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FINAL EXPANDED GROUNDWATER BACKGROUND STUDY REPORT MCB CAMP LEJEUNE NC
9/1/2012
CH2M HILL

Final

Expanded Groundwater Background Study Report

Marine Corps Installations East - Marine Corps Base Camp Lejeune
Jacksonville, North Carolina

Contract Task Order 0094

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Acronyms and Abbreviations

amsl	above mean sea level
ANOVA	analysis of variance
Baker	Baker Environmental, Inc.
bgs	below ground surface
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
COPC	Chemicals of potential concern
CTO	Contract Task Order
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
FFA	Federal Facilities Agreement
ID	inner diameter
KM	Kaplan-Meier
MCIEAST-MCB CAMLEJ	Marine Corps Installations East—Marine Corps Base Camp Lejeune
MLE	maximum-likelihood-estimate
MMRP	Military Munitions Response Program
MS/MSD	matrix spike/matrix spike duplicate
mV	millivolt(s)
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCDENR	North Carolina Department of Environment and Natural Resources
NTU	nephelometric turbidity unit
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
ROS	regression on order statistics
RSL	regional screening level
TAL	Target Analyte List
TOC	top-of-casing
U.S.	United States
UFP- SAP	Uniform Federal Policy – Sampling and Analysis Plan
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UTL	upper tolerance limit
UTM	Universal Transverse Mercator

SECTION 1

Introduction

This report presents the findings of the Expanded Groundwater Background Study that evaluated background groundwater conditions within Marine Corps Installations East—Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ), Jacksonville, North Carolina (**Figure 1-1**). The information contained within this report supplements the Base Background Groundwater Study conducted by Baker Environmental, Inc. (Baker) in 2002 and will be utilized to support environmental investigations and risk assessments at MCIEAST-MCB CAMLEJ.

This project was conducted by CH2M HILL under the Comprehensive Long-term Environmental Action—Navy (CLEAN) 1000 Program Contract N62470-08-D-1000, Contract Task Order (CTO) 0094, for submittal to Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division, MCIEAST-MCB CAMLEJ, the United States Environmental Protection Agency (USEPA), and the North Carolina Department of Environment and Natural Resources (NCDENR). Field activities were conducted in accordance with the *Uniform Federal Policy – Sampling and Analysis Plan (UFP-SAP) for the Expanded Soil and Groundwater Background Study* (CH2M HILL, 2010a), hereinafter referred to as the UFP-SAP.

1.1 Objective and Approach

The initial Base Background Groundwater Study (Baker, 2002) collected groundwater samples in April 2002 from 25 temporary monitoring well pairs installed in the upper and lower surficial aquifer (**Figure 1-2**). Groundwater samples were analyzed for metals only. The objective of this study was to expand upon the initial Base Background Groundwater Study by evaluating anthropogenic chemicals (polycyclic aromatic hydrocarbons [PAHs] and pesticides), as well as naturally occurring elements in both the surficial and upper Castle Hayne aquifer. In order to assess temporal variations in background hydrogeochemistry, the study also included a year-long groundwater quality assessment. The resultant data were used to calculate background threshold values (BTVs) for use in site-specific environmental investigations and risk assessments. The technical approach employed during this study included:

- Review of regulatory records to identify potentially impacted areas such as former ranges and waste disposal sites
- Selection of monitoring well locations in areas hydraulically upgradient of current or former environmental sites
- Completion of four quarterly monitoring events involving the collection of groundwater samples from 10 monitoring wells screened within the surficial aquifer and 5 monitoring wells screened within the upper Castle Hayne aquifer
- Laboratory analysis of groundwater samples for PAHs, pesticides, and metals
- Statistical analysis of the resulting laboratory analytical data

1.2 Report Organization

This report comprises the following sections:

- Section 1 - Introduction
- Section 2 – Background
- Section 3 – Site Characteristics
- Section 4 – Field Investigation
- Section 5 – Statistical Evaluation
- Section 6 – Use of Background Data
- Section 7 – References

Figures and tables are provided at the end of each respective section, and appendixes are provided at the end of this report.

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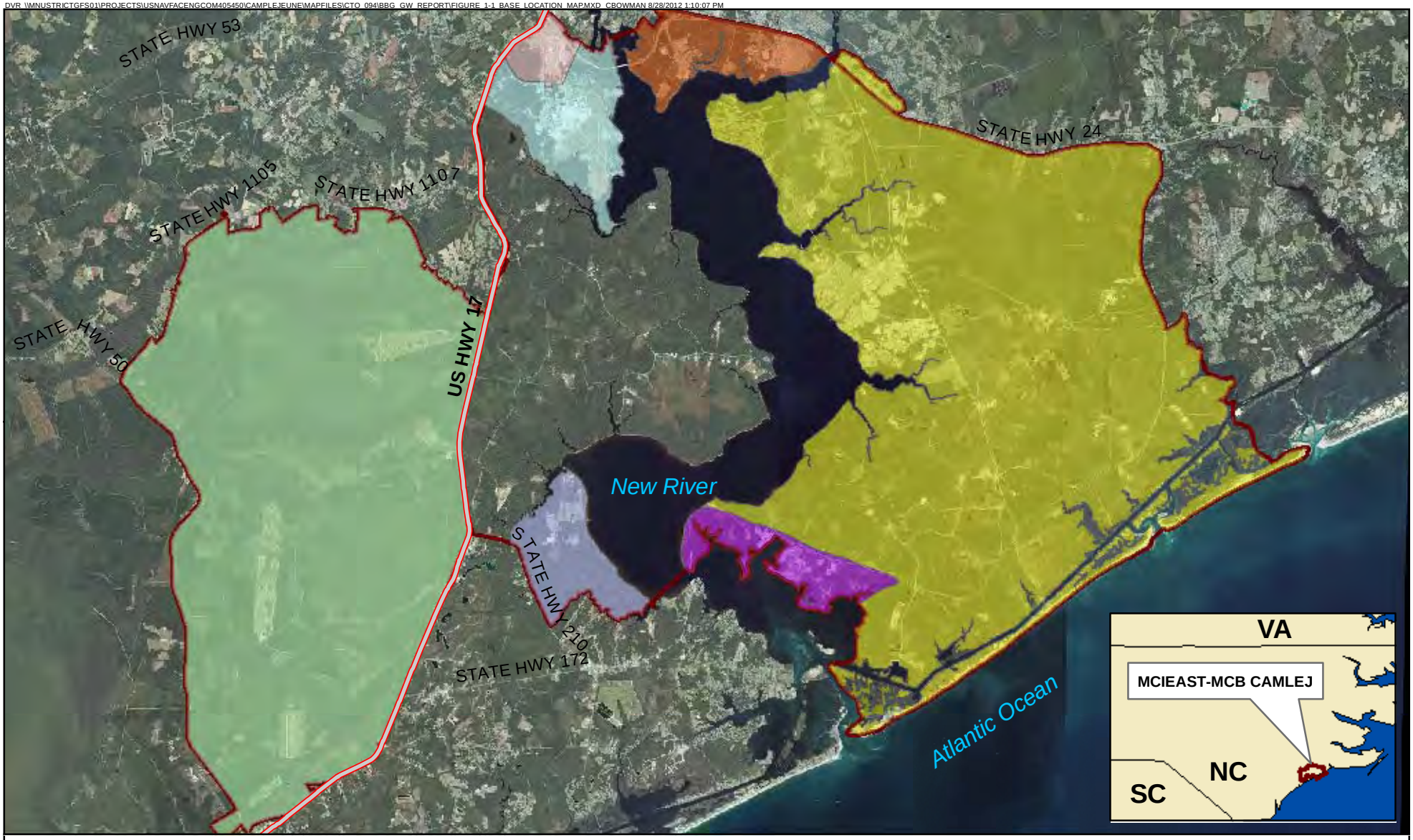

Legend

- Highways
- Camp Geiger
- Greater Sandy Run
- Marine Corps Air Station New River
- Stone Bay
- Montford Point/Tarawa Terrace
- Courthouse Bay
- Main Side
- Installation Boundary

N

0 7,500 15,000 30,000 Feet

1 inch = 15,000 feet

Figure 1-1
Base Location Map
Expanded Groundwater Background Study Report
MCIEAST-MCB CAMLEJ
North Carolina

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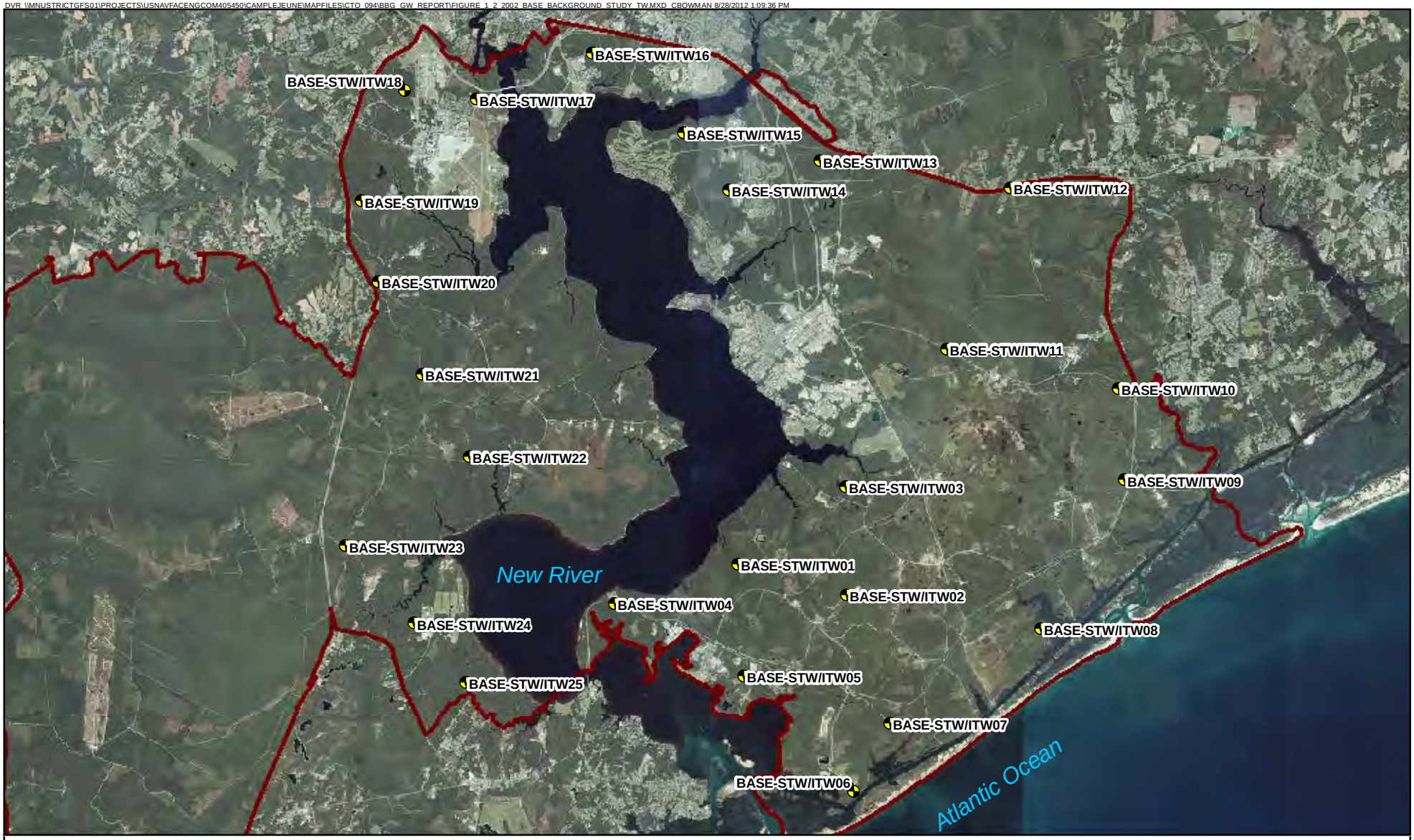
DVR \\MNUSTR\CTGFS01\PROJECTS\USNAVFACENGCOM405450\CAMPLEJEUNE\MAPFILES\CTO_094\BBG_GW_REPORT\FIGURE_1_2_2002_BASE_BACKGROUND_STUDY_TW.MXD CBOWMAN 8/28/2012 1:09:36 PM



Legend

- Shallow Surficial and Intermediate Surficial Aquifer Temporary Well Pair
- Installation Boundary

N

0 6,500 13,000 26,000 Feet

1 inch = 13,000 feet

Figure 1-2
2002 Base Background Study Temporary Monitoring Wells
Expanded Groundwater Background Study Report
MCIEAST-MCB CAMLEJ
North Carolina

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SECTION 2

Background

MCIEAST-MCB CAMLEJ encompasses approximately 156,000 acres of land in Onslow County, North Carolina, adjacent to the southern boundary of the City of Jacksonville. Jacksonville is the largest city near MCIEAST-MCB CAMLEJ and contains approximately half of the county's total population. Since 1990, much of the MCIEAST-MCB CAMLEJ complex has been part of Jacksonville. The remaining areas adjacent to MCIEAST-MCB CAMLEJ are generally rural. MCIEAST-MCB CAMLEJ is bordered by the Atlantic Ocean to the south, United States (U.S.) Highway 17 to the west, State Route 24 to the north, and the town of Hubert, North Carolina, to the east. MCIEAST-MCB CAMLEJ is bisected by the New River, which flows into the Atlantic Ocean in a southeasterly direction.

2.1 Regulatory Status

MCIEAST-MCB CAMLEJ was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List, effective November 4, 1989. Subsequent to this listing, the USEPA Region 4, NCDENR, the Department of the Navy (Navy), and the Marine Corps entered into a Federal Facilities Agreement (FFA) for MCIEAST-MCB CAMLEJ. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at MCIEAST-MCB CAMLEJ are thoroughly investigated and that appropriate CERCLA response and Resource Conservation and Recovery Act (RCRA) corrective action alternatives are developed and implemented, as necessary, to protect public health and welfare and the environment.

Several areas of MCIEAST-MCB CAMLEJ are currently under investigation or remediation to address environmental impacts related to historical waste management practices or range activities. These sites are managed under CERCLA, RCRA, Military Munitions Response Program (MMRP), and the Underground Storage Tank (UST) Program and were specifically avoided during the field sampling activities conducted during this study. There are currently 30 active CERCLA sites, 10 active RCRA sites, 17 active MMRP sites, and 104 active UST sites.

2.2 Land Use

The majority of MCIEAST-MCB CAMLEJ is used for live-fire ranges and training areas. Roughly 7,000 acres have been developed, consisting of residential and industrial land use. The primary residential areas are located on Paradise Point and Montford Point. The main industrial areas are located in Marine Corps Air Station New River, Camp Geiger, Courthouse Bay, Rifle Range, and Hadnot Point Industrial Area.

SECTION 3

Site Characteristics

3.1 Physiography and Surface Water Hydrology

MCIEAST-MCB CAMLEJ lies within the outer part of the Atlantic Coastal Plain Physiographic Province in North Carolina. This physiographic province stretches from Georgia to Long Island, New York. The physiography of the area is typical of the Atlantic Coastal Plain, with stepped terraces consisting of wide, gently eastward-sloping plains separated by linear, steeper, northward- and eastward-facing scarps. Low elevations and relatively low relief characterize the topography within MCIEAST-MCB CAMLEJ. The ground surface elevations range from sea level to approximately 70 feet above mean sea level (amsl), with average elevations ranging from 20 to 40 feet.

The land at MCIEAST-MCB CAMLEJ generally slopes toward the New River with a grade of about 0.5 percent. The relief between stream and interstream areas typically ranges from 20 to 30 feet (CH2M HILL, 2010b).

3.2 Geology and Hydrogeology

The MCIEAST-MCB CAMLEJ area is underlain by an eastward-thickening wedge of marine and non-marine sediments ranging in age from early Cretaceous to Holocene. The eastward-thickening wedge of sediment begins at the fall line (the western boundary of the Atlantic Coastal Plain Physiographic Province) and dips southeastward towards the coast. Along the coastline, several thousand feet of interlayered, unconsolidated sediment is present, consisting of gravel, sand, silt, clay deposits, calcareous clays, shell beds, sandstone, and limestone that was deposited over pre-Cretaceous crystalline basement rock. Minor amounts of detrital carbonate shells and secondary minerals, such as glauconite, siderite, and chlorite, often distinguish these sedimentary units.

Historical Coastal Plain sedimentation and deposition was controlled by fluctuations in sea level on a subsiding continental margin in marine and near-shore environments (Winner and Coble, 1989). Confining units associated with specific aquifers within the Coastal Plain region are composed of less permeable beds of clay and silt. Within the MCIEAST-MCB CAMLEJ area, approximately 1,500 feet of a sedimentary sequence that overlies the basement rock is composed of seven aquifers (the surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers) and their associated confining units (Cardinell et al., 1993).

Recharge of aquifers within the Coastal Plain region generally occurs within interstream areas. Annual recharge to the aquifers has been estimated in the range of 5 to 21 inches of rainfall (Heath, 1989). Natural discharge of groundwater from the Coastal Plain aquifer system is generally into streams, swamps, and lakes. Evapotranspiration from the soil zone and upward leakage through confining units into streams, estuaries, swamps, and even the ocean also contribute to groundwater discharge. The New River estuary serves as the principal discharge area within the vicinity of MCIEAST-MCB CAMLEJ for groundwater from the Castle Hayne aquifer (Harned et al., 1989).

