

**QUARTERLY GROUNDWATER MONITORING REPORT
SITE M232-236
MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA
Revision 01**

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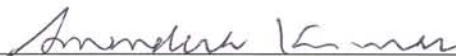
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We hereby certify that the Report shown and marked in this submittal is proposed to be incorporated into Contract Number N62470-03-D-4000, is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and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



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22 September 2004



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LIST OF ACRONYMS/ABBREVIATIONS

AVOC	Aromatic Volatile Organic Compound
bgs	below ground surface
DI	Deionized Water
DWM	Division of Waste Management
EEI	Engineering and Environment, Inc.
GCL	Gross Contamination Level
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
OBG	O'Brien & Gere Engineers, Inc.
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 M232-236, Marine Corp Base Camp Lejeune, North Carolina. The report presents the findings of groundwater monitoring activities conducted in June 2004.

Buildings M232 through M236 are located in the Camp Johnson area of Camp Lejeune and are used as bachelors' quarters for military personnel. In May 1990, five heating oil Underground Storage Tanks (USTs) ranging in capacity from 530 gallons to 550 gallons were excavated and removed from the site. Soil samples collect at the time the USTs were 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, and petroleum constituents were not detected in groundwater at concentrations above North Carolina Groundwater Quality Standards (NCGWQS). Removal of petroleum-impacted soil in the immediate vicinity of the former USTs was recommended.

Additional site characterization activities were conducted 1992. No petroleum constituents were detected in groundwater above NCGWQSs, although measurable free product was observed in one well (well MW-3, at a thickness of 0.12 foot). It was recommended to remove petroleum-impacted soil in the immediate vicinity of the former USTs, conduct free product removal from well MW-3, and monitor groundwater quality biannually.

Five additional monitoring wells were subsequently installed in the immediate vicinity of each of the former USTs. Gauging data indicated free product was present only in well MW-19, located near the former UST associated with Building M235; free product was not identified in well MW-3. Based on the presence of measurable free product at well MW-19, it was considered that the site warranted an Intermediate Risk classification.

Further groundwater monitoring activities were conducted in 2000 and 2001. Quarterly gauging data indicated free product was present at well MW-19 only, at thicknesses of 0.12 foot to 0.61 foot, and free product recovery was conducted. Few compounds were present in groundwater at concentrations above NCGWQSs with 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-19. Continued recovery of free product from this well was recommended.

Gauging events were conducted in 2002 and 2003 at seven site wells, including well MW-19. The data indicated free product was no longer present at site wells. For some of the events, sorbent socks that had been removed from well MW-19 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 that indicated 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 at 22 site wells and semi-annual groundwater sampling at wells MW-5, MW-7, MW-18, MW-20, MW-21, and MW-22. For the current event, free product was observed only in well MW-19, at a thickness of 0.49 foot. Product recovery via hand bailing subsequently was conducted. Analysis of groundwater samples indicated no aromatic volatile organic compounds or target analyte semi-volatile organic compounds were present at concentrations above NCGWQSs during the current sampling event. The C₉-C₂₂ Aromatics were present at concentrations slightly above NCGWQSs in wells MW-18 and MW-21, respectively; both wells are located in the immediate vicinity of the two former USTs associated with Buildings M236 and M233.

It is recommended that the quarterly groundwater gauging and semi-annual groundwater sampling program be continued. Additionally, the top-of-casing elevations of wells MW-18 through MW-22 should be surveyed as the data are unavailable. Lastly, well MW-3 should be included in the next scheduled sampling event as the well previously had exhibited free product or elevated concentrations of dissolved-phased petroleum constituents.

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 M232-236, 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; NCDENR, 2003) and the site specific work prepared for this site by EEI (EEI, 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, 2000b).

1.1 Site Description

The site is located on MCB Camp Lejeune in Onslow County, North Carolina (34°, 43', 13" N, 77°, 24', 52" W) (Figure 1-1). Within Camp Lejeune, the site is located along Hayes Street in the Camp Johnson area (Figure 1-2). Buildings M232 through M236 are used as bachelors' quarters for military personnel.

No permanent surface water bodies are present at the site. A shallow drainage ditch is present between the eastern wall of Buildings M232 through M236 and Hayes Street. The nearest mapped surface water bodies are the New River, located approximately 650 feet west of the site, and Northeast Creek, located approximately 850 feet southeast of the site. No potable water supply wells are located within 1200 feet of the site, and the potable water supply wells throughout Camp Lejeune draw water from the Castle Hayne aquifer at depths typically of at least 150 feet (OBG, 1993).

1.2 Site History

In May 1990, five USTs (one each associated with Buildings M232 through 236) were excavated and removed from site (OBG, 1992). Four of the USTs had a capacity of 550-gallons and the fifth had a capacity of 530-gallons; all were used to store heating oil (Law2000a). The USTs had been in service from 1942 to the late 1980's (Law, 2000b). At the time the USTs were removed, soil samples were collected, analysis of the soil samples indicated Total Petroleum Hydrocarbons (TPH) were present at concentrations above State standards then in effect (OBG, 1992).

A site assessment was conducted in 1991 which included in part advancement of soil borings and installation of 14 surficial aquifer monitoring wells (seven with total depths of approximately 15 feet below ground surface [bgs], and seven with total depths of approximately 30 feet bgs, with the wells installed in pairs). Analysis of soil and groundwater samples collected during the investigation indicated petroleum constituents were not present at significant concentrations in

areas surrounding the former USTs, and no free product was observed in site monitoring wells. However, the assessment concluded that concentrations of petroleum constituents in soils in the immediate vicinity of the former USTs (as reported from the UST removal effort) could present a future exposure risk. The assessment recommended these soils be removed (OBG, 1992).

Further investigation was conducted in 1992. This investigation included in part installation of three surficial aquifer monitoring wells, each to total depths of approximately 15 feet bgs. No constituents were detected in groundwater samples collected from the three newly installed wells. However, free product was observed in well MW-3 at a thickness of 0.12 foot; measurable free product was not identified in any other site well. It was recommended to excavated petroleum-impacted soils in the immediate vicinity of the former USTs, conduct free product removal from well MW-3 using passive mechanisms, and monitor groundwater quality biannually.

Between July 1993 and November 1999, five monitoring wells were installed at locations adjacent to the former UST locations (Law, 2000a). EEI has been unable to locate well construction records for these wells, and well-specific data (e.g., top-of-casing elevations, screen parameters, etc.) are unavailable. (Additionally, at some point during this period, well identifications were changed, as follows: well MW-3 was re-identified as well MW-7; well MW-4 was re-identified as well MW-8; well MW-7 was re-identified as well MW4; and well MW-8 was re-identified as well MW-3. EEI is not aware of the reason for the well re-identification; the re-assignment of well identifications listed above is based on review of a site drawing presented in a Law Engineering and Environmental Services, Inc. (Law) work plan from 2000 [Law, 2000a] and comparison of well top-of-casing elevations presented in O'Brien and Gere Engineers, Inc. (OBG) reports from 1992/1993 [OBG, 1992; OBG, 1993] and Law reports from 2000/2001 [Law, 2000b; Law, 2001]. For this report and in EEI's work plan for this program [EEI, 2004], well identifications follow that obtained from MCB Camp Lejeune's environmental database, which is consistent with the well identifications presented in the OBG reports [OBG, 1992; OBG, 1993]. All references to site data, including discussions in the report text, figures, and tables, consistently adhere to the database identifications. Footnotes are presented in tables as necessary.)

Based on citations on Law documents, natural attenuation monitoring was conducted at the site after July 1993 and prior to May 1998, and a risk characterization was conducted by Law in November 1999 (Law, 1999; Law, 2000b; Law, 2001). EEI was unable to locate these reports for review, although groundwater quality data apparently from the risk characterization assessment and summarized in later monitoring reports prepared by Law (Law, 2000b; Law, 2001) has been incorporated in this report. The risk characterization assessment reportedly indicated the site warranted classification as an Intermediate Risk based on the presence of measurable free product at well MW-19 (Law, 2000b; Law, 2001).

Further groundwater monitoring activities were conducted in 2000 and continued into 2001 (Law, 2000b, Law, 2001). The monitoring program included quarterly well gauging at all site wells and semi-annual groundwater sampling at wells MW-3 (identified as MW-7), MW-5, MW-18, MW-20, MW-21, and MW-22. The gauging data over this period identified the presence of measurable free product only in well MW-19, at thicknesses ranging from 0.12 foot to 0.61 foot,

and free product recovery was conducted. 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-19, and it was recommended to continue free product recovery from this well (Law, 2000b, Law, 2001).

A program of quarterly gauging of seven wells including well MW-19 was initiated in October 2002 and was completed in August 2003 (EEI, 2003a, b, c, d). The program included accessing well MW-19 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 22 site wells and semi-annual groundwater sampling at wells MW-5, MW-7, MW-18, MW-20, MW-21, and MW-22. Additionally, free product recovery via hand bailing or installation of sorbent socks is conducted as needed. 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, 22 site monitoring wells (MW-1 through MW-22) 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-19, at a thickness of 0.49 foot. Free product recovery via hand bailing subsequently was conducted. Approximately three ounces of free product were recovered; the material was processed through the treatment plant located at Lot 203 on MCB Camp Lejeune.

2.2 Groundwater Sampling

Groundwater samples were collected on 16 and 17 June 2004 from monitoring wells MW-5, MW-7, MW-18, MW-20, MW-21, and MW-22. Field data sampling sheets are presented in Appendix A.

Monitoring well groundwater samples were collected using low-flow purging techniques. For the two-inch diameter wells (wells MW-5 and MW-7), 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; one well (MW-5) was 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.

At the one-inch diameter wells (wells MW-18 and MW-20 through MW-22), the submersible pump was too large to be placed into the wells. Therefore, purging and sampling was conducted using a peristaltic pump with polyethylene tubing lowered into the water column of the well. The polyethylene tubing was connected to a short length of silicone tubing that was threaded over the pump's rotor. Because of the small diameter of the wells, the interface probe could not be placed in the well while the polyethylene discharge tubing was in place. Therefore, water levels in these wells were not monitored during the purge. However, water quality indicator parameters as identified above were repeatedly measured and recorded while purging. Purging,

sampling, and sample handling were conducted as described above. None of the one-inch diameter wells were purged dry during the sampling event.

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 submersible 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. For the peristaltic pump, the pump did not contact groundwater and decontamination of the pump was not required; new polyethylene and silicone tubing were 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 liter 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, although extensive rusting of the hinges on some of the well standards was observed. Repair or replacement of the affected hinges will be conducted.

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 shallow drainage ditch is present between the Buildings M232 through M236 and Hayes Street. No permanent surface water bodies intersect the site. The nearest mapped surface water bodies are the New River, located approximately 650 feet west of the site, and Northeast Creek, located approximately 850 feet southeast of the site.

Shallow soil at the site includes a mixture of sands, silts, and clays. The uppermost nine feet of soils are described as a silts and clays with variable amounts of very fine to medium sand. From approximately nine feet bgs to about 19 feet bgs, very fine sands coarsening downwards to very coarse sands are encountered. Below 19 feet bgs to 30 feet bgs (the maximum depth of borings advanced during previous site investigations), medium to very coarse sands are described (OBG, 1992; OBG, 1993). First saturated soils of the surficial aquifer typically were encountered at depths of nine to 11 feet bgs (OBG, 1992; OBG, 1993).

