625 analysis showed the presence of one analyte, phenanthrene. It was present at a concentration of 1.60

µg/L as compared to the NCGWQS of 210 µg/L. No specific TICs were identified with match probabilities. C_5-C_8 aliphatics were present at a concentration of <100 µg/L. The C_9-C_{18} aliphatics concentration was <940 µg/L, which is less than the standard of 4,200 µg/L. C_{19}-C_{36} aliphatics were present at 110 µg/L, which is also less than the standard of 42,000 µg/L. The C_9-C_{22} aromatics concentration, however, was just above the NCGWQS (210 µg/L) at <250 µg/L. Tables 1-4 summarize the data obtained during Sovereign's field activities.

6.0 RECEPTOR SURVEY

Sovereign reassessed site conditions in March 2006. The site was found to be fenced off and being prepared for demolition. MCB Camp Lejeune is building new enlisted housing in the Tarawa Terrace housing area and previously scheduled the TT3548 area for demo in 2009 or 2010. Site reconnaissance, however, proved otherwise. As a result, MCB Camp Lejeune immediately contracted CATLIN to conduct preliminary soil excavation sampling. Fieldwork was scheduled for April 7, 2006. CATLIN will provide soil sampling results under separate cover.

Site demolition and housing construction activities will occur over the course of the remainder of 2006. The area will still be used as residential acreage where military families will live and play. There are no water supply wells in the area. As a result, no change should be made to the previous receptor survey. The previous survey can be found within the Phase I LSA data in Appendix A.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on fieldwork and laboratory analytical data gathered during the tank removal, Phase I LSA, SAR, and subsequent groundwater sampling events, the following conclusions and recommendations are presented:

1. Soil contaminants were detected in the UST basin during tank removal. Six VOCs and SVOCs were detected above applicable STGW MSCCs. MADEP constituents were also detected above STGW and residential MSCCs. Specifically, the C_9-C_{18} aliphatics concentration was above the STGW MSCC, but below the residential level. In addition, the C_9-C_{22} aromatics concentration was present in the center of the basin above the residential standard.

2. Mid-Atlantic detected soil contamination during the Phase I LSA at levels above the applicable STGW MSCCs. Only C_9-C_{22} aromatics, however, were detected above the residential MSCC from SB-2, which was located near the center of the former tank basin.

3. Mid-Atlantic took a groundwater sample from the site during the LSA. Laboratory analysis did not detect groundwater contamination above applicable groundwater quality standards.

4. CATLIN conducted a SAR at the project site, and they confirmed the presence of MADEP constituents at the base and sidewalls of the excavation in excess of the Residential MSCCs. VOCs and SVOCs were also detected; however, concentrations were below residential MSCCs and above STGW MSCCs.

5. During the SAR, soil contamination was confirmed to be present at depths of greater than eight feet BLS and within the boundary of the excavation area.

6. A groundwater sample obtained during the SAR exhibited MADEP constituents in excess of the applicable groundwater quality standards.

7. An EEI groundwater sampling event, conducted in July 2005, only detected C_9-C_{22} aromatics at a concentration of <240 µg/L, which should be considered in excess of the standard of 210 µg/L.

8. Sovereign conducted additional groundwater sampling activities at the project site on January 19, 2006. While contaminants were detected, only the C_9-C_{22} aromatics concentration was just above the NCGWQS (210 µg/L) at <250 µg/L.

Groundwater at the project site continues to display MADEP contamination in excess of the applicable groundwater quality standards. Groundwater monitoring should be continued on an annual basis and sampled for MADEP VPH/EPH until levels attenuate to below applicable NCGWQs.

Soil contamination should be excavated per SAR recommendations based on the outcome of the April 7, 2006 CATLIN soil sampling event. The preliminary soil sampling results and any resultant excavation information will be submitted under separate cover by MCB Camp Lejeune.

8.0 REFERENCES

AH Environmental Consultants, *Final Report, Wellhead Protection Plan – 2002 Update, Marine Corps Base, Camp Lejeune,* August 2002.

CATLIN Engineers and Scientists, *Soil Assessment Report for TT-3548, Marine Corps Base Camp Lejeune, North Carolina,* December 29, 2004.

J.A. Jones Environmental, Inc, *Underground Storage Tank Closure Report, TT3546/3548, Camp Lejeune, Onslow County, North Carolina, January 10, 2002.*

Mid-Atlantic Engineers and Scientists, *Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for UST TT3546/3548 Site, Tarawa Terrace II Housing Area, Marine Corps Base Camp Lejeune, North Carolina,* May 7, 2003.

North Carolina Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *Guidelines for Assessment and Corrective Action*, April 2001.

TABLES

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: January 2006
Incident Number and Name: TT-3548, 23694
Facility ID#: N/A

Analytical Method: EPA Method 602

Contaminant of Concern			Benzene	Diisopropyl ether (DIPE)	Ethylbenzene	Methyl-tert butyl ether (MTBE)	Toluene	Total Xylenes
Well ID	**Sample ID**	**Date Collected**						
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	BQL	BQL	BQL	BQL	BQL	BQL
2L Standard (µg/l)			1	70	550	200	1,000	530
GCL (µg/l)			5,000	70,000	84,500	200,000	257,500	87,500

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits

Table 2
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: January 2006
Incident Number and Name: TT-3548, 23694
Facility ID#: N/A

Analytical Method: EPA Method 625 plus 10 largest TICS[1]

Contaminant of Concern			Phenanthrene	All Other Analytes
Well ID	**Sample ID**	**Date Collected**		
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	**1.60J**	BQL
2L Standard (µg/l)			210	Varies
GCL (µg/l)			410	Varies

- [1] Note – No specific TICS identified with a match probability. See laboratory reports for additional information.
- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits
- J = detected below the quantitation limit
- **BOLDED** = detected concentration

TABLE 3
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: January 2006
Incident Number and Name: TT-3548, 23694
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH

Contaminant of Concern								
Well ID	**Sample ID**	**Date Collected**	C_5-C_8 Aliphatics	C_9-C_{12} Aliphatics	C_9-C_{10} Aromatics	C_9-C_{18} Aliphatics	C_{19}-C_{36} Aliphatics	C_{11}-C_{22} Aromatics
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	<100	<100	<100	**840**	**110**	**150**

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- **BOLDED** = detected concentration

TABLE 4
SUMMARY OF GROUNDWATER SAMPLING RESULTS

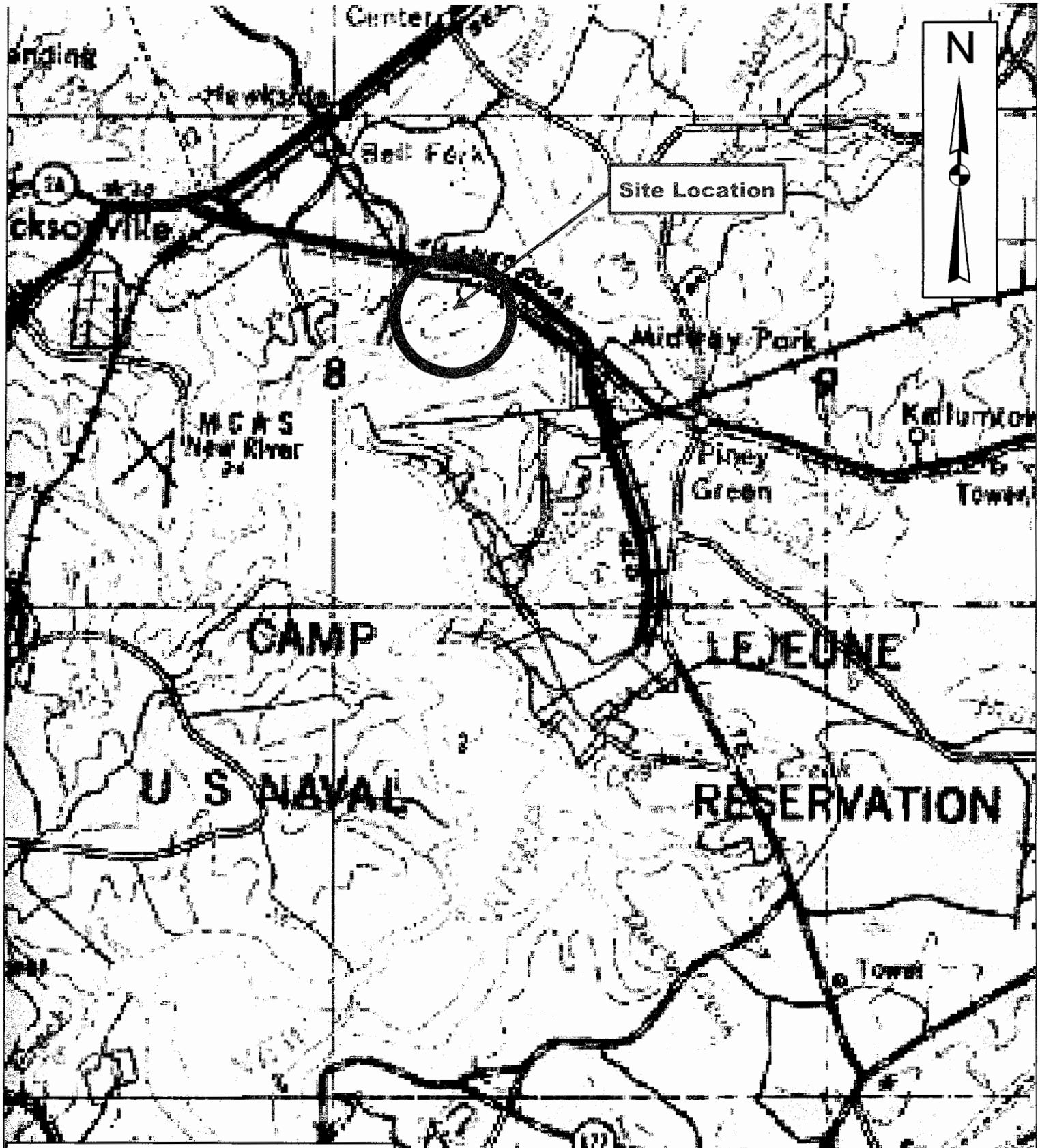
Date: January 2006
Incident Number and Name: TT-3548, 23694
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH as compared to NCDENR 2L Interim GWQS