3.3 Regional Water Usage

Water supply wells pumping groundwater from the Castle Hayne aquifer provide MCIEAST-MCB CAMLEJ and the surrounding residential area with potable water. Although fresh water is present within the surficial, Castle Hayne, Beaufort, and Peedee aquifers (all of which are located below MCIEAST-MCB CAMLEJ), only the Castle Hayne aquifer is used by MCIEAST-MCB CAMLEJ as a water supply source (Cardinell et al., 1993). Regionally in southeastern North Carolina, the Castle Hayne aquifer may be used as a potable source of domestic water supply and for watering lawns or filling swimming pools.

SECTION 4

Field Investigation

The field sampling activities for the Expanded Groundwater Background Study were conducted between May 2010 and April 2012, in accordance with the approved UFP-SAP.

4.1 Sampling Design and Rationale

The initial Base Background Study, conducted in 2002, only evaluated naturally occurring concentrations of metals in groundwater within the surficial aquifer, and was limited to a single monitoring event (April 2002). In contrast, the Expanded Groundwater Background Study was designed to:

- Characterize the water quality of the surficial and upper Castle Hayne aquifers.
- Assess temporal variations in background hydrogeochemistry by conducting 4 quarterly monitoring events.
- Assess the presence of anthropogenic chemicals (PAHs and pesticides), which are most likely present at MCIEAST-MCB CAMLEJ as a result of atmospheric deposition (PAHs) or intentional application (pesticides). PAHs are present in the atmosphere from various anthropogenic or natural processes, including vehicle emissions, forest fires, or emissions from point sources such as power plants or factories.
- Provide additional data for metals, including data for speciated chromium to understand the ratio of hexavalent chromium to trivalent chromium in background groundwater. This is necessary because USEPA no longer has a regional screening level (RSL) for total chromium; therefore, total chromium data for sites are currently being compared to the hexavalent chromium RSL to be conservative.

The Expanded Groundwater Background Study consisted of installing 10 monitoring wells in the surficial aquifer and five monitoring wells in the upper Castle Hayne aquifer at locations hydraulically upgradient of current or former environmental sites (**Figure 4-1**). Groundwater samples were collected quarterly for 1 year from all 15 monitoring wells and analyzed for PAHs, pesticides, metals, and hexavalent chromium (first quarter only)[1].

4.2 Monitoring Well Installation and Development

The monitoring wells were installed by Probe Technologies, a North-Carolina-licensed driller, with oversight provided by CH2M HILL. Prior to conducting intrusive field activities, underground utilities within the vicinity of each monitoring well location were located and marked by a subcontractor. Ten monitoring wells (BASE-MW01 through BASE-MW10) were installed in the surficial aquifer to depths ranging from 13 to 22 feet below ground surface (bgs). Five monitoring wells (BASE-MW01UCH through BASE-MW05UCH) were installed in the upper Castle Hayne aquifer to depths ranging from 40 to 63 feet bgs. The drilling activities were completed using a Geoprobe 7720DT direct push technology rig and 4.25-inch inner diameter (ID) hollow-stem augers. Monitoring well construction details are summarized in **Table 4-1**.

Each surficial aquifer monitoring well was constructed using 2-inch ID Schedule 40 polyvinyl chloride (PVC) riser and a 10-foot length of 0.010-inch machine-slotted screen. The well screens were placed to bracket the water table. Each upper Castle Hayne aquifer monitoring well was constructed using 2-inch ID Schedule 40 PVC riser and a 5-foot length of 0.010-inch machine-slotted screen. A sand filter pack was installed around the screened interval in 1- to 2-foot lifts, to approximately 2 feet above the top of the well screen. Bentonite pellets were placed above the sand filter pack and hydrated with potable water. Once the bentonite had hydrated, the remaining borehole annulus was sealed with a Portland cement grout. The monitoring wells were completed with 8-inch diameter flush-mounted manhole covers and watertight locking caps. Monitoring well completion diagrams and soil boring logs are presented in **Appendix A**.

[1] Evaluation of the hexavalent chromium data indicated that the average concentration appeared to be skewed by the results from monitoring well BASE-MW07. In order to provide a more robust data set, additional groundwater samples were collected from BASE-MW07 for three consecutive months.

The monitoring wells were developed by surging and pumping using an electric submersible pump. Development continued until the water was visually clear and water quality parameters had stabilized. Four monitoring wells (BASE-MW01UCH, BASE-MW03UCH, BASE-MW05, and BASE-MW06) were re-developed during the first quarterly monitoring event because of high turbidity readings. All monitoring wells, except BBG-MW03UCH, were allowed to equilibrate for at least 24 hours before collecting the groundwater sample. The first quarterly groundwater sample from BBG-MW03UCH was collected immediately after the monitoring well was re-developed.

4.3 Monitoring Well Survey

EC Land Surveyors surveyed the horizontal coordinates and vertical elevations of the monitoring wells. Top-of-casing (TOC) elevations were measured to the nearest 0.01 foot and referenced to the nearest North American Vertical Datum of 1988 (NAVD88) benchmark. Horizontal controls were based on the metric system and referenced to the North American Datum of 1983 (NAD83) and the Universal Transverse Mercator (UTM) grid system.

4.4 Groundwater Sampling

A total of 15 groundwater samples were collected during each of the four quarterly (May 2010, September 2010, December 2012, and March 2011) monitoring events; 10 samples were collected from monitoring wells screened within the surficial aquifer, and five samples were collected from monitoring wells screened within the upper Castle Hayne aquifer. In addition, groundwater samples were collected from monitoring well BASE-MW07 in February, March, and April 2012 to further evaluate hexavalent chromium in the surficial aquifer.

Prior to purging and sampling, the depth to water was measured and recorded for each monitoring well. All samples were collected using low-flow purging and sampling methods, in accordance with the Master Project Plans (CH2M HILL, 2009). Water quality parameters (specific conductance, pH, turbidity, temperature, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured and recorded during the purging phase using an YSI 556 water quality meter and a Hanna turbidity meter. Field parameters are summarized in **Table 4-2**. Quarterly groundwater sampling sheets are provided in **Appendix B.**

Groundwater samples were collected either after all field parameters stabilized over three successive readings and at least one well volume had been purged or if at least three well volumes had been purged from the monitoring well. Parameters were considered stabilized when three successive measurements measured as follows:

- Temperature was constant
- pH within 0.1 standard units
- Specific conductivity within 10 percent
- Turbidity within 10 percent or as low as practicable given sampling conditions

Prior to sample collection, the water quality meter flow-through cell was disconnected from the pump so that the pump discharge flowed directly into the laboratory-supplied sample bottles. Groundwater samples were collected into laboratory-supplied containers with the appropriate preservative (if necessary) and placed in a cooler with ice. A chain-of-custody accompanied the samples during delivery to CompuChem Laboratories for the following analyses:

Quarterly Monitoring Events

- Total metals by USEPA Methods SW-846 6010B and 6020/7470A
- Chromium (Hexavalent) by USEPA Method SW-846 7196A (first quarter only)
- PAHs by USEPA Methods SW-846 8270C SIM and 8270D
- Pesticides by USEPA Method SW-846 8081B

Monthly Monitoring Events (BASE-MW07 only)

- Total Chromium by USEPA Method SW846 6010C
- Chromium (Hexavalent) by USEPA Method SW-846 7196A
- Chromium (Trivalent) by USEPA Method SW-846 7196A

4.5 Sample Management

4.5.1 Sample Designation

In order to identify and track the various samples, all samples were assigned unique identifications. The sample numbers serve to identify the type of investigation, the location, and sample types. The sample nomenclature is as follows:

Investigation – Sample and Station number– Year and quarter

For example:

BBG-GW02-10B
BBG – Base Background
GW02 – Groundwater sample from Monitoring Well 02
10B – Collected in Calendar year 2010 during the second quarter (B)

4.5.2 Quality Assurance/Quality Control Program

Quality assurance/quality control (QA/QC) samples were collected in accordance with the UFP-SAP. Duplicates, matrix spike/matrix spike duplicates (MS/MSDs), equipment rinseate blanks, and field blanks were collected at the following frequency:

Duplicate samples	1 per 10 samples
MS/MSD samples	1 per 20 samples
Equipment blanks	1 per lot of disposable equipment/1 per day per reusable equipment
Field blanks	1 per week

Due to logistical difficulties associated with short hold-times for aqueous hexavalent chromium samples, equipment blanks were collected every other day instead of daily as specified in the UFP-SAP.

4.5.3 Analytical Program and Data Validation

All samples were delivered under chain-of-custody control to CompuChem Laboratories of Cary, North Carolina, for the analyses listed in Section 4.4.

The laboratory analytical data were validated by Dataqual or Environmental Data Quality, Inc., in accordance with the *National Functional Guidelines for Organic Data Review* (USEPA, 1999) and the *National Functional Guidelines for Inorganic Data Review* (USEPA, 2004). Following validation, the electronic data were uploaded into the CH2M HILL database. These steps (third-party validation and electronic data handling) serve to reduce inherent uncertainties associated with data authenticity and usability.

TABLE 4-1

Expanded Background Study Well Construction Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Well ID	**Date Installed** (mm/dd/yy)	**Screened Interval** (ft bgs)	**Bottom of Well** (ft btoc)	**Surveyed Top of Casing Elevation** (ft msl)
Surficial Aquifer				
BASE-MW01	5/12/10	3-13	13	27.34
BASE-MW02	5/18/10	8-18	18	33.97
BASE-MW03	5/19/10	10-20	20	26.92
BASE-MW04	5/11/10	5-15	15	16.43
BASE-MW05	5/13/10	3-13	13	47.80
BASE-MW06	5/17/10	12-22	22	49.85
BASE-MW07	5/14/10	4-14	14	38.03
BASE-MW08	5/10/10	5-15	15	11.96
BASE-MW09	5/14/10	9-19	19	22.40
BASE-MW10	5/17/10	6-16	16	25.14
Upper Castle Hayne Aquifer				
BASE-MW01UCH	5/12/10	40-45	45	27.31
BASE-MW02UCH	5/18/10	53-58	58	34.48
BASE-MW03UCH	5/19/10	58-63	63	27.61
BASE-MW04UCH	5/11/10	35-40	40	16.43
BASE-MW05UCH	5/13/10	50-55	55	48.33

Notes:

ft bgs = feet below ground surface

ft btoc = feet below top-of-casing

ft msl = feet above mean sea level

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW01**				**BASE-MW01UCH**			
Sample Date	**5/25/2010**	**9/14/2010**	**12/6/2010**	**3/7/2011**	**6/2/2010**	**9/14/2010**	**12/6/2010**	**3/7/2011**
Field Parameters								
Dissolved Oxygen (mg/L)	4.42	0.99	0.35	0.92	0.50	0.94	0.61	0.55
Oxidation Reduction Potential (mV)	95.0	-11.8	65.2	108.2	-51.9	-52.1	-182.8	-104.6
pH	6.16	5.89	5.74	6.09	6.78	6.78	7.05	6.88
Specific Conductance (mS/cm)	0.387	0.484	0.401	0.273	0.681	0.629	0.600	0.599
Temperature (°C)	17.16	22.57	18.73	14.27	18.93	19.61	17.99	18.31
Turbidity (NTU)	12.3	9.39	17.2	1.77	30.6	31.1	17.0	20.9

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW02**				**BASE-MW02UCH**			
Sample Date	**5/27/2010**	**9/14/2010**	**12/7/2010**	**3/8/2011**	**6/2/2010**	**9/14/2010**	**12/7/2010**	**3/8/2011**
Field Parameters								
Dissolved Oxygen (mg/L)	4.91	3.01	NA	5.40	NA	0.82	NA	0.16
Oxidation Reduction Potential (mV)	207.5	146.8	-58.3	191.1	-149.9	-147.9	-57.6	-187.5
pH	5.61	4.96	5.65	5.50	7.56	7.61	7.61	7.67
Specific Conductance (mS/cm)	0.219	0.314	0.172	0.113	0.294	0.256	0.278	0.248
Temperature (°C)	17.58	20.12	17.71	14.68	18.37	18.34	16.68	17.67
Turbidity (NTU)	4.50	3.26	7.66	3.02	1.94	14.5	27.6	2.00

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW03**				**BASE-MW03UCH**			
Sample Date	**5/25/2010**	**9/13/2010**	**12/7/2010**	**3/9/2011**	**5/27/2010**	**9/13/2010**	**12/7/2010**	**3/9/2011**
Field Parameters								
Dissolved Oxygen (mg/L)	NA	6.94	6.98	6.04	5.30	0.30	0.22	0.35
Oxidation Reduction Potential (mV)	302.6	247.7	353.2	365.7	-6.6	-26.2	-117.0	0.4
pH	4.70	4.09	4.38	4.37	6.84	6.03	6.19	6.13
Specific Conductance (mS/cm)	0.143	0.367	0.408	0.314	0.246	0.216	0.215	0.215
Temperature (°C)	16.79	19.50	17.95	16.92	18.41	18.54	17.14	17.83
Turbidity (NTU)	10.0	36.1	21.2	6.01	1.08	35.0	11.9	8.59

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW04**				**BASE-MW04UCH**				**BASE-MW05**			
Sample Date	**5/27/2010**	**9/14/2010**	**12/9/2010**	**3/8/2011**	**6/2/2010**	**9/14/2010**	**12/8/2010**	**3/8/2011**	**6/2/2010**	**9/15/2010**	**12/9/2010**	**3/7/2011**
Field Parameters												
Dissolved Oxygen (mg/L)	2.68	0.39	0.60	1.22	0.20	0.43	0.54	0.26	NA	1.10	0.52	1.47
Oxidation Reduction Potential (mV)	-23.1	-81.9	-64.5	-24.2	-123.6	-126.2	-133.8	-134.0	42.8	-25.4	-192.3	-174.4
pH	6.57	6.78	6.78	6.87	7.46	7.31	7.32	7.30	4.35	3.97	5.21	4.64
Specific Conductance (mS/cm)	0.550	0.566	0.488	0.342	0.340	0.353	0.371	0.318	0.328	0.370	0.282	0.154
Temperature (°C)	18.73	23.36	17.21	13.74	19.23	20.23	17.71	17.92	19.40	24.35	17.84	14.42
Turbidity (NTU)	23.2	25.2	29.3	9.73	26.3	30.2	27.9	29.3	11.8	4.91	8.78	5.46

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW05UCH**				**BASE-MW06**				
Sample Date	**6/2/2010**	**9/15/2010**	**12/9/2010**	**3/9/2011**	**6/2/2010**	**9/17/2010**	**11/1/2010***	**12/6/2010**	**3/7/2011**
Field Parameters									
Dissolved Oxygen (mg/L)	NA	1.74	0.61	0.07	NA	NA	6.20	7.86	NA
Oxidation Reduction Potential (mV)	20.5	-108.9	-197.1	-209.6	202.1	177.8	-8.5	316.6	243.5
pH	8.27	7.37	7.49	7.84	5.93	4.72	3.67	4.65	4.90
Specific Conductance (mS/cm)	0.310	0.339	0.308	0.281	0.061	0.076	0.108	0.066	0.043
Temperature (°C)	18.95	19.11	18.47	18.63	17.48	20.03	20.46	18.32	16.16
Turbidity (NTU)	67.0	11.1	5.71	6.27	9.23	10.0	2.38	8.93	3.28

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW07**							**BASE-MW08**			
Sample Date	**5/27/2010**	**9/13/2010**	**12/8/2010**	**3/8/2011**	**2/9/2012**	**3/15/2012**	**4/11/2012**	**5/26/2010**	**9/15/2010**	**12/8/2010**	**3/8/2011**
Field Parameters											
Dissolved Oxygen (mg/L)	5.73	2.22	0.90	1.40	1.63	2.68	1.39	4.71	2.66	NM	NA
Oxidation Reduction Potential (mV)	294.7	187.4	233.0	218.9	-50.0	260.3	123.0	192.4	74.5	NM	161.3
pH	4.54	4.43	4.65	4.75	4.50	4.12	4.59	6.76	6.61	NM	6.53
Specific Conductance (mS/cm)	0.072	0.076	0.088	0.064	0.067	0.066	0.067	0.350	0.371	NM	0.132
Temperature (°C)	17.92	22.83	18.36	14.60	15.99	16.20	18.22	17.06	20.88	NM	14.32
Turbidity (NTU)	5.60	17.8	9.53	0.86	0.43	2.42	0.49	35.40	9.81	21.7	9.80

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

TABLE 4-2

Expanded Background Study Water Quality Parameter Summary

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	**BASE-MW09**				**BASE-MW10**				
Sample Date	**5/26/2010**	**9/14/2010**	**12/9/2010**	**3/9/2011**	**5/24/2010**	**9/17/2010**	**11/1/2010***	**12/6/2010**	**3/7/2011**
Field Parameters									
Dissolved Oxygen (mg/L)	7.71	7.75	6.73	7.85	NA	5.80	4.04	5.53	6.03
Oxidation Reduction Potential (mV)	256.9	169.9	300.2	220.7	248.3	179.1	68.3	297.8	242.4
pH	5.33	4.75	4.90	5.36	5.01	4.75	3.85	4.77	4.95
Specific Conductance (mS/cm)	0.085	0.069	0.091	0.068	0.108	0.084	NA	0.095	0.072
Temperature (°C)	16.55	19.68	16.68	15.93	16.71	20.78	19.58	17.88	14.19
Turbidity (NTU)	10.2	25.0	22.8	7.48	10.0	8.94	7.67	9.87	4.86

Notes:

* - Well re-sampled for pesticides because of lab error

°C - degrees Celcius

mg/L - milligrams per Liter

mS/cm - microSiemens per centimeter

mV - milliVolts

NA - Not Available due to equipment error

NM - Not Measured

NTU - Nephelometric Turbidity Unit

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Legend

- Surficial Aquifer Monitoring Well
- Surficial Aquifer and Upper Castle Hayne Aquifer Monitoring Well Pair
- Installation Boundary

N

0 5,000 10,000 20,000 Feet

1 inch = 10,000 feet

Figure 4-1
Expanded Background Study Monitoring Wells
Expanded Groundwater Background Study Report
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

SECTION 5

Statistical Evaluation

This section provides a summary of the analytical results from the Expanded Groundwater Background Study and a statistical evaluation of the updated background data set. The updated background data set includes analytical results from the initial Base Background Study and this Expanded Groundwater Background Study.