All of the monitoring wells installed at the site are screened in the surficial aquifer (Law, 1999). Ten of the wells (MW-1, MW-3, MW-5, MW-7, MW-9, MW-11, MW-13, MW-15, MW-16, and MW-17) are screened from about 5 feet bgs to 15 feet bgs, in the shallow silts/clays and the upper sands of the surficial aquifer. (These wells are designated in this report as surficial aquifer shallow wells.) Seven wells (MW-2, MW-4, MW-6, MW-8, MW-10, MW-12, and MW-14) are screened from approximately 20 feet bgs to 30 feet bgs in the medium to very coarse sands of the surficial aquifer (OBG, 1992; OBG, 1993). (These wells are designated in this report as surficial aquifer intermediate wells.) Each of the intermediate depth wells is paired with an odd numbered shallow depth well of next lowest number (e.g., intermediate well MW-2 is paired with shallow well MW-1). Construction records for wells MW-18 through MW22 could not be located by EEI. Field measurements by EEI indicate these wells have total depths of approximately 14 to 15 feet bgs, and therefore are designated as shallow wells. Other information, such as screened intervals and top-of-casing elevations, are not known to EEI.

Using the top-of-casing elevation data (where available) 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.)

From Table 3-1, groundwater elevations calculated for the individual members of the shallow/intermediate depth well pairs are not identical. Variations in groundwater elevations at the well pairs are inconsistent, with higher elevations observed in the intermediate wells MW-4 and MW-10 relative to their respective shallow wells (wells MW-3 and MW-9), and lower elevations observed in the remaining five intermediate wells relative to their respective shallow wells. The inconsistent variation suggests the groundwater elevation differences arise from lateral heterogeneities in subsurface soils and are not indicative of restricted vertical hydraulic flow (i.e., an aquitard or aquiclude is not present between the screen zones of the wells, and all wells intercept the surficial aquifer).

The elevation data for the shallow and intermediate wells were used to construct surficial aquifer groundwater elevation maps from which groundwater flow directions were estimated (Figures 3-1 and 3-2). Both maps indicate similar flow patterns. An area of relatively higher groundwater elevations is present in the center of the site, with groundwater flowing radially away from this area. Groundwater flows away from the site primarily to the south-southeast in the general direction of Northeast Creek, although flow components to the east, north, and west are present due to the high groundwater elevation observed in the site's center. The relatively high groundwater elevations observed in the center of the site suggest this is an area of local recharge which, given the generally flat topography and absence of nearby significant surface water bodies, would exert a substantial short term influence on local flow during periods of active recharge (e.g., recent precipitation events). During periods when recharge is not actively occurring, the relatively low groundwater elevations observed in the southern and southeastern portions of the site suggest that the predominant flow direction is to the south-southeast. Previous investigations have identified variable flow directions (OBG, 1992; OBG, 1993; Law, 2000b, Law, 2001). It was considered that the variability may reflect seasonal variations in the

water table elevation (Law, 2000b). However, the variability may be indicative more of inconsistent, short duration influences associated with precipitation that affect local recharge.

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. With respect to wells screened in the shallow portion of the surficial aquifer, wells MW-3 and MW-7 are approximately aligned with the groundwater flow direction, and data from these wells were used to calculate the horizontal gradient. For these wells, $\Delta L = 278$ feet and $\Delta h = (5.71 \text{ feet} - -0.85 \text{ foot}) = 6.56$ feet, so that $i = 6.56 \text{ feet} / 278 \text{ feet} = 0.024$ (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 , respectively based on aquifer testing and examination of subsurface soil samples. The investigations identified a K of 1.47 feet/day for shallow wells, and a n_e of 0.40 (dimensionless) (OBG, 1993). Using these values and the horizontal gradient calculated above, the flow velocity is calculated as $V = (1.47 \text{ feet /day} * 0.024) / 0.40 = 0.088 \text{ foot/day}$, or 32 feet/year.

SECTION 4 LABORATORY ANALYTICAL RESULTS

Groundwater samples were collected in June 2004 from site monitoring wells MW-5, MW-7, MW-18, MW-20, MW-21, and MW-22. One duplicate groundwater sample was collected from well MW-7. 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

Table 4-1 summarizes the laboratory data for the current sampling event. (For the SVOCs, only compounds detected at one or more locations during the current or previous sampling events and included in the current analytic suite are listed.) From a review of Table 4-1, no target analytes were detected in samples collected from wells MW-5 and MW-7. One TIC, identified only as “unknown,” was reported at an estimated concentration of 10 ug/L for the sample collected from well MW-5. An “unknown” TIC also was reported at an estimated concentration of 20 ug/L for the sample collected from well MW-7. This “unknown” TIC was reported in the duplicate sample collected from this well at an estimated concentration of 13 ug/L. (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.)

Various target analyte AVOCs and SVOCs were reported for the samples collected from wells MW-18, MW-20, MW-21, and MW-22. Each of these wells are located in the immediate vicinity of USTs formerly present at the site (Figure 1-3). All of the detected AVOCs (ethylbenzene, toluene, and xylene isomers) and target analyte SVOCs (acenaphthene, fluorene, naphthalene, and phenanthrene) were reported at low (estimated) concentrations, and all were substantially below NCGWQSs and GCLs.

Some TICs were reported at wells MW-18, MW-20, MW-21, and MW-22, most of which were not identified as specific compounds. Those TICs that were reported as specific compounds included 2,3-dimethylnaphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Of these TICs, 2,3-dimethylnaphthalene was reported only in well MW-21 at an estimated concentration of 22 ug/L. A NCGWQS has not been established for this compound, therefore the standard is set at the reporting limit, and the detection of the compound is by definition above the standard. A GCL has not been established for this compound. 1-Methylnaphthalene was reported at estimated concentrations of 4.6 ug/L, 37 ug/L, and 50 ug/L at wells MW-18, MW-21, and MW-22, respectively. A NCGWQS has not been established for 1-methylnaphthalene; therefore, as noted above, any detection of the compound is above the standard. A GCL has not been established for 1-methylnaphthalene. 2-Methylnaphthalene was reported in wells MW-21 and MW-22 at estimated concentrations of 19 ug/L and 20 ug/L, respectively. These concentrations slightly exceed the NCGWQS for 2-Methylnaphthalene of 14 ug/L, but are substantially below the compounds GCL of 12,500 ug/L. For all of these reported TICs, given the uncertainties associated with TIC quantitation, a reduced level of confidence in the reported concentration is warranted, and the significance of the data are limited.

Wells MW-18, MW-21, and MW-22 exhibited detectable concentrations of the C₉-C₁₂ Aliphatic Hydrocarbon fraction, quantitated by MADEP VPH. The C₉-C₁₈ Aliphatics, quantitated by MADEP EPH, were not detected (at reporting limits of 100 ug/L) in these or any other samples collected during the current event. A NCGWQS of 4,200 ug/L has been established for the C₉-C₁₈ Aliphatics, presented in Table 4-1 as the sum of the detected VPH C₉-C₁₂ Aliphatic and EPH C₉-C₁₈ Aliphatics. From Table 4-1, the (summed) C₉-C₁₈ Aliphatics concentrations ranged from 120 ug/L (well MW-22) to 200 ug/L (well MW-18), substantially below the NCGWQS. A CGL has not been established for the C₉-C₁₈ Aliphatics.

Wells MW-18 and MW-21 exhibited detectable concentrations of the C₁₁-C₂₂ Aromatic Hydrocarbon fraction, quantitated by MADEP EPH. The C₉-C₁₀ Aromatics, quantitated by MADEP VPH, were not detected (at reporting limits of 100 ug/L). A NCGWQS of 210 ug/L has been established for the C₉-C₂₂ Aromatics, presented in Table 4-1 and the sum of the detected VPH C₉-C₁₀ Aromatics and EPH C₁₁-C₂₂ Aromatics. From Table 4-1, the (summed) C₉-C₂₂ Aromatic concentrations for well MW-18 and MW-22 were 570 ug/L and 360 ug/L, respectively. These concentrations are somewhat above the 210 ug/L NCGWQS established for the C₉-C₂₂ Aromatics. A GCL has not been established for the C₉-C₂₂ Aromatics. The C₉-C₂₂ Aromatics were the only target analytes reported at concentrations greater than NCGWQSs.

Figure 4-1 presents the surficial aquifer shallow well concentrations of the C₉-C₂₂ Aromatics. The figure clearly illustrates the extent of the C₉-C₂₂ Aromatics above the NCGWQS is limited to the immediate vicinity of the former USTs associated with Building M233 (monitored by well MW-21) and Building M-236 (monitored by well MW-18).

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 NCGWQSs at any site wells. One compound, phenanthrene, was reported above GCLs at well MW-3 during the November 1991 sampling event. However, phenanthrene was not detected at this well in any subsequent sampling event, nor was this compound detected in any other site wells during the November 1991 event or during any other sampling event. No other compounds have been detected at concentrations above GCLs during any sampling event.

Wells that historically exhibited groundwater concentrations above NCGWQSs are limited to MW-3, MW-12, MW-18, MW-21, and MW-22. At well MW-3, other than phenanthrene (discussed above), only the C₉-C₂₂ Aromatics have been detected at concentrations above NCGWQSs. In October 2000 and April 2001, the C₉-C₂₂ Aromatics were reported at concentrations of 440 ug/L and 430 ug/L, respectively, somewhat above the NCGWQS of 210 ug/L. As indicated above, a GCL has not been established for the C₉-C₂₂ Aromatics. Well MW-3 is not designated for sampling for the current monitoring program.

Well MW-12 exhibited a chloroform concentration of 4.0 ug/l in November 1991, above the NCGWQS of 0.19 ug/L but substantially below the GCL of 190 ug/L. No other compounds were present above NCGWQSs at this well for that sampling event. Chloroform is not a constituent of petroleum fuels and often is present in potable water supplies than employ certain chlorine disinfection treatment processes. Consequently, and the presence of chloroform at this

low concentration is not considered significant. The well has not been sampled since the November 1991 event.

At well MW-18, 4-isopropyltoluene was reported at a concentration of 0.5 ug/L in April 2001. As a NCGWQS has not been established for this compound, the detection of the compound is considered above the standard; a GLC has not been established for this compound. 4-Isopropyltoluene is not included in the analytic suite for the current monitoring program. Bis(2-ethylhexyl)phthalate (DEHP) was reported at well MW-18 at a concentration of 159 ug/L in August 1999, above the NCGWQS of 3 ug/L but substantially below the GCL of 3000 ug/L. DEHP has not been detected at this well in subsequent sampling events (including the current event). DEHP is not a constituent of petroleum fuels but is a component of many plastics, and this compound frequently occurs as an artifact of the sampling and/or laboratory process due to incidental contact with plastics. Consequently, the reported former presence of DHEP at this well is not considered significant. The C₉-C₂₂ Aromatics were reported at well MW-18 in October 2000 and April 2001 at concentrations of 280 ug/L and 270 ug/L, respectively. These concentrations are slightly above the NCGWQS of 210 ug/L and lower than the 570 ug/L concentration reported for the current event.

Well MW-21 exhibited concentrations of 4-isopropyltoluene of 2 ug/L and 3 ug/L in October 2000 and April 2001, respectively. As noted previously, a NCGWQS is not available for this compound so that the detection constitutes an exceedance of the standard. As indicated above, the compound is not included in the current analytic suite. DEHP was detected only once at this well (also in August 1999) at a concentration of 6 ug/L, above the NCGWQS of 3 ug/L and substantially below the GCL of 3000 ug/L. As discussed with respect to DHEP reported at well MW-18, the reported former presence of DHEP is not considered significant. The C₉-C₂₂ Aromatics were reported at well MW-18 in October 2000 and April 2001 at concentrations of 250 ug/L and 440 ug/L, respectively. These concentrations are slightly above the NCGWQS of 210 ug/L and comparable to the 360 ug/L concentration reported for the current event.

