

**QUARTERLY GROUNDWATER MONITORING REPORT
SITE H-28
MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA**

Prepared for:

DEPARTMENT OF THE NAVY

Contract No. N62470-03-D-4000

Task Order No 0009



Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Building A (South East Wing) 3rd Floor
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4 August 2004

EEI PROJECT NO. LDO3-0011

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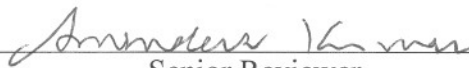
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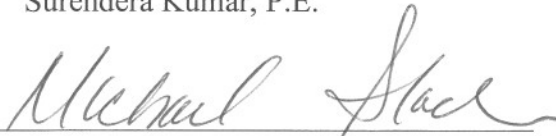
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We hereby certify that the Report shown and marked in this submittal is proposed to be incorporated into Contract Number N62470-03-D-4000, is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.



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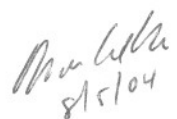


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LIST OF ACRONYMS/ABBREVIATIONS

AVOC	Aromatic Volatile Organic Compound
Baker	Baker Environmental, Inc.
bgs	below ground surface
CAP	Corrective Action Plan
DI	Deionized Water
DWM	Division of Waste Management
EEI	Engineering and Environment, Inc.
GCL	Gross Contamination Level
Jones	J.A. Jones Environmental Services Company
L	Liter
Law	Law Engineering and Environmental Services, Inc.
MADEP EPH	Massachusetts Department of Environmental Protection Extractable Petroleum Hydrocarbons
MADEP VPH	Massachusetts Department of Environmental Protection Volatile Petroleum Hydrocarbons
MCB	Marine Corps Base
mg/kg	milligrams per kilogram
msl	mean sea level
MW	Monitoring Well
NAVFACENGCOM	Navy Atlantic Division, Naval Facilities Engineering Command
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCGS	North Carolina Geological Survey
NCGWQS	North Carolina Groundwater Quality Standard
ND	Not Detected
QC	Quality Control
SVOC	Semi-Volatile Organic Compound
TIC	Tentatively Identified Compound
TPH	Total Petroleum Hydrocarbons
ug/L	micrograms per liter
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

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EXECUTIVE SUMMARY

On behalf of the Department of the Navy, Atlantic Division, Naval Facilities Engineering Command, Engineering and Environment, Inc. has prepared this quarterly groundwater monitoring report for Site H-28, Marine Corp Base Camp Lejeune, North Carolina. The report presents the findings of groundwater monitoring activities conducted in June 2004.

Building H-28 is a single family house located in a residential area of Marine Corp Base Camp Lejeune, North Carolina. In May 1990, a 550-gallon Number 2 fuel oil Underground Storage Tank (UST) was excavated and removed from site. A soil sample collect at the time the UST was removed indicated petroleum constituents were present in soil above State action levels in effect at that time. Monitoring wells subsequently installed in 1991 indicated free product was not present, although petroleum constituents were detected in groundwater at concentrations slightly above North Carolina Groundwater Quality Standards (NCGWQS).

Additional site characterization and site monitoring activities were conducted, including preparation of a Corrective Action Plan (CAP), a risk characterization assessment, and various well gauging and groundwater sampling programs. The CAP identified one area of soil where petroleum constituents were present above soil rehabilitation goals developed in the CAP and recommended excavation of the soils as the remedial response. However, soil excavation later conducted in the area did not reveal evidence of impacted soil, and the excavated soil was used to backfill the excavation. Soil borings later advanced in the immediate vicinity of the former UST indicated soil concentrations were below Maximum Soil Contaminant Concentrations.

The CAP identified NCGWQSs as groundwater rehabilitation goals and recommended monitored natural attenuation to address petroleum impacted groundwater. Several monitoring programs and a risk characterization assessment were conducted from 1998 to 2003. The monitoring programs conducted from 1998 to 2001 identified some petroleum constituents present at concentrations above NCGWQSs but below Gross Contaminant Levels (GCLs) at wells located near the former UST. Concentrations of these constituents generally were observed to decrease over time.

Free product was detected at one well (MW-11) installed in 1999; the well is located close to the former UST. Product recovery efforts including hand bailing and use of sorbent socks were conducted at the well. Gauging data from 1999 to 2001 indicated the product thickness at well MW-11 was decreasing over time. A risk characterization assessment conducted in 1999 concluded that although the expose risk was considered low, the presence of free product indicated the site should be classified as in Intermediate Risk based on North Carolina Department of Environment and Natural Resources guidance.

Gauging data conducted in 2002 and 2003 at well MW-11 indicated free product was no longer present. However, for some of the events, sorbent socks that had been removed in advance of the gauging event had been reinstalled by an unknown party, and the gauging data for those events was compromised. However, the remaining 2003 gauging events indicating measurable free product was not present were considered valid without qualification.

In June 2004, the current groundwater monitoring program was initiated. The program includes quarterly well gauging and semi-annual groundwater sampling at wells MW-6, MW-8, and MW-9. For the current monitoring event, gauging at all 10 existing site monitoring wells was conducted, and groundwater samples were collected from monitoring wells MW-6 and MW-9. Well MW-8 was not sampled as free product was detected at the well at a thickness of 0.05 foot. No free product was observed in well MW-11, although a sorbent sock was present in the well immediately prior to gauging and the data are considered compromised. Analysis of groundwater samples indicated target analytes were not present at detectable levels, indicating continued reduction in petroleum constituent concentration over time.

It is recommended to continue with the quarterly groundwater gauging and semi-annual groundwater sampling program. The site should be accessed in advance of future field events to remove sorbent sock; the socks should be reinstalled as needed following the events. Additionally, if measurable free product is not detected at well MW-11 during the next scheduled sampling event, a groundwater sample should be collected from this well and analyzed for the same analytic suite as specified for wells presently included in the monitoring program.

SECTION 1 INTRODUCTION

On behalf of the Department of the Navy, Atlantic Division, Naval Facilities Engineering Command (NAVFACENGCOM), Engineering and Environment, Inc. (EEI) has prepared this quarterly groundwater monitoring report for Site H-28, Marine Corp Base (MCB) Camp Lejeune. The report presents the findings of groundwater monitoring activities conducted in June 2004. This report and the methods used to acquire the data in support of this report have been prepared in accordance with the North Carolina Department of Environmental Resources (NCDENR), Division of Waste Management (DWM), Underground Storage Tank Section (UST) Section guidelines (NCDENR, 2001 and 2003) and the site specific work prepared for this site by EEI (EEI, April 2004).

The site has been not been assigned an incident number by NCDENR. Previous site investigations have indicated the site meets criteria associated with NCDENR's Intermediate Risk classification (Law, 2000a).

1.1 Site Description

The site is located on MCB Camp Lejeune in Onslow County, North Carolina (N34 degrees, 40.636 minutes, W77 degrees, 22.151 minutes) (Law, 2000a) (Figure 1-1). Within Camp Lejeune, the site is located on Julian C. Smith Drive in a residential area of the base and includes Building H-28 (Figure 1-2). Building H-28 is a detached, single family officer's residence.

The nearest mapped body of water is Wallace Creek. The creek is located approximately 200 feet north of the site. No potable water supply wells are located within 1500 feet of the site (Law, 2000a).

1.2 Site History

In May 1990, a 550-gallon UST was excavated and removed from site (Baker, 1994). The installation date of the former UST is not known. The former UST had been located immediately south of Building H-28 and had been used to store Number 2 fuel oil for heating (Figure 1-3). A soil sample collected from below the UST at the time of removal indicated Total Petroleum Hydrocarbons (TPH) – high boiling point range were present at a concentration of 18,000 milligrams per kilogram (mg/kg), above the 10 mg/kg State action level in effect at that time (Baker, 1994). Three monitoring wells (now identified as MW-8, MW-9, and MW-10) were installed in September 1991. Soil samples collected during well installation indicated TPH was not present at detectable levels. Following installation, gauging of the wells indicated no measurable free product was present in any of the wells. However, analysis of groundwater samples collected from the wells indicated two wells, MW-9 and MW-10, exhibited benzene concentrations of 10 micrograms per liter (ug/L) and 19 ug/L, above the North Carolina Groundwater Quality Standard (NCGWQS) for benzene of 1 ug/L (Baker, 1994).

Additional site characterization activities were conducted and, in 1994, a corrective action plan (CAP) was prepared (Baker, 1994). The CAP included the results of the site characterization

program and presented a remediation strategy to address petroleum constituents in soil and groundwater. The characterization data indicated one area south of the former UST where soil TPH concentrations (medium-to-high boiling point range) exceeded the site rehabilitation goal of 240 mg/kg (developed in the CAP using State guidance in effect at that time). Groundwater impacts appeared to be limited to low concentrations of aromatic volatile organic compounds (AVOCs) and semi-volatile organic compounds (SVOCs) detected primarily near the former UST. The CAP identified NCGWQSs as site rehabilitation goals for groundwater, with respect to which benzene was the only compound present above it NCGWQS. The SVOCs detected in groundwater did not have NCGWQSs established at that time. The recommended remediation approach for soil was excavation of the affected soils south of the former UST. For groundwater, the CAP recommended remediation by monitored natural attenuation (Baker, 1994).

Soil excavation in the area south of the former UST was conducted in November 1995 (Jones, 1996) (Figure 1-3). Soil vapor analyses conducted during the excavation indicated the soil was not impacted with petroleum hydrocarbons, and the excavated soils were used to backfill the excavation while on site. Laboratory analyses of the soil confirmed that only low concentrations (less than 1 mg/kg) of TPH were present (Jones, 1996).

Groundwater monitoring activities were conducted in 1998. Activities included one site-wide well gauging event in January 1998, gauging wells MW-6 and MW-7 in April and July 1998, and collecting groundwater samples for AVOC and SVOC analyses from wells MW-6 and MW-7 in January, April, and July 1998 (Law, 1998a, b, c). No free product was detected during any of the gauging events, and no AVOCs or SVOCs were detected for the January and April events. For the July 1998 event, some AVOCs and SVOCs were detected in well MW-6 only, with naphthalene reported at a concentration above NCGWQSs but lower than observed during the CAP (Law 1998c).

A risk characterization assessment was conducted in 1999 (Law, 2000a). As part of the assessment, three soil borings were advanced in the immediate vicinity of the former UST (approximately five feet or less from the former UST), and one monitoring well (MW-11) was installed approximately five feet from the former UST. Unsaturated (vadose zone) soil samples collected during the advancement of the borings indicated petroleum constituent concentrations were below the most restrictive Maximum Soil Contaminant Concentrations (MSCCs) established by NCDENR. Groundwater samples collected from wells MW-6, MW-7, MW-9, and MW-11. Analysis of these samples indicated no detectable petroleum constituents were present in wells MW-7 and MW-9. However, NCGWQSs were exceeded for the C₉-C₂₂ Aromatic Hydrocarbon fraction, the C₉ – C₁₈ Aliphatic Hydrocarbon fraction, and/or naphthalene at wells MW-6 and MW-11, although concentrations were below NCDENR Gross Contaminant Levels (GCLs) for those constituents with established GCLs. Additionally, measurable free product was identified at well MW-11 in two of three gauging events (maximum product thickness of 0.85 foot). The assessment concluded that, although vadose zone soils were below MSCCs and surficial aquifer groundwater posed little exposure risk to surface water or drinking water aquifers, due to the presence of free product at well MW-11, the site should be considered as Intermediate Risk under NCDENR guidance (Law, 2000a).

Groundwater monitoring activities were resumed in 2000 and continued into 2001 (Law, 2000b, Law, 2001). The monitoring program included quarterly well gauging at all site wells (excluding well MW-4, which had not been located since at least January 1998), product recovery by hand bailing at wells exhibiting measurable free product, and semi-annual groundwater sampling at wells MW-6, MW-8, and MW-9. The gauging data identified the presence of free product only in well MW-11, and indicated the product thickness was decreasing over time at the well, with only 0.02 foot of product present at well MW-11 during the program's final gauging event in April 2001. Groundwater sample data indicated few compounds were present at concentrations above NCGWQSs (none above established GCLs), and concentrations of detected constituents generally were decreasing over time. However, the site was considered to remain an Intermediate Risk due to the minor thickness of free product at well MW-11.