All groundwater samples collected during the Expanded Groundwater Background Study had turbidity readings less than 50 nephelometric turbidity units (NTUs). Samples with high turbidity can affect the analytical results for some analytes (such as metals and PAHs); therefore, samples from the initial Base Background Study with turbidity readings higher than 50 NTUs were excluded from this study. The samples from the initial Base Background Study that were excluded from the updated background data set are listed below.

Upper Surficial Aquifer	Lower Surficial Aquifer
BASE-GW01STW	BASE-GW02ITW
BASE-GW02STW	BASE-GW04ITW
BASE-GW06STW	BASE-GW05ITW
BASE-GW11STW	BASE-GW06ITW
BASE-GW16STW	BASE-GW09ITW
BASE-GW17STW	BASE-GW17ITW
BASE-GW19STW	BASE-GW24ITW
BASE-GW25STW	BASE-GW25ITW

5.1 Analytical Results

Analytical data for groundwater samples collected in 2010 and 2011 from the surficial and upper Castle Hayne aquifer are provided in **Table 5-1**. Laboratory results and data validation reports are provided in **Appendix C**.

5.1.1 PAHs and Pesticides

The groundwater samples collected during quarterly monitoring events conducted between May 2010 and March 2011 were analyzed for PAHs and pesticides. A statistical evaluation of these results is provided in Section 5.2, which includes the mean, range, and BTVs for each detected analyte.

PAHs were detected in samples collected from both the surficial and upper Castle Hayne aquifer. A total of four analytes (acenaphthylene, benzo[b]fluoranthene, 2-methylnaphthalene, and naphthalene) were detected in samples collected from monitoring wells screened within the surficial aquifer. Four analytes (benzo[a]pyrene, benzo[b]fluoranthene, 2-methylnaphthalene, and naphthalene) were also detected in the samples collected from the upper Castle Hayne aquifer. 2-methylnaphthalene was the most frequently detected analyte for both aquifers; it was detected in 23 percent of the samples from the surficial aquifer and in 25 percent of the samples from the upper Castle Hayne aquifer.

Pesticides were detected in samples collected from both the surficial and upper Castle Hayne aquifer. A total of 14 analytes were detected in samples collected from the surficial aquifer, and a total of six analytes were detected in samples collected from the upper Castle Hayne aquifer. 4,4’-dichlorodiphenyltrichloroethane (DDT) and heptachlor epoxide were the most frequently detected analytes in the surficial aquifer; both analytes were detected in 10 percent of the samples. Heptachlor epoxide was also the most frequently detected analyte in the upper Castle Hayne aquifer; it was detected in 20 percent of the samples.

5.1.1.1 Inorganics

Quarterly Monitoring

The groundwater samples collected during quarterly monitoring events conducted between May 2010 and March 2011 were analyzed for Target Analyte List (TAL) metals. During the first quarterly monitoring event, samples were also analyzed for hexavalent chromium so the ratio of hexavalent chromium to trivalent chromium in background groundwater can be used to estimate the concentrations of these analytes at environmental sites where only total chromium data are available. Data collected in 2002 during the initial Base Background Study were also included in the statistical evaluation and are included in this discussion.

In samples collected from the surficial aquifer, a total of 22 analytes were detected. Sodium was the most frequently detected analyte in the surficial aquifer; it was detected in 99 percent of the samples. A total of 17 analytes were detected in samples collected from monitoring wells screened within the upper Castle Hayne aquifer. Calcium, iron, and manganese were the most frequently detected analytes in the upper Castle Hayne aquifer; all three analytes were detected in every sample.

Trivalent chromium[2] was more frequently detected than hexavalent chromium in the surficial aquifer, but the average concentration of hexavalent chromium was higher. For the upper Castle Hayne aquifer, trivalent chromium was detected in 60 percent of the samples, whereas hexavalent chromium was not detected. The concentrations of analytes known to reduce hexavalent chromium to trivalent chromium generally far outweigh the concentrations of the few analytes known to oxidize trivalent chromium to hexavalent chromium. Furthermore, once reduced, trivalent chromium is very stable in groundwater and unlikely to oxidize to hexavalent chromium. Thus, chromium in groundwater is more likely to be in its trivalent form than its hexavalent form (Fendorf and Zasoski, 1992; Milacic and Stupar, 1995; Weaver and Hochella, 2003). Consequently, the hexavalent chromium data for the surficial aquifer are potentially unreliable; the average concentration of hexavalent chromium appears to be skewed by the concentration from BASE-MW07.

Monthly Monitoring (BASE-MW07 only)

In order to further assess the potential presence of hexavalent chromium in the surficial aquifer, additional groundwater samples were collected from BASE-MW07 in February, March, and April 2012. The samples were analyzed for total chromium, trivalent chromium, and hexavalent chromium. The only reported detection was hexavalent chromium in the sample collected in March 2012. The analytical method for total chromium is more reliable than the analytical method for hexavalent chromium because the hexavalent chromium method is susceptible to interferences that can produce false positives. If the chromium concentration is low, certain substances such as mercury salts, molybdenum salts, and vanadium can react into complexes which absorb the same frequency of light as the hexavalent chromium complex, causing interference (USEPA, 1992). The hexavalent chromium data for BASE-MW07 is potentially unreliable because total chromium was not detected in any samples. Therefore, hexavalent chromium was not included in the statistical evaluation.

5.2 Statistical Evaluation

The statistical evaluation to calculate BTVs for the Expanded Groundwater Background Study involved defining data partitions, consideration of unusually elevated values (for example, outliers), and calculation of summary statistics.

5.2.1 Data Partitioning

The initial step in the statistical evaluation consisted of establishing appropriate data partitions, as these form the populations that are considered in the development of background summary statistics. Data were partitioned by source (surficial aquifer and upper Castle Hayne aquifer) because of the different characteristics between the two aquifers. The data derived by the initial Base Background Study were included in the surficial aquifer group.

[2] Trivalent chromium concentrations were determined by subtracting the concentration of hexavalent chromium from total chromium.

5.2.2 Seasonality

One of the objectives of the Expanded Groundwater Background Study was to assess potential temporal variations in background hydrogeochemistry. Consequently, the Expanded Groundwater Background Study samples were collected at quarterly intervals for a period of 1 year.

An analysis of variance (ANOVA) was completed to evaluate the statistical significance of a potential seasonal effect. **Table 5-2** presents a summary of the ANOVA calculations that evaluated the statistical difference between locations (grouped by aquifer) while also assessing the statistical significance of a potential seasonal effect. Since the uncertainty of an ANOVA increases as the percentage of detections decreases, analytes with at least 50 percent detections were only used for the ANOVA evaluation. The results in **Table 5-2** show that differences in results between locations are greater than the differences in results between seasons. This is also demonstrated by the typically lower calculated probabilities for the location effect relative to the seasonal effect (**Table 5-2**). Although statistical differences may be present in the ANOVA results, it does not always mean that the difference is practical, meaning it is statistically significant or a difference of concern. For the ANOVA results between data grouped by location and data grouped by season, seasonal effects are typically not as significant compared to effects of grouping data by location.

The interpretation of available seasonal results from this study carries some additional uncertainty because the data are from a single annual cycle (that is, a single result per analyte, per monitoring well, per season) so the potential seasonal effect was further evaluated by combining data from all locations within each aquifer for each season. This ANOVA evaluation (**Table 5-3**) utilized more samples per season than the previously discussed ANOVA evaluation that evaluated the potential seasonal effect for each individual location. For this ANOVA, which is based on a single effect (season), a *post hoc* Tukey test was performed to address which seasons were different from one another when the initial ANOVA probability was significant (less than 0.05), since this indicated there are significant differences between at least two of the seasons.

The results of the Tukey test (based on an experiment-wise error rate of 0.05) are reported as Tukey groupings in **Table 5-3**. For each case, the season with the largest mean value is assigned the letter A. If the mean values are not statistically different from one another, they all are assigned the letter A. If a mean value is statistically lower than the one designated as A, then it is designated as a B. If a mean value is not statistically different from either A or B, it is given the designation AB. Thus an area designated as AB lies between two significantly different areas. If a mean value had been statistically lower in another season than those with a B designation, then it would have been assigned the letter C, and there would have been the potential to have BC designations. This evaluation produced only A, B, and AB designations.

This evaluation indicated only a few statistically significant differences between seasons, and those that did occur did not appear to produce a consistent seasonal pattern or trend for multiple analytes. Since there were so few significant effects observed for season (which did not follow a consistent pattern) and since the seasonal effect appears less significant than the location effect, data from the four seasons were combined in this study. The outlier evaluation and calculation of background summary statistics was performed on the combined data set for each aquifer, including the April 2002 data from the initial Base Background Study.

5.2.3 Evaluation of Outliers

Outliers were evaluated with Dixon's and Rosner's outlier tests. Dixon's test was used when the number of samples was less than 25, and Rosner's test was used when the number of samples was 25 or more. The five most elevated results from each partition were evaluated with the respective mathematical outlier test. Both Dixon's and Rosner's tests assume that the data values (aside from those being tested as potential outliers) are normally distributed. Since environmental data, when not symmetrically distributed as with a normal distribution, tend to be right-skewed, a test that relies on an assumption of a normal distribution will tend to have a relatively large number of mathematical outliers.

Background sample locations were carefully selected for this program, avoiding areas that would be impacted by historical waste management practices. In choosing elevated results to exclude from the background data set (prior to calculation of BTVs), mathematical outliers were screened by the percent they exceeded the next highest

concentration. Only cases where the value exceeded the next highest value by 5 times or half an order of magnitude were excluded from the data set. The results to be excluded are listed in **Table 5-4**.

5.2.4 Calculation of Background Threshold Values

A primary goal of the Expanded Groundwater Background Study was to calculate BTVs. This report focuses on a 95/95 upper tolerance limit (UTL), which is an upper bound (with 95 percent confidence) of the background 95th percentile. This common BTV was calculated using the algorithms present in ProUCL Version 4 (USEPA, 2009). Limitations in calculating UTLs include increased uncertainty when there is a low frequency of detection, as sample sets with one or two detected values provide estimates with less certainty than when more detections are available. Other BTVs sometimes used in background studies include two times the mean and the mean plus two standard deviations. These BTVs do not carry the technical reputation of a UTL but are straightforward to calculate. However, when non-detections are present and a proxy value of half the reporting limit is substituted for the non-detect, the results can lead to confusing situations where these reporting limits are greater than detected concentrations. When this occurs, the calculated mean and standard deviation can be dominated by the magnitude of the reporting limits. This is not the case with the UTL calculations since the algorithms within ProUCL focus on the detected values.

As long as at least 60 percent of the results were actual detections, the distributions appearing most appropriate via ProUCL's distributional checks (normal, lognormal, or gamma) were used to calculate the UTL. When not all results were actual detections, the ProUCL algorithms sought to apply maximum-likelihood-estimate (MLE) or regression on order statistics (ROS) techniques to estimate the mean and standard deviation parameters used in the calculation of the UTLs. When a UTL estimate using MLE or ROS techniques was possible within ProUCL's algorithms, that approach was preferred over one using alternate proxy values (such as an analytical reporting limit divided by 2).

Another nonparametric approach provided in ProUCL is the Kaplan-Meier (KM) method, which estimates the UTL for left-censored data sets (those with non-detects). As applied in ProUCL, this approach estimates the mean and standard deviation not based on proxy values, but rather on the statistics of the detected values, the percentage of detected values, and the assortment of reporting limits. The KM method was applied both to cases when fewer than 60 percent of the results were detected and when the percent detections were greater than 60 percent yet no discernable distribution was available.

TABLE 5-1

Expanded Groundwater Background Study Analytical Results

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW01				BASE-MW01UCH					BASE-MW02				
Sample ID	BBG-GW01-10B	BBG-GW01-10C	BBG-GW01-10D	BBG-GW01-11A	BBG-GW01UCH-10B	BBG-GW01UCH-10C	BBG-GW01UCHD-10C	BBG-GW01UCH-10D	BBG-GW01UCH-11A	BBG-GW02-10B	BBG-GW02-10C	BBG-GW02D-10C	BBG-GW02-10D	BBG-GW02-11A
Sample Date	05/25/10	09/14/10	12/06/10	03/07/11	06/02/10	09/14/10	09/14/10	12/06/10	03/07/11	05/27/10	09/14/10	09/14/10	12/07/10	03/08/11
Chemical Name														
PAHs (µg/l)														
2-Methylnaphthalene	0.22 UJ	0.2 U	0.2 U	0.0567 J	0.21 U	0.2 U	0.2 U	0.2 U	0.0474 J	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.138 J	0.21 UJ	0.2 U	0.2 U	0.2 U	0.138 J
Naphthalene	0.22 UJ	0.2 U	0.2 U	0.0346 J	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Pesticides (µg/l)														
4,4'-DDD	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.1 U	0.011 U	0.011 U	0.023 J	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
alpha-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.05 U	0.01 U	0.01 U	0.01 U	0.056 U	0.011 U	0.01 U	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.019 J	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Total Metals (µg/l)														
Aluminum	5,760	435 J	893 J+	62.1 J	615	321 J	343 J	251 J+	338	169 J	125 J	139 J	159 U	117 J
Antimony	10 U	5 U	5 U	5 U	5.6 J	5 U	2.16 J	5.53 U	5 U	10 U	5 U	5 U	7.93 U	5 U
Arsenic	10 U	5 U	5 U	5 U	6.4 J	3.47 J	4.63 J	5.38 J	5 U	10 U	5 U	5 U	5 U	5 U
Barium	24.9 J	100 U	19.5 J	16.4 J	31.3 J	28.1 J	29.3 J	30 J	31.1 J	71.1 J	86.2 J	87.6 J	32.7 J	24.2 J
Beryllium	0.98 J	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	89,300 J	92,000	73,800	60,700	136,000 J	133,000	140,000	143,000	146,000	14,400 J	9,560	9,870	16,300	10,600
Chromium	7 J	5 UJ	5 U	5 U	3.8 J	1.24 J	1.81 J	5 U	5 U	10 U	5 UJ	5 UJ	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	10 U	NA	NA	NA	NA
Chromium III and compounds	7	NA	NA	NA	3.8 J	NA	NA	NA	NA	5 U	NA	NA	NA	NA
Cobalt	5 U	2.5 U	2.97 U	2.5 U	5 U	2.5 U	2.5 U	3.29 U	2.5 U	5 U	2.5 U	2.5 U	3.04 U	2.5 U
Copper	1.1 J	2.5 U	2.5 U	2.5 U	2.1 J	2.5 U	2.5 U	1.17 J	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Iron	2,060	642	407 J	211	1,040	840	894	664 J	804	100 U	63.2 J	51.8 J	120 U	17 J
Lead	3.7	5 U	2.83 J	5 U	3 U	5 U	5 U	5 U	5 U	3 U	5 U	5 U	5 U	5 U
Magnesium	2,570 J	2,500 U	2,500 U	2,500 U	5,000 U	2,500 U	2,500 U	2,500 U	2,500 U	7,300	10,400	10,800	2,500 U	3,270 U
Manganese	15.1	10.7	12.7 J	9.3 J	58.5	57	60.1	54.5 J	45.4	28.2	18	18.5	5.89 U	4.03 J
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	5 U	2.5 U	2.5 U	2.5 U	3.6 J	0.93 J	1.73 J	2.54 U	2.5 U	2.2 J	2.5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	410 J	548 J	300 J	5,000 U	874 J	914 J	1,160 J	1,010 J	5,000 U	1,160 J	1,200 J	1,020 J	650 J
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	0.828 J	2.5 U
Sodium	6,930	6,880	8,050 J	8,530	31,300	12,700	13,600	13,600 J	13,100	17,000	30,600	31,800	15,900 J	10,900
Vanadium	9.3 J	10 U	10 U	10 U	3.2 J	2.62 J	2.18 J	10 U	2 J	20 U	10 U	10 U	10 U	10 U
Zinc	5.9 J	10 U	10 U	10 U	5.4 J	4.43 J	4.53 J	14 J	10 U	16.5 J	10 U	10 U	4.89 J	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