At well MW-22, 4-isopropyltoluene concentrations of 2 ug/L and 0.8 ug/L were reported for the October 2000 and April 2001 sampling events, respectively, and, in the absence of an established NCGWQS, the detection of the compound constitutes an exceedance; the compound is not included in the current analytic suite. DEHP was reported only once at this well (again in August 1999, as with wells MW-18 and MW-21) at a concentration of 283 ug/L, above the NCGWQS of 3 ug/L and substantially below the GCL of 3000 ug/L. As discussed above, the reported former presence of DHEP is not considered significant. The C₉-C₂₂ Aromatics were reported at well MW-21 in October 2000 and April 2001 at concentrations of 340 ug/L and 310 ug/L, respectively, slightly above the NCGWQS of 210 ug/L. The C₉-C₂₂ Aromatics were not detected during the current sampling event.

Measurable free product was detected during the current event only at well MW-19, at a thickness of 0.49 foot. Measurable free product was not observed at any other site well. Figure 4-2 presents the estimated extent of measurable free product for June 2004. The map illustrates the lateral extent of free product is restricted to the area in the immediate vicinity the well and the former UST associated with the adjacent Building M235.

Gauging data from investigations conducted prior to the current program also have identified measurable free product at well MW-19. Four gauging events conducted from July 2000 to April 2001 identified measurable free product at this well, ranging in thickness from 0.61 foot (January 2001) to 0.12 foot (July 2001) (Law, 2000b; Law, 2001). More recently, four gauging events conducted between October 2002 and August 2003 indicated measurable free product was not present at this well, although two events identified the presence of a sorbent sock in the well immediately prior to gauging, reducing the reliability of the gauging data at the well (EEI, 2003a; EEI, 2003b; EEI, 2003c; EEI, 2003d).

The only well other than MW-19 where measurable free product has been observed is well MW-3. Free product was reported at this well in December 1992 at a thickness of 0.12 foot (OBG, 1993). Measurable free product was not detected during gauging events conducted at this well in November 1991, July and October 2002, and January and April 2001 (OBG, 1992; Law, 2000b; law, 2001). As indicated above, measurable free product was not observed during the current event.

In summary, a review of site groundwater quality data indicate few AVOCs or SVOCs have been present at concentrations above NCGWQSs, and the current data indicate no AVOCs or target analyte SVOCs are present above NCGWQSs. The C₉-C₂₂ Aromatics have been reported at concentrations slightly above NCGWQSs at wells MW-3, MW-18, MW-21, and MW-22. The current event, which included sampling at wells MW-18, MW21, and MW-22 but not MW-3, indicated the C₉-C₂₂ Aromatics exceeded the NCGWQS only at wells MW-18 and MW-21. Other than one gauging event conducted in December 1992 that reported measurable free product in well MW-3, well MW-19 is the only well to exhibit measurable free product, and the free product measured in this well has not occurred consistently 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-7. The primary and QC samples were submitted to Paradigm Analytical Laboratories for the same analyses. Results for the two samples were consistent, with no target analytes detected in either sample. A single TIC, identified as “unknown” with a retention time of 10.42, was reported at estimated concentrations of 20 ug/L and 13 ug/L for the primary and duplicate samples, respectively.

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 an evaluation of site data. Each is discussed below.

5.1 Conclusions

The following conclusions have been drawn based on site data:

- Surficial aquifer groundwater flow direction has varied over time. The current data suggest surficial aquifer groundwater flows radially away from an apparent local, transient recharge area present in the center of the site. In the absence of the localized recharge, groundwater flow appears to be to the south-southeast.
- No water supply wells have been identified within 1200 feet of the site, and supply wells at the base do not draw water from the surficial aquifer but from the deeper Castle Hayne aquifer.
- There are no mapped surface water bodies present at the site. The closest mapped surface water bodies are more than 600 feet from the site.
- Previous investigations indicate petroleum-impacted soils exhibiting TPH concentrations above State standards in effect at the time of sampling are limited to the immediate vicinity of the former USTs.
- Gauging data suggest that a limited thickness of free product is present inconsistently at well MW-19, located in the immediate vicinity of the former UST associated with Building M235. The only other well where measurable product has been recorded is well MW-3, with free product recorded during a single gauging event conducted in November 1992.
- Historical groundwater quality data indicate few constituents have been present above NCGWQs, and, with the exception of phenanthrene detected once in 1991 at one well, all constituents have been substantially below GCLs.
- No AVOCs or target analyte SVOCs were present at concentrations above NCGWQs during the current sampling event.
- Historical and current groundwater quality data indicate that the C₉-C₂₂ Aromatics are present at concentrations above slightly NCGWQs, primarily in wells located in the immediate vicinity of some of the former USTs.

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.
- Survey the top-of-casing elevations of wells MW-18 through MW-22.
- Include well MW-3 in the next scheduled groundwater sampling event. 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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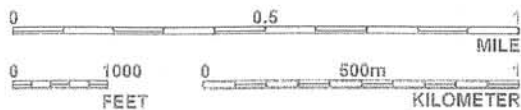
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OBG, 1993 (O'Brien and Gere Engineers, Inc.). July 1993. Addendum Site Assessment, Tanks M232-M236, Camp Johnson, Marine Corps Base Camp Lejeune, North Carolina. Prepared for the Department of the Navy.

FIGURES



Scale 1 : 24,000
Contour Interval 5 ft



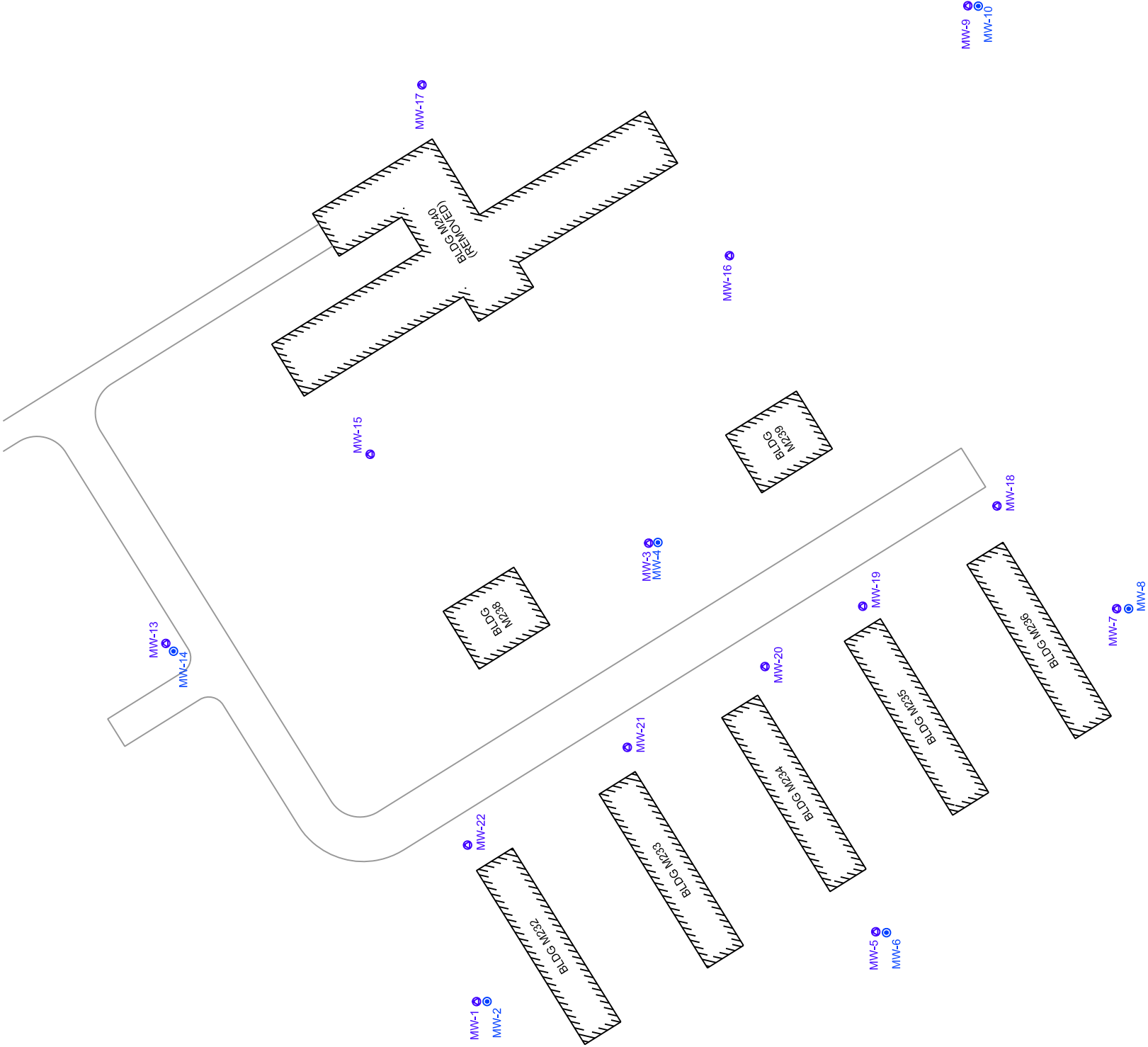
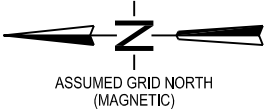
MAP LOCATION
IN NORTH CAROLINA

U.S.G.S TOPOGRAPHIC MAP:
JACKSONVILLE SOUTH, N.C.
1952
PHOTOINSPECTED 1988

	FIGURE	1-1
	DATE	8/9/04
	REVISION	0
	DRAWN BY	WCM
	FILE	M232_TOPO

SITE LOCATION

SITE M232-236
QUARTERLY MONITORING REPORT
MCB CAMP LEJEUNE, NC



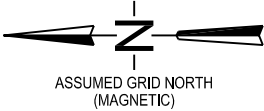
LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL



MW-11
●
MW-12
●

	FIGURE	1-2	SITE LAYOUT AND WELL LOCATIONS
	DATE	7/17/04	SITE M232-236
	REVISION	0	QUARTERLY MONITORING REPORT
	DRAWN BY	WCM	MCB CAMP LEJEUNE, NC
	FILE	M232_MAP	



LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- FORMER UST

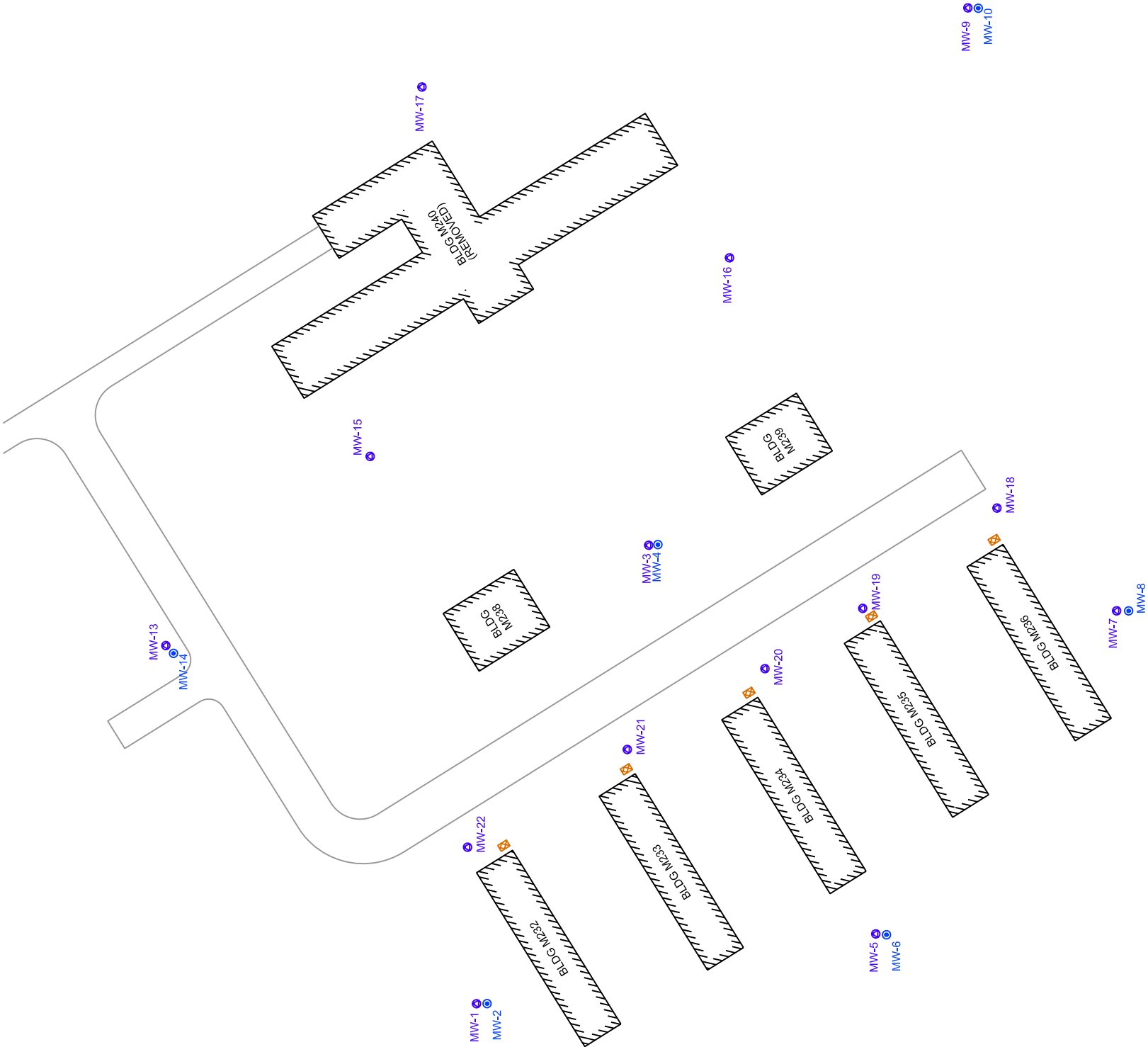
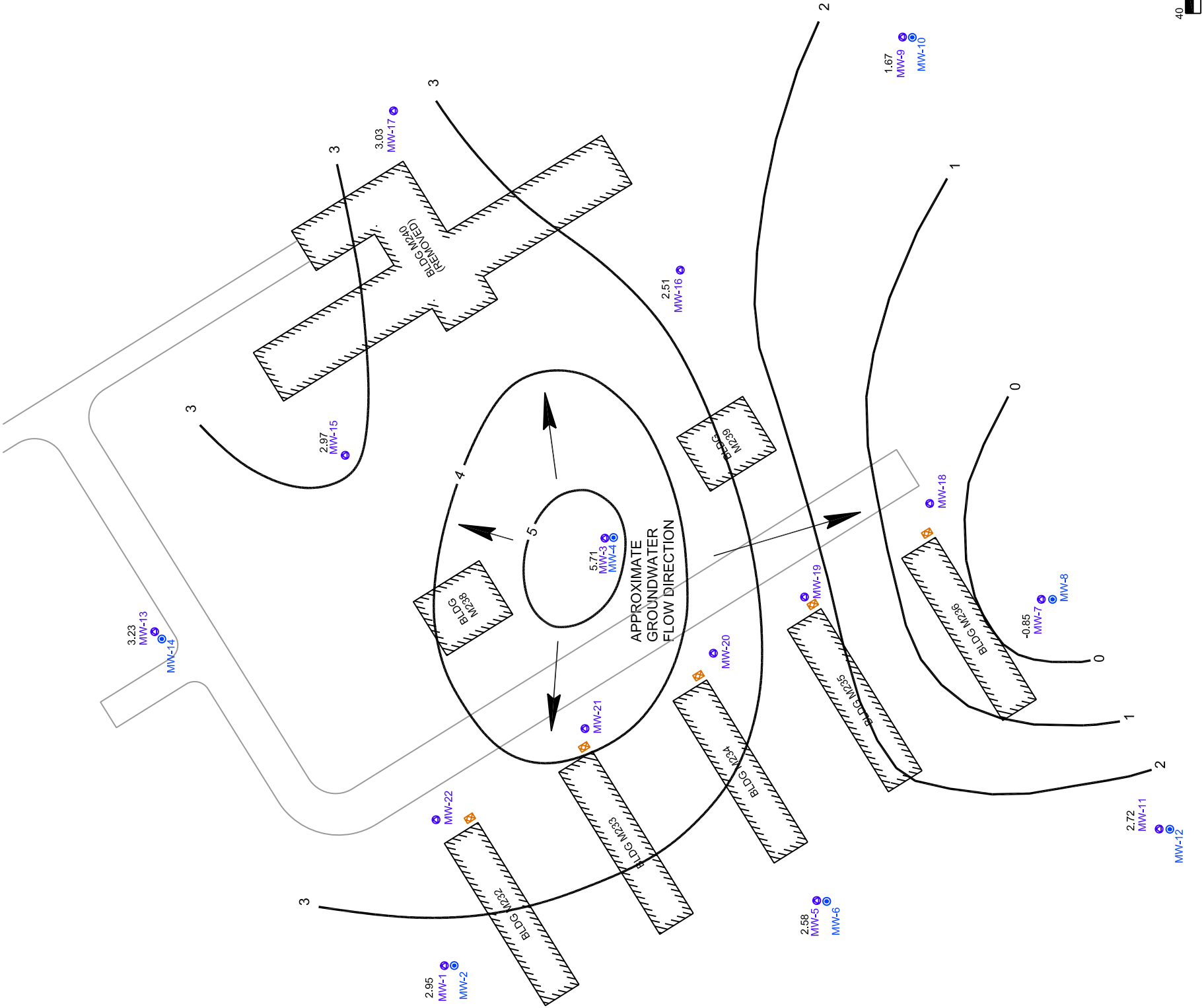
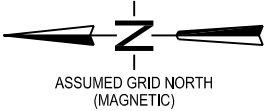


	FIGURE	1-3	FORMER UST LOCATIONS
	DATE	7/17/04	
	REVISION	0	
	DRAWN BY	WCM	
	FILE	M232_MAP	
	SITE M232-236 QUARTERLY MONITORING REPORT MCB CAMP LEJEUNE, NC		



LEGEND

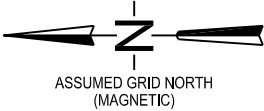
- SHALLOW MONITORING WELL
 - INTERMEDIATE MONITORING WELL
 - FORMER UST
 - SURFICIAL AQUIFER SHALLOW WELL GROUNDWATER ELEVATION
 - SURFICIAL AQUIFER SHALLOW WELL GROUNDWATER ELEVATION CONTOUR
- (GROUNDWATER ELEVATIONS EXPRESSED IN FEET ABOVE/BELOW MEAN SEA LEVEL)



SCALE (Feet)



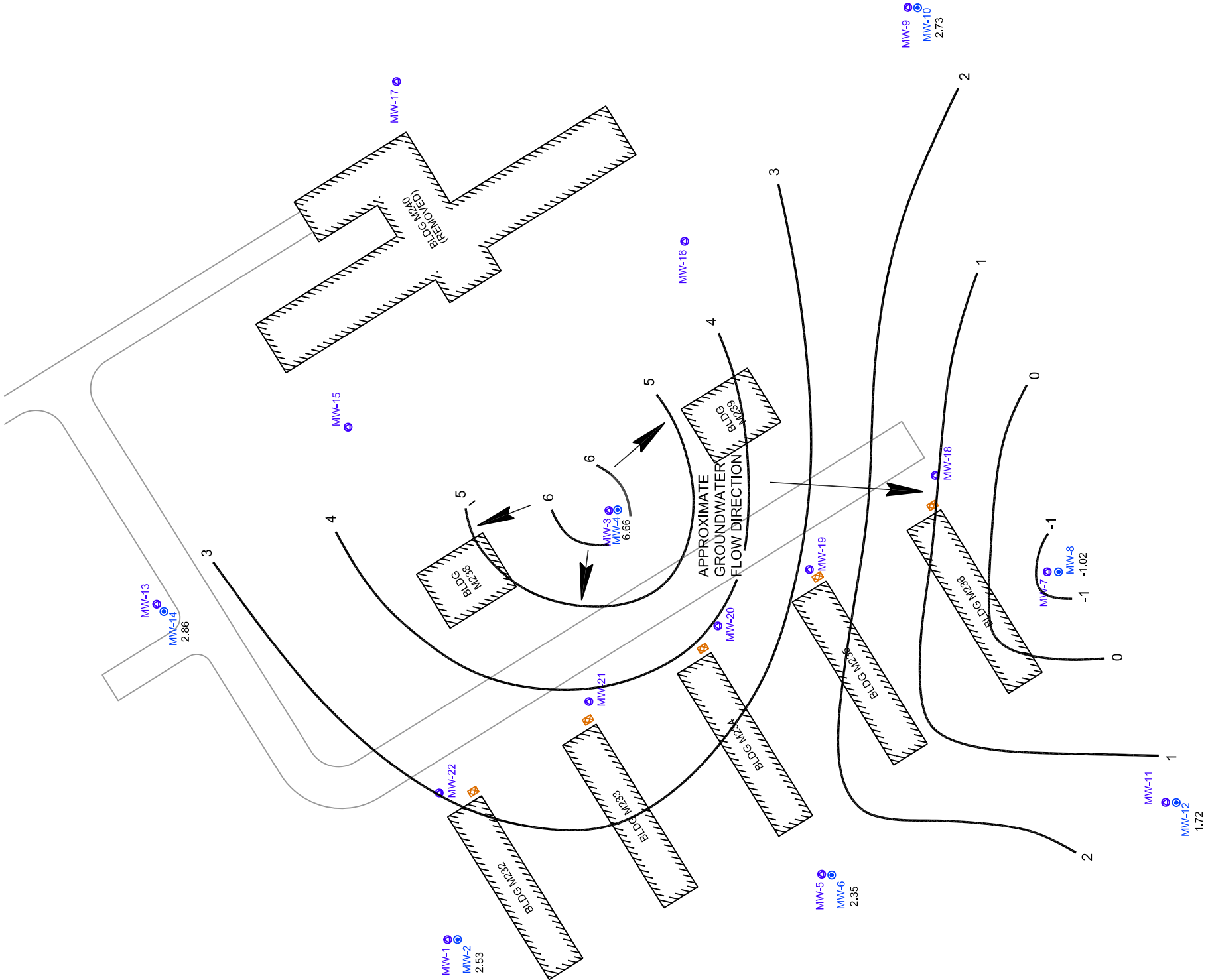
Engineering & Environment, Inc.	FIGURE	3-1	SURFICIAL AQUIFER SHALLOW WELL GROUNDWATER ELEVATIONS FOR 15 JUNE 2004	
	DATE	7/17/04	SITE M232-236	
	REVISION	0	QUARTERLY MONITORING REPORT	
	DRAWN BY	WCM	MCB CAMP LEJEUNE, NC	
	FILE	M232_MAP		