Contaminant of Concern →			C_5-C_8 Aliphatics	C_9-C_{18} Aliphatics	C_{19}-C_{36} Aliphatics	C_9-C_{22} Aromatics
Well ID	**Sample ID**	**Date Collected**				
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	<100	**<940**	**110**	**<250**
2L Interim Standard (µg/l)			420	4,200	42,000	210
GCL (µg/l)			NE	NE	NE	NE

- All results reported in µg/l
- µg/L = micrograms per liter
- GCL = Gross Contaminant Level
- NE = Not Established
- **BOLDED** = detected concentration
- **BOLDED** and SHADED = detected concentration exceeds NCGWQS

FIGURES



Marine Corps Base Camp Lejeune
Camp Lejeune, NC

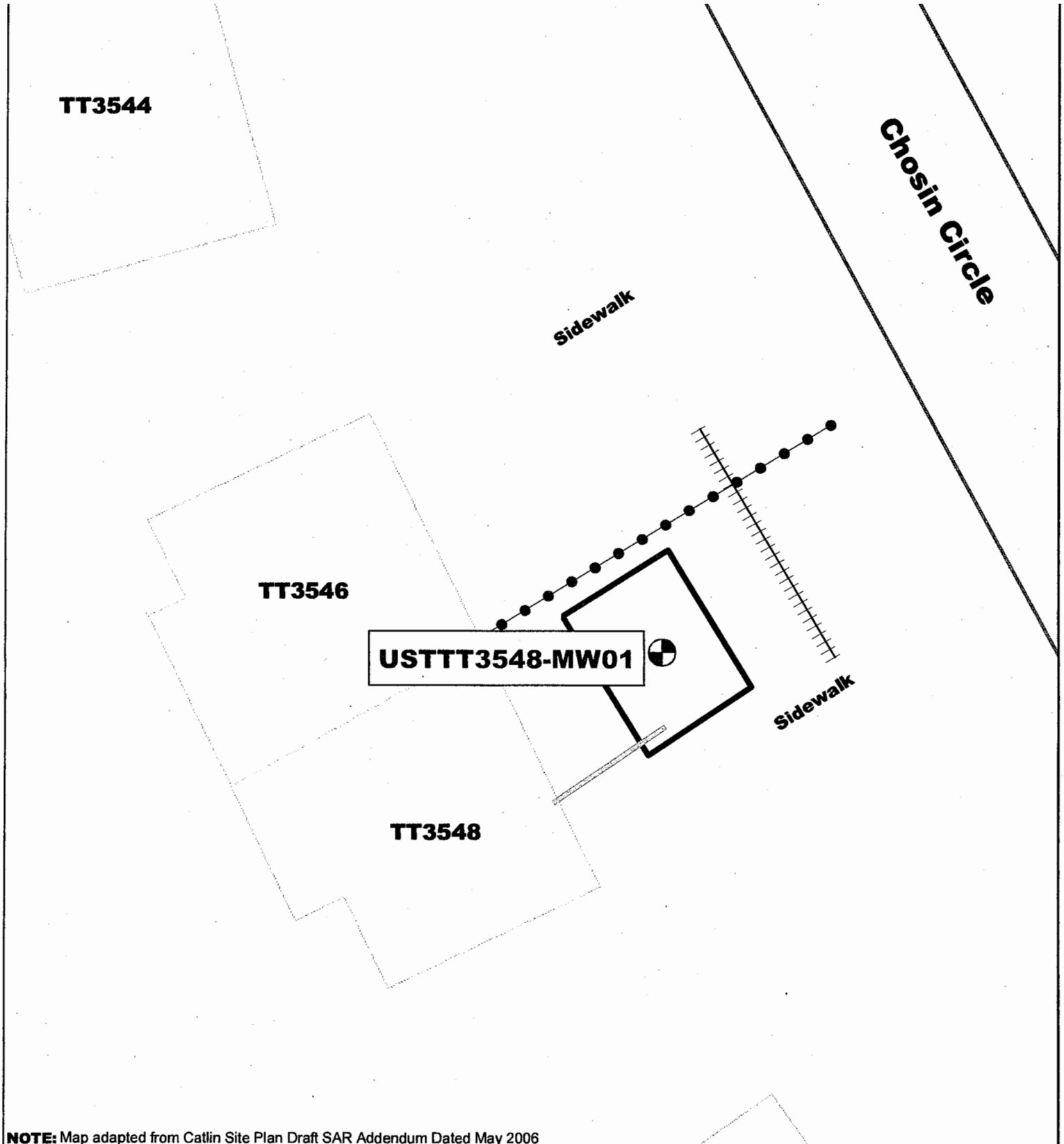
Figure 1: General
Vicinity Topographic Map

Job: NV007

Date: June 2006

606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

BEM SYSTEMS INC
606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606



NOTE: Map adapted from Catlin Site Plan Draft SAR Addendum Dated May 2006

Legend

- Monitoring Wells
- Existing Structures
- Roads
- Sewer Lines
- Former Fuel Delivery Line
- Former Excavation Area
- Water Lines

N
W E
S

1 inch = approximately 15 feet

Marine Corps Base Camp Lejeune
Camp Lejeune, NC

Figure 2: Site Map
With Monitoring Well Location

Project No. NV007

Date: June 2006

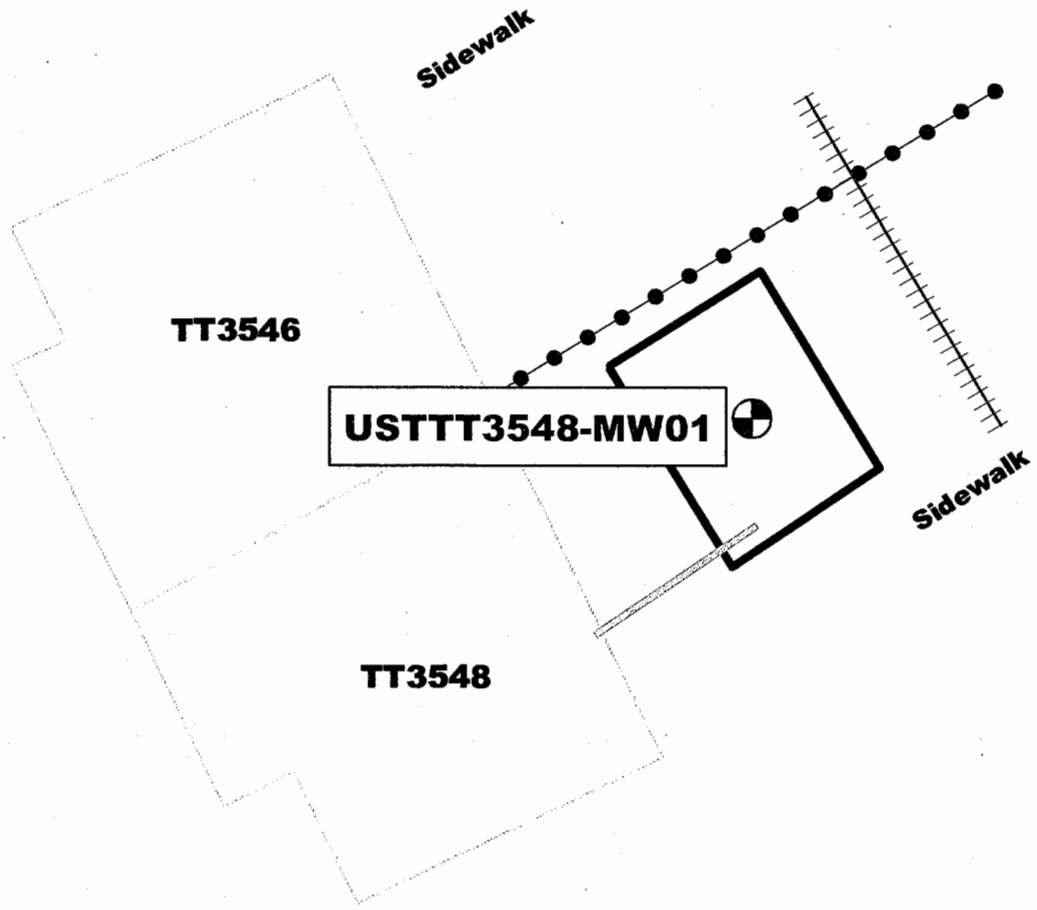
606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

BEM SYSTEMS, INC.
606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

Analytical Method: EPA Method 602

Contaminant of Concern			Benzene	Diisopropyl-ether (DIPE)	Ethyl-benzene	Methyl-tert butyl ether (MTBE)	Toluene	Total Xylenes
Well ID	Sample ID	Date Collected						
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	BQL	BQL	BQL	BQL	BQL	BQL
2L Standard (µg/l)			1	70	550	200	1,000	530
GCL (µg/l)			5,000	70,000	84,500	200,000	257,500	87,500