TABLE 5-1

Expanded Groundwater Background Study Analytical Results

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW02UCH						BASE-MW03				BASE-MW03UCH				
Sample ID	BBG-GW02UCH-10B	BBG-GW02UCHD-10B	BBG-GW02UCH-10C	BBG-GW02UCH-10D	BBG-GW02UCH-11A	BBG-GW02UCHD-11A	BBG-GW03-10B	BBG-GW03-10C	BBG-GW03-10D	BBG-GW03-11A	BBG-GW03UCH-10B	BBG-GW03UCH-10C	BBG-GW03UCH-10D	BBG-GW03UCHD-10D	BBG-GW03UCH-11A
Sample Date	06/02/10	06/02/10	09/14/10	12/07/10	03/08/11	03/08/11	05/25/10	09/13/10	12/07/10	03/09/11	05/27/10	09/13/10	12/07/10	12/07/10	03/09/11
Chemical Name															
PAHs (µg/l)															
2-Methylnaphthalene	0.22 U	0.2 U	0.22 U	0.21 U	0.026 J	0.0217 J	0.2 UJ	0.21 U	0.2 U	0.0292 J	0.22 UJ	0.22 U	0.2 U	0.2 U	0.0479 J
Acenaphthylene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.014 J	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.22 U	0.2 U	0.22 U	0.21 U	0.121 J	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Naphthalene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.0302 J
Pesticides (µg/l)															
4,4'-DDD	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.02 J	0.1 J	0.011 U	0.011 U	0.011 U	0.011 U
alpha-BHC	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0033 J	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0026 J	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.053 U	0.054 U	0.011 U	0.01 U	0.01 U	0.01 U	0.05 U	0.011 U	0.01 U	0.01 U	0.051 U	0.01 U	0.01 U	0.016 U	0.01 U
delta-BHC	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0033 J	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0071 J	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.017 J	0.05 U	0.005 U	0.0045 U	0.01 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.008 J
Total Metals (µg/l)															
Aluminum	47.8 J	47.6 J	244 J	411 J+	79.5 J	72.2 J	982	43,200 J	4,140 J+	3,580	92 J	1,540 J	1,050 J+	982 J+	676
Antimony	7.2 J	4.6 J	2.27 J	12.3 U	5 U	5 U	10 U	5 U	5.71 U	5 U	10 U	5 U	5 U	5 U	5 U
Arsenic	10 U	10 U	5 U	5 U	5 U	5 U	10 U	24	5 U	5 U	3.4 J	9.48 J	5 U	8.16 U	2.99 J
Barium	200 U	200 U	16.4 J	15.9 J	100 U	100 U	84.6 J	328	264	284	200 U	21.8 J	100 U	100 U	100 U
Beryllium	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	41,500 J	43,100 J	47,900	49,700	49,200	49,600	5,000 U	8,460	8,600	9,400	32,500 J	31,500	33,000	32,200	33,000
Chromium	1.3 J	0.82 J	5 UJ	5 U	5 U	0.926 J	1.7 J	63.8 J	5 U	5 U	2.3 J	8.05 J	5.06 U	5.65 U	1.5 J
Chromium (hexavalent)	10 U	10 U	NA	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA	NA
Chromium III and compounds	1.3 J	0.82 J	NA	NA	NA	NA	1.7 J	NA	NA	NA	5 U	NA	NA	NA	NA
Cobalt	5 U	5 U	2.5 U	5.15 U	2.5 U	2.5 U	5 U	2.03 J	5.82 U	2.5 U	5 U	2.5 U	4.55 U	6.08 U	2.5 U
Copper	5 U	5 U	2.5 U	2.01 J	2.5 U	2.5 U	5 U	15.2	2.03 J	2.5 U	4.2 J	1.09 J	1.06 J	2.5 U	2.5 U
Iron	573	604	907	571 J	788	799	62.1 J	11,600	121 U	50 U	290	2,370	1,090 J	1,090 J	704
Lead	3 U	3 U	5 U	5 U	5 U	5 U	3 U	28.3	2.81 J	2.89 J	3 U	5 U	1.93 J	5 U	5 U
Magnesium	5,000 U	5,000 U	2,500 U	2,500 U	1,610 J	1,620 J	8,740	26,900	24,100 J	20,200	5,000 U	2,500 U	2,500 U	2,500 U	2,500 U
Manganese	18.2	19.4	20.6	15 J	20.5 J	20.7 J	10 U	28.6	16.8 J	18	17.7	19.1	16 J	16.2 J	13.9
Mercury	0.2 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	0.78 J	5 U	2.5 U	3.3 U	2.5 U	2.5 U	5 U	6.36 J	2.98 U	2.5 U	1.4 J	2.09 J	2.5 U	3.39 U	2.5 U
Potassium	5,000 U	5,000 U	1,280 J	1,650 J	1,090 J	1,080 J	5,000 U	4,100 J	1,590 J	1,410 J	5,000 U	1,380 J	1,560 J	1,500 J	1,210 J
Silver	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	9,250	9,430	10,100	10,500 J	9,950 J	9,980 J	8,320	13,200	13,600 J	14,000	18,300	12,800	12,700 J	12,500 J	11,600
Vanadium	20 U	20 U	1.71 J	10 U	10 U	10 U	20 U	98.8	10 U	10 U	20 U	5.34 J	2.02 J	2.51 J	2.73 J
Zinc	20 U	20 U	10 U	9.46 J	4.34 J	10 U	7.7 J	16.2 J	24.4 J	10 U	5.4 J	7.96 J	5.91 J	7.42 J	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

TABLE 5-1

Expanded Groundwater Background Study Analytical Results

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW04				BASE-MW04UCH				BASE-MW05				BASE-MW05UCH			
Sample ID	BBG-GW04-10B	BBG-GW04-10C	BBG-GW04-10D	BBG-GW04-11A	BBG-GW04UCH-10B	BBG-GW04UCH-10C	BBG-GW04UCH-10D	BBG-GW04UCH-11A	BBG-GW05-10B	BBG-GW05-10C	BBG-GW05-10D	BBG-GW05-11A	BBG-GW05UCH-10B	BBG-GW05UCH-10C	BBG-GW05UCH-10D	BBG-GW05UCH-11A
Sample Date	05/27/10	09/14/10	12/09/10	03/08/11	06/02/10	09/14/10	12/08/10	03/08/11	06/02/10	09/15/10	12/09/10	03/07/11	06/02/10	09/15/10	12/09/10	03/09/11
Chemical Name																
PAHs (µg/l)																
2-Methylnaphthalene	0.2 UJ	0.22 U	0.2 U	0.0243 J	0.21 U	0.22 U	0.2 U	0.0502 J	0.21 U	0.2 U	0.2 U	0.0166 J	0.2 U	0.21 U	0.2 U	0.0817 J
Acenaphthylene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(a)pyrene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.2 UJ	0.22 U	0.2 U	0.138 J	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Naphthalene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.0303 J	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.0533 J
Pesticides (µg/l)																
4,4'-DDD	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.0042 J	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
alpha-BHC	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0037 J	0.0045 U	0.0045 U	0.056 U	0.0047 J	0.0045 U	0.0045 U
alpha-Chlordane	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0064 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.056 U	0.011 U	0.01 U	0.01 U	0.05 U	0.015 J	0.013 U	0.01 U	0.053 U	0.03 J	0.01 U	0.01 U	0.056 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.051 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0074 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.0075 J	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0071 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0047 U	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.07 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.0068 J	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0066 U	0.053 U	0.005 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.015 J
Total Metals (µg/l)																
Aluminum	182 J	279 J	235	440	112 J	53 J	100 U	84.3 J	5,760	5,240 J	1,920 J+	3,370 J	730	83.2 J	100 U	59.1 J
Antimony	10 U	5 U	11.9 U	5 U	5.7 J	5 U	5.97 U	5 U	3.8 J	5 U	5.04 U	5 U	5.2 J	2.57 J	5 U	5 U
Arsenic	4.4 J	3.9 J	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U
Barium	18.8 J	22.2 J	100 U	22.5 J	200 U	100 U	16.7 J	17.9 J	131 J	167 J	67.8 J	77.4 J	31.4 J	23.3 J	23.2 J	29.1 J
Beryllium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Calcium	125,000 J	115,000	101,000	89,600	78,900 J	79,300	81,200	83,100	27,700 J	22,300	37,200	14,900	50,900 J	49,100	48,700	47,500
Chromium	10 U	4.16 J	5 U	2.39 J	1.7 J	5 UJ	5 U	5 U	10 U	1.19 J	5 U	2 J	10 U	0.81 J	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	NA	NA	NA	1.68 J	NA	NA	NA	10 U	NA	NA	NA
Chromium III and compounds	5 U	NA	NA	NA	1.7 J	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Cobalt	5 U	2.5 U	3.81 J	2.5 U	5 U	2.5 U	4.77 U	2.5 U	5 U	2.5 U	5.93 U	2.5 U	5 U	2.5 U	3.7 U	2.5 U
Copper	5 U	2.5 U	2.5 U	2.5 U	1.6 J	2.5 U	2.5 U	2.5 U	5 U	2.5 U	1.08 J	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Iron	1,180	3,300	2,050	1,240	908	1,400	1,180 J	1,110	1,500	2,400	1,580 J	1,330	1,390	1,040	1,030	945
Lead	3 U	5 U	5 U	5 U	3 U	5 U	5 U	5 U	1.6 J	5 U	5 U	5 U	3 U	5 U	5 U	5 U
Magnesium	5,000 U	2,510 J	2,500 U	2,500 U	5,000 U	2,500 U	2,500 U	2,500 U	6,580	8,480	6,090 J	3,840 J	5,000 U	2,610 J	2,580 U	2,500 U
Manganese	26.4	49.7	41	35.9	11.7	17.2	16.5 J	16.2	22.1	33	75.8 J	18.2 J	65.8	89.3	92.6 J	87.3
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U
Nickel	9.3	18.8	22.3	21.7	0.72 J	2.5 U	2.5 U	2.5 U	5 U	2.3 J	2.94 U	1.79 J	5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	621 J	605 J	432 J	5,000 U	542 J	2,500 U	1,020 J	5,000 U	4,110 J	6,810	4,010 J	5,220	1,800 J	2,500 U	1,850 J
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	0.913 J
Sodium	3,500 J	4,440 J	5,680	4,400 U	5,000 U	3,780 J	3,800 U	3,770 U	10,400	13,200	10,900 J	7,870 J	17,800	27,700	22,300 J	19,300
Vanadium	3.4 J	1.76 J	2.2 J	2.88 J	20 U	10 U	10 U	10 U	1.7 J	2.56 J	1.8 J	2.19 J	2.5 J	10 U	10 U	10 U
Zinc	4.5 J	5.82 J	14.4 J	10 U	20 U	10 U	10 U	10 U	31.4	44.6	20.4 J	38.2	4.4 J	10 U	10 U	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

TABLE 5-1
Expanded Groundwater Background Study Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW06					BASE-MW07									
Sample ID	BBG-GW06-10B	BBG-GW06-10C	BBG-GW06-10C-2	BBG-GW06-10D	BBG-GW06-11A	BBG-GW07-10B	BBG-GW07-10C	BBG-GW07-10D	BBG-GW07-11A	BBG-GW07-12A	BBG-GW07D-12A	BBG-GW07-12A-2	BBG-GW07D-12A-2	BBG-GW07-12B	BBG-GW07D-12B
Sample Date	06/02/10	09/17/10	11/01/10	12/06/10	03/07/11	05/27/10	09/13/10	12/08/10	03/08/11	02/09/12	02/09/12	03/15/12	03/15/12	04/11/12	04/11/12
Chemical Name															
PAHs (µg/l)															
2-Methylnaphthalene	0.2 U	0.2 U	NA	0.2 U	0.0193 J	0.2 UJ	0.2 U	0.2 U	0.0314 J	NA	NA	NA	NA	NA	NA
Acenaphthylene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Naphthalene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Pesticides (µg/l)															
4,4'-DDD	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
4,4'-DDE	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.1 U	NA	0.011 U	0.0055 J	0.011 U	0.1 U	0.0098 J	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
alpha-BHC	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
alpha-Chlordane	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
beta-BHC	0.05 U	NA	0.01 U	0.01 U	0.01 U	0.05 U	0.011 U	0.01 U	0.01 U	NA	NA	NA	NA	NA	NA
delta-BHC	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Dieldrin	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Endosulfan I	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Endosulfan II	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
gamma-Chlordane	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Heptachlor	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.044	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)															
Aluminum	1,150	682 J	NA	1,050 J+	556 J	330	453 J	795 J+	154 J	NA	NA	NA	NA	NA	NA
Antimony	3 J	6.09 J	NA	5.68 U	5 U	10 U	5 U	5.86 U	5 U	NA	NA	NA	NA	NA	NA
Arsenic	10 U	5 U	NA	5 U	5 U	10 U	5 U	5 U	5 U	NA	NA	NA	NA	NA	NA
Barium	22.3 J	24.6 J	NA	21.5 J	19.5 J	29.7 J	29 J	24.7 J	22.2 J	NA	NA	NA	NA	NA	NA
Beryllium	5 U	2.5 U	NA	2.5 U	2.5 U	0.81 J	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Calcium	5,000 U	1,280 J	NA	855 J	739 J	5,000 U	1,690 J	1,470 J	1,390 J	NA	NA	NA	NA	NA	NA
Chromium	10 U	1.17 J	NA	5 U	5 U	10 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	NA	10.6	NA	NA	NA	7.4 U	7.4 U	8.79 J	5.2 J	7.4 U	7.4 U
Chromium III and compounds	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U
Cobalt	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.85 U	2.5 U	NA	NA	NA	NA	NA	NA
Copper	5 U	2.5 U	NA	1.36 J	2.5 U	2.4 J	2.39 J	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Iron	112	64.4 J	NA	161 U	46.6 J	480	883	823 J	427	NA	NA	NA	NA	NA	NA
Lead	1.8 J	5 U	NA	1.63 J	5 U	3 U	5 U	2.41 J	5 U	NA	NA	NA	NA	NA	NA
Magnesium	5,000 U	2,500 U	NA	2,500 U	683 J	5,000 U	2,500 U	2,500 U	1,320 J	NA	NA	NA	NA	NA	NA
Manganese	13.9	7.44 J	NA	6.8 U	5.71 J	21	18.2	15.8 J	13.3 J	NA	NA	NA	NA	NA	NA
Mercury	0.2 U	0.18 U	NA	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	NA	NA	NA	NA	NA	NA
Nickel	1.3 J	2.5 U	NA	2.5 U	2.5 U	5 U	2.45 J	2.85 U	1.68 J	NA	NA	NA	NA	NA	NA
Potassium	5,000 U	481 J	NA	477 J	247 J	5,000 U	810 J	786 J	501 J	NA	NA	NA	NA	NA	NA
Silver	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Sodium	7,690	11,000	NA	8,440 J	6,290 J	8,240	8,950	10,100 J	9,310 J	NA	NA	NA	NA	NA	NA
Vanadium	20 U	10 U	NA	10 U	10 U	20 U	10 U	10 U	10 U	NA	NA	NA	NA	NA	NA
Zinc	20 U	10 U	NA	6.01 J	10 U	15 J	9.82 J	9.54 J	6.67 J	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

TABLE 5-1
Expanded Groundwater Background Study Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW08				BASE-MW09					BASE-MW10						
Sample ID	BBG-GW08-10B	BBG-GW08-10C	BBG-GW08-10D	BBG-GW08-11A	BBG-GW09-10B	BBG-GW09D-10B	BBG-GW09-10C	BBG-GW09-10D	BBG-GW09-11A	BBG-GW10-10B	BBG-GW10-10C	BBG-GW10-10C-2	BBG-GW10-10D	BBG-GW10D-10D	BBG-GW10-11A	BBG-GW10D-11A
Sample Date	05/26/10	09/15/10	12/08/10	03/08/11	05/26/10	05/26/10	09/14/10	12/09/10	03/09/11	05/24/10	09/17/10	11/01/10	12/06/10	12/06/10	03/07/11	03/07/11
Chemical Name																
PAHs (µg/l)																
2-Methylnaphthalene	0.21 UJ	0.2 U	0.2 U	0.0158 J	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.0236 J	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.0467 J
Acenaphthylene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Naphthalene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.0316 J
Pesticides (µg/l)																
4,4'-DDD	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.0068 J	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
alpha-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.05 U	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U	0.012 J	0.011 J	0.01 U	0.05 U	NA	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0051 J	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.1 U	0.011 U	0.011 U	0.011 U	0.0028 J	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0022 J	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.05 U	0.0045 U	0.0045 U	0.033	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Total Metals (µg/l)																
Aluminum	285	96.6 J	680 J+	424 J	31,500	5,110	1,620 J	454	358	908	665 J	NA	705 J+	565 J+	511 J	432 J
Antimony	10 U	5 U	9.2 U	5 U	10 U	10 U	5 U	11.7 U	5 U	10 U	5 U	NA	5.12 U	5 U	5 U	5 U
Arsenic	10 U	5 U	5 U	5 U	5.5 J	10 U	5 U	5 U	5 U	10 U	5 U	NA	5 U	2.82 J	5 U	5 U
Barium	200 U	100 U	100 U	100 U	1,210	205	90.7 J	40.7 J	33.5 J	21.3 J	18.4 J	NA	21.2 J	21.3 J	17.6 J	17.7 J
Beryllium	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	82,300 J	75,500	44,000	26,200	10,300 J	9,390 J	1,450 J	4,480 J	5,190	5,860 J	850 J	NA	1,050 J	1,040 J	1,090 J	1,110 J
Chromium	10 U	1.62 J	9.32 U	4.08 J	44	10 U	2.16 J	5 U	5 U	1.3 J	1.37 J	NA	5 U	5 U	1.44 J	1.07 J
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA
Chromium III and compounds	5 U	NA	NA	NA	44	5 U	NA	NA	NA	1.3 J	NA	NA	NA	NA	NA	NA
Cobalt	5 U	2.5 U	4.49 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	5.11 U	4.25 U	2.5 U	2.5 U
Copper	2.1 J	2.5 U	1.29 J	2.5 U	16.4	5 U	1.1 J	2.5 U	2.5 U	3.7 J	2.5 U	NA	1.43 J	2.5 U	2.5 U	2.5 U
Iron	738	245 J	1,140 J	598	3,230	557	164 J	92.9 U	28.6 J	318	149 J	NA	172 U	130 U	101 J	76.1 J
Lead	3 U	5 U	5 U	5 U	13.9	3.2	5 U	5 U	5 U	2.6 J	5 U	NA	5 U	5 U	5 U	5 U
Magnesium	2,520 J	2,500 U	2,500 U	1,540 J	5,000 U	5,000 U	2,500 U	2,500 U	2,500 U	2,850 J	2,500 U	NA	2,500 U	2,500 U	2,410 J	2,440 J
Manganese	12.6	8.18 J	13.1 J	6.54 J	12.1	10 U	5 U	5 U	2.35 J	30.3	5 U	NA	5.13 U	5 U	6.54 J	6.2 J
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.909	NA	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	2 J	1.91 J	3.45 U	1.32 J	7.3	5 U	2.5 U	2.5 U	2.5 U	3.8 J	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	587 J	2,500 U	482 J	5,000 U	5,000 U	518 J	616 J	370 J	5,000 U	509 J	NA	750 J	759 J	541 J	549 J
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	6,310	6,760	6,420 J	6,240 J	3,280 J	4,460 J	6,560	7,290	5,540	12,000	12,500	NA	11,400 J	11,900 J	11,200 J	11,400 J
Vanadium	3.8 J	2.45 J	5.41 J	2.3 J	27.6	5.4 J	2.19 J	10 U	10 U	20 U	10 U	NA	10 U	10 U	10 U	10 U
Zinc	7.8 J	10 U	5.4 J	10 U	22.3	5.2 J	10 U	10 U	10 U	6.3 J	10 U	NA	10 U	7.85 J	4.63 J	4.99 J