LEGEND

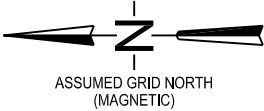
- SHALLOW MONITORING WELL
 - INTERMEDIATE MONITORING WELL
 - ⊠ FORMER UST
 - SURFICIAL AQUIFER INTERMEDIATE WELL GROUNDWATER ELEVATION
 - SURFICIAL AQUIFER INTERMEDIATE WELL GROUNDWATER ELEVATION CONTOUR
- (GROUNDWATER ELEVATIONS EXPRESSED IN FEET ABOVE/BELOW MEAN SEA LEVEL)

1.51
3



(Base map adapted from OBG, 1992; OBG, 1993, Law, 2000a)

	FIGURE	3-2	SURFICIAL AQUIFER INTERMEDIATE WELL
	DATE	7/17/04	GROUNDWATER ELEVATIONS
	REVISION	0	FOR 15 JUNE 2004
	DRAWN BY	WCM	SITE M232-236
	FILE	M232_MAP	QUARTERLY MONITORING REPORT
			MCB CAMP LEJEUNE, NC



LEGEND

- SHALLOW MONITORING WELL
 - INTERMEDIATE MONITORING WELL
 - FORMER UST
 - SURFICIAL AQUIFER SHALLOW WELL C9-C22 AROMATICS CONCENTRATION 360
 - SURFICIAL AQUIFER SHALLOW WELL C9-C22 AROMATICS ISOCONCENTRATION CONTOUR 210
- (CONCENTRATIONS EXPRESSED IN MICROGRAMS PER LITER)
(<# DENOTES NOT DETECTED AT THE INDICATED REPORTING LIMIT)
(THE NORTH CAROLINA GROUNDWATER QUALITY STANDARD FOR C9-C22 AROMATICS IS 210 MICROGRAMS PER LITER)

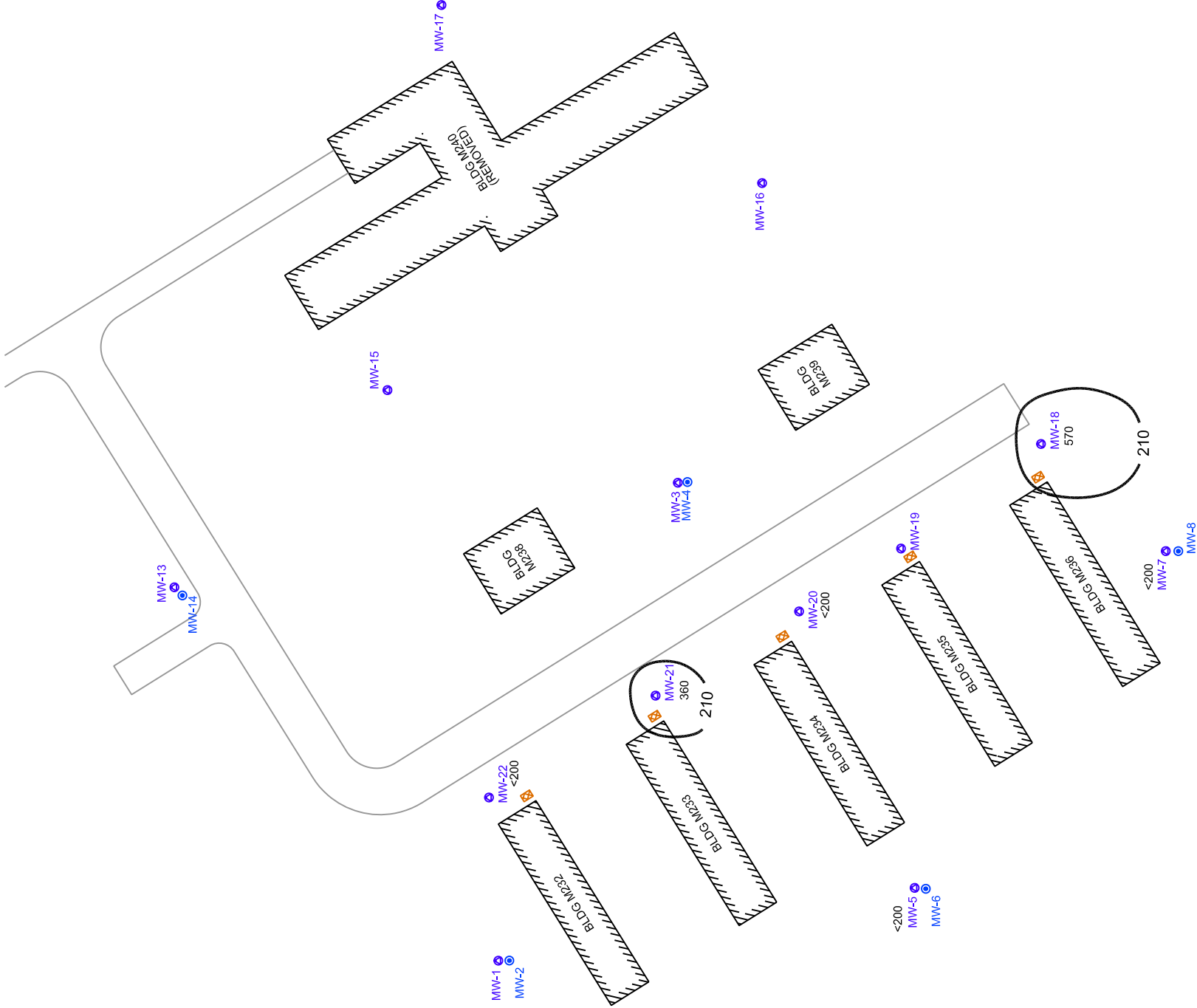


	FIGURE	4-1	SURFICIAL AQUIFER SHALLOW WELL C9-C22 AROMATICS CONCENTRATIONS FOR JUNE 2004
	DATE	7/17/04	
	REVISION	0	SITE M232-236
	DRAWN BY	WCM	QUARTERLY MONITORING REPORT
	FILE	M232_MAP	MCB CAMP LEJEUNE, NC

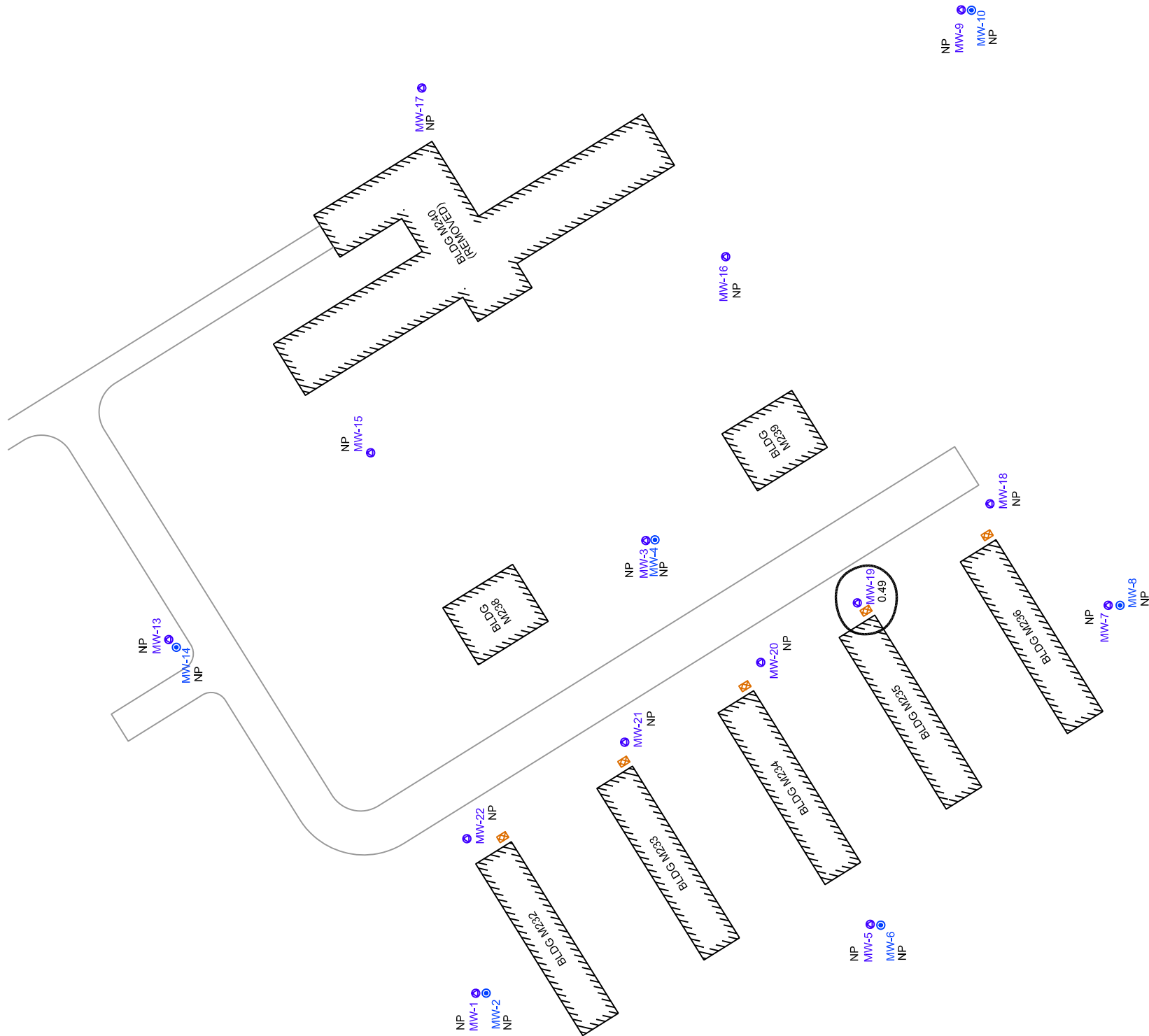


LEGEND

- SHALLOW MONITORING WELL
INTERMEDIATE MONITORING WELL

SURFICIAL AQUIFER FREE PRODUCT THICKNESS ESTIMATED EXTENT OF FREE PRODUCT

(THICKNESS EXPRESSED IN FEET)
(NP: MEASURABLE FREE PRODUCT NOT PRESENT)



SCALE (Feet)

	FIGURE	4-2	ESTIMATED EXTENT OF FREE PRODUCT THICKNESS FOR JUNE 2004 SITE M232-236 QUARTERLY MONITORING REPORT MCB CAMP LEJEUNE, NC
	DATE	7/17/04	
	REVISION	0	
	DRAWN BY	WCM	
	FILE	M232 MAP	