A program of quarterly gauging of well MW-11 was initiated in October 2002 and was completed in August 2003 (EEI, 2003a, b, c, d). The program included accessing the well in advance of the gauging event to remove a previously installed sorbent (product recovery) sock. No measurable free product was observed during four quarters of gauging. However, on two occasions, when the well was re-accessed for gauging, the sorbent sock had been reinstalled into the well by an unknown party. The product thickness data for these two events was considered compromised. However, data for the remaining events indicating measurable free product was not present was considered valid without qualification.

In June 2004, the current groundwater monitoring program was initiated. The program includes quarterly gauging at all site wells and semi-annual groundwater sampling at wells MW-6, MW-8, and MW-9. For the current (June 2004) monitoring event, well gauging was conducted by EEI at the 10 monitoring wells present at the site, and groundwater samples were collected from monitoring wells MW-6 and MW-9. Well MW-8 was not sampled as free product was detected at the well. Methods, results, conclusions, and recommendations are discussed in the following sections.

SECTION 2

FIELD PROGRAM

Field methods employed during the groundwater monitoring program are discussed briefly below. Activities were conducted in accordance with NCDENR guidance (NCDENR, 2001 and 2003) and as per the work plan (EEI, 2004) which details the field methods.

2.1 Well Gauging

On 15 June 2004, 10 site monitoring wells (MW-1 through MW-3, and MW-5 through MW-11) were gauged. Well gauging was conducted using an electronic interface probe to measure the depth to water and depth to product (if present). Data were recorded to the nearest 0.01 foot and referenced to the surveyed top of casing. During the gauging event, measurable free product was observed only at well MW-8, at a thickness of 0.05 foot. A sorbent sock subsequently was installed. At well MW-11, a sorbent sock was present in the well. The sock was removed, the well was gauged, and the sock was placed back into the well; measurable free product was not present at the well during the gauging event, although the product thickness datum is considered compromised due to the presence of the sock.

2.2 Groundwater Sampling

Groundwater samples were collected on 16 June 2004 from monitoring wells MW-6 and MW-9. Well MW-8 was designated for sampling but, due to the presence of measurable free product at the well, a sample was not collected. Additionally, one duplicate sample was collected at well MW-9. Field data sampling sheets are presented in Appendix A.

Monitoring well groundwater samples were collected using low-flow purging techniques. A Grundfos Redi-Flo II stainless steel submersible pump discharging through polyethylene tubing was used to purge and sample the wells. The water level in the well was periodically measured and recorded and, if necessary, the pumping rate was decreased to limit drawdown. Additionally, the pump intake height was adjusted as necessary. Water quality indicator parameters (pH, temperature, conductivity, oxidation-reduction potential, dissolved oxygen, and turbidity) were measured and recorded repeatedly during the purge. Purging was continued until water quality indicator parameters had stabilized or until a maximum of five well casing volumes had been purged. If a well purged to dryness, the well was allowed to recharge, and a sample then was collected; however, no wells were purged dry during the sampling event. Samples were collected immediately upon completion of the purge by filling the laboratory-prepared sample bottles directly from the discharge tubing. Samples were kept in an iced cooler from the time of collection until received by the laboratory.

Groundwater samples collected during this event were analyzed for the following parameters:

- AVOCs, EPA Method 602 with xylenes (3x40 milliliter [ml] vials),
- Massachusetts Department of Environmental Protection (MADEP) - Volatile Petroleum Hydrocarbons (VPH) (3 x 40 ml vials)

- SVOCs, EPA Method 625 + 10 largest non-target peaks (i.e., Tentatively Identified Compounds [TICs]) (2 x 1 liter [L])
- MADEP - Extractable Petroleum Hydrocarbons (EPH) (2 x 1 L)

Samples were submitted under chain-of-custody to Paradigm Analytical Laboratories in Wilmington, North Carolina. Samples were delivered to the laboratory either via overnight commercial courier or were picked up by a laboratory courier.

2.3 Equipment Decontamination and Waste Handling Procedures

The pump was decontaminated before first use and after each use by pumping a mixture of Alconox or Liquinox soap and potable water through the pump. The pump then was rinsed by pumping potable water through it, and final rinsed with deionized (DI) water. New polyethylene tubing was used at each well.

Water quality meter flow-through cells and down-hole gauging equipment were decontaminated after each use by washing with an Alconox/DI water mixture, followed by a DI water rinse. The water quality probe was decontaminated with a DI rinse.

Well purge water and equipment decontamination water generated during the sampling event were contained in a portable holding tank. The water was processed through a groundwater treatment system located at Lot 203 on MCB Camp Lejeune. Used tubing and other miscellaneous material were collected and bagged as they were generated. This material was treated as normal solid waste and placed in EEI's refuse container at Lot 203.

2.4 Well Maintenance

During the sampling event, any brush, debris, and/or litter in the vicinity of the well heads were cleared. The well heads, casing risers, well pads, bollards, well caps, locks, etc. were inspected for damage or deterioration. All wells appeared to be undamaged and in serviceable condition.

SECTION 3 HYDROGEOLOGY

The hydrogeologic characteristics of the subsurface substantially control the movement of groundwater, which strongly influences contaminant movement. The regional geologic setting provides a framework for understanding and interpreting the site-specific hydrogeology. Knowledge of the latter allows for evaluating groundwater flow at a scale relevant to the monitoring program.

3.1 Regional Hydrogeology

The site is located in the eastern portion of the Coastal Plain Physiographic Province of North Carolina. The Coastal Plain consists of nearly flat to gently dipping sedimentary strata of varying composition that overlie a crystalline basement complex. Approximately 80 miles northwest of the site, the Coastal Plain pinches out where it contacts the Piedmont Physiographic Province along the Fall Line. East of the Fall Line, the sediments gradually thicken, reaching a maximum thickness of approximately 10,000 feet at Cape Hatteras, North Carolina. In the vicinity of the site, the sedimentary sequence is estimated to be approximately 2000 feet thick (NCGS, 1988).

Surficial deposits of Quaternary age are present in and around the area of the site, typically at thicknesses ranging from about 25 to 80 feet. The uppermost mapped unit in the area of the site is identified as the River Bend Formation of Tertiary age, described as a calcareous limestone interlaced with indurated sandy, molluscan limestone (NCGS, 1985). The River Bend Formation overlies the Castle Hayne Formation, also of Tertiary age. The Castle Hayne Formation is described as gray to cream colored, fine grained to fossiliferous calcareous limestone with minor amounts of fine quartz, glauconite, and phosphate (NCGS, 1988). The thickness of the Castle Hayne Formation in the vicinity of the site is estimated at approximately 300 feet. The Castle Hayne aquifer is a primary source of potable water for the area.

3.2 Site Hydrogeology

The topography of the site is predominantly flat. A drainage ditch is located on the north side of the site along Julian C. Smith Drive. No permanent surface water bodies are present. Wallace Creek is the nearest mapped surface water body, located approximately 200 feet north of the site.

Shallow soil at the site is described as a sandy silt to silty sand. This material grades to a fine sand encountered at approximately six to eight feet below ground surface (bgs). The fine sand extends to a depth of at least 17 feet bgs. Infrequent clay lenses of about 0.5 foot in thickness were reported in the fine sand. First saturated soils of the surficial aquifer were encountered in the fine sand at depths of approximately 10 feet bgs (Baker, 1994).

All of the monitoring wells installed at the site are shallow wells (total depths of approximately 17 feet bgs for most wells) screened in the saturated shallow fine sands of the surficial aquifer. Using the top-of-casing elevations and gauging data recorded 15 June 2004, groundwater elevations for the site monitoring wells were calculated (Table 3-1). For wells exhibiting

measurable free product, the groundwater elevation was corrected by adding 80 percent of the product thickness to the calculated groundwater elevation. (The product thickness was multiplied by 80 percent as the specific gravity of the product is assumed to be 0.8.) Additionally, the groundwater elevation calculated for well MW-11 is not considered representative of static conditions as a sorbent sock was present in the well at the time the gauging measurements were recorded, and removal of the sock in order to measure the liquid level in the well is thought to have affected the water level. The calculated groundwater elevation at well MW-11 is substantially greater than that observed at other site wells.

The elevation data for the shallow wells were used to construct a surficial aquifer groundwater elevation map from which groundwater flow direction can be estimated (Figure 3-1). (Data for well MW-11 was not used in preparing the map as the water level in the well was not considered reflective of static conditions, as discussed above.) From the map, surficial aquifer groundwater generally flows to the northwest across the site. This flow direction is consistent with that typically observed from previous investigations, although the previous investigations suggest some variability in flow direction (Baker, 1994; Law, 1998; Law, 2000b, Law, 2001).

The horizontal gradient i is calculated using the standard equation $i = \Delta h / \Delta L$, where Δh is the change in head measured along the direction of groundwater flow, and ΔL is the straight-line distance between the measurement locations. As wells MW-3 and MW-7 are closely aligned with the groundwater flow direction, data from these wells were used to calculate the horizontal gradient. For these wells, $\Delta L = 96$ feet and $\Delta h = (2.59 \text{ feet} - 2.44 \text{ feet}) = 0.15$ foot, so that $i = 0.15 \text{ foot} / 96 \text{ feet} = 0.0016$ (dimensionless).

The groundwater linear flow velocity V is calculated using the standard equation $V = (Ki) / n_e$, where i is the horizontal gradient (discussed above), K is the hydraulic conductivity, and n_e is the effective porosity. Previous investigations have provided estimates of K and n_e based on aquifer testing and examination of subsurface soil samples, respectively. The investigations identified a K of 2.24 feet/day and a n_e of 0.30 (dimensionless) for the site (Baker, 1994). Using these values and the horizontal gradient calculated above, the flow velocity is calculated as $V = (2.24 \text{ feet/day} * 0.0016) / 0.30 = 0.012 \text{ foot/day}$, or 4.4 feet/year.

SECTION 4 LABORATORY ANALYTICAL RESULTS

Groundwater samples were collected in June 2004 from site monitoring wells MW-6 and MW-9. As discussed previously, well MW-8 was designated for sampling. However, a sample was not collected from this well due to the presence of measurable free product during the sampling event. One duplicate groundwater sample was collected from well MW-9. Groundwater samples were analyzed by Paradigm Analytical Laboratories for AVOCs (EPA Method 602), SVOCs (EPA Method 625), MADEP VPH, and MADEP EPH. Appendix B presents the laboratory analytical reports.

4.1 Groundwater Analytical Results

No target analytes were detected in any of the samples collected during the current sampling event. One TIC, identified only as “unknown,” was reported at an estimated concentration of 17 ug/L for the sample collected from well MW-6. (TICs are substances not on the target compound list, and not all TICs are identified and quantitated using individual standards. All TIC quantitations are estimated.) A TIC also identified only as “unknown” was reported for one laboratory method blank at an estimated concentration of 8.7 ug/L. The retention time for laboratory blank was the same as that reported for the MW-6 sample. Given the uncertainties associated with TIC quantitation, the lack of specific compound identification, and the presence of a TIC of the same retention time in the laboratory blank, a reduced level of confidence in the reported concentration is warranted, and the data are not considered significant. Table 4-1 summarizes the analytical results for the current event. Only compounds detected at one or more locations during the current or previous sampling events and which were quantitated during the current event are listed.

Groundwater quality data from previous sampling events are summarized in Table 4-2. From Table 4-2, few compounds have been detected at concentrations above NCGWQSSs at any site wells, and no compounds have been detected at concentrations above GCLs. In May 1992, well MW-4 exhibited some SVOCs above NCGWQSSs. The well could not be located in subsequent events and may have been abandoned.

Well MW-6 exhibited three SVOCs above NCGWQSSs in May 1992, of which only naphthalene was detected in later sampling events. Naphthalene was not detected in the current sampling event or in April 2001, the most recent prior event. Concentrations of the C₉-C₂₂ Aromatics, first included in the analytic suite in August 1999, have decreased substantially over time, from 2500 ug/L in April 1999 to below reporting limits in April 2001. As indicated above, the C₉-C₂₂ Aromatics were not detected above the reporting limit of 200 ug/L at well MW-6 in the current sampling event. The NCGWQS for the C₉-C₂₂ Aromatics is 210 ug/L; a GCL has not been established for this hydrocarbon fraction.