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

TABLE 5-2

ANOVA Evaluation for Monitoring Well and Season

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Constituent	Calculated Probability for Monitoring Well	Statistical Decision for Monitoring Well with 0.05 Signficance Level	Calculated Probability for Seasons	Statistical Decision for Season with 0.05 Signficance Level	Percent Detects
Surficial Aquifer					
Aluminum	2.4E-05	Difference	0.125		95
Barium	1.2E-07	Difference	0.028	Difference	78
Calcium	1.1E-14	Difference	0.025	Difference	95
Iron	1.4E-04	Difference	0.047	Difference	88
Manganese	2.4E-04	Difference	0.139		88
Potassium	6.4E-05	Difference	0.000	Difference	72
Sodium	3.2E-10	Difference	0.021	Difference	93
Zinc	7.0E-03	Difference	0.024	Difference	55
Upper Castle Hayne Aquifer					
Aluminum	1.1E-01		0.978		95
Barium	6.8E-01		0.055		78
Calcium	8.0E-07	Difference	0.489		95
Iron	7.4E-02		0.401		88
Manganese	3.8E-05	Difference	0.362		88
Potassium	3.3E-02	Difference	0.000	Difference	72
Sodium	7.0E-06	Difference	0.329		93
Zinc	5.2E-01		0.146		55

TABLE 5-3

ANOVA Evaluation for Season with post-hoc Tukey Groupings

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Parameter	Calculated Probability for Seasons	Statistical Decision for Season with 0.05 Significance Level	May - Jun 2010	Sep - Nov 2010	Dec 2010	Mar 2011
Surficial Aquifer						
Aluminum	0.499		A	A	A	A
Barium	0.456		A	A	A	A
Calcium	0.848		A	A	A	A
Iron	0.276		A	A	A	A
Manganese	0.436		A	A	A	A
Potassium	0.001	Difference	A	B	AB	B
Sodium	0.614		A	A	A	A
Zinc	0.092		A	A	A	A
Upper Castle Hayne Aquifer						
Aluminum	0.986		A	A	A	A
Barium	0.033	Difference	A	AB	B	AB
Calcium	0.970		A	A	A	A
Iron	0.548		A	A	A	A
Manganese	0.887		A	A	A	A
Potassium	0.002	Difference	A	B	B	B
Sodium	0.914		A	A	A	A

TABLE 5-4

Mathematical Outliers via Dixon's/Rosner's Tests

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Sample ID	Location	Parameter	Result	Number of Detects	Number of Samples	Percent Difference Between Outlier and Next Lowest Value
Surficial Aquifer						
BBG-GW01-10B	BASE-MW01	Aluminum	5760	54	73	10%
BBG-GW03-10C	BASE-MW03	Aluminum	43200 J	54	73	37%
BBG-GW05-10B	BASE-MW05	Aluminum	5760	54	73	0%
BBG-GW05-10C	BASE-MW05	Aluminum	5240 J	54	73	27%
BBG-GW09-10B	BASE-MW09	Aluminum	31500	54	73	447%
BBG-GW03-10C	BASE-MW03	Barium	328	62	73	15%
BBG-GW03-11A	BASE-MW03	Barium	284	62	73	8%
BBG-GW03-10D	BASE-MW03	Barium	264	62	73	58%
BBG-GW05-10C	BASE-MW05	Barium	167 J	62	73	17%
BBG-GW09-10B	BASE-MW09	Barium	1210	62	73	269%
BBG-GW01-10B	BASE-MW01	Chromium	7 J	23	73	40%
BBG-GW03-10C	BASE-MW03	Chromium	63.8 J	23	73	45%
BBG-GW09-10B	BASE-MW09	Chromium	44	23	73	529%
BASE-GW12STW-02B	BASE-STW12	Cobalt	5.5	13	73	17%
BBG-GW03-10C	BASE-MW03	Copper	15.2	14	73	198%
BBG-GW09-10B	BASE-MW09	Copper	16.4	14	73	8%
BASE-GW18STW-02B	BASE-STW18	Copper	5.1 J	14	73	38%
BBG-GW03-10C	BASE-MW03	Iron	11600	62	73	43%
BASE-GW18ITW-02B	BASE-ITW18	Iron	24500 J	62	73	111%
BASE-GW18STW-02B	BASE-STW18	Iron	32700 J	62	73	33%
BASE-GW20ITW-02B	BASE-ITW20	Iron	8110 J	62	73	6%
BASE-GW22STW-02B	BASE-STW22	Iron	7620	62	73	42%
BBG-GW03-10C	BASE-MW03	Lead	28.3	19	73	104%
BBG-GW09-10B	BASE-MW09	Lead	13.9	19	73	276%
BBG-GW02D-10C	BASE-MW02	Magnesium	10800	51	73	24%
BBG-GW03-10C	BASE-MW03	Magnesium	26900	51	73	12%
BBG-GW03-10D	BASE-MW03	Magnesium	24100 J	51	73	19%
BBG-GW03-11A	BASE-MW03	Magnesium	20200	51	73	76%
BASE-GW22STW-02B	BASE-STW22	Magnesium	11500	51	73	6%
BASE-GW06STW-02B	BASE-STW06	Manganese	254	66	73	22%
BASE-GW12STW-02B	BASE-STW12	Manganese	209	66	73	24%
BASE-GW22STW-02B	BASE-STW22	Manganese	359	66	73	41%
BBG-GW04-10D	BASE-MW04	Nickel	22.3	30	73	3%
BBG-GW04-11A	BASE-MW04	Nickel	21.7	30	73	15%
BBG-GW04-10C	BASE-MW04	Nickel	18.8	30	73	76%
BASE-GW18ITW-02B	BASE-ITW18	Nickel	10.7 J	30	73	15%
BBG-GW05-10D	BASE-MW05	Potassium	6810	57	73	54%
BBG-GW02D-10C	BASE-MW02	Sodium	31800	72	73	38%
BBG-GW03-10C	BASE-MW03	Vanadium	98.8	26	73	258%
BBG-GW09-10B	BASE-MW09	Vanadium	27.6	26	73	176%
BBG-GW05-10C	BASE-MW05	Zinc	44.6	37	73	17%
BBG-GW05-11A	BASE-MW05	Zinc	38.2	37	73	22%
BASE-GW15STW-02B	BASE-STW15	Zinc	70.3	37	73	58%
BASE-GW18ITW-02B	BASE-ITW18	Zinc	94 J	37	73	34%
Upper Castle Hayne Aquifer						
BBG-GW03UCH-10C	BASE-MW03UCH	Aluminum	1540 J	18	20	47%
BBG-GW02UCH-10B	BASE-MW02UCH	Antimony	7.2 J	7	20	17%
BBG-GW02UCH-10D	BASE-MW02UCH	Antimony	6.15 U	7	20	8%
BBG-GW04UCH-10B	BASE-MW04UCH	Antimony	5.7 J	7	20	2%
BBG-GW01UCH-10B	BASE-MW01UCH	Antimony	5.6 J	7	20	8%
BBG-GW05UCH-10B	BASE-MW05UCH	Antimony	5.2 J	7	20	4%
BBG-GW03UCH-10C	BASE-MW03UCH	Arsenic	9.48 J	6	20	48%
BBG-GW04UCH-10B	BASE-MW04UCH	Barium	100 U	13	20	0%
BBG-GW03UCH-10B	BASE-MW03UCH	Barium	100 U	13	20	0%
BBG-GW02UCH-10B	BASE-MW02UCH	Barium	100 U	13	20	100%

TABLE 5-4

Mathematical Outliers via Dixon's/Rosner's Tests

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Sample ID	Location	Parameter	Result	Number of Detects	Number of Samples	Percent Difference Between Outlier and Next Lowest Value
BBG-GW01UCH-11A	BASE-MW01UCH	Calcium	146000	20	20	2%
BBG-GW01UCH-10D	BASE-MW01UCH	Calcium	143000	20	20	2%
BBG-GW01UCHD-10C	BASE-MW01UCH	Calcium	140000	20	20	3%
BBG-GW01UCH-10B	BASE-MW01UCH	Calcium	136000 J	20	20	64%
BBG-GW03UCH-10C	BASE-MW03UCH	Chromium	8.05 J	9	20	61%
BBG-GW05UCH-10B	BASE-MW05UCH	Chromium	5 U	9	20	32%
BBG-GW01UCH-10B	BASE-MW01UCH	Chromium	3.8 J	9	20	50%
BBG-GW03UCH-10B	BASE-MW03UCH	Copper	4.2 J	7	20	68%
BBG-GW05UCH-10B	BASE-MW05UCH	Copper	2.5 U	7	20	0%
BBG-GW02UCH-10B	BASE-MW02UCH	Copper	2.5 U	7	20	19%
BBG-GW01UCH-10B	BASE-MW01UCH	Copper	2.1 J	7	20	4%
BBG-GW02UCH-10D	BASE-MW02UCH	Copper	2.01 J	7	20	26%
BBG-GW03UCH-10C	BASE-MW03UCH	Iron	2370	20	20	69%
BBG-GW01UCH-10B	BASE-MW01UCH	Nickel	3.6 J	6	20	44%
BBG-GW05UCH-10B	BASE-MW05UCH	Nickel	2.5 U	6	20	20%
BBG-GW03UCH-10C	BASE-MW03UCH	Nickel	2.09 J	6	20	21%
BBG-GW01UCHD-10C	BASE-MW01UCH	Nickel	1.73 J	6	20	5%
BBG-GW02UCH-10D	BASE-MW02UCH	Nickel	1.65 U	6	20	18%
BBG-GW05UCH-10B	BASE-MW05UCH	Potassium	5220	14	20	109%
BBG-GW04UCH-10B	BASE-MW04UCH	Vanadium	10 U	8	20	0%
BBG-GW03UCH-10B	BASE-MW03UCH	Vanadium	10 U	8	20	0%
BBG-GW02UCH-10B	BASE-MW02UCH	Vanadium	10 U	8	20	87%
BBG-GW01UCH-10D	BASE-MW01UCH	Zinc	14 J	9	20	40%
BBG-GW04UCH-10B	BASE-MW04UCH	Zinc	10 U	9	20	0%
BBG-GW02UCH-10B	BASE-MW02UCH	Zinc	10 U	9	20	6%
BBG-GW02UCH-10D	BASE-MW02UCH	Zinc	9.46 J	9	20	19%
BBG-GW03UCH-10C	BASE-MW03UCH	Zinc	7.96 J	9	20	7%

Notes:

Shading indicates the value is an outlier

J - Analyte detected, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

All concentrations are in micrograms per liter

SECTION 6

Use of Background Data

The primary purpose of the Expanded Groundwater Background Study was to provide BTVs for use in site-specific environmental investigations and human health and ecological risk assessments at MCIEAST-MCB CAMLEJ.

The UTLs calculated for the surficial and upper Castle Hayne aquifer at MCIEAST-MCB CAMLEJ may be used as BTVs to support risk assessment activities. Additional statistical values have also been calculated to facilitate future site characterization efforts (such as minimum and maximum values and percent detections). **Tables 6-1** and **6-2** present summaries of the statistical data for samples from the surficial aquifer and upper Castle Hayne aquifer, respectively. The anticipated uses of the BTVs are described further as follows.

6.1 Site Screening

For site data collected as part of an investigation, the BTVs can be used to assess if a detected target analyte is related to site impacts or background conditions. This will be done by comparing the individual site results to the BTV in order to assess whether site results appear as part of a similar parent population as the background data. Site results will be compared to the aquifer-specific BTVs (surficial and upper Castle Hayne) that are appropriate for the site (**Tables 6-1** and **6-2**).

6.2 Risk Assessment

During human health risk screenings and assessments, the BTVs will be used, along with risk-based screening criteria, to identify the chemicals of potential concern (COPCs). When a risk assessment will be conducted, these COPCs will be the focus of the risk assessment calculations. For ecological risk screenings and assessments, the BTVs will be used after all detected analytes have been compared to their respective ecological screening values.

Selection of the appropriate BTVs for use at a given site will be done using the same process described in Section 6.1. If a target analyte is detected at a concentration below the relevant BTV and there is no evidence of historical use of that particular analyte, it may be removed from further consideration as a COPC.

USEPA no longer has a RSL for total chromium; therefore, the ratio of the BTVs for trivalent and hexavalent chromium will be used to estimate the concentration of these chemicals for sites if total chromium data are only available. The estimated site-related trivalent and hexavalent chromium concentrations will be compared to the RSLs to determine if either or both are COPCs. BTVs are currently only available for trivalent and hexavalent chromium in the upper Castle Hayne aquifer; the BTVs for the surficial aquifer are being reevaluated so they will be provided in the final report or an addendum.

6.3 Cleanup Action Levels

Cleanup action levels for sites undergoing remediation are selected for each chemical of concern. In the event that the BTV is greater than the regulatory or risk-based standard, the cleanup level will be set to the BTV (Navy, 2004).