TABLES

Table 3-1
Gauging Data for 15 June 2004
Site M232-236

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	14.20	11.25	NP	NP	2.95	2.95
<i>MW-2</i>	13.96	11.43	NP	NP	2.53	2.53
MW-3	16.33	10.62	NP	NP	5.71	5.71
<i>MW-4</i>	16.48	9.82	NP	NP	6.66	6.66
MW-5	12.80	10.22	NP	NP	2.58	2.58
<i>MW-6</i>	13.07	10.72	NP	NP	2.35	2.35
MW-7	12.90	13.75	NP	NP	-0.85	-0.85
<i>MW-8</i>	12.91	13.93	NP	NP	-1.02	-1.02
MW-9	13.88	12.21	NP	NP	1.67	1.67
<i>MW-10</i>	14.43	11.70	NP	NP	2.73	2.73
MW-11	10.87	8.15	NP	NP	2.72	2.72
<i>MW-12</i>	10.89	9.17	NP	NP	1.72	1.72
MW-13	16.10	12.87	NP	NP	3.23	3.23
<i>MW-14</i>	15.97	13.11	NP	NP	2.86	2.86
MW-15	15.28	12.31	NP	NP	2.97	2.97
MW-16	15.14	12.63	NP	NP	2.51	2.51
MW-17	14.52	11.49	NP	NP	3.03	3.03
MW-18	NA	8.84	NP	NP	NC	NC
MW-19	NA	9.27	8.78	0.49	NC	NC
MW-20	NA	8.25	NP	NP	NC	NC
MW-21	NA	8.92	NP	NP	NC	NC
MW-22	NA	8.83	NP	NP	NC	NC

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

Well identifications shown in *italics* indicate wells screened from approximately 20 feet bgs to 30 feet bgs; all other wells screened at or above 15 feet bgs

feet msl - feet above/below mean sea level

feet btoc - feet below top of casing

NA - Not Available - top of casing elevation data not available

NC - Not Calculated - insufficient data available to calculate a groundwater elevation

NP - Not Present - no measurable product detected

Table 4-1
Summary of Groundwater Quality Analytical Data for June 2004
Site M232-236

EPA Method 602 (ug/L)	NCGWQS	GCL	MW-5	MW-7	DUP ⁽¹⁾	MW-18	MW-20	MW-21	MW-22
			06/16/04	06/16/04	06/16/04	06/17/04	06/17/04	06/17/04	06/17/04
Benzene	1	5000	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Diisopropyl ether	70	70,000	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Ethylbenzene	29	29,000	<1.00	<1.00	<1.00	<1.00	<1.00	0.720 J	.617 J
Methyl-tert butyl ether	200	200,000	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Toluene	1000	257,500	<1.00	<1.00	<1.00	0.443 J	0.497 J	0.655 J	<1.00
m,p-Xylene ⁽²⁾			<2.00	<2.00	<2.00	0.660 J	<2.00	0.916 J	<2.00
o-Xylene ⁽²⁾			<2.00	<2.00	<2.00	0.798 J	<2.00	0.598 J	<2.00
Total Xylenes ⁽²⁾	530	87,500	<4.00	<4.00	<4.00	1.458 J	<4.00	1.514 J	<4.00
EPA Method 625 (ug/L)									
Acenaphthene	80	2120	<10.0	<10.0	<10.0	6.50 J	1.80 J	2.20 J	3.20 J
Anthracene	2100	2100	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Bis(2-ethylhexyl)phthalate	3	3000	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4,6-Dinitro-2-methylphenol	RL	NE	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0
Fluorene	280	450	<10.0	<10.0	<10.0	9.40 J	2.10 J	3.40 J	4.50 J
Naphthalene	21	15,500	<10.0	<10.0	<10.0	2.70 J	<10.0	4.60 J	7.80 J
Phenanthrene	210	410	<10.0	<10.0	<10.0	8.80 J	<10.0	2.60 J	3.30 J
Pyrene	210	210	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
TICs (total)			10 J	20 J	13 J	109.6 J	11 J	100 J	117 J
1-Methylnaphthalene (TIC)	RL	NE	NR	NR	NR	4.6 J	NR	37 J	50 J
2-Methylnaphthalene (TIC)	14	12,500	NR	NR	NR	NR	NR	19 J	20 J
2,3-Dimethylnaphthalene (TIC)	RL	NE	NR	NR	NR	NR	NR	22 J	NR
MADEP VPH (ug/L)									
C ₅ -C ₈ Aliphatics	420	NE	<100	<100	<100	<100	<100	<100	<100
C ₉ -C ₁₂ Aliphatics ⁽³⁾			<100	<100	<100	200	<100	130	120
C ₉ -C ₁₀ Aromatics ⁽³⁾			<100	<100	<100	<100	<100	<100	<100
MADEP EPH (ug/L)									
C ₉ -C ₁₈ Aliphatics ⁽³⁾			<100	<100	<100	<100	<100	<100	<100
C ₁₉ -C ₃₆ Aliphatics	42,000	NE	<100	<100	<100	<100	<100	<100	<100
C ₁₁ -C ₂₂ Aromatics ⁽³⁾			<100	<100	<100	570	<100	360	<100
MADEP VPH + EPH (ug/L)									
C ₉ -C ₁₂ + C ₉ -C ₁₈ Aliphatics ⁽³⁾	4200	NE	<200	<200	<200	200	<200	130	120
C ₉ -C ₁₀ + C ₁₁ -C ₂₂ Aromatics ⁽³⁾	210	NE	<200	<200	<200	570	<200	360	<200

⁽¹⁾ DUP is a duplicate sample collected from well MW-7

⁽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

GCL: Gross Contamination Level

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

NCGWQS: North Carolina Groundwater Quality Standard

RL: Reporting Limit; a NCGWQS has not been established for the compound; therefore, the NCGWQS is set at the reporting limit

TICs: Tentatively Identified Compound; "total" indicates sum of all TICs; discrete compounds when identified are listed separately; 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 (Page 1 of 2)
Summary of Historical Groundwater Quality Analytical Data
Site M232-236

Volatile Organic Compounds (ug/L)			MW-1	MW-2	MW-3		MW-4	MW-5		MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12		
			November 1991	November 1991	November 1991	October 2000 ⁽¹⁾	April 2001 ⁽¹⁾	November 1991	November 1991	October 2000	April 2001	November 1991	November 1991	November 1991	November 1991	November 1991	November 1991	November 1991
			(8010/ 8020)	(8010/ 8020)	(8010/ 8020)	(6210D)	(6210D)	(8010/ 8020)	(8010/ 8020)	(6210D)	(6210D)	(8010/ 8020)	(8010/ 8020)	(8010/ 8020)	(8010/ 8020)	(8010/ 8020)	(8010/ 8020)	(8010/ 8020)
Benzene	1	5000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
n-Butylbenzene	70	6900	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
sec-Butylbenzene	70	8500	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
tert-Butylbenzene	70	15,000	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
Chloroform	0.19	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.0	
Ethylbenzene	29	29,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.0	ND	ND	
Isopropylbenzene	70	25,000	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
4-Isopropyltoluene	RL	NE	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
Naphthalene	21	15,500	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
n-Propyl benzene	70	30,000	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
Tetrachloroethene	0.7	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Toluene	1000	257,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	8.0	6.0	
1,2,4-Trimethylbenzene	350	28,500	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
1,3,5-Trimethylbenzene	350	25,000	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
Total Xylenes	530	87,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.0	ND	ND	
Semi-volatile Organic Compounds (ug/L)			(8100)	na	(8100)	(625)	(625)	na	(8100)	(625)	(625)	na	na	na	na	na	na	
Acenaphthene	80	2120	ND	na	ND	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
Anthracene	2100	2100	ND	na	ND	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
Bis(2-ethylhexyl)phthalate	3	3000	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
4,6-Dinitro-2-methylphenol	RL	NE	na	na	na	ND	ND	na	na	ND	ND	na	na	na	na	na	na	
Fluorene	280	450	ND	na	ND	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
Naphthalene	21	15,500	ND	na	ND	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
Phenanthrene	210	410	ND	na	2900	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
Pyrene	210	210	ND	na	ND	ND	ND	na	ND	ND	ND	na	na	na	na	na	na	
TICs (total)			na	na	na	1024 J	585 J	na	na	ND	ND	na	na	na	na	na	na	
MADEP VPH + EPH (ug/L)																		
C ₉ -C ₁₈ Aliphatics	4200	NE	na	na	na	760	690	na	na	ND	ND	na	na	na	na	na	na	
C ₁₉ -C ₃₆ Aliphatics		NE	na	na	na	200	140	na	na	ND	ND	na	na	na	na	na	na	
C ₉ -C ₂₂ Aromatics	210	NE	na	na	na	440	430	na	na	ND	ND	na	na	na	na	na	na	

⁽¹⁾ Well identified as MW-7 in source document

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
ND: Not Detected; compound quantitated and not detected; detection limit not specified in source document summay table

GCL:Gross Contamination Level
NE: Not Established; a GCL has not been established for the analyte
NCGWQS: North Carolina Groundwater Quality Standard
RL: Reporting Limit; a NCGWQS has not be established for the compound; therefore, the NCGWQS is set at the reporting limit
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

November 1991 data from OBG, 1992
December 1992 data from OBG, 1993
October 2000 data from Law, 2000b
April 2001 data from Law, 2001

Table 4-2 (Page 2 of 2)
Summary of Historical Groundwater Quality Analytical Data
Site M232-236

Volatile Organic Compounds (ug/L)	NCGWQS	GCL	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18			MW-20			MW-21			MW-22		
			November 1991	November 1991	December 1992	December 1992	December 1992	August 1999	October 2000	April 2001	August 1999	October 2000	April 2001	August 1999	October 2000	April 2001	August 1999	October 2000	April 2001
			(8010/8020)	(8010/8020)	(601/602)	(601/602)	(601/602)	(602)	(6210D)	(6210D)	(602)	(6210D)	(6210D)	(602)	(6210D)	(6210D)	(602)	(6210D)	(6210D)
Benzene	1	5000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	70	6900	na	na	na	na	na	na	ND	10	na	2	2	na	4	4	na	ND	1
sec-Butylbenzene	70	8500	na	na	na	na	na	na	4	6	na	ND	ND	na	6	6	na	3	1
tert-Butylbenzene	70	15,000	na	na	na	na	na	na	0.7	0.7	na	ND	ND	na	ND	0.6	na	0.8	ND
Chloroform	0.19	190	ND	ND	ND	ND	ND	na	ND	ND	na	ND	ND	na	ND	ND	na	ND	ND
Ethylbenzene	29	29,000	ND	ND	ND	ND	ND	ND	ND	0.8	7	ND	ND	ND	0.7	1	ND	1	ND
Isopropylbenzene	70	25,000	na	na	na	na	na	na	ND	2	na	ND	ND	na	2	3	na	3	1
4-Isopropyltoluene	RL	NE	na	na	na	na	na	na	ND	0.5	na	ND	ND	na	2	3	na	2	0.8
Naphthalene	21	15,500	na	na	na	na	na	na	3	5	na	1	1	na	8	7	na	24	11
n-Propyl benzene	70	30,000	na	na	na	na	na	na	ND	1	na	0.7	0.6	na	5	6	na	5	2
Tetrachloroethene	0.7	700	ND	ND	ND	ND	ND	na	ND	ND	na	ND	ND	na	ND	0.6	na	ND	ND
Toluene	1000	257,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	350	28,500	na	na	na	na	na	na	ND	ND	na	ND	ND	na	11	14	na	22	9
1,3,5-Trimethylbenzene	350	25,000	na	na	na	na	na	na	0.5	ND	na	ND	ND	na	3	5	na	4	1
Total Xylenes	530	87,500	ND	4.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds (ug/L)			na	na	na	na	na	(625)	(625)	(625)	(625)	(625)	(625)	(625)	(625)	(625)	(625)	(625)	(625)
Acenaphthene	80	2120	na	na	na	na	na	ND	ND	ND	3	ND	ND	ND	ND	ND	2	ND	ND
Anthracene	2100	2100	na	na	na	na	na	na	ND	ND	na	ND	ND	na	ND	ND	na	ND	ND
Bis(2-ethylhexyl)phthalate	3	3000	na	na	na	na	na	159	ND	ND	ND	ND	ND	6	ND	ND	283	ND	ND
4,6-Dinitro-2-methylphenol	RL	NE	na	na	na	na	na	na	ND	ND	na	ND	ND	na	ND	ND	na	ND	ND
Fluorene	280	450	na	na	na	na	na	ND	12	12	4	ND	ND	2	ND	ND	3	ND	ND
Naphthalene	21	15,500	na	na	na	na	na	6	ND	ND	ND	ND	ND	ND	ND	ND	8	14	13
Phenanthrene	210	410	na	na	na	na	na	ND	11	ND	5	ND	ND	2	ND	ND	1	ND	ND
Pyrene	210	210	na	na	na	na	na	na	ND	ND	na	ND	ND	na	ND	ND	na	ND	ND
TICs (total)			na	na	na	na	na	19 J	222 J	203 J	92 J	5.4 J	3.8 J	84 J	5170 J	430 J	118 J	380 J	369 J
MADEP VPH + EPH (ug/L)																			
C ₉ -C ₁₈ Aliphatics	4200	NE	na	na	na	na	na	21	630	430	260	120	ND	110	460	520	150	420	340
C ₁₉ -C ₃₆ Aliphatics		NE	na	na	na	na	na	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C ₉ -C ₂₂ Aromatics	210	NE	na	na	na	na	na	15	280	270	170	ND	ND	72	250	440	96	340	310