At well MW-8, located close to and downgradient of the former UST, the AVOC 4-Isopropyltoluene was reported at concentration of 1 ug/L in October 2003. A NCGWQS has not been established for 4-isopropyltoluene. Therefore, the standard is set at the reporting limit, and consequently the detection of 4-isopropyltoluene is by definition above the standard. No other

AVOCs were reported at concentrations above NCGWQSs during that event or the subsequent sampling event conducted in April 2001, and no SVOCs have been detected in the well above NCGWQSs. The C₉-C₂₂ Aromatics were reported at concentrations of 220 ug/L and 350 ug/L in October 2000 and April 2001, respectively, both above the NCGWQS. As indicated previously, well MW-8 was not sampled during the current event as free product was present at the well.

At Well MW-9, located close to and cross-gradient of the former UST, chloroform was the only compound detected at concentrations above its NCGWQS of 0.19 ug/L, reported at a concentration of 0.6 ug/L in October 2000 and April 2001. These concentrations are substantially below the CGL for chloroform of 190 ug/L. Chloroform was not included in the analytic suite for the current sampling event. However, given the low concentrations previously reported and that chloroform is not a fuel-related compound, the past reporting of chloroform is not considered significant.

Well MW-11, located close to and cross-gradient of the former UST, exhibited C₉-C₂₂ Aromatics and C₉-C₂₂ Aliphatics concentrations of 3020 ug/L and 4680 ug/L, respectively, in August 1999. These concentrations exceed their respective NCGWQSs of 210 ug/L and 4200 ug/L. A GCL has not been established for either hydrocarbon fraction. Samples for AVOC and SVOC analyses were to have been collected later in August 1999, but were not as free product subsequently was detected at the well. During later sampling events, samples were not collected as free product was present in the well. Well MW-11 was not designated for sampling in the current monitoring program.

Measurable free product was detected at well MW-8 at a thickness of 0.05 foot for the current sampling event. Measurable free product was not observed at any other site well, including well MW-11 which historically exhibited free product during some gauging events. However, as discussed previously, the product thickness datum for well MW-11 is considered compromised as a sorbent sock was present in well immediately prior to gauging. Figure 4-1 illustrates the estimated extent of free product for June 2004. The map illustrates the limited lateral extent of free product, with free product restricted to the area in the immediate vicinity of the former UST.

Gauging data from investigations conducted prior to the current program have identified measurable free product at only well MW-11 (Table 4-3). Six gauging events conducted from August 1999 to April 2001 identified measurable free product at this well. Over this period, the product thickness declined from a maximum of 0.85 foot in October 2000 to 0.02 foot in January and April 2001. Five gauging events conducted since April 2001, from October 2002 to the current (June 2004) event, have not detected measurable free product at well MW-11, although three of the five events reported the presence of a sorbent sock in the well immediately prior to gauging, reducing the reliability of the gauging data at well MW-11 for those events. The current gauging event indicated a minor product thickness was present in well MW-8 only. The consistent absence of free product at well MW-11 since April 2001 preceded by a trend of decreasing product thickness at this well, and the occurrence of only a minor thickness of product at well MW-8 for the current gauging event, suggests the volume of free product at the site has decreased over time.

In summary, a review of the historical and current groundwater quality data indicate dissolved-phase petroleum constituents have decreased over time, and any constituents potentially present at concentrations above NCGWQSs would be restricted to wells MW-8 and MW-11, both located close to the former UST. Gauging data suggest that free product is limited to the immediate vicinity of the former UST, and the volume of free product has decreased over time.

4.2 Quality Assurance/Quality Control and Data Verification

One quality control (QC) sample consisting of a field duplicate sample was collected from well MW-9. The primary and QC samples were submitted to Paradigm Analytical Laboratories for the same analyses. Results for the two samples were consistent, with no analytes detected in either sample.

Data verification was performed by EEI on the complete set of the primary investigative samples. Verification followed criteria relative to U.S. EPA National Functional Guidelines:

- Holding times
- Blanks
- Laboratory control spikes
- Surrogate recoveries
- Internal standards
- Calibrations

A professional assessment of the results indicated the data are usable for project purposes.

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations have been developed based on a review of site data. Each is discussed below.

5.1 Conclusions

The following conclusions have been drawn based on site data:

- Surficial aquifer groundwater flows to the northwest across the site, consistent with the typical flow pattern identified in previous investigations.
- A previous investigation indicated constituent concentrations in soil are below NCDENR Soil-to-Groundwater Maximum Contaminant Concentrations.
- Gauging data suggest that only a minor thickness of free product is present at the site, that what free product is present is limited to the immediate vicinity of the former UST, and that the volume of free product has decreased over time.
- No target analytes were present at detectable concentrations during the current sampling event.
- Historical groundwater quality data indicate few constituents have been present above NCGWQSs, and all constituents have been substantially below GCLs.
- Historical and current groundwater quality data indicate dissolved-phase petroleum constituent concentrations have decreased over time, and any constituents potentially remaining at concentrations above NCGWQSs would be restricted to wells MW-8 and MW-11, both located close to the former UST.

5.2 Recommendations

The following recommendations are made based on site data:

- Continue with the planned quarterly groundwater gauging and semi-annual groundwater sampling program.
- Remove sorbent socks from site monitoring wells approximately two weeks prior to the next scheduled monitoring event, and reinstall socks as needed following the event.
- If measurable free product is not detected at well MW-11 during the next scheduled sampling event, collect a groundwater sample from this well, and analyze the sample for the same analytic suite as specified for wells presently included in the monitoring program.

SECTION 6 REFERENCES

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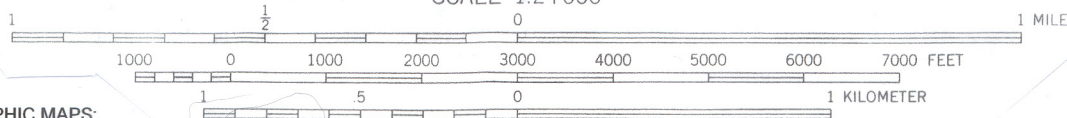
NCGS (North Carolina Geological Survey). 1985. Geologic Map of North Carolina, scale 1:500,000.

NCGS, (North Carolina Geological Survey). 4 November 1988. Preliminary Explanatory Text for the 1985 Geologic Map of North Carolina, Contractual Report 88-1.

FIGURES



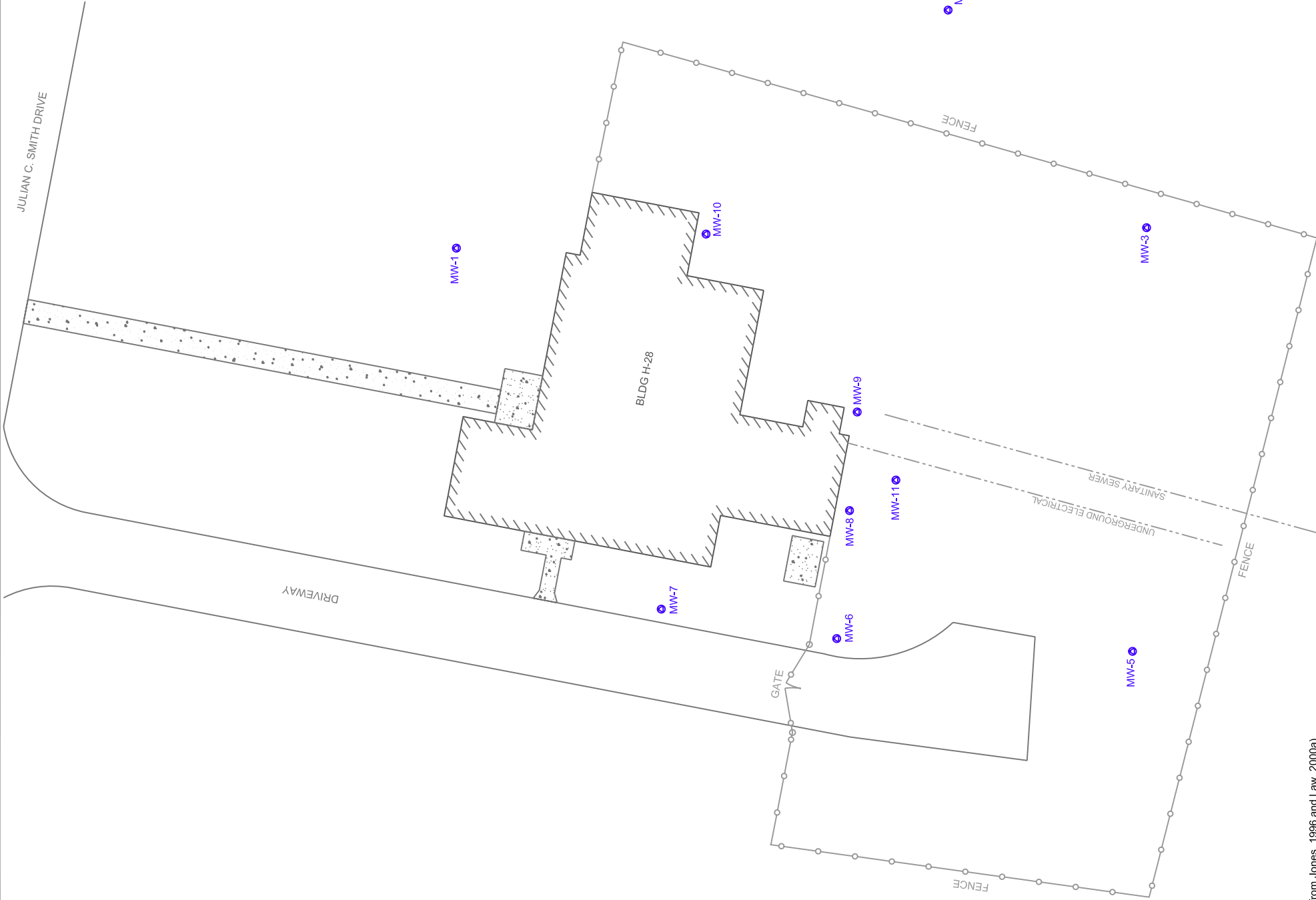
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U.S.G.S TOPOGRAPHIC MAPS:
JACKSONVILLE SOUTH, N.C.
1952
PHOTOINSPECTED 1988
and
CAMP LEJEUNE SOUTH, N.C.
1952
PHOTOREVISED 1971

(Map adapted from Law, 2000a)

	FIGURE	1-1	SITE LOCATION SITEH-28 QUARTERLY MONITORING REPORT MCB CAMP LEJEUNE, NC
	DATE	7/30/04	
	REVISION	0	
	DRAWN BY	WCM	
	FILE	H28_TOPO	



LEGEND

- SHALLOW MONITORING WELL



Engineering & Environment, Inc.	FIGURE	1-2	SITE LAYOUT AND WELL LOCATIONS	
	DATE	7/30/04	SITE H-28	
	REVISION	0	QUARTERLY MONITORING REPORT	
	DRAWN BY	WCM	MCB CAMP LEJEUNE, NC	
	FILE	H28_MAP		