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits



NOTE: Map adapted from Catlin Site Plan Draft SAR Addendum Dated May 2006

Legend
- Monitoring Wells
- Existing Structures
- Roads
- Sewer Lines
- Former Fuel Delivery Line
- Former Excavation Area
- Water Lines

N W E S

1 inch = approximately 15 feet

Marine Corps Base Camp Lejeune
Camp Lejeune, NC

Figure 3: Site Map With Groundwater Laboratory Results -EPA Method 602

Project No. NV007

Date: June 2006

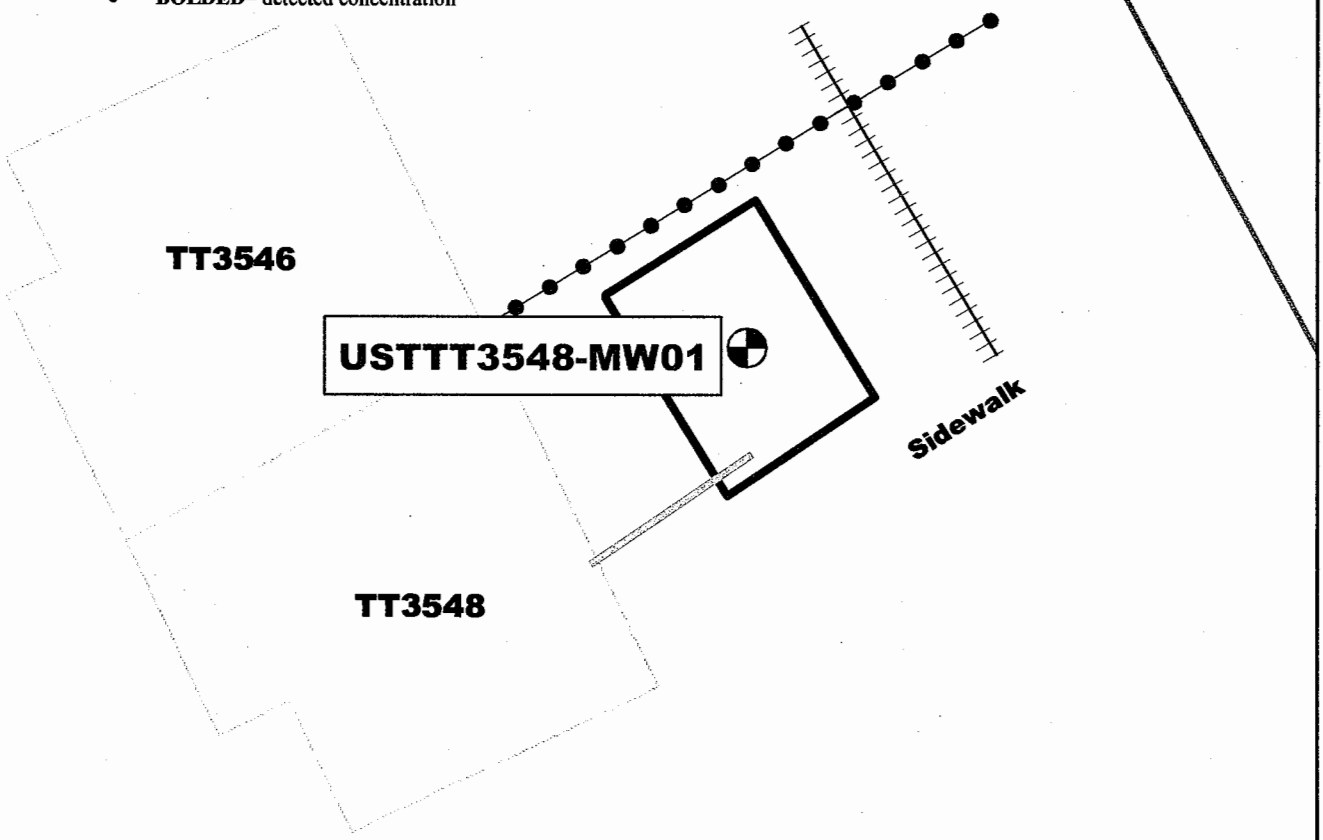
606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

BEM SYSTEMS, INC.
606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

Analytical Method: EPA Method 625 plus 10 largest TICS*

Contaminant of Concern			Phenanthrene	All Other Analytes
Well ID	Sample ID	Date Collected		
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	**1.60J**	BQL
2L Standard (µg/l)			210	Varies
GCL (µg/l)			410	Varies

- *= No specific TICS identified with a match probability. See laboratory reports for additional information.
- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits
- J= detected below the quantitation limit
- **BOLDED**= detected concentration



NOTE: Map adapted from Catlin Site Plan Draft SAR Addendum Dated May 2006

Legend
- Monitoring Wells
- Existing Structures
- Roads
- Sewer Lines
- Former Fuel Delivery Line
- Former Excavation Area
- Water Lines

N W E S

1 inch = approximately 15 feet

Marine Corps Base Camp Lejeune
Camp Lejeune, NC

Figure 4: Site Map With Groundwater Laboratory Results EPA Method 625 Plus 10 Largest TICS

Project No. NV007

Date: June 2006

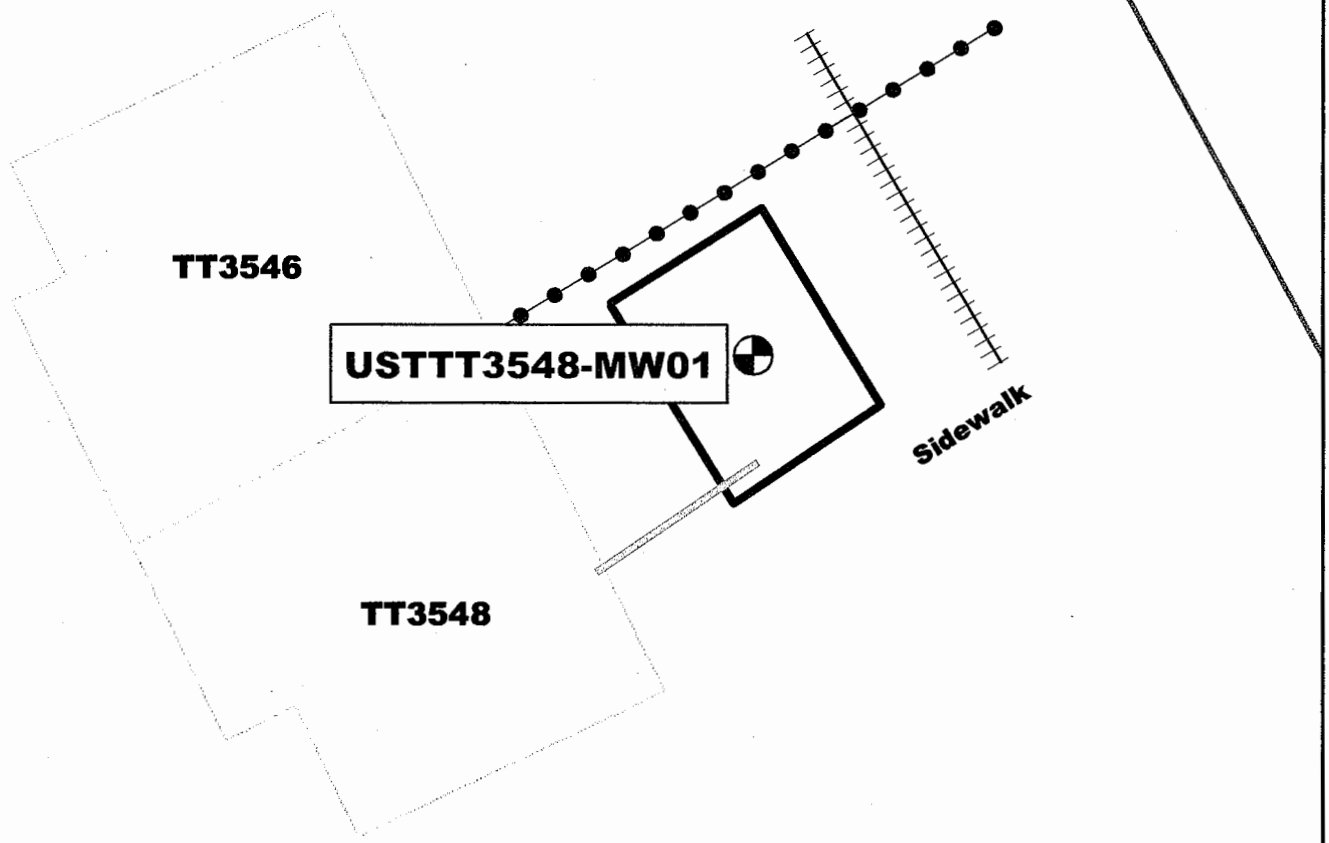
606 Thimble Shoals Blvd. Suite A-1 Newport News, VA 23606

BEM SYSTEMS, INC. 606 Thimble Shoals Blvd. Suite A-2 Newport News, VA 23606

Analytical Method: MADEP Method VPH/EPH
as compared to
NCDENR 2L Interim GWQS

Contaminant of Concern			C_5-C_8 Aliphatics	C_9-C_{18} Aliphatics	C_{19}-C_{36} Aliphatics	C_9-C_{22} Aromatics
Well ID	**Sample ID**	**Date Collected**				
USTTT3548-MW01	USTTT3548-MW01	1/19/2006	<100	**<940**	**110**	**<250**
2L Interim Standard (µg/l)			420	4,200	42,000	210
GCL (µg/l)			NE	NE	NE	NE