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
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
RL: Reporting Limit; a NCGWQS has not be established for the compound; therefore, the NCGWQS is set at the reporting limit
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

November 1991 data from OBG, 1992
December 1992 data from OBG, 1993
October 2000 data from Law, 2000
April 2001 data from Law, 2001

APPENDIX A
FIELD DATA SAMPLING SHEETS

Engineering & Environment, M232-236

pid 0

Date 6/16/04 Time 13:39 Weather Cloudy

Sampler B5 Well/Sample # USTM232-MW05

Depth To Bottom(ft) 15 Depth To Water (ft) 10.22 Water Depth (ft) 4.78

Well Vol. 0.78 Purge Vol. 2.34 Vol. Purged

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	13:09	13:16	13:24				N/A
Temperature	19.32	20.59	22.38				°C
Spec. Conductivity	1124	1123	1122				(m s/m)
Dissolved Oxygen	2.32	1.87	1.92				(MS/L)
PH	4.55	4.68	4.73				(STD)
ORP	275.9	256.3	240.5				(G/L)
Turbidity	0/L	0/L	0/L				(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	13:04	13:08	13:15	13:22			
W/L	10.22	12.10	12.39	12.75			
Pump adj.	2.5			1.5			
amount adj.							

*Dry at 13:29, waited ten min.
Took Sample Turb. 749*

J

Engineering & Environment, M232-236 *Pid 1.2*

Date 6-16-04 Time 14:20 Weather Cloudy

Sampler Q5 Well/Sample # USTM232-M467

Depth To Bottom(ft) 15 Depth To Water (ft) 13.75 Water Depth (ft) 1.25

Well Vol. 204 Purge Vol. .612 Vol. Purged 1.75

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	14:03	14:07	14:09	14:11	14:13		N/A
Temperature	17.41	17.40	17.34	17.26	17.21		°C
Spec. Conductivity	1100	1105	1106	1106	1107		(m s/m)
Dissolved Oxygen	1.02	.59	.37	.28	.23		(MS/L)
PH	4.91	3.79	2.75	2.98	3.20		(STD)
ORP	149.7	245.8	297.6	283.6	271.2		(G/L)
Turbidity	245	96.2	23.4	11.3	7.02		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments:							

2" well vol.=water depth X 0.1632

Time	14:01	14:01	14:08	14:13	14:15		
W/L	13.75	13.83	13.85	13.86	13.85		
Pump adj.	2"						
amount adj.							

Dup

Engineering & Environment, M232-236

Pic O

Date 6-17-04 Time 11:15 Weather CloudySampler DS Well/Sample # USTM232-MW18Depth To Bottom(ft) 14.68 Depth To Water (ft) 8.48 Water Depth (ft) 6.2Well Vol. .3 Purge Vol. .9 Vol. Purged Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	11:15	11:17	11:19	11:21	11:24		N/A
Temperature	18.58	18.43	18.41	18.42	18.41		°C
Spec. Conductivity	1235	0.871	1233	1231	1230		(m s/m)
Dissolved Oxygen	1.02	.69	1.02	1.15	1.30		(MS/L)
PH	4.69	4.53	4.80	5.05	5.57		(STD)
ORP	30	30.6	16.2	4.3	-22.0		(G/L)
Turbidity	5.89	5.06	2.76	2.37	3.01		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments:							

2" well vol.=water depth X 0.1632

Time	11:13						
W/L							
Pump adj.	1'						
amount adj.							

Probe will not fit in well with Tubing

pid 0

Date 6-17-04

Time 12:05

Weather Cloudy

Sampler RS

Well/Sample # USTM232-MW20

Depth To 1 Bottem(ft) 4.66

Depth To Water (ft) 8.75

Water Depth (ft) 5.91

Well Vol. 26

Purge Vol. 178Vol. Purged

--

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	11:49	11:52	11:55	11:58	12:01		N/A
Temperature	20.85	20.16	20.02	20.02	19.92		°C
Spec. Conductivity	1083	1083	1083	1083	1093		(m s/m)
Dissolved Oxygen	1.52	0.60	1.55	1.47	1.42		(MS/L)
PH	5.49	5.35	5.33	5.03	5.19		(STD)
ORP	51.3	47.2	42.0	55	40.6		(G/L)
Turbidity	37.1	19.5	12	12	8.24		(NTU)

Analyte	Size	Preserv.
6210D	3 X 40 ml	HCL
625	1 X 1L	None
VPH	40 ml x2	HCL

Comments:

2" well vol.=water depth X 0.1632

Time	11:46								
W/L									
Pump adj.	i ^e								
amount adj.									

Probe will not fit in well with Tabing

Engineering & Environment, M232-236

Date 6-17-04 Time 12:36 Weather Cloudy

Sampler JS Well/Sample # USTM232-MW21

Depth To Bottom(ft) 14.47 Depth To Water (ft) 8.92 Water Depth (ft) 5.56

Well Vol. 1.26 Purge Vol. .78 Vol. Purged

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	12:17	12:20	12:24	12:29	12:32		N/A
Temperature	21.43	21.29	21.57	21.53	21.71		°C
Spec. Conductivity	.115	.105	.111	.110	.110		(m s/m)
Dissolved Oxygen	1.20	2.92	4.69	5.90	5.71		(MS/L)
PH	5.77	5.62	5.67	5.70	5.72		(STD)
ORP	1.1	13.1	11.3	11.6	11.3		(G/L)
Turbidity	48.5	87.4	49.3	28.1	12.9		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments:							

2" well vol.=water depth X 0.1632							
Time	12:13						
W/L							
Pump adj.	1°						
amount adj.							

Probe will not fit in well with tubing

Engineering & Environment, M232-236

Date 6-17-04 Time 13:15 Weather Cloudy

Sampler B.S Well/Sample # USTM232-MW22

Depth To Bottom(ft) 13.36 Depth To Water (ft) 8.83 Water Depth (ft) 4.53

Well Vol. .21 Purge Vol. .63 Vol. Purged

Sampling Device (pump/Bailer)

	ONE	TWO	THREE	FOUR	FIVE	SIX	UNIT
Time	13:00	13:03	13:06	13:09	13:12		N/A
Temperature	21.36	21.22	21.03	21.02			°C
Spec. Conductivity	.311	.265	.244	.223			(m s/m)
Dissolved Oxygen	.88	.61	.55	.79			(MS/L)
PH	6.17	6.08	6.03	6.00			(STD)
ORP	-46.4	-27.2	-18.2	-12			(G/L)
Turbidity	85.2	61.7	36.6	57.2	86.1		(NTU)
Analyte	Size	Preserv.					
6210D	3 X 40 ml	HCL					
625	1 X 1L	None					
VPH	40 ml x2	HCL					
Comments:							

2" well vol.=water depth X 0.1632

Time	<u>13:57</u>						
W/L							
Pump adj.	<u>1'</u>						
amount adj.							

Probe will not fit in well with Tubing

APPENDIX B

LABORATORY ANALYTICAL REPORTS

Mr. Fred Kozminski
Engineering & Environment, Inc.
195 South Rosemont Rd.
Suite 118
Virginia Beach VA 23452-4353
Report Number: G546-10
Client Project: M232-236

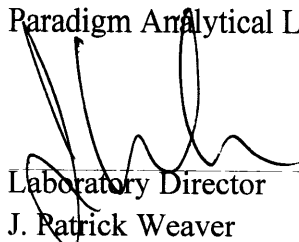
Dear Mr. Kozminski:

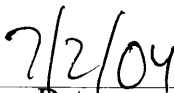
Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period 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


Date

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW22

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/17/2004 13:15

Lab Sample ID: G546-10-1B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	0.617	1.00	0.299	1	06/25/2004	J
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	BQL	1.00	0.302	1	06/25/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/25/2004	
o-Xylene	BQL	2.00	0.596	1	06/25/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.4	98.6

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW21

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/17/2004 12:35

Lab Sample ID: G546-10-2B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	0.720	1.00	0.299	1	06/25/2004	J
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	0.655	1.00	0.302	1	06/25/2004	J
m/p-Xylene	0.916	2.00	0.608	1	06/25/2004	J
o-Xylene	0.598	2.00	0.596	1	06/25/2004	J

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.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW18

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/17/2004 11:25

Lab Sample ID: G546-10-3B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/25/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	0.443	1.00	0.302	1	06/25/2004	J
m/p-Xylene	0.660	2.00	0.608	1	06/25/2004	J
o-Xylene	0.798	2.00	0.596	1	06/25/2004	J

Surrogate Spike Recoveries**Spike
Added****Spike
Result****Percent
Recovery**

Trifluorotoluene

40

39.1

97.6

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW07

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/16/2004 14:20

Lab Sample ID: G546-10-4B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/25/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	BQL	1.00	0.302	1	06/25/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/25/2004	
o-Xylene	BQL	2.00	0.596	1	06/25/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.0	97.5

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW05

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/16/2004 13:39

Lab Sample ID: G546-10-5B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/25/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	BQL	1.00	0.302	1	06/25/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/25/2004	
o-Xylene	BQL	2.00	0.596	1	06/25/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.1	97.7

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-MW20

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/17/2004 12:05

Lab Sample ID: G546-10-6B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/25/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	0.497	1.00	0.302	1	06/25/2004	J
m/p-Xylene	BQL	2.00	0.608	1	06/25/2004	
o-Xylene	BQL	2.00	0.596	1	06/25/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.1	97.6

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Results for Volatiles

by GC 602

Client Sample ID: USTM232-DUP

Analyzed By: DCS

Client Project ID: M232-236

Date Collected: 06/16/2004 00:00

Lab Sample ID: G546-10-7B

Date Received: 6/18/04

Lab Project ID: G546-10

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	06/25/2004	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	06/25/2004	
Ethylbenzene	BQL	1.00	0.299	1	06/25/2004	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	06/25/2004	
Toluene	BQL	1.00	0.302	1	06/25/2004	
m/p-Xylene	BQL	2.00	0.608	1	06/25/2004	
o-Xylene	BQL	2.00	0.596	1	06/25/2004	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.1	97.7