LEGEND

- SHALLOW MONITORING WELL

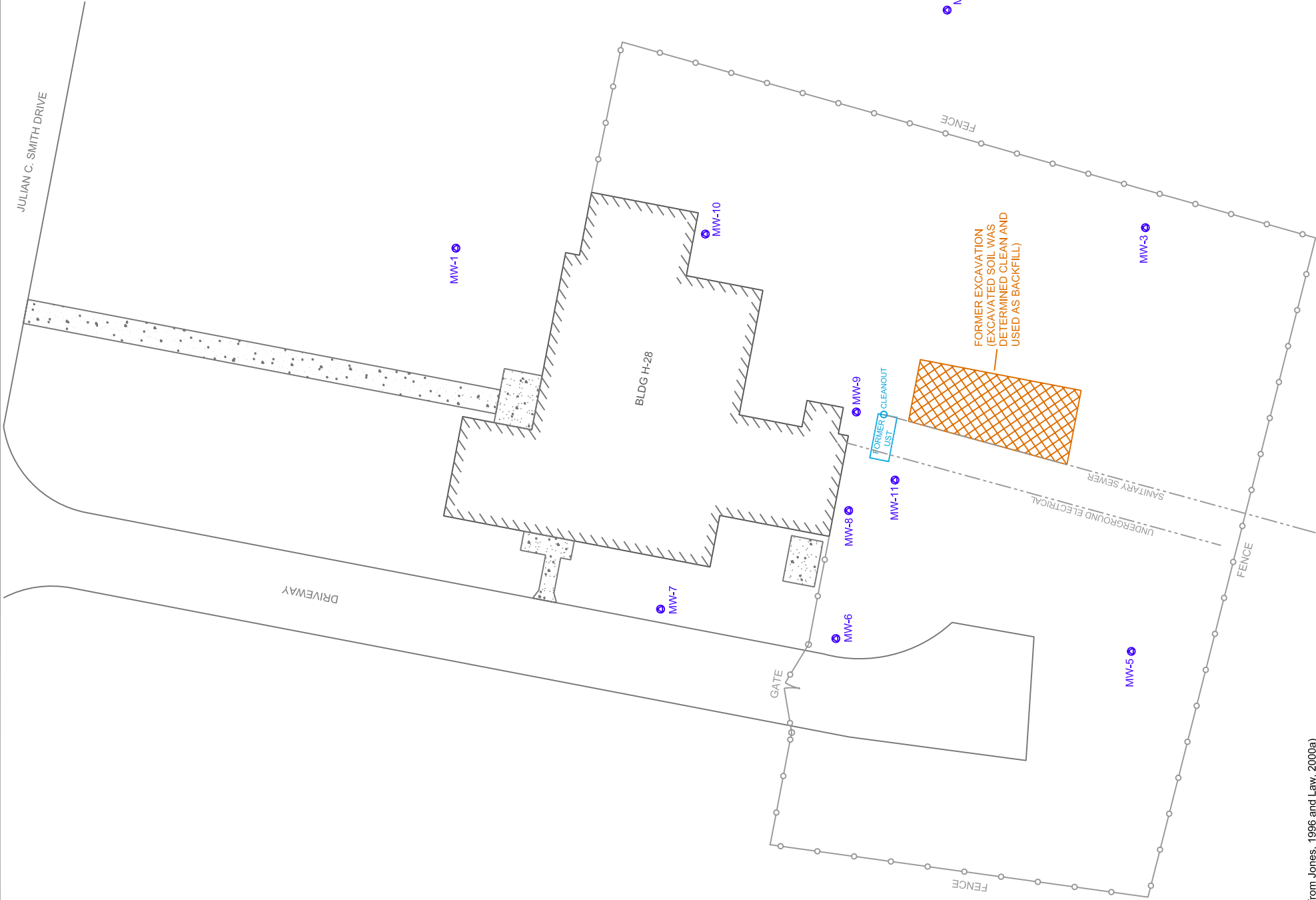


	FIGURE	1-3	LOCATION OF FORMER UST AND PREVIOUS EXCAVATION
	DATE	7/30/04	SITE H-28
	REVISION	0	QUARTERLY MONITORING REPORT
	DRAWN BY	WCM	MCB CAMP LEJEUNE, NC
	FILE	H28_MAP	



LEGEND

- SHALLOW MONITORING WELL
 - SURFICIAL AQUIFER GROUNDWATER ELEVATION
 - SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR
- (GROUNDWATER ELEVATIONS EXPRESSED IN FEET ABOVE/BELOW MEAN SEA LEVEL)

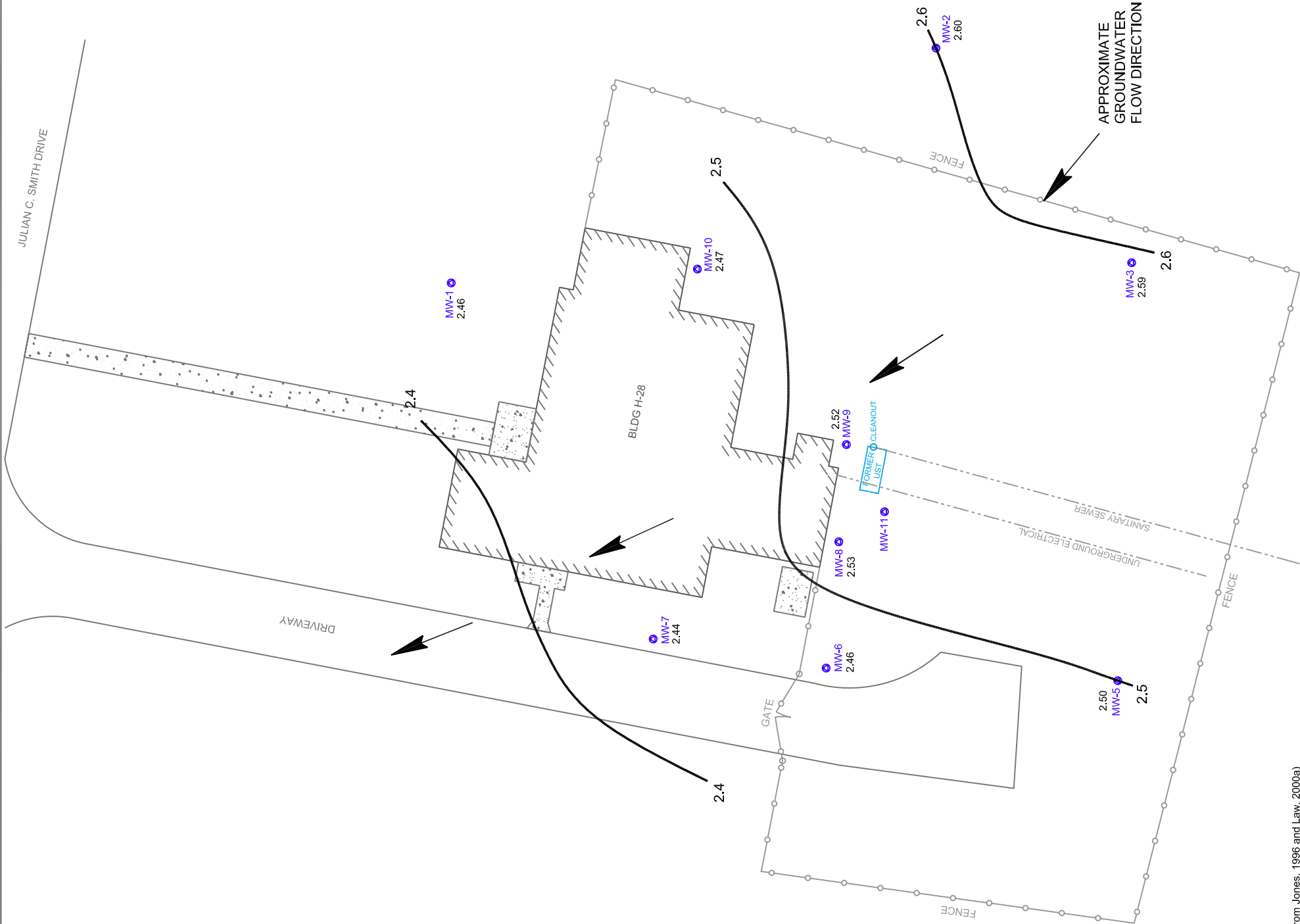
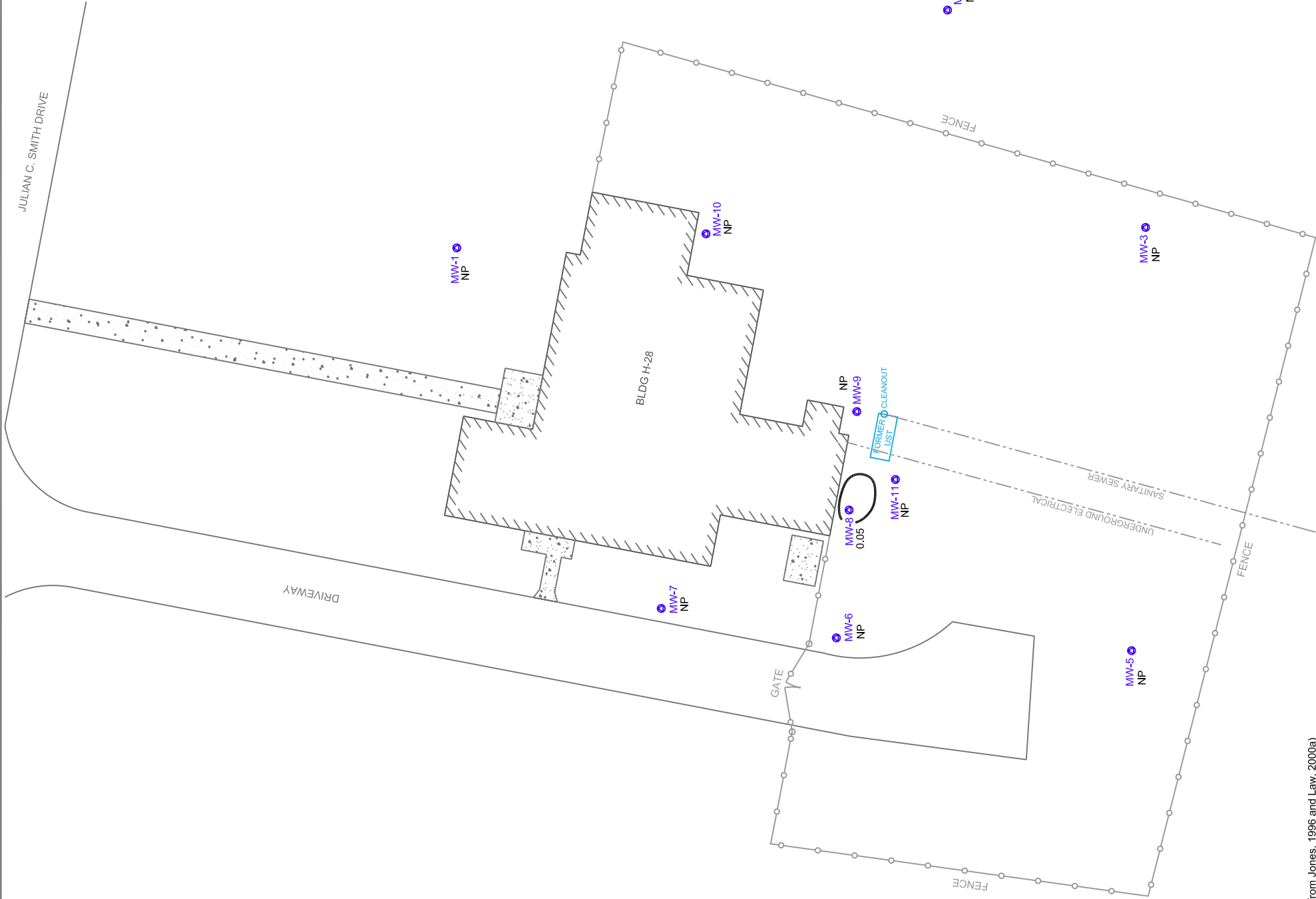


	FIGURE	3-1	SURFICIAL AQUIFER		
			GROUNDWATER ELEVATIONS		
			FOR 15 JUNE 2004		
			SITE H-28		
	DATE	7/30/04	WCM	H28_MAP	
	REVISION	0			
	DRAWN BY				
		FILE	QUARTERLY MONITORING REPORT		
			MCB CAMP LEJEUNE, NC		



LEGEND

- SHALLOW MONITORING WELL
- FREE PRODUCT THICKNESS
- ESTIMATED EXTENT OF FREE PRODUCT
- (THICKNESS EXPRESSED IN FEET)
- (NP: MEASURABLE FREE PRODUCT NOT PRESENT)



	FIGURE	4-1	ESTIMATED EXTENT OF FREE PRODUCT FOR JUNE 2004
	DATE	7/30/04	SITE H-28
	REVISION	0	QUARTERLY MONITORING REPORT
	DRAWN BY	WCM	MCB CAMP LEJEUNE, NC
	FILE	H28_MAP	