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- NE= not estimated
- **BOLDED**= detected concentration
- **BOLDED and SHADED**= detected concentration exceeds NCGWQS



NOTE: Map adapted from Catlin Site Plan Draft SAR Addendum Dated May 2006

Legend
- Monitoring Wells
- Existing Structures
- Roads
- Sewer Lines
- Former Fuel Delivery Line
- Former Excavation Area
- Water Lines

N
W E
S

1 inch = approximately 15 feet

Marine Corps Base Camp Lejeune
Camp Lejeune, NC

Figure 5: Site Map With Groundwater Laboratory Results MADEP VPH/EPH As Compared to NCDENR 2L GWQS

Project No. NV007

Date: June 2006

606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

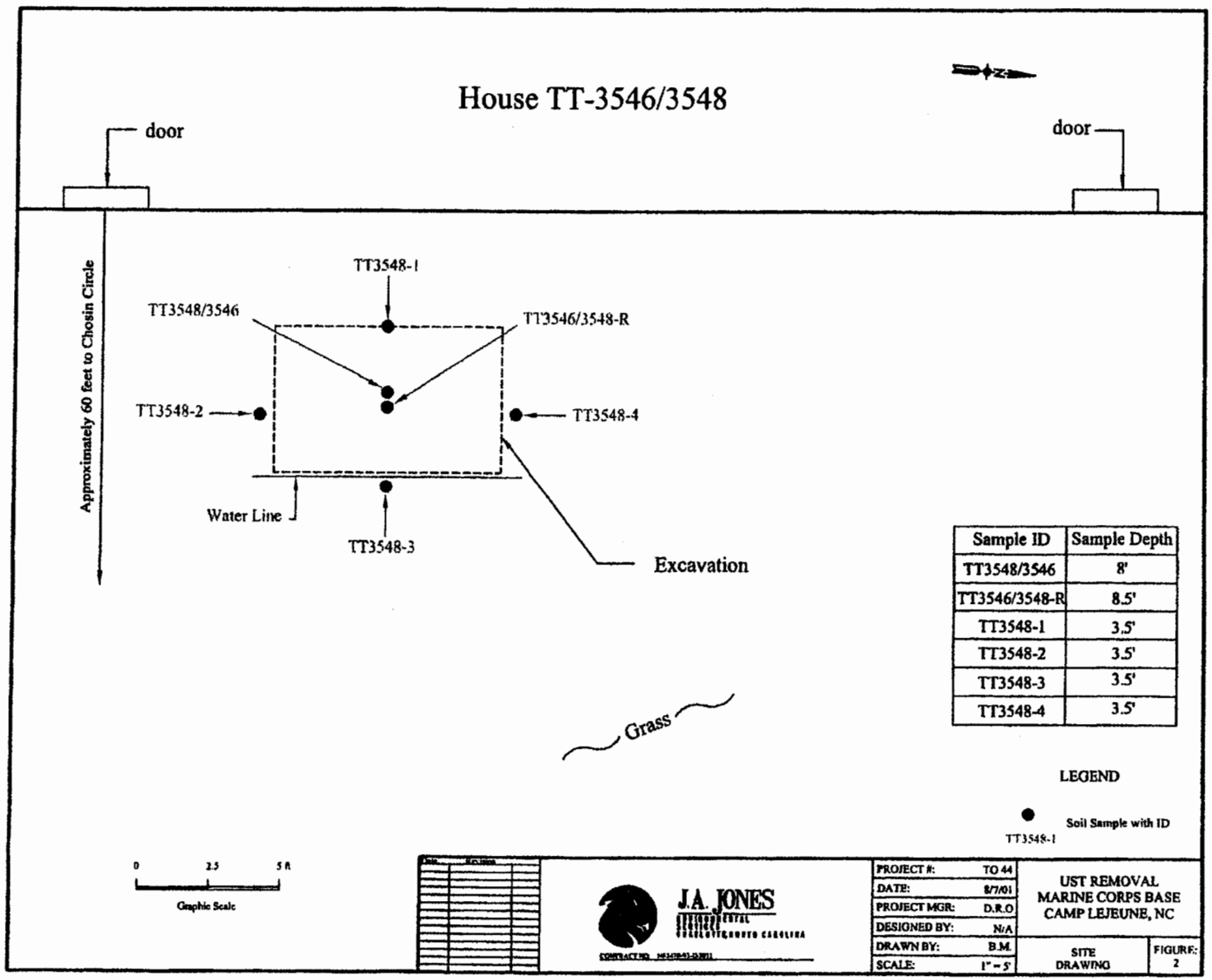
BEM SYSTEMS, INC.
606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

APPENDIX A

HISTORICAL SOIL AND GROUNDWATER DATA AND FIGURES

TANK CLOSURE REPORT
DATA AND FIGURES

House TT-3546/3548



Sample ID	Sample Depth
TT3548/3546	8'
TT3546/3548-R	8.5'
TT3548-1	3.5'
TT3548-2	3.5'
TT3548-3	3.5'
TT3548-4	3.5'

LEGEND

● TT3548-1 Soil Sample with ID

J.A. JONES

PROJECT #:	TO 44
DATE:	8/7/01
PROJECT MGR:	D.R.O
DESIGNED BY:	N/A
DRAWN BY:	B.M.
SCALE:	1" = 5'

UST REMOVAL
MARINE CORPS BASE
CAMP LEJEUNE, NC

SITE DRAWING

FIGURE: 2

TABLES

Table 1 Soil Sample Analytical Results (8/7/01 Sampling Event)

Sample ID	Sample Date	Sample Depth (ft bls)	TPH-GRO (Mg/Kg)	TPH-DRO (Mg/Kg)
TT-3548/3546	8/7/01	8	2,000	15,000

Table 2 SOIL SAMPLES ANALYTICAL RESULTS

(9/20 & 10/23/01 Sampling Event)

SAMPLE ID	DATE	SAMPLE DEPTH	COMPOUND CONCENTRATION (ppm)														
			C9-C22 Aromatics	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	Carbon disulfide	Fluorene	Sec-Butylbenzene	P-Isopropyltoluene	Naphthalene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Methylnaphthalene	Phenanthrene	Pyrene	Total Xylenes
TT3546/3548-R	9/20/01	8.5'	**2090**	63	4000	750		5.7	3.7	4	17	28	13	48	10		6.9
TT3548-1	10/23/01	3.5'					0.018									0.4	
TT3548-2	10/23/01	3.5'			110		0.009				0.0095						
TT3548-3	10/23/01	3.5'															
TT3548-4	10/23/01	3.5'															
Residential Soil Cleanup Level	--		469	939	9386	93860	1564	620	156	n/e	63	782	782	63	469	469	32000
Soil-to-Water Maximum Soil Contaminant Concentration	--		34	72	3255		4	44	3	n/e	0.58	8	7	3	60	286	5

Note:

1. Only those compounds whose concentration is above Method Detection Limit are listed
2. A no-entry-cell indicates compound concentration Below Method Detection Limit
3. n/e ----- Not established yet by NCDENR
4. Bold indicates compound concentration above Residential Soil Cleanup Level

PHASE I LIMITED SITE ASSESSMENT
DATA AND FIGURES

Table 6.1: Summary of Soil Sampling Results (mg/Kg)

Date: April 2003 Incident Number and Name: 23694, Tarawa Terrace 3548 Facility ID#: N/A

Analytical Method (mg/kg - unless otherwise noted) →			VOC EPA 8260	VOC EPA 8260	VOC EPA 8260	VOC EPA 8260	VOC EPA 8260	VOC EPA 8260	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	Semi-VOC EPA 8270	MADEP VPH	MADEP VPH	MADEP EPH	MADEP EPH	MADEP VPH	MADEP VPH
Constituent of Concern →			n-Butylbenzene	4-Isopropyltoluene	Naphthalene (EPA 8260 Test)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes	Acenapthene	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	TIC 1-methylnaphthalene (Probability. Listed)	TIC – 2-methylnaphthalene 99% probability	Other TICs (Total)	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C10 Aromatics	C11-C22 Aromatics
Sample ID	Date Collected (m/dd/yy)	Sample Depth (ft. BGS)																					
USTTT 3548-SB01	7/24/02	2 – 3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Not I.D.'d	Not I.D.'d	Not I.D.'d	<10	<10	<10	<10	<10	<10
Note: sample near product line																							
USTTT 3548/3548-SB02, 8-9'	3/20/03	8-9'	2.0	1.2	**4.0**	**11.0**	5.8	4.6	2.2	3.2	**15.0**	**5.4**	8.6	ND (<.66)	17.0 (96%)	**15.0** (99%)	87.7	23	310	380	110	**43**	**690**
USTTT 3548/3548-SB02, 9-11'	3/20/03	9-11'	1.4	ND (<1.1)	**1.9**	5.2	3.6	ND (<2.3)	0.71	1.2	**5.8**	**0.69**	3.1	0.81	3.9 (92%)	Not I.D.'d	55.5	<10	200	460	130	19	**320**
Soil to groundwater MSCC (mg/kg)			4	NA	0.58	8	7	5	8	44	3	0.58	60	286	NA	3	NA	72	3,255		Immobile	34	
Residential MSCC (mg/kg)			156	NA	83	782	782	32,000	940	620	63	63	469	409	NA	83	NA	939	9,386		93,860	469	
Industrial/Commercial MSCC (mg/kg)			4,088	NA	1,635	20,440	20,440	200,000	24,000	16,400	1,635	1,635	12,264	12,264	NA	1,365	NA	24,528	245,280		HBL >100%	12,264	