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTM232-MW22
Client Project ID: M232-236
Lab Sample ID: G546-10-1H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 13:15
Date Received: 06/18/2004
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	3.20	10.0	1.22	1	06/26/2004	J
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	4.50	10.0	1.22	1	06/26/2004	J
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: USTM232-MW22
 Client Project ID: M232-236
 Lab Sample ID: G546-10-1H
 Lab Project ID: G546-10

Analyzed By: MRC
 Date Collected: 06/17/2004 13:15
 Date Received: 06/18/2004
 Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	7.80	10.0	1.08	1	06/26/2004	J
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	3.30	10.0	1.38	1	06/26/2004	J
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	9.1	91
2-Fluorophenol	10	8.9	89
Nitrobenzene-d5	10	9	90
Phenol-d6	10	8.1	81
2,4,6-Tribromophenol	10	9.2	92
4-Terphenyl-d14	10	9.2	92

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: ELU

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTM232-MW22
Client Project ID: M232-236
Lab Sample ID: G546-10-1H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 13:15
Date Received: 06/18/2004
Matrix: Water

Dilution: 1

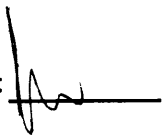
Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	1-Methylnaphthalene	10.15	000090-12-0	97	50
2	Dimethylnaphthalene, Isomer of	11.13			26
3	Unknown	10.42			21
4	2-Methylnaphthalene	9.99	000091-57-6	99	20
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: USTM232-MW21
Client Project ID: M232-236
Lab Sample ID: G546-10-2H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 12:35
Date Received: 06/18/2004
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	2.20	10.0	1.22	1	06/26/2004	J
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	3.40	10.0	1.22	1	06/26/2004	J
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: USTM232-MW21
Client Project ID: M232-236
Lab Sample ID: G546-10-2H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 12:35
Date Received: 06/18/2004
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	4.60	10.0	1.08	1	06/26/2004	J
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	2.60	10.0	1.38	1	06/26/2004	J
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	9.3	93
2-Fluorophenol	10	9	90
Nitrobenzene-d5	10	9.1	91
Phenol-d6	10	8.1	81
2,4,6-Tribromophenol	10	9.2	92
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: USTM232-MW21
Client Project ID: M232-236
Lab Sample ID: G546-10-2H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 12:35
Date Received: 06/18/2004
Matrix: Water

Dilution: 1

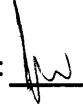
Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	1-Methylnaphthalene	10.15	000090-12-0	99	37
2	Naphthalene, 2,3-dimethyl-	11.12	000581-40-8	96	22
3	Unknown	10.42			22
4	2-Methylnaphthalene	10.00	000091-57-6	96	19
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: USTM232-MW18
Client Project ID: M232-236
Lab Sample ID: G546-10-3H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 11:25
Date Received: 06/18/2004
Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	6.50	10.0	1.22	1	06/26/2004	J
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	9.40	10.0	1.22	1	06/26/2004	J
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: USTM232-MW18
 Client Project ID: M232-236
 Lab Sample ID: G546-10-3H
 Lab Project ID: G546-10

Analyzed By: MRC
 Date Collected: 06/17/2004 11:25
 Date Received: 06/18/2004
 Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Naphthalene	2.70	10.0	1.08	1	06/26/2004	J
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	8.80	10.0	1.38	1	06/26/2004	J
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	8.6	86
2-Fluorophenol	10	8.7	87
Nitrobenzene-d5	10	8.9	89
Phenol-d6	10	8.2	82
2,4,6-Tribromophenol	10	8.8	88
4-Terphenyl-d14	10	8.4	84

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: ELM

Results of Library Search for Semivolatile Compounds by GCMS

Client Sample ID: USTM232-MW18
 Client Project ID: M232-236
 Lab Sample ID: G546-10-3H
 Lab Project ID: G546-10

Analyzed By: MRC
 Date Collected: 06/17/2004 11:25
 Date Received: 06/18/2004
 Matrix: Water

Dilution: 1

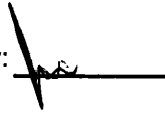
Date Analyzed: 06-26-2004

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Aromatic, Unknown	7.21	000496-11-7	83	35
2	Methylpropenylbenzene, Isomer of	8.48	000768-49-0	91	26
3	Tetrahydromethylnaphthalene, Isomer of	9.93	001680-51-9	93	16
4	Aromatic, Unknown	8.97	017059-48-2	87	14
5	Unknown	10.42			14
6	1-Methylnaphthalene	10.15	000090-12-0	98	4.6
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: USTM232-MW07

Client Project ID: M232-236

Lab Sample ID: G546-10-4H

Lab Project ID: G546-10

Analyzed By: MRC

Date Collected: 06/16/2004 14:20

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: USTM232-MW07
 Client Project ID: M232-236
 Lab Sample ID: G546-10-4H
 Lab Project ID: G546-10

Analyzed By: MRC
 Date Collected: 06/16/2004 14:20
 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	8.9	89
2-Fluorophenol	10	9	90
Nitrobenzene-d5	10	8.9	89
Phenol-d6	10	8.2	82
2,4,6-Tribromophenol	10	8.2	82
4-Terphenyl-d14	10	9.5	95

Comments:

Flags:

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTM232-MW07
Client Project ID: M232-236
Lab Sample ID: G546-10-4H
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/16/2004 14:20
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			20
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: USTM232-MW05
Client Project ID: M232-236
Lab Sample ID: G546-10-5I
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/16/2004 13:39
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: USTM232-MW05

Client Project ID: M232-236

Lab Sample ID: G546-10-5I

Lab Project ID: G546-10

Analyzed By: MRC

Date Collected: 06/16/2004 13:39

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	8.5	85
2-Fluorophenol	10	7.9	79
Nitrobenzene-d5	10	8	80
Phenol-d6	10	7.2	72
2,4,6-Tribromophenol	10	7.6	76
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: USTM232-MW05
Client Project ID: M232-236
Lab Sample ID: G546-10-5I
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/16/2004 13:39
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			10
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: USTM232-MW20

Client Project ID: M232-236

Lab Sample ID: G546-10-6K

Lab Project ID: G546-10

Analyzed By: MRC

Date Collected: 06/17/2004 12:05

Date Received: 06/18/2004

Matrix: Water

Compound	Result ug/L	Quantitation Limit ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	1.80	10.0	1.22	1	06/26/2004	J
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	2.10	10.0	1.22	1	06/26/2004	J
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: USTM232-MW20

Client Project ID: M232-236

Lab Sample ID: G546-10-6K

Lab Project ID: G546-10

Analyzed By: MRC

Date Collected: 06/17/2004 12:05

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	8.5	85
2-Fluorophenol	10	7.8	78
Nitrobenzene-d5	10	8.4	84
Phenol-d6	10	7.3	73
2,4,6-Tribromophenol	10	8.1	81
4-Terphenyl-d14	10	9.3	93

Comments:**Flags:**

BQL = Below Quantitation Limits.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTM232-MW20
Client Project ID: M232-236
Lab Sample ID: G546-10-6K
Lab Project ID: G546-10

Analyzed By: MRC
Date Collected: 06/17/2004 12:05
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			11
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: USTM232-DUP

Client Project ID: M232-236

Lab Sample ID: G546-10-7I

Lab Project ID: G546-10

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: USTM232-DUP
Client Project ID: M232-236
Lab Sample ID: G546-10-7I
Lab Project ID: G546-10

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	8	80
2-Fluorophenol	10	7.9	79
Nitrobenzene-d5	10	8	80
Phenol-d6	10	7.3	73
2,4,6-Tribromophenol	10	7.6	76
4-Terphenyl-d14	10	10.3	103

Comments:**Flags:**

BQL = Below Quantitation Limits.

Reviewed By: *ELC*

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTM232-DUP
Client Project ID: M232-236
Lab Sample ID: G546-10-71
Lab Project ID: G546-10

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	Unknown	10.42			13
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: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW22
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/17/04
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**	120 (µg/L)
C ₉ -C ₁₀ Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	100
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: g546-10-1a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW21
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/17/04
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**	130 (µg/L)
C ₉ -C ₁₀ Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	100
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: g546-10-2a

Reviewed By: EICM

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW18
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/17/04
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**	200 (µg/L)
C ₉ -C ₁₀ Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	100
Surrogate % Recovery - FID	120

* = 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: g546-10-3a

Reviewed By: *EJN*

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW07
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	100
Surrogate % Recovery - FID	110

* = 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: g546-10-4a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW05
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	95
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: g546-10-5a

Reviewed By: ELC

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW20
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	06/17/04
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	97
Surrogate % Recovery - FID	110

* = 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: g546-10-6a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting FormClient Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-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: g546-10-7a

Reviewed By: ELW

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW22
Sample Matrix	Water
Date Collected	06/17/04
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	110
Aromatic Surrogate % Recovery	110

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-10-11

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW21
Sample Matrix	Water
Date Collected	06/17/04
Date Received	06/18/04
Date Extracted	06/22/04
Date Analyzed	06/29/04
Dry Weight	
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	< 100 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	< 100 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	360 (µg/L)
Aliphatic Surrogate % Recovery	57
Aromatic Surrogate % Recovery	81
Fractionation Surrogate 1 % Recovery	53

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G546-10-21

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW18
Sample Matrix	Water
Date Collected	06/17/04
Date Received	06/18/04
Date Extracted	06/22/04
Date Analyzed	06/29/04
Dry Weight	
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	< 100 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	< 100 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	570 (µg/L)
Aliphatic Surrogate % Recovery	82
Aromatic Surrogate % Recovery	93
Fractionation Surrogate 1 % Recovery	55

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G546-10-3I

Reviewed By: ECH

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW07
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	110

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-10-4J

Reviewed By: ELW

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW05
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	68
Aromatic Surrogate % Recovery	93

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-10-5H

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-MW20
Sample Matrix	Water
Date Collected	06/17/04
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: G546-10-6H

Reviewed By: EUC

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Engineering & Environment, Inc.Project Name: M232-236

Sample Information and Analytical Results	
Sample Identification	USTM232-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	82
Aromatic Surrogate % Recovery	84

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: G546-10-7H

Reviewed By: ELCH

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.

PARADIGM ANALYTICAL LABORATORIES, INC.

5500 Business Drive, Wilmington, NC 28405

Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 44319

45 of 45

Client: Engineering Environment Project ID: M232-236

Date: 9-18-04

Report To: Fred Kynsht

Address: 824 Gumbrecht Rd Suite 5 Contact: Bill Morris

Turnaround: Standard

Virginia Beach

Address: Jacksonville, NC 29540 Phone: 910-949-3214

Job Number: _____

Invoice To: Mike Skiba

Quote #: _____ Fax: 910-949-3341

P.O. Number: _____

Comments: Please specify any special reporting requirements

Sample ID	Date	Time	Matrix	Preservatives		Analyses				Comments
				ICE	HCI	602	825-10105	VPH	EPH	
ASTM232-MW22	6-17-04	13:15	GW	X	X	3	1	2	1	
ASTM232-MW21	6-17-04	12:35	GW	X	X	3	1	2	1	
ASTM232-MW18	6-17-04	11:25	GW	X	X	3	1	2	1	
ASTM232-MW07	6-16-04	14:20	GW	X	X	3	1	2	1	
ASTM232-MW05	6-16-04	13:39	GW	X	X	3	1	2	1	
ASTM232-MW20	6-17-04	12:05	GW	X	X	3	1	2	1	
ASTM232-B4P	6-16-04		GW	X	X	3	1	2	1	

Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____ Temperature: _____

State Certification Requested: _____

NC _____ SC _____ Other _____

SEE REVERSE FOR TERMS AND CONDITIONS

ORIGINAL

N.C. CERTIFICATION #481