TABLES

Table 3-1
Gauging Data for 15 June 2004
Site H-28

Well Identification	Top of Casing Elevation (feet msl)	Depth to Water (feet btoc)	Depth to Product (feet btoc)	Product Thickness (feet)	Uncorrected Groundwater Elevation (feet msl)	Corrected Groundwater Elevation ⁽¹⁾ (feet msl)
MW-1	11.72	9.26	NP	NP	2.46	2.46
MW-2	12.00	9.40	NP	NP	2.60	2.60
MW-3	12.18	9.59	NP	NP	2.59	2.59
MW-4	12.29	Not Located - Assumed Abandoned				
MW-5	12.31	9.81	NP	NP	2.50	2.50
MW-6	11.96	9.50	NP	NP	2.46	2.46
MW-7	11.62	9.18	NP	NP	2.44	2.44
MW-8	12.07	9.58	9.53	0.05	2.49	2.53
MW-9	12.20	9.68	NP	NP	2.52	2.52
MW-10	11.57	9.10	NP	NP	2.47	2.47
MW-11 ⁽²⁾	12.21	10.66	NP	NP	1.55	1.55

⁽¹⁾ Corrected Groundwater Elevation = Top of Casing Elevation - Depth to Water + 0.8 x Product Thickness

⁽²⁾ The product thickness datum at well MW-11 a is considered compromised as a sorbent sock was present in the well immediately prior to gauging. Additionally, the groundwater elevation datum for well MW-11 is not considered reflective of static conditions as the sorbent sock was removed from the well immediately prior to gauging

feet msl - feet above/below mean sea level

feet btoc - feet below top of casing

NP - Not Present - no measurable product detected

Table 4-1
Summary of Groundwater Quality Analytical Data for June 2004
Site H-28

EPA Method 602 (ug/L)	NCGWQS	GCL	MW-6	MW-8	MW-9	DUP ⁽¹⁾
			16 June 2004	16 June 2004	16 June 2004	16 June 2004
Benzene	1	5000	<1.00	NS	<1.00	<1.00
Ethylbenzene	29	29,000	<1.00	NS	<1.00	<1.00
Toluene	1000	257,500	<1.00	NS	<1.00	<1.00
m,p-Xylene ⁽²⁾			<2.00	NS	<2.00	<2.00
o-Xylene ⁽²⁾			<2.00	NS	<2.00	<2.00
Total Xylenes ⁽²⁾	530	87,500	<4.00	NS	<4.00	<4.00
EPA Method 625 (ug/L)						
Acenaphthene	80	2120	<10.0	NS	<10.0	<10.0
Benzo[a]anthracene	0.0479	22	<10.0	NS	<10.0	<10.0
Benzyl butyl phthalate	100	NE	<10.0	NS	<10.0	<10.0
Bis(2-ethylhexyl)phthalate	3	3000	<10.0	NS	<10.0	<10.0
Di-n-octylphthalate	140	NE	<10.0	NS	<10.0	<10.0
Fluorene	280	450	<10.0	NS	<10.0	<10.0
N-Nitrosodi-n-propylamine	0.0007	NE	<10.0	NS	<10.0	<10.0
Naphthalene	21	15,500	<10.0	NS	<10.0	<10.0
Phenanthrene	210	410	<10.0	NS	<10.0	<10.0
TICs (total)			17 J	NS	NR	NR
MADEP VPH (ug/L)						
C ₅ -C ₈ Aliphatics	420	NE	<100	NS	<100	<100
C ₉ -C ₁₂ Aliphatics ⁽³⁾			<100	NS	<100	<100
C ₉ -C ₁₀ Aromatics ⁽³⁾			<100	NS	<100	<100
MADEP EPH (ug/L)						
C ₉ -C ₁₈ Aliphatics ⁽³⁾			<100	NS	<100	<100
C ₁₉ -C ₃₆ Aliphatics	42,000	NE	<100	NS	<100	<100
C ₁₁ -C ₂₂ Aromatics ⁽³⁾			<100	NS	<100	<100
MADEP VPH + EPH (ug/L)						
C ₉ -C ₁₂ + C ₉ -C ₁₈ Aliphatics ⁽³⁾	4200	NE	<200	NS	<200	<200
C ₉ -C ₁₀ + C ₁₁ -C ₂₂ Aromatics ⁽³⁾	210	NE	<200	NS	<200	<200

⁽¹⁾ DUP is a duplicate sample collected from well MW-9

⁽²⁾ Laboratory quantitation is performed on the m,p-xylene isomers and on the o-xylene isomer; the NCGWQS is based on the sum of the m-, p-, and o-xylene isomers; the sum of the m,p-xylene isomers and the o-xylene isomer is presented as Total Xylenes

⁽³⁾ Laboratory quantitation is performed on each of the indicated hydrocarbon fractions; NCGWQSs are based on the sum of the indicated fractions; the sums for the indicated fractions are presented as MADEP VPH + EPH

J: Estimated concentration below reporting limits or estimated concentration for TIC quantitations

NR: None Reported; no TICs were identified in the sample

NS: Not Sampled; measurable free product detected

GCL: Gross Contamination Level

NE: Not Established; a GCL has not been established for the analyte

NCGWQS: North Carolina Groundwater Quality Standard

TICs (total): Tentatively Identified Compound; sum of all TICs; all TIC concentrations are estimated

ug/L: micrograms per liter

Bold type indicates analyte detection

Shaded area in bold indicates analyte detection at a concentration above the NCGWQS

Shaded area in bold italics indicates analyte detection at a concentration above the GCL

Table 4-2
Summary of Historical Groundwater Quality Analytical Data
Site H-28

EPA Method 602 or 6210D (ug/L)	NCGWQS	GCL	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6							MW-7					MW-8			MW-9				MW-10	MW-11
			May 1992	May 1992	May 1992	May 1992	May 1992	May 1992	January 1998	April 1998	July 1998	August 1999	October 2000	April 2001	May 1992	January 1998	April 1998	July 1998	August 1999	May 1992	October 2000	April 2001	May 1992	October 1999	October 2000	April 2001	May 1992	August 1999 ⁽¹⁾
Benzene	1	5000	ND	ND	ND	ND	ND	8.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ns
n-Butylbenzene	70	6900	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	ND	nr	nr	nr	nr	nr	nr	1	2	nr	na	ND	ND	nr	ns
sec-Butylbenzene	70	8500	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	ND	nr	nr	nr	nr	nr	nr	1	ND	nr	na	ND	ND	nr	ns
Chloroform	0.19	190	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	ND	nr	nr	nr	nr	nr	nr	ND	ND	nr	na	0.6	0.6	nr	ns
Ethylbenzene	29	29,000	8.0	ND	ND	5.0	8.0	18.0	ND	ND	4.99	3	9	3	8.0	ND	ND	ND	ND	22.0	2	1	ND	ND	ND	ND	ND	ns
Isopropylbenzene	70	25,000	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	0.8	nr	nr	nr	nr	nr	nr	1	3	nr	na	ND	ND	nr	ns
4-Isopropyltoluene	RL	NE	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	ND	nr	nr	nr	nr	nr	nr	1	ND	nr	na	ND	ND	nr	ns
Naphthalene	21	15,500	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	42	16	nr	nr	nr	nr	nr	nr	19	20	nr	na	ND	ND	nr	ns
n-Propyl benzene	70	30,000	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	3	1	nr	nr	nr	nr	nr	nr	2	5	nr	na	ND	ND	nr	ns
Toluene	1000	257,500	7.0	ND	ND	ND	ND	5.0	ND	ND	ND	ND	ND	ND	6.0	ND	ND	ND	ND	14.0	ND	ND	ND	ND	ND	ND	ND	ns
1,2,4-Trimethylbenzene	350	28,500	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	2	nr	nr	nr	nr	nr	nr	19	12	nr	na	ND	ND	nr	ns
1,3,5-Trimethylbenzene	350	25,000	nr	nr	nr	nr	nr	nr	nr	nr	nr	na	ND	0.8	nr	nr	nr	nr	nr	nr	ND	3	nr	na	ND	ND	nr	ns
Total Xylenes	530	87,500	nr	nr	nr	nr	nr	nr	ND	ND	3.26	4	ND	ND	nr	ND	ND	ND	ND	nr	2.7	2	nr	ND	ND	ND	nr	ns
TCLP Full Scan (ug/L)																												
1,2-Dichloroethane	0.38	380	na	na	na	na	na	11.0	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	ns
EPA Method 625 (ug/L)																												
Acenaphthene	80	2120	na	na	na	nr	na	nr	nr	ND	1.38	ND	ND	ND	na	nr	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
Benzo[a]anthracene	0.0479	22	na	na	na	10.9	na	ND	nr	nr	nr	nr	ND	ND	na	nr	nr	nr	nr	na	ND	ND	na	ND	ND	ND	na	ns
Benzyl butyl phthalate	100	NE	na	na	na	7.2	na	4.3	ND	ND	ND	nr	ND	ND	na	ND	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
Blis(2-ethylhexyl)phthalate	3	3000	na	na	na	34.2	na	24.2	ND	ND	ND	ND	ND	ND	na	ND	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
Di-n-octylphthalate	140	NE	na	na	na	374	na	12.4	ND	ND	ND	nr	ND	ND	na	ND	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
Fluorene	280	450	na	na	na	ND	na	2.9	ND	ND	2.17	ND	ND	ND	na	ND	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
N-Nltrosodi-n-propylamine	0.0007	NE	na	na	na	ND	na	3.2	ND	ND	ND	nr	ND	ND	na	ND	ND	ND	nr	na	ND	ND	na	ND	ND	ND	na	ns
Naphthalene	21	15,500	na	na	na	ND	na	48	ND	ND	31.7	72	40	ND	na	ND	ND	ND	ND	na	15	12	na	ND	ND	ND	na	ns
Phenanthrene	210	410	na	na	na	nr	nr	nr	nr	ND	1.23	ND	ND	ND	na	nr	ND	ND	ND	na	ND	ND	na	ND	ND	ND	na	ns
TICs (total)			na	na	na	nr	na	nr	nr	nr	nr	305 J	176 J	41.9	na	nr	nr	nr	nr	na	108 J	179.2 J	na	76 J	ND	ND	na	ns
MADEP VPH + EPH (ug/L)																												
C ₉ -C ₁₈ Aliphatics	4200	NE	na	na	na	na	na	na	nr	nr	nr	2770	190	140	na	nr	nr	nr	ND	na	350	590	na	ND	ND	ND	na	4680
C ₉ -C ₂₂ Aromatics	210	NE	na	na	na	na	na	na	nr	nr	nr	2500	230	ND	na	nr	nr	nr	ND	na	220	350	na	ND	ND	ND	na	3020

⁽¹⁾ MADEP VPH and EPH samples collected 13 August 1999; other analyses were to be collected 20 August 1999 but were not as free product was identified at that time (Law, 2000a)

J: Estimated concentration below reporting limits or estimated concentration for TIC quantitations
na: Not Analyzed, compound not quantitated in the analytic suite specified for the sample
nr: Not Reported; compound not reported in source document summary table (either not analyzed or not detected)
ns: Not Sampled
ND: Not Detected; compound quantitated and not detected; detection limit not specified in source document summary table

GCL: Gross Contamination Level
NE: Not Established; a GCL has not been established for the analyte
NCGWQS: North Carolina Groundwater Quality Standard
TICs (total): Tentatively Identified Compound; sum of all TICs; all TIC concentrations are estimated
ug/L: micrograms per liter

Bold type indicates analyte detection
Shaded area in bold indicates analyte detection at a concentration above the NCGWQS
Shaded area in bold italics indicates analyte detection at a concentration above the GCL

May 1992 data from Baker, 1994
January 1998 from Law, 1998b
April and July 1998 data from Law, 1998c
August 1999 data for MW-7 and MW-11, and October 1999 data for MW-9 from Law, 2000a
October 2000 and April 2001 data for wells MW-6, MW-8, and MW-9 from Law, 2001

Table 4-3
Summary of Product Thickness Data Over Time
Site H-28

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
12 May 1992	ni	ni	ni	ni	ni	ni	ni	NP	NP	NP	ni
20 May 1992	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	ni
29 January 1998	NP	NP	NP	nl	NP	NP	NP	nm	NP	nl	ni
3 April 1998	nm	nm	nm	nl	nm	NP	NP	nm	nm	nm	ni
7 July 1998	nm	nm	nm	nl	nm	NP	NP	nm	nm	nm	ni
13 August 1999	nm	nm	nm	nl	nm	NP	NP	nm	NP	nm	NP
20 August 1999	nm	nm	nm	nl	nm	NP	NP	nm	NP	nm	0.27
22 October 1999	nm	nm	nm	nl	nm	nm	nm	nm	NP	nm	0.85
20 July 2000	NP	NP	NP	nl	NP	NP	NP	NP	NP	NP	0.30
17 October 2000	NP	NP	NP	nl	NP	NP	NP	NP	NP	NP	0.33
16 January 2001	NP	NP	NP	nl	NP	NP	NP	NP	NP	NP	0.02
12 April 2001	NP	NP	NP	nl	NP	NP	NP	NP	NP	NP	0.02
21 October 2002	nm	nm	nm	nl	nm	nm	nm	nm	nm	nm	NP ⁽¹⁾
30 January 2003	nm	nm	nm	nl	nm	nm	nm	nm	nm	nm	NP
30 April 2003	nm	nm	nm	nl	nm	nm	nm	nm	nm	nm	NP ⁽¹⁾
21 August 2003	nm	nm	nm	nl	nm	nm	nm	nm	nm	nm	NP
15 June 2004	NP	NP	NP	nl	NP	NP	NP	0.05	NP	NP	NP ⁽¹⁾