Notes:
Empty cells indicate sample not analyzed by Laboratory Method.
Bold = Concentration shown exceeds lowest MSCC
MSCC = maximum soil contaminant concentration
HBL = Health Based Level
ft. BGS = feet below ground surface
Results are reported in mg/kg (milligrams per kilogram)
ND = Compounds not detected above laboratory Practical Quantitation Limit (PQL). The PQL may vary for target analytes tested.
ND (<.66) = Not detected at or above elevated PQL due to dilution of sample. Elevated PQL is shown.
N/A = Not Analyzed
Not I.D.'d – Not Identified

Table 6.2: Summary of Chemical Constituents Detected in Groundwater (µg/L)

Date: May 2003 Incident Number and Name: 23694, Tarawa Terrace 3548 Facility ID#: Not Applicable

			VOC EPA 602	VOC EPA 602	Semi-VOC EPA 625	Semi-VOC EPA 625	Semi-VOC EPA 625	MADEP VPH	MADEP VPH	MADEP EPH	MADEP EPH	MADEP VPH	MADEP EPH
			Toluene	Xylenes (Total)	1-Methylnaphthalene (TIC), Estimated concentration, ug/L [Match Probability, %]	2-Methylnaphthalene (TIC), Estimated concentration, ug/L [Match Probability, %]	Other Total TICs Estimated concentration, ug/L	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C10 Aromatics	C11-C22 Aromatics
USTTT3546/3548 -MW01 Temporary Well at former UST location	UST TT3546/3548-MW01	7/25/02	2	14	15 [97%]	13 [94%]	104	<100	130	<100	<100	<100	120
			1,000	530	NA	28	NA	420	4,200		42,000	210	
			257,500	87,500	NA	12,500	NA	Not Est.	Not Est.		Not Est.	Not Est.	

Notes:

Bold = Concentration is equal to or exceeds State Groundwater Standard
GCL = Gross Contaminant Level
NA = Not Applicable
Not Est. = GCL not established
PQL = Practical Quantitation Limit
ug/L =micrograms per liter

3.0 RISK CHARACTERIZATION

Limited Site Assessment Risk Classification and Land Use Form

Part I – Groundwater/Surface Water/Vapor Impacts
High Risk

1. *Has the release contaminated any water-supply well including any used for non-drinking purposes?* YES **NO**

   Water supply wells are not located within a 1,500-foot radius of the project site.

2. *Is a water-supply well used for drinking water located within 1,000-feet of the source area of the discharge or release?* YES **NO**

   There are no water-supply wells located within 1,000 feet of the source area.

3. *Is a water-supply well not used for drinking water (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release?* YES **NO**

   There are no water-supply wells located within 250 feet of the source area of the release.

4. *Does groundwater within 500 feet of the source area of the release have the potential for future use (there is no other source of water-supply other than the groundwater)?* YES **NO**

   No. There are an adequate number of locations for additional water-supply wells to be installed on other portions of the base.

5. *Do vapors from the release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment? If yes, describe.* YES **NO**

   No. No evidence of accumulations were reported in the UST Closure document or during this investigation.

6. *Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment? If yes, describe.* YES **NO**

No. Review of available previous environmental reports and data collected during this investigation does not provide evidence to suggest other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment.

Intermediate Risk

7. *Is a surface water body located within 500 feet of the source area of the discharge or release?* YES **NO**

The closest surface water body is a perennial stream located approximately 520 feet to the northwest (Drawing 1.1).

*If **YES**, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B.0200 by a factor of 10?*

8. *Is the source area of the discharge or release located within an approved or planned wellhead protection area as defined in 42 USC 300h-7(e)? If YES, describe.* YES **NO**

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State for Onslow County. However, MCB Camp Lejeune has identified proposed wellhead protection areas on the base. The site is not located in a proposed wellhead protection area.

9. *Is the release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?* **YES** NO

As identified in the Geologic Map of North Carolina (North Carolina Geological Survey, 1985), the subject site lies within the Coastal Plain Physiographic Province. Potential impacts to deeper aquifers are unknown.

*If **YES**, is the source area of the release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water?* YES **NO**

Aquifers below the surficial aquifer in the area of UST TT3546/3548 typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Peedee Aquifer, in order of increasing depth. Both the Beaufort and Peedee Aquifers contain saltwater in portions of the MCB and are not generally used for water-supply. The Castle Hayne Aquifer contains freshwater and is the principal aquifer used in the area for water-supply.

While there is likely recharge to the unconfined surficial aquifer at the Base, this aquifer is not used for water supply. Deeper aquifers may obtain a portion of recharge from the surficial aquifer at the Base; however, the amount of recharge provided by the surficial aquifer is expected to be substantially limited due to the presence of semi-confining to confining units composed of silt and/or clay.

10. *Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established by the Department?* YES **NO**

Groundwater sample results for VOCs, VPH, and EPH were below established GCLs and 2L Standards.

Part II – Land Use

Property Containing Source Area of Release
The questions below pertain to the property containing the source area of the release.

1. *Does the property contain one or more primary or secondary residences (permanent or temporary)? Describe.* **YES** NO

Yes. The former UST was located adjacent to a building containing two single-family residences, which adjoin one another (Drawing 3.1). The UST was located between two of the residences, TT-3546 and TT-3548. Additional single residential homes and duplexes are located in the vicinity around the UST TT3546/3548 site.

2. *Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly? Describe.* YES **NO**

   No. The property in the direct vicinity of the former UST contains two military family residences as indicated in "1" above.

3. *Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped? Describe.* YES **NO**

   The property is residential as previously mentioned. The surrounding property has been developed and historically utilized as a residential area for enlisted marines and their families.

4. *Do children visit the property? Explain.* **YES** NO

   Yes. Military families housed in the Tarawa Terrace housing areas typically have young children. The UST was located in front of the entrances to two residences and near walkways that lead to the entrances.

   Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)? Explain. **YES** NO

   The site is located within a restricted area of the base and military police frequently patrol the area. However, access is not restricted to the former tank areas. Military personnel frequently traverse the area on their way to their homes.

5. *Do pavement, buildings, or other structures cap the contaminated soil? Describe.* YES **NO**

   No. The former UST excavation is overlain by grass.

6. *What is the zoning status of the property?*

   The MCB Camp Lejeune is not subject to local or county zoning requirements.

7. *Is the use of the property likely to change in the next 20 years? Explain.*

YES **NO**

No. The designated use of the site as residential housing for the MCB is not likely to change in the foreseeable future. Building renovation or new housing may occur in the future, as MCB military personnel needs dictate.

Property Surrounding Source Area of Release

The questions below pertain to the area within 1,500 feet of the source area of the release (excludes property containing source area of the release):

1. *What is the distance from the source area of the release to the **nearest** primary or secondary residence (permanent or temporary)?*

   Military families reside in residential units TT3546 and TT3548 located approximately four feet to the west of the former UST.

2. *What is the distance from the source area of the release to the **nearest** school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?*

   A playground is located approximately 210 feet to the northeast of the site (Drawing 3.1).

3. *What is the zoning status of properties in the surrounding area?*

   As previously stated, MCB Camp Lejeune is not subject to local or county zoning requirements. The surrounding property has been developed for military support purposes.

4. *Briefly characterize the use and activities of the land in the surrounding area?*

   The surrounding properties are developed and buildings are used for residential housing of military personnel and their families. Recreational facilities such as playgrounds, tennis courts, and basketball courts are also located nearby.

4.0 RECEPTOR INFORMATION

4.1 Water-Supply Wells

There are no active public drinking water-supply wells located within 1,500 feet of the source area of the release. Former water-supply wells used by the MCB in this area have been abandoned according to MCB Water Department personnel.

4.2 Public Water Supplies

Public water is provided to buildings within 1,500 feet of the subject site by water mains which carry treated potable water. Potable water is supplied to the site and surrounding areas by the MCB water-supply system. Based on paint markings by PLS, Inc., water lines that service the TT-3548 household are located adjacent to the former UST excavation (Drawing 4.1). Potable water for Tarawa Terrace is provided by the Holcomb Boulevard Water Treatment Facility. Groundwater obtained from the Castle Hayne Aquifer beneath the MCB is the raw water source for the treatment facility.

4.3 Surface Water

The closest surface water body is a perennial stream located approximately 520 feet northwest of the subject site (Drawings 1.1 and 3.1).

4.4 Wellhead Protection Areas

Wellhead protection areas have not, as of this time, been designated by the State for the MCB. However, MCB Camp Lejeune has identified proposed wellhead protection areas on the base. The site is not located in a proposed wellhead protection area.

4.5 Deep Aquifers in the Coastal Plain Physiographic Region

As identified in the Geologic Map of North Carolina (North Carolina Geological Survey, 1985), the subject site lies within the Coastal Plain Physiographic Province. Potential impacts to deeper aquifers are unknown. During this study, we did not identify degradation to surficial groundwater (Section 6).

To some degree, seven of the ten aquifers identified to date in the North Carolina Coastal Plain are typically present beneath portions of the MCB. In order of increasing depth, these aquifers include the surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers.

Aquifers below the surficial aquifer in the area of UST TT3546/3548 typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Peedee Aquifer, in order of increasing depth. Both the Beaufort and Peedee Aquifers contain saltwater in portions of the MCB and are not generally used for water supply. The Castle Hayne Aquifer contains freshwater and is the principal aquifer used in the area for water supply.