TABLE 6-1
Statistical Summary of Surficial Aquifer Data
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Chemical Name	Number of Detects	Number of Analyses	Percent Detects	Minimum Detected Value	Maximum Detected Value	Minimum RL for Non-detects	Maximum RL for Non-detects	Location of Maximum Detected Concentration	Mean Value (1/2 RL for NDs)	Standard Deviation (1/2 RL for NDs)	BTV	Basis
Polycyclic Aromatic Hydrocarbons (µg/L)												
2-Methylnaphthalene	9	40	23	0.0158 J	0.0567 J	0.2	0.22	BASE-MW01	0.0855	0.0314	0.0572	Kaplan Meier UTL
Acenaphthylene	1	40	3	0.014 J	0.014 J	0.2	0.22	BASE-MW03	0.0992	0.0141	NA	Only a Single Detect
Benzo(b)fluoranthene	2	40	5	0.138 J	0.138 J	0.2	0.22	BASE-MW02, BASE-MW04	0.103	0.0086	NA	Only a Single Unique Detect
Naphthalene	2	40	5	0.0316 J	0.0346 J	0.2	0.22	BASE-MW01	0.098	0.0154	0.0363	Kaplan Meier UTL
Pesticides (µg/L)												
4,4'-DDD	1	40	3	0.0068 J	0.0068 J	0.011	0.11	BASE-MW10	0.017	0.0199	NA	Only a Single Detect
4,4'-DDE	1	40	3	0.0042 J	0.0042 J	0.011	0.11	BASE-MW05	0.0169	0.02	NA	Only a Single Detect
4,4'-DDT	4	40	10	0.0055 J	0.023 J	0.011	0.11	BASE-MW01	0.0178	0.0197	0.0171	Kaplan Meier UTL
alpha-BHC	1	40	3	0.0037 J	0.0037 J	0.0045	0.056	BASE-MW05	0.00811	0.0102	NA	Only a Single Detect
alpha-Chlordane	1	40	3	0.0064 J	0.0064 J	0.0045	0.056	BASE-MW05	0.00817	0.0101	NA	Only a Single Detect
beta-BHC	3	40	8	0.011 J	0.03 J	0.01	0.056	BASE-MW05	0.0111	0.00935	0.0189	Kaplan Meier UTL
delta-BHC	2	40	5	0.0051 J	0.051 J	0.0045	0.056	BASE-MW05	0.00936	0.0121	0.0219	Kaplan Meier UTL
Dieldrin	1	40	3	0.0028 J	0.0028 J	0.011	0.11	BASE-MW09	0.0158	0.0193	NA	Only a Single Detect
Endosulfan I	1	40	3	0.0074 J	0.0074 J	0.0045	0.056	BASE-MW05	0.0082	0.0101	NA	Only a Single Detect
Endosulfan II	1	40	3	0.0075 J	0.0075 J	0.011	0.11	BASE-MW04	0.0158	0.019	NA	Only a Single Detect
gamma-BHC (Lindane)	1	40	3	0.0071 J	0.0071 J	0.0045	0.056	BASE-MW05	0.00819	0.0101	NA	Only a Single Detect
gamma-Chlordane	2	40	5	0.0022 J	0.0071 J	0.0045	0.056	BASE-MW03	0.00819	0.0101	0.00423	Kaplan Meier UTL
Heptachlor	1	40	3	0.07 J	0.07 J	0.0045	0.056	BASE-MW05	0.00976	0.0141	NA	Only a Single Detect
Heptachlor epoxide	4	40	10	0.005 J	0.044	0.0045	0.053	BASE-MW07	0.00949	0.0117	0.0249	Kaplan Meier UTL
Total Metals (µg/L)												
Aluminum	54	73	74	62.1 J	43200 J	19.6	224	BASE-MW03	1830	6210	14000	Kaplan Meier UTL
Antimony	3	73	4	3 J	6.09 J	2.2	11.9	BASE-MW06	2.57	1.34	3.91	Kaplan Meier UTL
Arsenic	7	73	10	2.82 J	24	2	10	BASE-MW03	2.85	3.53	9.79	Kaplan Meier UTL
Barium	62	73	85	4.2 J	1210	22.8	200	BASE-MW09	68.4	148	359	Kaplan Meier UTL
Beryllium	2	73	3	0.81 J	0.98 J	0.2	5	BASE-MW01	0.886	0.773	0.874	Kaplan Meier UTL
Calcium	70	73	96	501 J	125000 J	5000	5000	BASE-MW04	32500	38200	179000	Gamma UTL
Chromium	22	72	31	0.85 J	63.8 J	0.5	10	BASE-MW03	2.71	7.47	16.9	Kaplan Meier UTL
Chromium (hexavalent)	1	9	11	1.68 J	1.68 J	10	10	BASE-MW05	5.23	2.16	NA	Only a Single Detect
Chromium III and compounds	3	9	33	1.3 J	7	5	5	BASE-MW01	2.78	1.64	7.38	Kaplan Meier UTL
Cobalt	13	73	18	1.1 J	5.5	0.7	5.93	BASE-STW12	1.53	1.13	3.38	Kaplan Meier UTL
Copper	14	73	19	1.08 J	16.4	1	5	BASE-MW09	1.75	2.52	6.59	Kaplan Meier UTL
Iron	62	73	85	17 J	32700 J	33	161	BASE-STW18	2020	4950	16100	Lognormal UTL
Lead	19	73	26	1.1 J	28.3	1.1	5	BASE-MW03	2.23	3.52	8.92	Kaplan Meier UTL
Magnesium	51	73	70	683 J	26900	2500	5000	BASE-MW03	3700	4830	13500	Lognormal UTL
Manganese	66	73	90	2.35 J	359	5	10	BASE-STW22	48.4	65.1	176	Kaplan Meier UTL
Mercury	1	73	1	0.909	0.909	0.1	0.2	BASE-MW10	0.0845	0.1	NA	Only a Single Detect
Nickel	30	73	41	1.3 J	22.3	0.9	5	BASE-MW04	3.08	4.43	11.8	Kaplan Meier UTL
Potassium	57	73	78	247 J	6810	353	5000	BASE-MW05	1550	1240	5590	Gamma UTL
Silver	6	73	8	0.52 J	0.828 J	0.5	5	BASE-MW02	1.01	0.731	0.724	Kaplan Meier UTL
Sodium	72	73	99	3370	31800	4400	4400	BASE-MW02	9740	5420	22700	Lognormal UTL
Vanadium	26	73	36	0.44 J	98.8	0.4	20	BASE-MW03	4.78	11.8	26.7	Kaplan Meier UTL
Zinc	37	73	51	2.1 J	94 J	1.6	20	BASE-ITW18	11.1	15.3	41.2	Kaplan Meier UTL

Notes:
BTV - Background threshold value
J - Analyte detected, value may or may not be accurate or precise
NA - Not applicable
ND - Non-detect
RL - Reporting Limit
UTL - Upper tolerance limit

TABLE 6-2

Statistical Summary of Upper Castle Hayne Aquifer Data

Expanded Groundwater Background Study Report

MCIEAST - MCB CAMLEJ, North Carolina

Chemical Name	Number of Detects	Number of Analyses	Percent Detects	Minimum Detected Value	Maximum Detected Value	Minimum RL for Non-detects	Maximum RL for Non-detects	Location of Maximum Detected Concentration	Mean Value (1/2 RL for NDs)	Standard Deviation (1/2 RL for NDs)	BTV	Basis
Polycyclic Aromatic Hydrocarbons (µg/L)												
2-Methylnaphthalene	5	20	25	0.026 J	0.0817 J	0.2	0.22	BASE-MW05UCH	0.0907	0.0257	0.0934	Kaplan Meier UTL
Benzo(a)pyrene	1	20	5	0.121 J	0.121 J	0.2	0.22	BASE-MW02UCH	0.104	0.00568	NA	Only a Single Detect
Benzo(b)fluoranthene	1	20	5	0.138 J	0.138 J	0.2	0.22	BASE-MW01UCH	0.105	0.00878	NA	Only a Single Detect
Naphthalene	3	20	15	0.0302 J	0.0533 J	0.2	0.22	BASE-MW05UCH	0.0937	0.0247	0.064	Kaplan Meier UTL
Pesticides (µg/L)												
4,4'-DDT	1	20	5	0.1 J	0.1 J	0.011	0.11	BASE-MW03UCH	0.0199	0.0272	NA	Only a Single Detect
alpha-BHC	2	20	10	0.0033 J	0.0047 J	0.0045	0.056	BASE-MW05UCH	0.00854	0.0107	0.0043	Kaplan Meier UTL
alpha-Chlordane	1	20	5	0.0026 J	0.0026 J	0.0045	0.056	BASE-MW03UCH	0.00838	0.0108	NA	Only a Single Detect
beta-BHC	1	20	5	0.015 J	0.015 J	0.01	0.056	BASE-MW04UCH	0.011	0.00952	NA	Only a Single Detect
delta-BHC	1	20	5	0.0033 J	0.0033 J	0.0045	0.056	BASE-MW03UCH	0.00842	0.0108	NA	Only a Single Detect
Heptachlor epoxide	4	20	20	0.008 J	0.019 J	0.0045	0.056	BASE-MW01UCH	0.0109	0.0107	0.0186	Kaplan Meier UTL
Total Metals (µg/L)												
Aluminum	18	20	90	47.8 J	1540 J	100	100	BASE-MW03UCH	345	400	2520	Gamma UTL
Antimony	7	20	35	2.16 J	7.2 J	5	12.3	BASE-MW02UCH	3.51	1.61	6.93	Kaplan Meier UTL
Arsenic	6	20	30	2.99 J	9.48 J	5	10	BASE-MW03UCH	3.74	1.86	8.16	Kaplan Meier UTL
Barium	13	20	65	15.9 J	31.4 J	100	200	BASE-MW05UCH	40.9	27.9	38.8	Kaplan Meier UTL
Calcium	20	20	100	31500	146000	NA	NA	BASE-MW01UCH	70200	39900	146000	Nonparametric UTL
Chromium	9	20	45	0.81 J	8.05 J	5	10	BASE-MW03UCH	2.61	1.58	6.05	Kaplan Meier UTL
Chromium III and compounds	3	5	60	1.3 J	3.8 J	5	5	BASE-MW01UCH	2.36	0.958	6.39	Normal UTL
Copper	7	20	35	1.06 J	4.2 J	2.5	5	BASE-MW03UCH	1.6	0.757	3.44	Kaplan Meier UTL
Iron	20	20	100	290	2370	NA	NA	BASE-MW03UCH	987	423	2250	Gamma UTL
Lead	1	20	5	1.93 J	1.93 J	3	5	BASE-MW03UCH	2.22	0.446	NA	Only a Single Detect
Magnesium	2	20	10	1620 J	2610 J	2500	5000	BASE-MW05UCH	1650	589	2280	Kaplan Meier UTL
Manganese	20	20	100	11.7	92.6 J	NA	NA	BASE-MW05UCH	37.9	28.5	92.6	Nonparametric UTL
Nickel	6	20	30	0.72 J	3.6 J	2.5	5	BASE-MW01UCH	1.47	0.637	3.19	Kaplan Meier UTL
Potassium	14	20	70	542 J	5220	2500	5000	BASE-MW05UCH	1710	1010	3750	Gamma UTL
Silver	1	20	5	0.913 J	0.913 J	2.5	5	BASE-MW05UCH	1.55	0.57	NA	Only a Single Detect
Sodium	17	20	85	3780 J	31300	3770	5000	BASE-MW01UCH	13200	7980	33300	Normal UTL
Vanadium	8	20	40	1.71 J	5.34 J	10	20	BASE-MW03UCH	4.88	2.53	5.32	Kaplan Meier UTL
Zinc	9	20	45	4.34 J	14 J	10	20	BASE-MW01UCH	6.4	2.59	12.6	Kaplan Meier UTL

Notes:

BTV - Background threshold value

J - Analyte detected, value may or may not be accurate or precise

NA - Not applicable

ND - Non-detect

RL - Reporting Limit

UTL - Upper tolerance limit

SECTION 7

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Appendix A
Boring Logs and Monitoring Well Completion Diagrams

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW01 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3839864.1 N 286847.5 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/11/10 08:00 END : 5/12/10 09:50 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL**.		Grout - 7:1 Portland cement mix
		5.0	HA-1			**SILTY SAND (SM)** dark gray, moist to wet, very loose to loose, some silt.		Bentonite pellets 0.5 bag
5	5.0					**POORLY GRADED SAND (SP)** light gray, wet to saturated, loose, trace clay, iron oxide staining, laminated clay bedding.		
		4.6	DP-1					#2 Sand 4.5 bags 10ft 0.010 in screen
10	10.0							
		4.5	DP-2					
15	15.0					**POORLY GRADED SAND (SP)** light gray, saturated, loose, trace clay, no staining, laminated clay bedding.		

Boring terminated at 15'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 20 min
Estimated purge volume: 30 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW01UCH	SHEET 1 OF 2

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3839866.6 N 286847.5 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/12/10 08:11 END : 5/12/10 09:41 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL** grass and roots.		
		5.0	HA-1			**SILTY SAND (SM)** dark gray, moist to wet, very loose to loose, some silt.		
5	5.0					**POORLY GRADED SAND (SP)** light gray, wet to saturated, loose, trace clay, iron oxide staining, laminated clay bedding.		
		2.5	DP-1					
10	10.0							
		3.8	DP-2			**POORLY GRADED SAND (SP)** light gray, saturated, loose, trace clay, no staining, laminated clay bedding.		
15	15.0							
		5.0	DP-3					Grout - 7:1 Portland cement mix
20	20.0					**LEAN CLAY (CL)** light gray, wet, soft, trace fine sand.		
		5.0	DP-4			**WELL GRADED SAND (SW)** light gray, saturated, loose.		
25								

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW01UCH	SHEET 2 OF 2

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3839866.6 N 286847.5 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/12/10 08:11 END : 5/12/10 09:41 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	25.0					**CLAYEY SAND (SC)** light greenish gray, saturated, medium dense, some clay.		
		5.0	DP-5			**POORLY GRADED SAND (SP)** light gray, wet, loose.		
30	30.0							
		5.0	DP-6			**POORLY GRADED SAND (SP)** light orangish gray, wet, loose, iron oxide staining, laminated.		
35	35.0							
		5.0	DP-7			**SILTY SAND (SM)** orangish tan, wet to saturated, loose to medium dense, some silt, trace shells, trace cemented sand.		Bentonite pellets 0.25 bucket
40	40.0							
		5.0	DP-8			**WELL GRADED SAND (SW)** light gray, wet, medium dense, trace, little cemented sand.		#2 Sand 3 bags 5ft 0.010 in screen
45	45.0							

Boring terminated at 45'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 30 min
Estimated purge volume: 40 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW02 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 34.0 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3829403.5 N 283695.9 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/18/10 08:20 END : 5/18/10 09:30 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**POORLY GRADED SAND (SP)** tan, dry to wet, some silt, and clay, water at 10 ft bgs.		Grout - 7:1 Portland cement mix
5	5.0		DP-1					Bentonite pellets 1 bag
10	10.0		DP-2					#2 Sand 5 bags 10ft 0.010 in screen
15	15.0		DP-3					
	18.0						Boring terminated at 18'	

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 36 min
Estimated purge volume: 43 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW02UCH	SHEET 1 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 34.5 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3829407.6 N 283698.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/18/10 08:20 END : 5/18/10 09:30 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**POORLY GRADED SAND (SP)** tan, dry to wet, some silt, and clay, water at10 ft bgs.		
5	5.0		DP-1					
10	10.0		DP-2					
15	15.0		DP-3					
20	20.0		DP-4					
25	25.0							Grout - 7:1 Portland cement mix

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW02UCH	SHEET 2 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 34.5 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3829407.6 N 283698.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/18/10 08:20 END : 5/18/10 09:30 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
						POORLY GRADED SAND (SP) tan, dry to wet, some silt, and clay, water at10 ft bgs.		
			DP-5			**LEAN CLAY (SP)** gray, soft, trace sand.		
30	30.0					**POORLY GRADED SAND (SP)** gray to orangish tan, interbedded well graded sand.		
			DP-6					
35	35.0							
			DP-7					
40	40.0							
			DP-8					
45	45.0					**LEAN CLAY (CL)** light tan, soft, trace sand.		
						CLAYEY SAND (SC) light greenish gray, loose.		
			DP-9					
50	50.0					**POORLY GRADED SAND (SP)** cemented sand.		Bentonite pellets 0.75 bucket

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW02UCH SHEET 3 OF 3

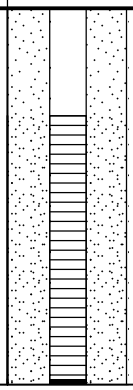
Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 34.5 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3829407.6 N 283698.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/18/10 08:20 END : 5/18/10 09:30 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
			DP-10			No recovery.		
55	55.0					No recovery.		#2 Sand 3.5 bags 10ft 0.010 in screen
	58.0							
							Boring terminated at 58'	Well Construction Information *Wellhead protection cover type: Flush mount w/8" manhole cover* *Concrete pad dimensions: 2ft x 2ft* *Well casing: 2" Schedule 40 PVC* Well Development Information *Development method: Whale pump* *Development time: 23 min* *Estimated purge volume: 35 gal*

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW03 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 26.9 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3841745.8 N 284296.5 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/19/10 09:00 END : 5/19/10 11:15 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**SILTY SAND (SM)** tan, moist, loose.		Grout - 7:1 Portland cement mix
5	5.0	2.5	DP-1			**SILTY SAND (SM)** orangish gray, loose to medium dense.		Bentonite pellets 1 bag
10	10.0	2.4	DP-2			**POORLY GRADED SAND (SP)** light tan, wet, loose, little clay, very fine grained.		#2 Sand 6 bags
15	15.0	4.0	DP-3					10ft 0.010 in screen
20	20.0						Boring terminated at 20'	

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 45 min
Estimated purge volume: 50 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW03UCH	SHEET 1 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.6 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3841745.1 N 284298.2 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/19/10 09:00 END : 5/19/10 11:15 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**SILTY SAND (SM)** tan, moist, loose.		
5	5.0	2.5	DP-1			**SILTY SAND (SM)** orangish gray, loose to medium dense.		
10	10.0	2.4	DP-2			**POORLY GRADED SAND (SP)** light tan, wet, loose, little clay, very fine grained.		
15	15.0	4.0	DP-3					
20	20.0	4.5	DP-4			**CLAYEY SAND (SC)** orange, moist, loose, little clay, fine grained. **WELL GRADED SAND (SW)** orange, wet, loose, fine to coarse grained.		
25								

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW03UCH	SHEET 2 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.6 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3841745.1 N 284298.2 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/19/10 09:00 END : 5/19/10 11:15 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
	25.0	4.2	DP-5			**WELL GRADED SAND (SW)** orange, wet, loose, fine to coarse grained.		Grout - 7:1 Portland cement mix
30	30.0	4.0	DP-6					
35	35.0	4.8	DP-7			**POORLY GRADED SAND (SP)** dark gray, wet, loose. **POORLY GRADED SAND (SP)** tan, wet, loose.		
40	40.0	5.0	DP-8					
45	45.0	5.0	DP-9			**CLAYEY SAND (SC)** dark gray, wet, loose, little clay, fine grained. **POORLY GRADED SAND (SP)** gray, wet, loose, fine grained.		
50								

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

PROJECT NUMBER:	BORING NUMBER:
CTO-94	Base-MW03UCH SHEET 3 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 27.6 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3841745.1 N 284298.2 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/19/10 09:00 END : 5/19/10 11:15 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	50.0	5.0	DP-10			**POORLY GRADED SAND (SP)** gray, wet, loose, fine grained.		Bentonite pellets 1 bucket
55	55.0					No recovery.		
		0.0	DP-11					#2 Sand 3 bags 5ft 0.010 in screen
60	60.0							
		0.0						
	63.0							

Boring terminated at 63'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 80 min
Estimated purge volume: 80 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW04 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 16.4 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3846944.1 N 275053.2 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/11/10 11:30 END : 5/11/10 00:15 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL** grass and roots.		Grout - 7:1 Portland cement mix
			HA-1			**SILTY SAND (SM)** gray, moist, loose, little silt.		Bentonite pellets 1 bag
5	5.0					**POORLY GRADED SAND (SP)** tan, saturated, loose, trace silt, iron staining at 7 ft bgs.		
			DP-1			**WELL GRADED SAND (SW)** tannish gray, wet to saturated, loose, some shells, trace partially cemented nodules.		#2 Sand 5.5 bags
10	10.0							10ft 0.010 in screen
			DP-2					
15	15.0							

Boring terminated at 15'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 30 min
Estimated purge volume: 25 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW04UCH	SHEET 1 OF 2

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 16.4 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3846941.3 N 275054.9 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/11/10 10:35 END : 5/11/10 15:40 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL** grass and roots.		
		5.0	HA-1			**SILTY SAND (SM)** gray, moist, loose, little silt, fine grained.		
5	5.0							
		4.5	DP-1			**POORLY GRADED SAND (SP)** tan, saturated, loose, trace silt, iron oxide staining, at 7 ft bgs, fine grained.		
10	10.0					**WELL GRADED SAND (SW)** tannish gray, wet to saturated, loose, some shells, trace partially cemented nodules, fine to coarse grained.		
		4.6	DP-2					
15	15.0							Grout - 7:1 Portland cement mix
		5.0	DP-3			**POORLY GRADED SAND (SP)** gray, moist to wet, loose, trace shells, fine grained.		
20	20.0							
		5.0	DP-4			**CLAYEY SAND (SC)** tannish gray, wet, medium dense, little clay, fine grained.		
25						**WELL GRADED SAND (SW)** gray, saturated, loose, little shells, little rock fragments, little fine gravel, weak cementation, fine to coarse grained.		