⁽¹⁾ Sorbent sock present in well immediately prior to gauging; product thickness data is considered compromised

Product thickness data expressed in feet

ni: Not Installed; well not installed at the time gauging was conducted

nl: Not Located; well could not be located

nm: Not Measured; well not measured during the gauging event

NP: Not Present; no measurable thickness of free product present in the well

1992 data from Baker, 1994

1998 from Law, 1998a, b, c

1999 data from Law, 2000a

2000 data from Law, 2000b

2001 data from Law, 2001

2002 and 2003 data from EEI, 2003a, b, c, d

APPENDIX A
FIELD DATA SAMPLING SHEETS

Engineering & Environment, H28

Date 6-16-04 Time 9:28 Weather Cloudy

Sampler AS Well/Sample # USTH28- MW06

Depth To Bottom(ft) 16.5 Depth To Water (ft) 9.5 Water Depth (ft) 7

Well Vol. 1.14 Purge Vol. 3.4 Vol. Purged 6

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	9:05	9:09	9:15	9:20	9:25		N/A
Temperature	20.25	20.27	20.14	20.1	19.97		°C
Spec. Conductivity	194	189	185	183	183		(m s/m)
Dissolved Oxygen	3.02	1.05	.65	.61	.49		(MS/L)
PH	2.90	2.22	2.70	3.10	3.57		(STD)
ORP	150.2	180.5	155.1	132.5	104.6		(G/L)
Turbidity	382	108	26.4	19.7	9.53		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments: s:							

2" well vol.=water depth X 0.1632

Time	8:55	9:02	9:05	9:08	9:14	9:19	9:24
W/L	9.5	9.72	9.74	9.77	9.78	9.78	9.79
Pump adj.	8.17	4.0					
amount adj.							

Dropped pump down water level was
with the bottom of screen

Engineering & Environment, H28

Date 6-16-04 Time 10:10 Weather Cloudy

Sampler BS Well/Sample # USTH28-MV09

Depth To Bottom(ft) 12.02 Depth To Water (ft) 9.68 Water Depth (ft) 2.34

Well Vol. .38 Purge Vol. 1.14 Vol. Purged

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	9:56	9:59	10:02	10:05	10:09		N/A
Temperature	19.69	19.9	19.84	19.99	20.23		°C
Spec. Conductivity	1165	1167	1166	1167	1169		(m s/m)
Dissolved Oxygen	6.2	6.01	5.93	5.72	5.44		(MS/L)
PH	5.29	5.36	5.39	5.45	5.52		(STD)
ORP	154.3	160.9	163.8	165.0	170.1		(G/L)
Turbidity	106	118	63.8	43.1	28.6		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments:s:							

2" well vol.=water depth X 0.1632

Time	9:52	9:56	9:59	10:01	10:03	10:07		
W/L	9.64	10.12	10.09	10.04	10.01	10.03		
Pump adj.	6"							
amount adj.								

APPENDIX B

LABORATORY ANALYTICAL REPORTS

Mr. Fred Kozminski
Engineering & Environment, Inc.
195 South Rosemont Rd.
Suite 118
Virginia Beach VA 23452-4353
Report Number: G546-11
Client Project: H28

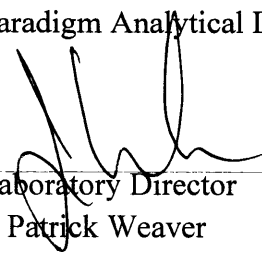
Dear Mr. Kozminski:

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 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.


Laboratory Director
J. Patrick Weaver

7/2/04
Date

Results for Volatiles

by GC 602

Client Sample ID: USTH28-MW06

Analyzed By: DCS

Client Project ID: H28

Date Collected: 06/16/2004 09:28

Lab Sample ID: G546-11-1B

Date Received: 6/18/04

Lab Project ID: G546-11

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/26/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/26/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/26/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/26/2004	
Toluene	BQL	1.00	0.302	1	06/26/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/26/2004	
o-Xylene	BQL	2.00	0.596	1	06/26/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.2	97.9

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTH28-MW09

Analyzed By: DCS

Client Project ID: H28

Date Collected: 06/16/2004 10:10

Lab Sample ID: G546-11-2B

Date Received: 6/18/04

Lab Project ID: G546-11

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/26/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/26/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/26/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/26/2004	
Toluene	BQL	1.00	0.302	1	06/26/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/26/2004	
o-Xylene	BQL	2.00	0.596	1	06/26/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.2	97.9

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTH28-Dup

Analyzed By: DCS

Client Project ID: H28

Date Collected: 06/16/2004 00:00

Lab Sample ID: G546-11-3B

Date Received: 6/18/04

Lab Project ID: G546-11

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/26/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/26/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/26/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/26/2004	
Toluene	BQL	1.00	0.302	1	06/26/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/26/2004	
o-Xylene	BQL	2.00	0.596	1	06/26/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.2	98

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: Method Blank

Analyzed By: DCS

Client Project ID:

Date Collected:

Lab Sample ID: VBLK3062504D

Date Received:

Lab Project ID:

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/26/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/26/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/26/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/26/2004	
Toluene	BQL	1.00	0.302	1	06/26/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/26/2004	
o-Xylene	BQL	2.00	0.596	1	06/26/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.1	97.8

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

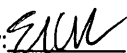
Control Limits for QC Check / Laboratory Control Spike

Method: 602 Spike[ppb]: 10
 Instrument : gc3
 Filename : 062504\033r0101.txt

Compound	ppb	Q(%)	QC Limits		P _s (%)	LCS Limits	
			Lower	Upper		Lower	Upper
Benzene	10.1	101.4	77.0	123.0	101	39	150
Chlorobenzene	10.2	102.1	80.5	119.5	102	55	135
1,2-Dichlorobenzene	10.2	102.4	68.0	132.0	102	37	154
1,3-Dichlorobenzene	10.2	102.1	72.5	127.5	102	50	141
1,4-Dichlorobenzene	10.5	104.7	69.5	130.5	105	42	143
• Diisopropyl ether	8.7	86.6	43.1	156.9	87	30	170
Ethylbenzene	10.2	102.3	63.0	137.0	102	32	160
• MTBE	9.7	96.6	46.8	153.2	97	35	165
Toluene	10.2	101.6	77.5	127.0	102	46	148
• m,p-Xylene	20.8	103.8	11.2	188.8	104	D	239
• o-Xylene	10.2	102.4	47.6	152.4	102	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 : 062504\047r0101.txt
 MS : 062504\048r0101.txt
 MSD : 062504\049r0101.txt

Compound	µg/L			P(%)		P Limits	
	Sam.	MS	MSD	MS	MSD	Lower	Upper
Benzene	41.4	50.8	50.8	94	94	39	150
Chlorobenzene	ND	10.4	9.9	105	100	55	135
1,2-Dichlorobenzene	ND	10.1	9.5	97	91	37	154
1,3-Dichlorobenzene	ND	10.0	9.4	100	94	50	141
1,4-Dichlorobenzene	ND	10.3	9.7	102	96	42	143
• Diisopropyl ether	1.3	10.3	9.8	90	85	30	170
Ethylbenzene	ND	10.8	10.3	105	99	32	160
• MTBE	ND	10.1	9.7	101	97	35	165
Toluene	ND	10.8	10.3	105	100	46	148
• m,p-Xylene	ND	21.5	20.4	106	101	D	239
• o-Xylene	ND	10.4	9.9	104	98	36	164

Flags :

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

Reviewed by: 

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTH28-MW06
Client Project ID: H28
Lab Sample ID: G546-11-11
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 09:28
Date Received: 06/18/2004
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	06/26/2004	
Acenaphthylene	BQL	10.0	1.12	1	06/26/2004	
Anthracene	BQL	10.0	1.75	1	06/26/2004	
Benzo[a]anthracene	BQL	10.0	1.36	1	06/26/2004	
Benzo[a]pyrene	BQL	10.0	1.27	1	06/26/2004	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	06/26/2004	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	06/26/2004	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	06/26/2004	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	06/26/2004	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	06/26/2004	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	06/26/2004	
Butylbenzylphthalate	BQL	10.0	1.53	1	06/26/2004	
2-Chloronaphthalene	BQL	10.0	1.25	1	06/26/2004	
2-Chlorophenol	BQL	10.0	4.22	1	06/26/2004	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	06/26/2004	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	06/26/2004	
Chrysene	BQL	10.0	1.11	1	06/26/2004	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	06/26/2004	
Di-n-Butylphthalate	BQL	10.0	1.65	1	06/26/2004	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	06/26/2004	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	06/26/2004	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	06/26/2004	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	06/26/2004	
2,4-Dichlorophenol	BQL	10.0	3.75	1	06/26/2004	
Diethylphthalate	BQL	10.0	1.48	1	06/26/2004	
Dimethylphthalate	BQL	10.0	1.04	1	06/26/2004	
2,4-Dimethylphenol	BQL	10.0	9.25	1	06/26/2004	
Di-n-octylphthalate	BQL	10.0	1.16	1	06/26/2004	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	06/26/2004	
2,4-Dinitrophenol	BQL	50.0	4.20	1	06/26/2004	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	06/26/2004	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	06/26/2004	
Fluoranthene	BQL	10.0	1.41	1	06/26/2004	
Fluorene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobenzene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobutadiene	BQL	10.0	1.58	1	06/26/2004	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	06/26/2004	
Hexachloroethane	BQL	10.0	1.58	1	06/26/2004	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	06/26/2004	
Isophorone	BQL	10.0	1.27	1	06/26/2004	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTH28-MW06
 Client Project ID: H28
 Lab Sample ID: G546-11-11
 Lab Project ID: G546-11

Analyzed By: MRC
 Date Collected: 06/16/2004 09:28
 Date Received: 06/18/2004
 Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	BQL	10.0	1.08	1	06/26/2004	
Nitrobenzene	BQL	10.0	1.32	1	06/26/2004	
2-Nitrophenol	BQL	10.0	3.52	1	06/26/2004	
4-Nitrophenol	BQL	50.0	3.17	1	06/26/2004	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	06/26/2004	
N-Nitrosodiphenylamine	BQL	10.0	1.53	1	06/26/2004	
Pentachlorophenol	BQL	50.0	2.83	1	06/26/2004	
Phenanthrene	BQL	10.0	1.38	1	06/26/2004	
Phenol	BQL	10.0	3.38	1	06/26/2004	
Pyrene	BQL	10.0	2.08	1	06/26/2004	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	06/26/2004	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	06/26/2004	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	8.1	81		
2-Fluorophenol		10	7.4	74		
Nitrobenzene-d5		10	7.8	78		
Phenol-d6		10	7	70		
2,4,6-Tribromophenol		10	7.9	79		
4-Terphenyl-d14		10	9	90		

Comments:**Flags:**

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTH28-MW06
Client Project ID: H28
Lab Sample ID: G546-11-1I
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 09:28
Date Received: 06/18/2004
Matrix: Water

Dilution: 1

Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Unknown	10.42			17
2					
3					
4					
5					
6					
7					
8					
9					
10					