4.6 Subsurface Structures

The building containing the TT3546/3548 residential units is of slab on grade construction. An underground sewer line was previously marked by PLS, Inc. crossing the former UST excavation (Drawing 4.1), however this line was not identified during the utility clearance for our March 2003 fieldwork. Water and sewer lines were identified near the UST excavation. Other underground utilities may be present throughout the subject site but were not encountered during this investigation.

4.7 Property Owners and Occupants

The site and adjacent buildings are located on the MCB property; therefore the U.S. Government owns land in the vicinity of housing units TT3546/3548.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

According to the Geologic Map of North Carolina (North Carolina Geological Survey, 1985), the site lies within the Coastal Plain Physiographic Province.

Field observations noted during hand auger soil boring advancement on July 25, 2002, indicate surficial site soils outside of the backfilled UST pit are comprised of black silt and sand (USCS Type SM) from 0.0 to 0.5 feet BLS, tan fine sand (SP) from 0.5 to 1.5 feet BLS, and olive gray fine sand with some silt (SM) from 1.5 to

JULY 2005 GROUNDWATER SAMPLING EVENT DATA AND FIGURES

Engineering & Environment, *Inc.*

26 July 2005

Mr. Dave Cleland
Department of the Navy
Navy Facilities Engineering Command, Atlantic
Code OPCEV4
6506 Hampton Boulevard, Building C, Room 311
Norfolk, Virginia 23508

Re: Data Report, Well Gauging and Sampling at Site TT-3548, Revision 0
Marine Corps Base, Camp Lejeune, North Carolina
Contract # N62470-04-D-1763, Contract Task Order 0003

Dear Mr. Cleland:

Engineering & Environment, Inc. (EEI) is pleased to provide this data report summarizing groundwater sampling activities at site TT-3548, Marine Corps Base, Camp Lejeune, North Carolina. Activities included well gauging and groundwater sampling at well MW-1. Field procedures followed those indicated in EEI's work plan, "Work Plan, Groundwater Monitoring, Sites BB-190 and BB-293, Marine Corps Base, Camp Lejeune, North Carolina, June 2004."

On 6 July 2005, an EEI representative mobilized to site TT-3458. Well MW-1 was gauged using an oil-water interface probe. No measurable free product was detected.

A stainless steel submersible pump was lowered into well MW-1 and used to purge the well. Upon completion of the purge, a groundwater sample was collected for the following analyses: Aromatic Volatile Organic Compounds (AVOCs) by Method 602 (with total xylene isomers, methyl-tert-butyl ether, and diisopropyl ether); Semi-Volatile Organic Compounds (SVOCs) by Method 625 (with 10 largest non-target peaks); Volatile Petroleum Hydrocarbons (VPH) by MADEP VPH; and Extractable Petroleum Hydrocarbons (EPH) by MADEP EPH. The samples were submitted under chain-of-custody to Paradigm Analytical Laboratories, Inc. The field sampling data sheet, laboratory report, and chain-of-custody form are attached.

Toluene was the only AVOC detected in the sample, reported at an estimated concentration of 0.421 microgram per liter (ug/L). This concentration is substantially below both the North Carolina Groundwater Quality Standard (NCGWQS) of 1,000 ug/L and the Gross Contaminant Level (GCL) of 257,000 ug/L for toluene.

Phenanthrene was the only target analyte SVOC detected in the sample, reported at an estimated concentration of 2.10 ug/L. This concentration is substantially below both the NCGWQS of 210 ug/L and the GCL of 410 for phenanthrene. Five Tentatively Identified Compounds (TICs) were reported, with a total estimated concentration of 27.56 ug/L; none of the TICs were identified as specific compounds (e.g., compound identified as an isomer of dimethylnaphthalene). TICs are

824 GUM BRANCH ROAD ♦ SUITE S ♦ JACKSONVILLE, NORTH CAROLINA 28540
PHONE: 910.989.3214 ♦ FAX: 910.989.3341

EDCL

substances not on the target compound list, and not all TICs are identified and quantitated using individual standards. Frequently, TICs cannot be identified as specific compounds, and are reported as compound isomers or as unknown. All TIC quantitations are estimated. Given the uncertainties associated with TIC quantitation and the lack of specific compound identification, the significance of the data is limited.

None of the VPH hydrocarbon fractions were present at detectable concentrations. Of the EPH hydrocarbon fractions, only the C_{11}-C_{22} Aromatics fraction was detected, reported at a concentration of 140 ug/L. The NCGWQS for the C_9-C_{22} Aromatics fraction is 210 ug/L, and is compared to the sum of the VPH C_9-C_{10} Aromatics fraction and the C_{11}-C_{22} Aromatics fraction. As the VPH C_9-C_{10} Aromatics fraction was not detected, and the C_{11}-C_{22} Aromatics fraction was reported at 140 ug/L, the combined fraction is considered below the NCGWQS for the C_9-C_{22} Aromatics. A GCL has not been established for the C_9-C_{22} Aromatics.

Engineering and Environment, Inc. appreciates the opportunity to work with the Navy on this project. Please direct and technical or contractual question regarding this report to me at (910) 989-3214 (bmorris@eeimail.com) or Mr. J.C. Hardee at (910) 989-3214 (jhardee@eeimail.com).

Sincerely,

ENGINEERING AND ENVIRONMENT, INC.

Mr. William C. Morris, P.G.
Project Manager

attachments

cc: Mr. Andrew Smith, (MCB/EMD) Camp Lejeune
Mr. J.C. Hardee, EEI - JAX

1-26-05

APPENDIX B

LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION FROM JANUARY 2006 GROUNDWATER SAMPLING EVENT

Mr. Chris Murray
Sovereign Consulting
606 Thimble Shoals Rd.
Suite A1
Newport-News VA 23606
Report Number: G650-23

Client Project: NV008 TT3548

Dear Mr. Murray:

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call Paradigm at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
Paradigm Analytical Laboratories, Inc.

1/31/08
Date

Laboratory Director
J. Patrick Weaver

Results for Volatiles

by GC 602

Client Sample ID: USTT3548-MW01
Client Project ID: NV008 TT3548
Lab Sample ID: G650-23-1A
Lab Project ID: G650-23

Analyzed By: MJC
Date Collected: 1/19/06 16:22
Date Received: 1/20/06
Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	1/25/06	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	1/25/06	
Ethylbenzene	BQL	1.00	0.299	1	1/25/06	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	1/25/06	
Toluene	BQL	1.00	0.302	1	1/25/06	
m/p-Xylene	BQL	2.00	0.608	1	1/25/06	
o-Xylene	BQL	2.00	0.596	1	1/25/06	

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.5	101

Comments:
All values corrected for dilution.
BQL = Below quantitation limit.

Reviewed By:

GC_LIMS_v2.0 XLS

Results for Volatiles
by GC 602

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: VBLK3012406B
Lab Project ID:

Analyzed By: MJC
Date Collected:
Date Received:
Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	1/24/06	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	1/24/06	
Ethylbenzene	BQL	1.00	0.299	1	1/24/06	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	1/24/06	
Toluene	BQL	1.00	0.302	1	1/24/06	
m/p-Xylene	BQL	2.00	0.608	1	1/24/06	
o-Xylene	BQL	2.00	0.596	1	1/24/06	

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.5	101

Comments:
All values corrected for dilution.
BQL = Below quantitation limit.

Reviewed By:

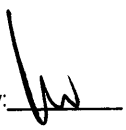
Control Limits for QC Check / Laboratory Control Spike

Method: 602 **Spike[ppb] :** 10
Instrument : gc3
Filename : 012406\024r0101.txt

				QC Limits			LCS Limits	
	Compound	ppb	Q(%)	Lower	Upper	P_s(%)	Lower	Upper
	Benzene	10.0	99.6	77.0	123.0	100	39	150
	Chlorobenzene	9.6	96.4	80.5	119.5	96	55	135
	1,2-Dichlorobenzene	9.9	98.7	68.0	132.0	99	37	154
	1,3-Dichlorobenzene	9.6	95.5	72.5	127.5	96	50	141
	1,4-Dichlorobenzene	9.8	98.5	69.5	130.5	98	42	143
•	Diisopropyl ether	9.3	93.2	43.1	156.9	93	30	170
	Ethylbenzene	10.1	101.1	63.0	137.0	101	32	160
•	MTBE	9.7	97.1	46.8	153.2	97	35	165
	Toluene	9.9	99.0	77.5	127.0	99	46	148
•	m,p-Xylene	20.2	101.1	11.2	188.8	101	D	239
•	o-Xylene	9.8	97.9	47.6	152.4	98	36	164

Flags :

+ = out of QC limits.
• = lab generated limits.
D = Detected

Reviewed by: 

Control Limits for MS-MSD

Method: 602 **Spike[ppb] :** 10
Instrument : gc3
Sample : 012406\038r0101.txt
MS : 012406\041r0101.txt
MSD : 012406\042r0101.txt

		µg/L		P(%)		P Limits	
Compound	Sam.	MS	MSD	MS	MSD	Lower	Upper
Benzene	ND	10.2	9.9	102	99	39	150
Chlorobenzene	ND	9.8	9.5	98	95	55	135
1,2-Dichlorobenzene	ND	10.0	9.8	99	97	37	154
1,3-Dichlorobenzene	ND	9.4	9.3	94	93	50	141
1,4-Dichlorobenzene	ND	9.8	9.5	98	95	42	143
• Diisopropyl ether	ND	9.2	8.8	92	88	30	170
Ethylbenzene	ND	10.4	10.1	104	101	32	160
• MTBE	ND	9.9	9.7	98	95	35	165
Toluene	ND	10.1	9.9	101	99	46	148
• m,p-Xylene	ND	21.0	20.4	104	101	D	239
• o-Xylene	ND	9.8	9.5	98	95	36	164