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW04UCH	SHEET 2 OF 2

Soil Boring Log / Well Completion Diagram

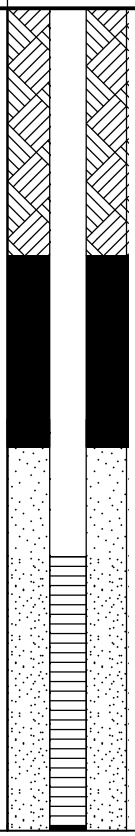
CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 16.4 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3846941.3 N 275054.9 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/11/10 10:35 END : 5/11/10 15:40 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	25.0	4.5	DP-5			**WELL GRADED SAND (SW)** gray, saturated, loose, little shells, little rock fragments, little fine gravel, weak cementation, fine to coarse grained.		
30	30.0	0.8	DP-6			**WELL GRADED SAND (SW)** gray, saturated, loose, little shells, little rock fragments, little fine gravel, weak cementation, fine to coarse grained, liner empty from 30-35 ft, liner stuck from 35-40 ft.		Bentonite pellets 1 bucket
35	35.0	0.0	DP-7					#2 Sand 4 bags 5ft 0.010 in screen
40	40.0						Boring terminated at 40'	



Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 30 min
Estimated purge volume: 25 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW05 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

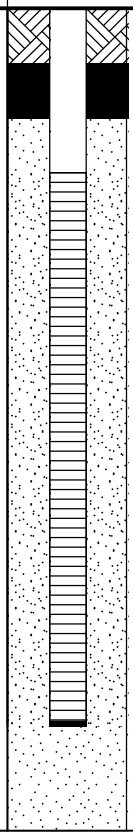
CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 47.8 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3830375.6 N 275516.2 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/13/10 07:58 END : 5/13/10 08:26 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**POORLY GRADED SAND (SP)** light gray, dry to moist, very loose to loose.		Grout - 7:1 Portland cement mix Bentonite pellets 0.5 bag
5	5.0	4.6	DP-1			**POORLY GRADED SAND (SP)** grayish brown, wet to saturated, loose. **POORLY GRADED SAND-SILTY SAND (SP-SM)** reddish brown, saturated, loose, little silt.		#2 Sand 4.5 bags 10ft 0.010 in screen
10	10.0	5.0	DP-2			**SILTY SAND (SM)** very dark brown, saturated, loose, with organics, organic odor. **POORLY GRADED SAND (SP)** grayish brown, wet to saturated, loose.		
15	15.0						Boring terminated at 15'	



Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 36 min
Estimated purge volume: 47 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW05UCH	SHEET 1 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 48.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3830374.2 N 275515.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/13/10 09:55 END : 5/13/10 11:08 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**POORLY GRADED SAND (SP)** light gray, dry to moist, very loose to loose.		
5	5.0	4.6	DP-1			**POORLY GRADED SAND (SP)** grayish brown, wet to saturated, loose.		
10	10.0	5.0	DP-2			**POORLY GRADED SAND-SILTY SAND (SP-SM)** reddish brown, saturated, loose, little silt.		
15	15.0	5.0	DP-3			**SILTY SAND (SM)** very dark brown, saturated, loose, with organics, organic odor.		
20	20.0	5.0	DP-4			**POORLY GRADED SAND (SP)** grayish brown, wet to saturated, loose.		
25						**SILTY SAND (SM)** very dark brown, saturated, loose, with organics, organic odor.		
						POORLY GRADED SAND (SP) grayish brown, wet to saturated, loose.		
						LEAN CLAY (CL) light grayish green, wet, very soft, little fine sand, homogeneous.		Grout - 7:1 Portland cement mix

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW05UCH	SHEET 2 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 48.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3830374.2 N 275515.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/13/10 09:55 END : 5/13/10 11:08 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	25.0	5.0	DP-5			**LEAN CLAY (CL)** light grayish green, wet, very soft, little fine sand, homogeneous.		
30	30.0	5.0	DP-6			**LEAN CLAY (CL)** grayish green, moist to wet, soft, little fine sand.		
35	35.0	5.0	DP-7					
40	40.0	5.0	DP-8					
45	45.0	2.0	DP-9			**WELL GRADED SAND (SW)** dark green, moist to wet, very dense, trace clayey silt, moderate cementation. **WELL GRADED SAND (SW)** light gray, saturated, medium dense, trace clay, weak cementation.		Bentonite pellets 1 bucket
50								

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW05UCH	SHEET 3 OF 3

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 48.3 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3830374.2 N 275515.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/13/10 09:55 END : 5/13/10 11:08 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	50.0					**WELL GRADED SAND (SW)** light gray, saturated, medium dense, trace clay, weak cementation.		
		5.0	Cuttings					#2 Sand 3 bags 5ft 0.010 in screen
55	55.0							
							Boring terminated at 55'	Well Construction Information *Wellhead protection cover type: Flush mount w/8" manhole cover* *Concrete pad dimensions: 2ft x 2ft* *Well casing: 2" Schedule 40 PVC* Well Development Information *Development method: Whale pump* *Development time: 35 min* *Estimated purge volume: 32 gal*

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW06 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 49.9 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3834115.5 N 295297.4 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/17/10 12:39 END : 5/17/10 13:00 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL** grass and roots.		
						POORLY GRADED SAND (SP) light tannish white, moist, very loose, laminated.		
		5.0	HA-1					Grout - 7:1 Portland cement mix
5	5.0							
		3.3	DP-1					
						SILTY SAND (SM) brown, moist, loose, some silt, little organics.		Bentonite pellets 1 bag
10	10.0					**POORLY GRADED SAND (SP)** dark reddish brown, moist to wet, loose, trace organics.		
		4.0	DP-2				Borehole collapsed	
15	15.0							
		5.0	DP-3					#2 Sand 6 bags 10ft 0.010 in screen
						POORLY GRADED SAND (SP) reddish brown, wet, loose, trace organics, laminated.		
20	20.0					No recovery.		
							Boring terminated at 22'	Well Construction Information *Wellhead protection cover type: Flush mount w/8" manhole cover* *Concrete pad dimensions: 2ft x 2ft* *Well casing: 2" Schedule 40 PVC* Well Development Information *Development method: Whale pump* *Development time: 25 min* *Estimated purge volume: 15 gal*

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW07 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 38.0 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3836494.1 N 278558.5 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/13/10 08:45 END : 5/14/10 08:46 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0			0 ppm		**POORLY GRADED SAND (SP)** light gray, moist, very loose to loose, trace clay, iron oxide staining.		Grout - 7:1 Portland cement mix
			HA-1			**LEAN CLAY (CL)** light gray, moist, medium stiff, trace fine sand, iron oxide staining.		Bentonite pellets 1 bag
						POORLY GRADED SAND (SP) light gray, moist, very loose to loose, trace clay, iron oxide staining.		
5	5.0			0 ppm		**LEAN CLAY (CL)** light gray, wet, medium stiff, trace fine sand, iron oxide staining.		
						POORLY GRADED SAND (SP) light gray, wet to saturated, very loose to loose, trace clay, iron oxide staining.		
		4.0	DP-1					#2 Sand 7 bags 10ft 0.010 in screen
10	10.0			0 ppm				
			DP-2					
						LEAN CLAY (CL) light gray, moist, medium stiff, trace fine sand, iron oxide staining.		
15	15.0							

Boring terminated at 15'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 115 min
Estimated purge volume: 16 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW08 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 12.0 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3841426.0 N 273433.7 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/10/10 16:33 END : 5/10/10 17:32 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**TOPSOIL** grass and roots.		Grout - 7:1 Portland cement mix
		5.0	HA-1			**POORLY GRADED SAND (SP)** light orangish tan, moist, loose, trace silt, iron oxide staining, fine grained.		Bentonite pellets 1 bag
5	5.0			0 ppm		**POORLY GRADED SAND (SP)** medium reddish orange, moist, loose, trace silt, iron oxide staining, fine grained.		
		3.0	DP-1			**POORLY GRADED SAND (SP)** medium reddish orange, wet, loose, with, iron oxide staining, fine grained.		#2 Sand 4.5 bags
10	10.0			0 ppm		**WELL GRADED SAND (SW)** light tan, saturated, little shells, fine to coarse grained.		10ft 0.010 in screen
		4.6	DP-2			**POORLY GRADED SAND (SP)** medium reddish orange, saturated, loose, with, iron oxide staining, fine grained.		
15	15.0							

Boring terminated at 15'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 18 min
Estimated purge volume: 20 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW09 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 22.4 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3846579.5 N 281321.3 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/14/10 11:07 END : 5/14/10 11:24 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0					**POORLY GRADED SAND (SP)** light tan, dry to moist, loose.		
		5.0	HA-1			**SILTY SAND (SM)** light orangish tan, moist, loose, some silt.		Grout - 7:1 Portland cement mix
5	5.0					**POORLY GRADED SAND (SP)** light tan, moist, loose.		
		5.0	DP-1					Bentonite pellets 1 bag
10	10.0							
		5.0	DP-2			**POORLY GRADED SAND (SP)** light tan, moist to wet, loose.		#2 Sand 4 bags 10ft 0.010 in screen
15	15.0							
			DP-3			**POORLY GRADED SAND (SP)** light tan, wet to saturated, loose, iron oxide staining.		
20	20.0							

Boring terminated at 20'

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 30 min
Estimated purge volume: 25 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

CH2MHILL	PROJECT NUMBER: CTO-94	BORING NUMBER: Base-MW10 SHEET 1 OF 1

Soil Boring Log / Well Completion Diagram

CLIENT: NAVFAC PROJECT : Base Background Study LOCATION : Camp Lejeune, North Carolina

ELEVATION : 25.1 ft DRILLING CONTRACTOR : Probe Technologies

COORDINATES : 3834343.1 N 287315.8 E DRILLING METHOD AND EQUIPMENT : DPT/HSA with Geoprobe 7720DT

WATER LEVEL: --- START : 5/17/10 15:27 END : 5/17/10 15:41 LOGGER : E Twamley

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	PID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR , MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	COMMENTS: WELL DETAILS
	0.0	5.0	HA-1			**POORLY GRADED SAND-SILTY SAND (SP-SM)** light orangish tan, moist, loose, little silt, iron oxide staining.		Grout - 7:1 Portland cement mix Bentonite pellets 1 bag
5	5.0	3.3	DP-1			**LEAN CLAY (CL)** orangish tan, moist, medium stiff, little fine sand, iron oxide staining. **POORLY GRADED SAND (SP)** light orangish tan, moist, loose, iron oxide staining. **POORLY GRADED SAND (SP)** white, moist, loose, iron oxide staining. **POORLY GRADED SAND (SP)** light tan, moist to wet, loose, trace fine gravel.		
10	10.0		DP-2			**WELL GRADED SAND (SW)** light tan, wet to saturated, loose.		#2 Sand 4.5 bags 10ft 0.010 in screen
15	15.0		DP-3			No recovery.		
	16.0						Boring terminated at 16'	

Well Construction Information
Wellhead protection cover type: Flush mount w/8" manhole cover
Concrete pad dimensions: 2ft x 2ft
Well casing: 2" Schedule 40 PVC

Well Development Information
Development method: Whale pump
Development time: 15 min
Estimated purge volume: 20 gal

PID: Photo ionization detector
HA: Hand auger
DP: Direct push

Appendix B
Groundwater Sampling Sheets

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW01-10B
Date:	5/24/2010, 5/25/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	partly cloudy 70° F		Verd Anna Cunningham/RDU

Total Depth:		12.85	FT.(BTOC)
Depth to water:	(-)	6.15	FT.(BTOC)
Water Column:		6.70	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.09	GAL.
Total Purge Vol.:		26.75	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/25/2010 Time: 1010	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.16	0.387	4.42	6.16	95	12.3	6.50	clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1535	0.25	18.95	0.473	NA	6.63	93.3	577	6.30	cloudy
1540	0.75	18.02	0.456	7.86	6.17	107.7	387	6.45	
1545	1.25	17.54	0.472	6.81	6.11	88.5	207	6.48	
1550	1.75	17.47	0.469	7.11	6.09	87.4	156	6.48	
1555	2.25	17.55	0.461	6.68	6.09	84.7	115	6.46	
1600	2.75	17.32	0.455	6.38	6.09	88.2	74.1	6.46	
1610	3.75	17.31	0.444	6.65	6.06	79.7	52.0	6.46	
1620	4.75	17.46	0.439	5.84	6.07	85.0	30.8	6.45	
1630	5.75	17.28	0.431	6.06	6.06	85.7	27.6	6.49	
1640	6.75	17.33	0.424	6.55	6.05	88.1	20.1	6.49	
1650	7.75	17.13	0.417	6.31	6.00	86.9	20.4	6.49	
1710	9.75	17.29	0.482	6.26	6.00	90.4	34.6	6.45	clear
1720	10.75	17.38	0.477	7.68	6.00	89.9	21.0	6.52	
1730	11.75	17.32	0.478	6.20	6.02	91.8	26.4	6.42	
1750	13.75	17.15	0.399	6.56	6.04	95.5	12.0	NM	
1800	14.75	17.12	0.390	7.17	6.06	94.6	11.2	6.49	
1810	15.75	17.12	0.394	7.10	6.06	94.5	11.0	6.51	
1820	16.75	17.10	0.393	5.27	6.08	96.2	11.6	6.49	
0840	17.75	17.25	0.430	7.38	6.25	99.0	189	6.32	continued 5/25/2010
0850	18.75	17.20	0.418	5.61	6.21	96.9	91.8	6.50	
0900	19.75	17.16	0.405	4.82	6.18	94.1	46.0	6.51	
0910	20.75	17.15	0.402	4.69	6.18	97.1	23.5	6.52	
0920	21.75	17.13	0.397	4.41	6.17	91.2	20.0	6.54	
0930	22.75	17.15	0.395	4.63	6.16	93.9	18.7	6.50	
0940	23.75	17.16	0.393	4.66	6.15	94.0	17.0	6.50	
0950	24.75	17.14	0.389	4.49	6.17	93.6	12.8	6.50	
1000	25.75	17.14	0.391	4.09	6.16	93.7	11.9	NM	
1010	26.75	17.16	0.387	4.42	6.16	95.0	12.3	NM	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1529, 0830 on 5/25/2010

Purge Rate set @ 350 mL/min

Tubing intake set @ 6 ft btoc

NA - Not Available due to equipment error

NM - Not Measured

MS/MSD | Duplicate ID No.:

Signature(s): Rachel Zajac

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01-UCH
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW01UCH-10B
Date:	6/2/2010	Sampling Team:	David Seed/RDU
Weather:	82° F		

Total Depth:		44.00	FT.(BTOC)
Depth to water:	(-)	8.65	FT.(BTOC)
Water Column:		35.35	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.76	GAL.
Total Purge Vol.:		9.20	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 1140	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.93	0.681	0.50	6.780	-51.9	30.6	NM	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1030	1.10	18.96	0.783	NA	6.78	-53.2	>1000	NM	
1040	2.20	18.97	0.783	NA	6.78	-52.7	839	NM	
1050	3.30	18.98	0.784	NA	6.78	-52.1	194	NM	
1100	4.40	18.86	0.685	0.49	6.78	-51.8	94.0	NM	
1110	5.50	18.86	0.684	0.57	6.78	-51.8	84.0	NM	
1115	6.15	18.86	0.683	0.54	6.78	-51.8	71.0	NM	
1120	6.80	18.87	0.685	0.52	6.78	-51.7	66.8	NM	
1125	7.45	18.95	0.681	0.53	6.78	-51.9	54.2	NM	
1130	8.10	18.96	0.681	0.50	6.78	-51.8	43.9	NM	
1140	9.20	18.93	0.681	0.50	6.78	-51.9	30.6	NM	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1020