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: EUN

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTH28-MW09
Client Project ID: H28
Lab Sample ID: G546-11-21
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 10:10
Date Received: 06/18/2004
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	06/26/2004	
Acenaphthylene	BQL	10.0	1.12	1	06/26/2004	
Anthracene	BQL	10.0	1.75	1	06/26/2004	
Benzo[a]anthracene	BQL	10.0	1.36	1	06/26/2004	
Benzo[a]pyrene	BQL	10.0	1.27	1	06/26/2004	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	06/26/2004	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	06/26/2004	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	06/26/2004	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	06/26/2004	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	06/26/2004	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	06/26/2004	
Butylbenzylphthalate	BQL	10.0	1.53	1	06/26/2004	
2-Chloronaphthalene	BQL	10.0	1.25	1	06/26/2004	
2-Chlorophenol	BQL	10.0	4.22	1	06/26/2004	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	06/26/2004	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	06/26/2004	
Chrysene	BQL	10.0	1.11	1	06/26/2004	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	06/26/2004	
Di-n-Butylphthalate	BQL	10.0	1.65	1	06/26/2004	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	06/26/2004	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	06/26/2004	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	06/26/2004	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	06/26/2004	
2,4-Dichlorophenol	BQL	10.0	3.75	1	06/26/2004	
Diethylphthalate	BQL	10.0	1.48	1	06/26/2004	
Dimethylphthalate	BQL	10.0	1.04	1	06/26/2004	
2,4-Dimethylphenol	BQL	10.0	9.25	1	06/26/2004	
Di-n-octylphthalate	BQL	10.0	1.16	1	06/26/2004	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	06/26/2004	
2,4-Dinitrophenol	BQL	50.0	4.20	1	06/26/2004	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	06/26/2004	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	06/26/2004	
Fluoranthene	BQL	10.0	1.41	1	06/26/2004	
Fluorene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobenzene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobutadiene	BQL	10.0	1.58	1	06/26/2004	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	06/26/2004	
Hexachloroethane	BQL	10.0	1.58	1	06/26/2004	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	06/26/2004	
Isophorone	BQL	10.0	1.27	1	06/26/2004	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTH28-MW09
 Client Project ID: H28
 Lab Sample ID: G546-11-21
 Lab Project ID: G546-11

Analyzed By: MRC
 Date Collected: 06/16/2004 10:10
 Date Received: 06/18/2004
 Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	BQL	10.0	1.08	1	06/26/2004	
Nitrobenzene	BQL	10.0	1.32	1	06/26/2004	
2-Nitrophenol	BQL	10.0	3.52	1	06/26/2004	
4-Nitrophenol	BQL	50.0	3.17	1	06/26/2004	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	06/26/2004	
N-Nitrosodiphenylamine	BQL	10.0	1.53	1	06/26/2004	
Pentachlorophenol	BQL	50.0	2.83	1	06/26/2004	
Phenanthrene	BQL	10.0	1.38	1	06/26/2004	
Phenol	BQL	10.0	3.38	1	06/26/2004	
Pyrene	BQL	10.0	2.08	1	06/26/2004	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	06/26/2004	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	06/26/2004	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.4	84
2-Fluorophenol	10	7.9	79
Nitrobenzene-d5	10	8.1	81
Phenol-d6	10	7.4	74
2,4,6-Tribromophenol	10	7.8	78
4-Terphenyl-d14	10	9.4	94

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTH28-MW09
Client Project ID: H28
Lab Sample ID: G546-11-2I
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 10:10
Date Received: 06/18/2004
Matrix: Water

Dilution: 1

Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	No library search compounds detected.				
2					
3					
4					
5					
6					
7					
8					
9					
10					

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: USTH28-Dup
Client Project ID: H28
Lab Sample ID: G546-11-3J
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 00:00
Date Received: 06/18/2004
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	06/26/2004	
Acenaphthylene	BQL	10.0	1.12	1	06/26/2004	
Anthracene	BQL	10.0	1.75	1	06/26/2004	
Benzo[a]anthracene	BQL	10.0	1.36	1	06/26/2004	
Benzo[a]pyrene	BQL	10.0	1.27	1	06/26/2004	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	06/26/2004	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	06/26/2004	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	06/26/2004	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	06/26/2004	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	06/26/2004	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	06/26/2004	
Butylbenzylphthalate	BQL	10.0	1.53	1	06/26/2004	
2-Chloronaphthalene	BQL	10.0	1.25	1	06/26/2004	
2-Chlorophenol	BQL	10.0	4.22	1	06/26/2004	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	06/26/2004	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	06/26/2004	
Chrysene	BQL	10.0	1.11	1	06/26/2004	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	06/26/2004	
Di-n-Butylphthalate	BQL	10.0	1.65	1	06/26/2004	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	06/26/2004	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	06/26/2004	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	06/26/2004	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	06/26/2004	
2,4-Dichlorophenol	BQL	10.0	3.75	1	06/26/2004	
Diethylphthalate	BQL	10.0	1.48	1	06/26/2004	
Dimethylphthalate	BQL	10.0	1.04	1	06/26/2004	
2,4-Dimethylphenol	BQL	10.0	9.25	1	06/26/2004	
Di-n-octylphthalate	BQL	10.0	1.16	1	06/26/2004	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	06/26/2004	
2,4-Dinitrophenol	BQL	50.0	4.20	1	06/26/2004	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	06/26/2004	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	06/26/2004	
Fluoranthene	BQL	10.0	1.41	1	06/26/2004	
Fluorene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobenzene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobutadiene	BQL	10.0	1.58	1	06/26/2004	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	06/26/2004	
Hexachloroethane	BQL	10.0	1.58	1	06/26/2004	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	06/26/2004	
Isophorone	BQL	10.0	1.27	1	06/26/2004	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTH28-Dup
Client Project ID: H28
Lab Sample ID: G546-11-3J
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 00:00
Date Received: 06/18/2004
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	BQL	10.0	1.08	1	06/26/2004	
Nitrobenzene	BQL	10.0	1.32	1	06/26/2004	
2-Nitrophenol	BQL	10.0	3.52	1	06/26/2004	
4-Nitrophenol	BQL	50.0	3.17	1	06/26/2004	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	06/26/2004	
N-Nitrosodiphenylamine	BQL	10.0	1.53	1	06/26/2004	
Pentachlorophenol	BQL	50.0	2.83	1	06/26/2004	
Phenanthrene	BQL	10.0	1.38	1	06/26/2004	
Phenol	BQL	10.0	3.38	1	06/26/2004	
Pyrene	BQL	10.0	2.08	1	06/26/2004	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	06/26/2004	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	06/26/2004	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9	90
2-Fluorophenol	10	8.6	86
Nitrobenzene-d5	10	8.8	88
Phenol-d6	10	7.9	79
2,4,6-Tribromophenol	10	8.6	86
4-Terphenyl-d14	10	9.4	94

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTH28-Dup
Client Project ID: H28
Lab Sample ID: G546-11-3j
Lab Project ID: G546-11

Analyzed By: MRC
Date Collected: 06/16/2004 00:00
Date Received: 06/18/2004
Matrix: Water

Dilution: 1

Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	No library search compounds detected.				
2					
3					
4					
5					
6					
7					
8					
9					
10					

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: PB1275
Lab Project ID:

Analyzed By: MRC
Date Collected:
Date Received:
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	06/25/2004	
Acenaphthylene	BQL	10.0	1.12	1	06/25/2004	
Anthracene	BQL	10.0	1.75	1	06/25/2004	
Benzo[a]anthracene	BQL	10.0	1.36	1	06/25/2004	
Benzo[a]pyrene	BQL	10.0	1.27	1	06/25/2004	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	06/25/2004	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	06/25/2004	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	06/25/2004	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	06/25/2004	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	06/25/2004	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	06/25/2004	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	06/25/2004	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	06/25/2004	
Butylbenzylphthalate	BQL	10.0	1.53	1	06/25/2004	
2-Chloronaphthalene	BQL	10.0	1.25	1	06/25/2004	
2-Chlorophenol	BQL	10.0	4.22	1	06/25/2004	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	06/25/2004	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	06/25/2004	
Chrysene	BQL	10.0	1.11	1	06/25/2004	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	06/25/2004	
Di-n-Butylphthalate	BQL	10.0	1.65	1	06/25/2004	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	06/25/2004	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	06/25/2004	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	06/25/2004	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	06/25/2004	
2,4-Dichlorophenol	BQL	10.0	3.75	1	06/25/2004	
Diethylphthalate	BQL	10.0	1.48	1	06/25/2004	
Dimethylphthalate	BQL	10.0	1.04	1	06/25/2004	
2,4-Dimethylphenol	BQL	10.0	9.25	1	06/25/2004	
Di-n-octylphthalate	BQL	10.0	1.16	1	06/25/2004	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	06/25/2004	
2,4-Dinitrophenol	BQL	50.0	4.20	1	06/25/2004	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	06/25/2004	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	06/25/2004	
Fluoranthene	BQL	10.0	1.41	1	06/25/2004	
Fluorene	BQL	10.0	1.22	1	06/25/2004	
Hexachlorobenzene	BQL	10.0	1.22	1	06/25/2004	
Hexachlorobutadiene	BQL	10.0	1.58	1	06/25/2004	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	06/25/2004	
Hexachloroethane	BQL	10.0	1.58	1	06/25/2004	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	06/25/2004	
Isophorone	BQL	10.0	1.27	1	06/25/2004	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB1275
Lab Project ID:

Analyzed By: MRC
Date Collected:
Date Received:
Matrix: WATER

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	BQL	10.0	1.08	1	06/25/2004	
Nitrobenzene	BQL	10.0	1.32	1	06/25/2004	
2-Nitrophenol	BQL	10.0	3.52	1	06/25/2004	
4-Nitrophenol	BQL	50.0	3.17	1	06/25/2004	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	06/25/2004	
N-Nitrosodiphenylamine	BQL	10.0	1.53	1	06/25/2004	
Pentachlorophenol	BQL	50.0	2.83	1	06/25/2004	
Phenanthrene	BQL	10.0	1.38	1	06/25/2004	
Phenol	BQL	10.0	3.38	1	06/25/2004	
Pyrene	BQL	10.0	2.08	1	06/25/2004	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	06/25/2004	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	06/25/2004	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.3	83
2-Fluorophenol	10	7.8	78
Nitrobenzene-d5	10	8.1	81
Phenol-d6	10	7.2	72
2,4,6-Tribromophenol	10	7.2	72
4-Terphenyl-d14	10	9.2	92

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB1275
Lab Project ID:

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

Dilution: 1

Date Analyzed: 06-25-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Unknown	10.42			8.7
2					
3					
4					
5					
6					
7					
8					
9					
10					

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 Water Laboratory Control Standard (LCS)
by GCMS

Client Sample ID: Batch QC
 Client Project ID:
 Lab Sample ID: W-LCS-1275
 Lab Project ID:
 Matrix: Water

Date Collected:
 Date Received:
 Date Analyzed: 06/25/04
 Analyzed By: MRC

	Spiked ng	LCS ng	LCS % Rec.	LIMITS	
				LOWER	UPPER
Acenaphthylene	10	11.65	117	74	158
4-Chloro-3-methylphenol	10	8.62	86	50	130
2-Chlorophenol	10	8.46	85	58	112
1,4-Dichlorobenzene	10	4.99	50	31	86
2,4-Dinitrotoluene	10	9.62	96	61	139
N-Nitrosodi-n-propylamine	10	9.53	95	53	131
4-Nitrophenol	10	6.97	70	25	161
Pentachlorophenol	10	6.31	63	40	113
Phenol	10	8.26	83	55	114
Pyrene	10	9.61	96	55	147
1,2,4-Trichlorobenzene	10	7.89	79	44	117

Comments:

Concentrations are on column amounts.

Flags:

* = Out of limits.

NA = Not applicable.

Reviewed By: 

Results For Water Matrix Spike / Matrix Spike Duplicate (MS/MSD)
by GCMS

Client Sample ID: Batch QC
 Client Project ID:
 Lab Sample ID: W-MS-1275
 Lab Project ID:
 Matrix: Water

Date Collected:
 Date Received:
 Date Analyzed: 06/25/04
 Analyzed By: MRC
 Dilution: 1

	Sample ng	Spiked ng	MS %	MSD %	Limits		RPD %	Limit Max. %
					Lower %	Upper %		
Acenaphthylene	BQL	10	112	99	80	161	11.7	30
4-Chloro-3-methylphenol	BQL	10	95	88	62	123	8.4	30
2-Chlorophenol	BQL	10	87	83	60	113	4.8	30
1,4-Dichlorobenzene	BQL	10	55	51	40	90	8.2	30
2,4-Dinitrotoluene	BQL	10	102	91	71	136	11.1	30
N-Nitrosodi-n-propylamine	BQL	10	101	92	56	131	9.2	30
4-Nitrophenol	BQL	10	86	77	40	173	11.3	30
Pentachlorophenol	BQL	10	78	67	50	116	15.3	30
Phenol	BQL	10	85	80	58	115	6.1	30
Pyrene	BQL	10	91	82	62	143	10.5	30
1,2,4-Trichlorobenzene	BQL	10	84	76	56	114	9.1	30

Comments:

Concentrations are on column amounts.