Flags :

+ = out of QC limits.
• = lab generated limits.
D = Detected
ND = None Detected

Reviewed by:

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Sovereign Consulting

Project Name: NV008 TT3548

Sample Information and Analytical Results	
Sample Identification	USTT3548-MW01
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	01/19/06
Date Received	01/20/06
Date Extracted	01/27/06
Date Analyzed	01/27/06
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	< 100 (µg/L)
C_9-C_{12} Aliphatics**	< 100 (µg/L)
C_9-C_{10} Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	92
Surrogate % Recovery - FID	98

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: g650-23-1e

Reviewed By:

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 10/31/05 PID Initial Calibration Date: 10/31/05

Calibration Ranges and Limits

Range	MDL (07/15/2004) (µg/L)	ML (µg/L)	RL (µg/L)	RL (mg/Kg)
C_5-C_8 Aliphatics	4.4	14	100	10
C_9-C_{12} Aliphatics	3.4	11	100	10
C_9-C_{10} Aromatics	0.13	0.41	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C_5-C_8 Aliphatics	40	7.9	Calibration Factor
	1000		
	2000		
	3000		
	4000		
C_9-C_{12} Aliphatics	10	1.00	Linear Regression
	250		
	500		
	750		
	1000		
C_9-C_{10} Aromatics	10	16.20	Calibration Factor
	250		
	500		
	750		
	1000		

Calibration Check Date: 01/27/06

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	2000	200	5.0
C_9-C_{12} Aliphatics	500	50	-2.9
C_9-C_{10} Aromatics	500	50	18.4

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Sovereign Consulting

Project Name: NV008 TT3548

Sample Information and Analytical Results	
Sample Identification	USTT3548-MW01
Sample Matrix	Water
Date Collected	01/19/06
Date Received	01/20/06
Date Extracted	01/23/06
Date Analyzed	01/27/06
Dry Weight	
Dilution Factor	1:1
C_9-C_{18} Aliphatics*	840 (ug/L)
C_{19}-C_{36} Aliphatics*	110 (ug/L)
C_{11}-C_{22} Aromatics*	150 (ug/L)
Aliphatic Surrogate % Recovery	63
Aromatic Surrogate % Recovery	75
Fractionation Surrogate 1 % Recovery	130

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G650-23-1L

Reviewed By:

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 12/28/05

Calibration Ranges and Limits

Range	MDL (2/2004) (µg/L)	ML (µg/L)	RL (µg/L)	RL (mg/Kg)
C_9-C_{18} Aliphatics	3.84	12.2	100	10
C_{19}-C_{36} Aliphatics	0.57	1.8	100	10
C_{11}-C_{22} Aromatics	4.54	14.4	100	10

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C_9-C_{18} Aliphatics	6	24.90	Calibration Factor
	30		
	60		
	120		
	240		
C_{19}-C_{36} Aliphatics	8	15.4	Calibration Factor
	40		
	80		
	160		
	320		
C_{11}-C_{22} Aromatics	17	9.8	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 01/26/06

Calibration Check

Range	Levels (µg/mL)	RPD
C_9-C_{18} Aliphatics	120	12.5
C_{19}-C_{36} Aliphatics	160	4.5
C_{11}-C_{22} Aromatics	340	10.4

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTT3548-MW01
Client Project ID: NV008 TT3548
Lab Sample ID: G650-23-1H
Lab Project ID: G650-23

Analyzed By: MRC
Date Collected: 1/19/2006 16:22
Date Received: 1/20/2006
Date Extracted: 1/23/2006
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	10.0	1.22	1	1/25/2006	
Acenaphthylene	BQL	10.0	1.12	1	1/25/2006	
Anthracene	BQL	10.0	1.75	1	1/25/2006	
Benzo[a]anthracene	BQL	10.0	1.36	1	1/25/2006	
Benzo[a]pyrene	BQL	10.0	1.27	1	1/25/2006	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	1/25/2006	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	1/25/2006	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	1/25/2006	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	1/25/2006	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	1/25/2006	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	1/25/2006	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	1/25/2006	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	1/25/2006	
Butylbenzylphthalate	BQL	10.0	1.53	1	1/25/2006	
2-Chloronaphthalene	BQL	10.0	1.25	1	1/25/2006	
2-Chlorophenol	BQL	10.0	4.22	1	1/25/2006	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	1/25/2006	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	1/25/2006	
Chrysene	BQL	10.0	1.11	1	1/25/2006	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	1/25/2006	
Di-n-Butylphthalate	BQL	10.0	1.65	1	1/25/2006	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	1/25/2006	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	1/25/2006	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	1/25/2006	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	1/25/2006	
2,4-Dichlorophenol	BQL	10.0	3.75	1	1/25/2006	
Diethylphthalate	BQL	10.0	1.48	1	1/25/2006	
Dimethylphthalate	BQL	10.0	1.04	1	1/25/2006	
2,4-Dimethylphenol	BQL	10.0	9.25	1	1/25/2006	
Di-n-octylphthalate	BQL	10.0	1.16	1	1/25/2006	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	1/25/2006	
2,4-Dinitrophenol	BQL	50.0	4.20	1	1/25/2006	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	1/25/2006	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	1/25/2006	
Diphenylamine *	BQL	10.0	1.53	1	1/25/2006	
Fluoranthene	BQL	10.0	1.41	1	1/25/2006	
Fluorene	BQL	10.0	1.22	1	1/25/2006	
Hexachlorobenzene	BQL	10.0	1.22	1	1/25/2006	
Hexachlorobutadiene	BQL	10.0	1.58	1	1/25/2006	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	1/25/2006	
Hexachloroethane	BQL	10.0	1.58	1	1/25/2006	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	1/25/2006	

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTT3548-MW01
Client Project ID: NV008 TT3548
Lab Sample ID: G650-23-1H
Lab Project ID: G650-23

Analyzed By: MRC
Date Collected: 1/19/2006 16:22
Date Received: 1/20/2006
Date Extracted: 1/23/2006
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Isophorone	BQL	10.0	1.27	1	1/25/2006	
Naphthalene	BQL	10.0	1.08	1	1/25/2006	
Nitrobenzene	BQL	10.0	1.32	1	1/25/2006	
2-Nitrophenol	BQL	10.0	3.52	1	1/25/2006	
4-Nitrophenol	BQL	50.0	3.17	1	1/25/2006	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	1/25/2006	
Pentachlorophenol	BQL	50.0	2.83	1	1/25/2006	
Phenanthrene	**1.60**	10.0	1.38	1	1/25/2006	J
Phenol	BQL	10.0	3.38	1	1/25/2006	
Pyrene	BQL	10.0	2.08	1	1/25/2006	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	1/25/2006	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	1/25/2006	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.4	84
2-Fluorophenol	10	8.4	84
Nitrobenzene-d5	10	8.5	85
Phenol-d6	10	8.4	84
2,4,6-Tribromophenol	10	8.7	87
4-Terphenyl-d14	10	8.7	87

Comments:

* N-Nitrosodiphenylamine is reported as the breakdown product Diphenylamine.

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds

by GCMS

Client Sample ID: USTT3548-MW01
Client Project ID: NV008 TT3548
Lab Sample ID: G650-23-1H
Lab Project ID: G650-23
Sample Wt/Vol: 500 ML
Dilution: 1

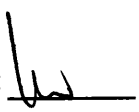
Analyzed By: MRC
Date Collected: 1/19/2006 16:22
Date Received: 1/20/2006
Date Extracted: 1/23/2006
Date Analyzed: 1/25/2006
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Alkane, Unknown	10.69			16.8
2	Unknown	9.78			13.6
3	Alkane, Unknown	12.35			13.1
4	Alkane, Unknown	13.12			12.4
5	Alkane, Unknown	13.85			8.98
6	Unknown	8.94			8.49
7	Ethyldimethylbenzene, Isomer of	8.04			8.03
8	Alkane, Unknown	14.54			7.32
9	Unknown	9.08			7.09
10	Alkane, Unknown	15.20			5.86

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

Results for Semivolatiles
by GCMS 625

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB4365
Lab Project ID:

Analyzed By: MRC
Date Collected:
Date Received:
Date Extracted: 1/23/2006
Matrix: WATER