Flags:

* = Out of limits.

NA = Not applicable.

Reviewed By: 

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB1283
Lab Project ID:

Analyzed By: MRC
Date Collected:
Date Received:
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	06/26/2004	
Acenaphthylene	BQL	10.0	1.12	1	06/26/2004	
Anthracene	BQL	10.0	1.75	1	06/26/2004	
Benzo[a]anthracene	BQL	10.0	1.36	1	06/26/2004	
Benzo[a]pyrene	BQL	10.0	1.27	1	06/26/2004	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	06/26/2004	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	06/26/2004	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	06/26/2004	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	06/26/2004	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	06/26/2004	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	06/26/2004	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	06/26/2004	
Butylbenzylphthalate	BQL	10.0	1.53	1	06/26/2004	
2-Chloronaphthalene	BQL	10.0	1.25	1	06/26/2004	
2-Chlorophenol	BQL	10.0	4.22	1	06/26/2004	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	06/26/2004	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	06/26/2004	
Chrysene	BQL	10.0	1.11	1	06/26/2004	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	06/26/2004	
Di-n-Butylphthalate	BQL	10.0	1.65	1	06/26/2004	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	06/26/2004	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	06/26/2004	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	06/26/2004	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	06/26/2004	
2,4-Dichlorophenol	BQL	10.0	3.75	1	06/26/2004	
Diethylphthalate	BQL	10.0	1.48	1	06/26/2004	
Dimethylphthalate	BQL	10.0	1.04	1	06/26/2004	
2,4-Dimethylphenol	BQL	10.0	9.25	1	06/26/2004	
Di-n-octylphthalate	BQL	10.0	1.16	1	06/26/2004	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	06/26/2004	
2,4-Dinitrophenol	BQL	50.0	4.20	1	06/26/2004	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	06/26/2004	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	06/26/2004	
Fluoranthene	BQL	10.0	1.41	1	06/26/2004	
Fluorene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobenzene	BQL	10.0	1.22	1	06/26/2004	
Hexachlorobutadiene	BQL	10.0	1.58	1	06/26/2004	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	06/26/2004	
Hexachloroethane	BQL	10.0	1.58	1	06/26/2004	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	06/26/2004	
Isophorone	BQL	10.0	1.27	1	06/26/2004	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: Method Blank

Client Project ID:

Lab Sample ID: PB1283

Lab Project ID:

Analyzed By: MRC

Date Collected:

Date Received:

Matrix: WATER

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	BQL	10.0	1.08	1	06/26/2004	
Nitrobenzene	BQL	10.0	1.32	1	06/26/2004	
2-Nitrophenol	BQL	10.0	3.52	1	06/26/2004	
4-Nitrophenol	BQL	50.0	3.17	1	06/26/2004	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	06/26/2004	
N-Nitrosodiphenylamine	BQL	10.0	1.53	1	06/26/2004	
Pentachlorophenol	BQL	50.0	2.83	1	06/26/2004	
Phenanthrene	BQL	10.0	1.38	1	06/26/2004	
Phenol	BQL	10.0	3.38	1	06/26/2004	
Pyrene	BQL	10.0	2.08	1	06/26/2004	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	06/26/2004	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	06/26/2004	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.5	85
2-Fluorophenol	10	8.6	86
Nitrobenzene-d5	10	8.7	87
Phenol-d6	10	8.2	82
2,4,6-Tribromophenol	10	8.9	89
4-Terphenyl-d14	10	9.6	96

Comments:**Flags:**

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: Method Blank
Client Project ID:
Lab Sample ID: PB1283
Lab Project ID:

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

Dilution: 1

Date Analyzed: 06-25-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	No library search compounds detected.				
2					
3					
4					
5					
6					
7					
8					
9					
10					

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 Water Laboratory Control Standard (LCS)
by GCMS

Client Sample ID: Batch QC
 Client Project ID:
 Lab Sample ID: W-LCS-1283
 Lab Project ID:
 Matrix: Water

Date Collected:
 Date Received:
 Date Analyzed: 06/26/04
 Analyzed By: MRC

	Spiked ng	LCS ng	LCS % Rec.	LIMITS	
				LOWER	UPPER
Acenaphthylene	10	10.27	103	74	158
4-Chloro-3-methylphenol	10	8.68	87	50	130
2-Chlorophenol	10	8.36	84	58	112
1,4-Dichlorobenzene	10	4.96	50	31	86
2,4-Dinitrotoluene	10	9.63	96	61	139
N-Nitrosodi-n-propylamine	10	9.29	93	53	131
4-Nitrophenol	10	7.24	72	25	161
Pentachlorophenol	10	6.59	66	40	113
Phenol	10	7.91	79	55	114
Pyrene	10	9.82	98	55	147
1,2,4-Trichlorobenzene	10	7.19	72	44	117

Comments:

Concentrations are on column amounts.

Flags:

* = Out of limits.

NA = Not applicable.

Reviewed By: 

Results For Water Matrix Spike / Matrix Spike Duplicate (MS/MSD)
by GCMS

Client Sample ID: Batch QC
 Client Project ID:
 Lab Sample ID: W-MS-1283
 Lab Project ID:
 Matrix: Water

Date Collected:
 Date Received:
 Date Analyzed: 06/26/04
 Analyzed By: MRC
 Dilution: 1

	Sample ng	Spiked ng	MS %	MSD %	Limits		RPD %	Limit Max. %
					Lower %	Upper %		
Acenaphthylene	BQL	10	109	105	80	161	3.8	30
4-Chloro-3-methylphenol	BQL	10	84	89	62	123	4.9	30
2-Chlorophenol	BQL	10	81	83	60	113	2.3	30
1,4-Dichlorobenzene	BQL	10	54	53	40	90	1.5	30
2,4-Dinitrotoluene	BQL	10	92	96	71	136	3.7	30
N-Nitrosodi-n-propylamine	BQL	10	94	91	56	131	3.0	30
4-Nitrophenol	BQL	10	81	83	40	173	2.9	30
Pentachlorophenol	BQL	10	87	92	50	116	4.8	30
Phenol	BQL	10	75	78	58	115	4.4	30
Pyrene	BQL	10	94	90	62	143	5.3	30
1,2,4-Trichlorobenzene	BQL	10	82	82	56	114	0.0	30

Comments:

Concentrations are on column amounts.

Flags:

* = Out of limits.

NA = Not applicable.

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: H28

Sample Information and Analytical Results	
Sample Identification	USTH28-MW06
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/24/04
Date Analyzed	06/24/04
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	93
Surrogate % Recovery - FID	100

* = 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.

Comments: Sample reported on a wet weight basis.

Lab Info: g546-11-1a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: H28

Sample Information and Analytical Results	
Sample Identification	USTH28-MW09
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/24/04
Date Analyzed	06/24/04
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	91
Surrogate % Recovery - FID	100

* = 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.

Comments: Sample reported on a wet weight basis.

Lab Info: g546-11-2a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: H28

Sample Information and Analytical Results	
Sample Identification	USTH28-Dup
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/24/04
Date Analyzed	06/24/04
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	93
Surrogate % Recovery - FID	100

* = 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.

Comments: Sample reported on a wet weight basis.

Lab Info: g546-11-3a

Reviewed By: 

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 06/02/04PID Initial Calibration Date: 06/02/04

Calibration Ranges and Limits

Range	MDL		ML		RL	
	(µg/L)	(mg/Kg)	(µg/L)	(mg/Kg)	(µg/L)	(mg/Kg)
C ₅ -C ₈ Aliphatics	9.3	0.41	29.4	1.3	100	10
C ₉ -C ₁₂ Aliphatics	7.9	0.3	25.2	0.97	100	10
C ₉ -C ₁₀ Aromatics	0.5	0.04	1.5	0.14	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C ₅ -C ₈ Aliphatics	40	14.5	Calibration Factor
	160		
	400		
	1600		
	4000		
C ₉ -C ₁₂ Aliphatics	10	21.4	Calibration Factor
	40		
	100		
	400		
	1000		
C ₉ -C ₁₀ Aromatics	10	1	Linear Regression
	40		
	100		
	400		
	1000		

Calibration Check Date: 06/23/04

Calibration Check

Range	Levels		RPD
	(µg/L)	(mg/Kg)	
C ₅ -C ₈ Aliphatics	1600	160	10.9
C ₉ -C ₁₂ Aliphatics	400	40	4.5
C ₉ -C ₁₀ Aromatics	400	40	-13.2

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: Engineering & Environment, Inc.Project Name: H28

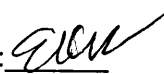
Sample Information and Analytical Results	
Sample Identification	USTH28-MW06
Sample Matrix	Water
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/22/04
Date Analyzed	06/23/04
Dry Weight	
Dilution Factor	1
C ₉ -C ₁₈ Aliphatics*	< 100 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	< 100 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	< 100 (µg/L)
Aliphatic Surrogate % Recovery	100
Aromatic Surrogate % Recovery	100

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-11-1H

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: H28

Sample Information and Analytical Results	
Sample Identification	USTH28-MW09
Sample Matrix	Water
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/22/04
Date Analyzed	06/23/04
Dry Weight	
Dilution Factor	1
C ₉ -C ₁₈ Aliphatics*	< 100 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	< 100 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	< 100 (µg/L)
Aliphatic Surrogate % Recovery	72
Aromatic Surrogate % Recovery	87

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-11-2H

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: H28

Sample Information and Analytical Results	
Sample Identification	USTH28-Dup
Sample Matrix	Water
Date Collected	06/16/04
Date Received	06/18/04
Date Extracted	06/22/04
Date Analyzed	06/23/04
Dry Weight	
Dilution Factor	1
C ₉ -C ₁₈ Aliphatics*	< 100 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	< 100 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	< 100 (µg/L)
Aliphatic Surrogate % Recovery	100
Aromatic Surrogate % Recovery	100

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-11-3H

Reviewed By: 

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 05/13/04

Calibration Ranges and Limits

Range	MDL (mg/Kg)	(µg/L)	ML (mg/Kg)	(µg/L)	RL (mg/Kg)	(µg/L)
C ₉ -C ₁₈ Aliphatics	0.1	0.8	0.3	2.6	100	10
C ₁₉ -C ₃₆ Aliphatics	0.1	1.6	0.3	5	100	10
C ₁₁ -C ₂₂ Aromatics	0.2	2.1	0.6	6.7	100	10

Calibration Concentration Levels

Range	Levels (µg/L) (mg/Kg)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	0.6 10	6.50	Calibration Factor
	1.5 25		
	3 50		
	6 100		
	30 500		
C ₁₉ -C ₃₆ Aliphatics	0.8 13.3	5.0	Calibration Factor
	2 33.3		
	4 66.7		
	8 133		
	40 667		
C ₁₁ -C ₂₂ Aromatics	1.7 28.3	5.3	Calibration Factor
	4.25 70.8		
	8.5 142		
	17 283		
	85 1420		

Calibration Check Date: 06/23/04

Calibration Check

Range	Levels (µg/mL) (mg/Kg)	RPD
C ₉ -C ₁₈ Aliphatics	6 100	12.9
C ₁₉ -C ₃₆ Aliphatics	8 133	5.9
C ₁₁ -C ₂₂ Aromatics	17 283	-0.4

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit

DF = Dilution Factor

Dup = Duplicate

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

% solids = 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.

5500 Business Drive, Wilmington, NC 28405

Chain-of-Custody Record & Analytical Request

COC# 44320

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Project ID: H28

Date: 6-18-04

Contact: 8:11 Morris

Turnaround: 549 and 201

Address: Jacksonville, N.C. 28540

Phone: 910-989-3214

Job Number:

Quote #:

Fax: 910-989-3341

P.O. Number:

Invoice To:

Comments:
Please specify any special reporting requirements

[illegible]

N.C. CERTIFICATION #481