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	10.0	1.22	1	1/25/2006	
Acenaphthylene	BQL	10.0	1.12	1	1/25/2006	
Anthracene	BQL	10.0	1.75	1	1/25/2006	
Benzo[a]anthracene	BQL	10.0	1.36	1	1/25/2006	
Benzo[a]pyrene	BQL	10.0	1.27	1	1/25/2006	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	1/25/2006	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	1/25/2006	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	1/25/2006	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	1/25/2006	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	1/25/2006	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	1/25/2006	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	1/25/2006	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	1/25/2006	
Butylbenzylphthalate	BQL	10.0	1.53	1	1/25/2006	
2-Chloronaphthalene	BQL	10.0	1.25	1	1/25/2006	
2-Chlorophenol	BQL	10.0	4.22	1	1/25/2006	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	1/25/2006	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	1/25/2006	
Chrysene	BQL	10.0	1.11	1	1/25/2006	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	1/25/2006	
Di-n-Butylphthalate	BQL	10.0	1.65	1	1/25/2006	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	1/25/2006	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	1/25/2006	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	1/25/2006	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	1/25/2006	
2,4-Dichlorophenol	BQL	10.0	3.75	1	1/25/2006	
Diethylphthalate	BQL	10.0	1.48	1	1/25/2006	
Dimethylphthalate	BQL	10.0	1.04	1	1/25/2006	
2,4-Dimethylphenol	BQL	10.0	9.25	1	1/25/2006	
Di-n-octylphthalate	BQL	10.0	1.16	1	1/25/2006	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	1/25/2006	
2,4-Dinitrophenol	BQL	50.0	4.20	1	1/25/2006	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	1/25/2006	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	1/25/2006	
Diphenylamine *	BQL	10.0	1.53	1	1/25/2006	
Fluoranthene	BQL	10.0	1.41	1	1/25/2006	
Fluorene	BQL	10.0	1.22	1	1/25/2006	
Hexachlorobenzene	BQL	10.0	1.22	1	1/25/2006	
Hexachlorobutadiene	BQL	10.0	1.58	1	1/25/2006	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	1/25/2006	
Hexachloroethane	BQL	10.0	1.58	1	1/25/2006	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	1/25/2006	

Results for Semivolatiles
by GCMS 625

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB4365
Lab Project ID:

Analyzed By: MRC
Date Collected:
Date Received:
Date Extracted: 1/23/2006
Matrix: WATER

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Isophorone	BQL	10.0	1.27	1	1/25/2006	
Naphthalene	BQL	10.0	1.08	1	1/25/2006	
Nitrobenzene	BQL	10.0	1.32	1	1/25/2006	
2-Nitrophenol	BQL	10.0	3.52	1	1/25/2006	
4-Nitrophenol	BQL	50.0	3.17	1	1/25/2006	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	1/25/2006	
Pentachlorophenol	BQL	50.0	2.83	1	1/25/2006	
Phenanthrene	BQL	10.0	1.38	1	1/25/2006	
Phenol	BQL	10.0	3.38	1	1/25/2006	
Pyrene	BQL	10.0	2.08	1	1/25/2006	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	1/25/2006	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	1/25/2006	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	7.7	77
2-Fluorophenol	10	7.4	74
Nitrobenzene-d5	10	7.7	77
Phenol-d6	10	7.7	77
2,4,6-Tribromophenol	10	7	70
4-Terphenyl-d14	10	9.3	93

Comments:

* N-Nitrosodiphenylamine is reported as the breakdown product Diphenylamine.

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By:

Results For Matrix Spike / Matrix Spike Duplicate and Laboratory Control Standard (MS/MSD/LCS)
by GCMS

Client Sample ID: Batch QC
Client Project ID:
Lab Sample ID: Batch-4365-MS/MSD/LCS
Lab Project ID:
Matrix: WATER
Prep Method: 3520

Date Collected:
Date Received:
Date Extracted: 01/23/06
Date Analyzed: 01/25/06
Analyzed By: MRC
Dilution: 1

	Sample Amount (µg/L)	MS Spike (µg/L)	MS Conc. (µg/L)	MS Spike % Rec.	MSD Spike (µg/L)	MSD Conc. (µg/L)	MSD Conc. % Rec.	RPD	QC Limits RPD	QC Limits % Rec.
Acenaphthylene	BQL	286	271	95.0	250	235	94.1	0.952	30	62.0-119
4-Chloro-3-methylphenol	BQL	286	237	82.9	250	208	83.4	0.601	30	67.0-109
2-Chlorophenol	BQL	286	232	81.3	250	196	78.6	3.38	30	59.0-95.0
1,4-Dichlorobenzene	BQL	286	147	51.4	250	119	47.5	7.89	30	29.0-86.0
2,4-Dinitrotoluene	BQL	286	240	84.0	250	204	81.8	2.65	30	63.0-103
N-Nitrosodi-n-propylamine	BQL	286	235	82.3	250	197	78.9	4.22	30	67.0-107
4-Nitrophenol	BQL	286	260	91.1	250	218	87.4	4.14	30	49.0-146
Pentachlorophenol	BQL	286	210	73.7	250	180	72.2	2.06	30	43.0-106
Phenol	BQL	286	236	82.6	250	200	79.9	3.32	30	61.0-100
Pyrene	BQL	286	226	79.0	250	200	80.1	1.38	30	41.0-123
1,2,4-Trichlorobenzene	BQL	286	195	68.3	250	169	67.7	0.882	30	41.0-96.0

	Spiked Amount (µg/L)	LCS Conc. (µg/L)	LCS Spike %	QC Limits % Rec.
Acenaphthylene	100	88.5	88.5	66.1-116
4-Chloro-3-methylphenol	100	79.3	79.3	64.3-128
2-Chlorophenol	100	72.6	72.6	56.9-93.4
1,4-Dichlorobenzene	100	48.5	48.5	20.6-82.8
2,4-Dinitrotoluene	100	78.0	78.0	63.7-116
N-Nitrosodi-n-propylamine	100	76.3	76.3	62.6-108
4-Nitrophenol	100	86.4	86.4	53.7-143
Pentachlorophenol	100	67.0	67.0	31.0-102
Phenol	100	76.0	76.0	57.4-99.5
Pyrene	100	76.5	76.5	44.1-124
1,2,4-Trichlorobenzene	100	63.5	63.5	37.6-97.9

Comments:

Concentrations reflect the spiked sample amounts.

Flags:

* = Out of limits.
NA = Not applicable.

Reviewed By:

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL = Reporting Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% soilds = Percent Solids

Special Notes:

1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.

2) Uncertainty for all reported data is less than or equal to 30 percent.

MI34.092205.2

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(1)

CLIENT: Sovereign Consulting Inc

CONTACT: Thomas Tillerson PHONE NO: (910) 526-3941

PROJECT: NV008 SITE/PWSID#: TT3548

REPORTS TO: Chris Murray (757) 777-8982

cmurray@sovcon.com FAX NO.: (757) 794-9227

INVOICE TO: Chris Murray QUOTE #

606 A1 Thimble Shoals Blvd P.O. NUMBER

Newport News VA 23606

SGS Reference: G650-23

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(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No CONTAINERS	SAMPLE TYPE (C=COMP G=GRAB)
	UST TT3548-MW01	1/19/06	1622	W	7	

Preservatives Used: HCl | HCl | HCl | None

Analysis Required (3): 602 + xylenes | VPH | EPH | *625 + 10 TIC | report J's & QC spikelate

REMARKS: *625 plus 10 largest non target peaks

(5)

Collected/Relinquished By:(1)	Date	Time	Received By:
	1/22/06	1110	Julie Jones
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received By:

(4)

Shipping Carrier: NA

Shipping Ticket No:

Samples Received Cold? (Circle) YES NO

Temperature °C: 5.8°C

Special Deliverable Requirements:

Chain of Custody Seal: (Circle)

INTACT BROKEN ABSENT

Requested Turnaround Time and Special Instructions:

Standard turn – Email results in "EDD" Format

☐ 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
☐ 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557
☐ 1258 Greenbrier Street Charleston, WV 25311 Tel: (304) 346-0725 Fax: (304) 346-0761

White - Retained by Lab
Yellow - Returned with Report
Pink - Retained by Sampler

PURGING AND BAILING GROUNDWATER SAMPLING FORM
MCB Camp LeJeune and New River MCAS

Project Number:	NV008	Well ID:	MW01
Project Name:	TT3548	Sample ID:	UST-TT3548-MW01
Date:	1/19/06	Well Condition:	
Weather:			

ALL DEPTHS ARE TO BE COLLECTED FROM THE TOP OF THE CASING.

Protective Casing Diameter (inch):	2	Water Column (feet):	6.62
Inner Casing Diameter (inch):		Casing Volume (gal):	1.07
Inner Casing Material:		Pump Intake Setting from TOC (feet):	
Purge/Sample Method:		DTW After Pump Installed:	
PID/FID Reading of Well Headspace (ppm)		Start Purge Date/Time:	1555
Before Cap Removal:		End Purge Date/Time:	1620
After Cap Removal:		Total Volume Purged (gal):	
Depth to Product from TOC (feet):		Depth to Water After Purge from TOC (feet):	
Initial Depth to Water from TOC (feet):	13.11	Pre-Sample Depth to Water from TOC (feet):	
Product Thickness (feet):		Start Sample Date/Time:	1622
Depth to Top of Screen from TOC (feet):		End Sample Date/Time:	
Total Depth from TOC (feet):	19.73	Sampler Name:	Kurt Mickle

COLLECT READINGS AT THE START OF PURGING, AFTER EACH AND EVERY WELL VOLUME IS PURGED, AND AFTER SAMPLING IS COMPLETED. ±.2 .5 .2 .2 5 ± 10 mV

Time	Rate (gal/min)	Cumulative Gallons Purged	pH (SI Units)	Conductivity (µohms/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mv)	Depth to Water (ft)	Comments
1601	200 ml	1	5.55	.102	17.80	1.20	288	83.6		
1604			5.30	0.092	18.73	0.31	392	149.1		
1607			5.22	0.087	19.05	0.32	455	166.1		
1610			5.19	0.084	19.12	0.45	445	171.2		
1613			5.15	0.082	19.16	0.60	442	173.4		
1617			5.13	0.082	19.18	0.63	443	172.9		
1620			5.13	0.082	19.19	0.64	442	172.7		
1622	Sampling									
								3-602		
								2-VPH		
								1-EPH		
								1-625 + TICs		