Purge Rate set @ 500 mL/min

Tubing intake set @ 41 ft btoc

NA - Not Available due to equipment error

NM - Not Measured

MS/MSD

Duplicate ID No.:

Signature(s): David Seed

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW02-10B
Date:	5/27/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 80° F		Verd Anna Cunningham/RDU

Total Depth:		17.00	FT.(BTOC)
Depth to water:	(-)	10.16	FT.(BTOC)
Water Column:		6.84	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.11	GAL.
Total Purge Vol.:		3.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/27/2010 Time: 1400	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.58	0.219	4.91	5.61	207.5	4.50	10.31	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1325	0.6	17.85	0.209	5.34	5.68	184.3	37.9	10.21	
1335	1.4	17.39	0.215	5.80	5.67	191.1	18.60	10.31	
1345	2.2	17.46	0.218	5.22	5.64	202.1	7.78	10.31	
1350	2.6	17.53	0.219	5.05	5.63	205.5	5.77	10.33	
1355	3.0	17.58	0.219	4.91	5.61	207.5	4.50	10.31	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1318

Purge Rate set @ 300 mL/min

Tubing intake set @ 14 ft btoc

MS/MSD Yes	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02-UCH
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW02UCH-10B
Date:	6/1/2010, 6/2/2010	Sampling Team:	David Seed/RDU
Weather:	70° F		

Total Depth:		58.00	FT.(BTOC)
Depth to water:	(-)	26.9	FT.(BTOC)
Water Column:		31.10	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.06	GAL.
Total Purge Vol.:		7.90	GAL.
Purge Device:	Bladder Pump		

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 0830		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	18.37	0.294	NA	7.56	-149.9	1.94	27.30	

FIELD PARAMETERS 7.5

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1600	1.10	18.79	0.232	NA	7.75	-86.6	>1000	27.30	
1610	2.20	18.79	0.231	NA	7.75	-86.5	40.3	27.30	
1620	3.30	18.79	0.232	NA	7.75	-86.7	21.8	27.30	
1630	4.40	18.76	0.234	NA	7.75	-88.0	12.1	27.30	
1640	5.50	18.76	0.233	NA	7.75	-89.0	7.08	27.30	
0820	6.60	18.60	0.294	NA	7.56	-149.7	2.44	27.30	Continued 6/2/2010
0825	7.25	18.39	0.294	NA	7.36	-149.9	2.08	27.30	
0830	7.90	18.37	0.294	NA	7.36	-149.9	1.94	27.30	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1550

Purge Rate set @ 200 mL/min

Tubing intake set @ 56 ft btoc

NA - Not Available due to equipment error

MS/MSD		Duplicate ID No.:	BBG-MW02UCHD-10B
Signature(s):	David Seed		

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW03-10B
Date:	5/25/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Cloudy 70° F		Verd Anna Cunningham/RDU

Total Depth:		20.00	FT.(BTOC)
Depth to water:	(-)	14.15	FT.(BTOC)
Water Column:		5.85	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.95	GAL.
Total Purge Vol.:		18.1	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/25/2010 Time: 1635	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.79	0.143	NA	4.70	302.6	10.0	14.28	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1355	0.5	17.79	0.062	NA	6.28	96.9	269	14.23	
1405	1.6	17.15	0.069	NA	5.36	151.1	123	14.22	
1415	2.7	17.20	0.074	NA	5.24	167.5	94.8	14.31	
1425	3.8	16.95	0.083	NA	5.13	192.1	65.7	14.26	
1435	4.9	16.96	0.095	NA	5.07	209.5	53.9	14.26	
1445	6.0	16.99	0.106	NA	5.06	223.3	36.4	14.25	
1455	7.1	16.98	0.115	NA	5.03	235	29.4	14.30	
1505	8.2	16.87	0.119	NA	5.01	245.4	23.4	14.31	
1515	9.3	16.84	0.125	NA	5.00	255.4	19.8	14.31	
1525	10.4	16.84	0.127	NA	4.95	263.0	18.4	14.28	
1535	11.5	16.82	0.131	NA	4.90	269.1	17.1	14.26	
1545	12.6	16.82	0.135	NA	4.85	277.2	16.0	14.28	
1555	13.7	16.81	0.137	NA	4.82	282.4	14.4	14.29	
1605	14.8	16.81	0.138	NA	4.79	288.5	13.2	14.26	
1615	15.9	16.81	0.140	NA	4.77	292.9	11.5	14.28	
1625	17.0	16.81	0.142	NA	4.74	298.5	12.0	14.31	
1635	18.1	16.79	0.143	NA	4.70	302.6	10.0	14.28	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1350

Purge Rate set @ 425 mL/min

Tubing intake set @ 18 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03UCH
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW03UCH-10B
Date:	5/27/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Not Recorded		Verd Anna Cunningham/RDU

Total Depth:		68.00	FT.(BTOC)
Depth to water:	(-)	14.85	FT.(BTOC)
Water Column:		53.15	FT.
	(x)	0.163	GAL/FT.
Well Volume:		8.66	GAL.
Total Purge Vol.:		NM	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Monsoon

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/27/2010 Time: 1410	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.41	0.246	5.3	6.84	-6.6	1.08	NM	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1322	NM	NM	NM	NM	NM	NM	216	NM	
1335	NM	NM	NM	NM	NM	NM	106	NM	
1345	NM	NM	NM	NM	NM	NM	4.81	19.05	
1350	NM	NM	NM	NM	NM	NM	4.71	NM	
1355	NM	18.49	0.247	6.82	7.60	-11	2.90	15.75	
1400	NM	18.48	0.247	5.99	7.48	-6.6	1.58	15.75	
1405	NM	18.41	0.246	5.30	6.84	NM	1.08	NM	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1310

Purge Rate set @ 200 mL/min @ 1355

Tubing intake set @ 66 ft btoc

NM - Not Measured

*This is the development log and groundwater data sheet

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW04-10B
Date:	5/26/2010, 5/27/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Rainy 5/26, Sunny 5/27 70° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	4.5	FT.(BTOC)
Water Column:		10.50	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.71	GAL.
Total Purge Vol.:		22	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/27/2010 Time: 1130	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.73	0.550	2.68	6.57	-23.1	23.2	4.50	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1620	3.5	18.07	0.511	3.76	7.01	3.60	372	4.55	Cloudy
1703	5.5	17.93	0.502	2.88	7.05	5.80	118	4.61	
1720	7.5	17.98	0.508	2.89	7.05	-11.4	76.4	4.52	
1740	10.0	18.02	0.510	2.70	7.03	-13.2	47.3	4.54	Clearer
1758	12.0	17.98	0.512	2.69	7.06	-14.3	46.8	NM	
1816	13.5	18.05	0.511	2.61	7.05	-15.8	56.8	4.54	
0821	15.0	18.18	0.515	NM	6.66	-25.0	189	4.50	Continued 5/27/2010
0851	17.0	18.54	0.513	3.44	6.68	-21.8	NM	4.50	
0930	19.0	18.37	0.504	2.84	6.70	-24.1	115	4.50	
0950	22.0	18.44	0.511	2.73	6.69	-28.0	49.4	4.50	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1547, Pump restarted at 0803 5/27/10

Purge Rate set @ 300 mL/min

Tubing intake set @ 14 ft bgs

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04UCH
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW04UHC-10B
Date:	6/2/2010	Sampling Team:	David Seed/RDU
Weather:	80° F		

Total Depth:		39.00	FT.(BTOC)
Depth to water:	(-)	4.55	FT.(BTOC)
Water Column:		34.45	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.61	GAL.
Total Purge Vol.:		10.55	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 1550	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.23	0.340	0.20	7.46	-123.6	26.3	4.83	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1425	1.1	19.30	0.335	5.95	7.36	-125.1	>1000	4.83	
1435	2.2	19.29	0.335	5.74	7.36	-125.0	259	4.83	
1445	3.3	19.28	0.335	5.44	7.36	-124.3	104.3	4.83	
1455	4.5	19.28	0.334	5.24	7.36	-124.9	89.2	4.83	
1505	5.5	19.29	0.334	4.68	7.36	-124.9	77.8	4.83	
1510	6.2	19.16	0.334	1.09	7.36	-121.0	55.7	4.83	
1520	7.3	19.16	0.334	1.03	7.36	-121.7	47.7	4.83	
1530	8.4	19.21	0.340	0.20	7.45	-123.6	33.7	4.83	
1540	9.5	19.22	0.340	0.19	7.45	-123.6	31.4	4.83	
1550	10.3	19.23	0.340	0.20	7.46	-123.6	26.5	4.83	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1415

Purge Rate set @ 500 mL/min

Tubing intake set @ 37 ft btoc

MS/MSD

Duplicate ID No.:

Signature(s): David Seed

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW05-10B
Date:	6/2/2010	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Cloudy 70° F		David Seed/RDU

Total Depth:		13.00	FT.(BTOC)
Depth to water:	(-)	2.04	FT.(BTOC)
Water Column:		10.96	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.756	GAL.
Total Purge Vol.:		10.40	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 1025	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.40	0.328	NA	4.35	42.8	11.8	2.59	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0800	0.6	19.44	0.312	NA	4.31	38.1	>1000	2.57	Very dark brown
0810	1.3	19.33	0.310	NA	4.30	45.4	>1000	2.53	
0820	2.0	19.27	0.311	NA	4.31	46.4	>1000	2.21	
0830	2.7	19.37	0.314	NA	4.32	46.2	641	2.25	
0840	3.4	19.23	0.317	NA	4.32	44.9	308	2.48	
0850	4.1	19.36	0.320	NA	4.30	44.4	192	2.42	
0900	4.8	19.24	0.321	NA	4.30	43.9	119	2.52	
0910	5.5	19.25	0.322	NA	4.30	43.8	55.0	2.49	
0920	6.2	19.29	0.324	NA	4.31	43.0	46.5	2.39	
0930	6.9	19.35	0.325	NA	4.31	43.1	21.3	2.42	
0940	7.6	19.38	0.326	NA	4.33	42.5	16.4	2.12	
0950	8.3	19.31	0.326	NA	4.34	43.0	15.0	2.51	
1000	9.0	19.38	0.327	NA	4.35	42.6	11.2	2.56	
1010	9.7	19.37	0.327	NA	4.35	42.6	12.1	2.27	
1020	10.4	19.40	0.328	NA	4.35	42.8	11.8	2.59	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 0750

Purge Rate set @ 300 mL/min

Tubing intake set @ 9 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05UCH
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW05UCH-10B
Date:	6/2/2010	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Cloudy 70° F		David Seed/RDU

Total Depth:		55.00	FT.(BTOC)
Depth to water:	(-)	39.39	FT.(BTOC)
Water Column:		15.61	FT.
	(x)	0.163	GAL/FT.
Well Volume:		2.54	GAL.
Total Purge Vol.:		10.80	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 1345	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.95	0.310	NA	8.27	20.5	67.0	37.87	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1110	0.3	20.63	0.475	NA	10.42	-18.9	169	39.41	Slightly cloudy
1120	1.0	19.42	0.371	NA	10.15	16.1	203	39.88	
1130	1.7	19.30	0.347	NA	9.77	33.0	134	39.63	
1140	2.4	19.26	0.344	NA	9.42	40.5	109	39.84	
1150	3.1	19.27	0.343	NA	9.28	41.2	93.4	39.73	
1200	3.8	19.19	0.338	NA	9.14	36.9	84.8	39.74	
1210	4.5	19.31	0.335	NA	8.99	33.4	80.1	39.61	
1220	5.2	19.16	0.329	NA	8.98	31.2	NM	NM	
1230	5.9	19.18	0.329	NA	8.81	32.6	NM	NM	
1240	6.6	19.26	0.329	NA	8.66	30.5	NM	NM	
1250	7.3	19.10	0.324	NA	8.51	27.2	NM	NM	
1300	8.0	19.07	0.322	NA	8.44	25.1	79.6	39.86	
1310	8.7	19.05	0.320	NA	8.37	24.0	70.1	39.78	
1320	9.4	19.04	0.317	NA	8.33	21.5	61.9	39.79	
1330	10.1	18.98	0.313	NA	8.27	20.6	67.4	39.76	
1340	10.8	18.95	0.310	NA	8.27	20.5	67.0	37.87	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1102

Purge Rate set @ 300 mL/min
Tubing intake set @ 52 ft btoc

NA - Not Available due to equipment error

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW06
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW06-10B
Date:	6/2/2010	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Rainy 70° F		David Seed/RDU

Total Depth:		22.00	FT.(BTOC)
Depth to water:	(-)	13.37	FT.(BTOC)
Water Column:		8.63	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.407	GAL.
Total Purge Vol.:		11.9	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 6/2/2010 Time: 1740	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.48	0.061	NA	5.93	202.1	9.23	13.43	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1530	1.5	17.42	0.054	NA	7.62	98.0	804	13.44	Dark Brown
1540	2.3	17.49	0.058	NA	7.05	143.0	669	13.42	
1550	3.1	17.48	0.059	NA	6.78	157.3	464	13.44	
1600	3.9	17.53	0.060	NA	6.56	169.0	304	13.45	
1610	4.7	17.50	0.060	NA	6.43	175.7	201	13.43	
1620	5.5	17.50	0.061	NA	6.32	181.9	125	13.41	
1630	6.3	17.55	0.061	NA	6.25	185.5	95.4	13.42	
1640	7.1	17.49	0.061	NA	6.17	189.0	59.8	13.42	
1650	7.9	17.51	0.062	NA	6.10	192.5	37.9	13.45	
1700	8.7	17.48	0.061	NA	6.08	194.1	30.6	13.45	
1710	9.5	17.43	0.061	NA	6.02	197.1	22.7	13.42	
1720	10.3	17.42	0.061	NA	5.98	199.3	14.4	13.43	
1730	11.1	17.48	0.061	NA	5.95	201.4	10.8	13.42	
1740	11.9	17.48	0.061	NA	5.93	202.1	9.23	13.43	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1520

Purge Rate set @ 300 mL/min

Tubing intake set @ 19 ft btoc

NA - Not Available due to equipment error

MS/MSD | Duplicate ID No.:

Signature(s): Verd Anna Cunningham

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW07-10B
Date:	5/26/2010, 5/27/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	light rain 70° F		Verd Anna Cunningham/RDU

Total Depth:		14.05	FT.(BTOC)
Depth to water:	(-)	5.13	FT.(BTOC)
Water Column:		8.92	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.45	GAL.
Total Purge Vol.:		9.30	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/27/2010 Time: 0830	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.92	0.072	5.73	4.54	294.7	5.60	6.61	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1555	0.5	17.85	0.080	NA	5.43	236.9	114	5.69	
1605	1.7	18.09	0.078	6.33	5.13	270.9	30.0	6.51	
1615	2.9	17.91	0.076	5.51	5.00	260.1	36.1	7.27	
1625	4.1	17.78	0.073	5.74	4.87	251.2	263	8.16	
1635	5.3	17.82	0.073	5.79	4.85	251.0	197	8.26	
1645	6.1	17.78	0.072	5.39	4.84	250.3	74.2	8.40	
1655	6.9	17.82	0.072	4.93	4.79	258.4	106	8.61	
0800	7.2	17.68	0.087	5.57	4.73	212.0	66.2	5.41	Continued 5/27/2010
0810	7.7	17.90	0.075	5.42	4.62	236.9	18.5	5.71	
0820	8.5	17.90	0.073	5.84	4.57	268.4	8.40	6.12	
0825	8.9	17.85	0.072	5.79	4.55	282.0	7.55	6.42	
0830	9.3	17.92	0.072	5.73	4.54	294.7	5.60	6.61	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 5/26 1551, restarted pump on 5/26 @ 0753

Purge Rate set @ 450 mL/min, 340 mL/min @ 1645, 200 mL/min @ 0800, 300 mL/min @0810
Tubing intake set @ 12 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW08
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW08-10B
Date:	5/26/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Overcast 70° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	7.54	FT.(BTOC) 5%
Water Column:		7.46	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.22	GAL.
Total Purge Vol.:		11.9	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/26/2010 Time: 1445	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.06	0.350	4.71	6.76	192.4	35.4	7.78	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1300	0.85	17.22	0.348	4.61	6.80	190.5	373	7.77	
1310	1.90	17.17	0.337	5.70	6.78	191.2	122	7.66	
1320	3.10	17.11	0.403	5.55	6.78	186.7	93.2	7.69	
1330	4.20	17.10	0.347	5.30	6.77	183.5	75.9	7.64	
1340	5.30	17.01	0.348	5.31	6.77	182.1	56.7	7.69	
1350	6.40	17.14	0.349	4.97	6.76	181.7	47.9	7.76	
1400	7.50	17.06	0.348	5.24	6.76	186.6	42.1	7.74	
1410	8.60	17.06	0.350	5.24	6.76	188.3	37.5	7.68	
1420	9.70	17.07	0.347	5.35	6.76	190.1	34.9	7.77	
1430	10.80	17.10	0.347	4.32	6.76	191.2	35.7	7.69	
1440	11.90	17.06	0.350	4.71	6.76	192.4	35.4	7.78	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1252

Purge Rate set @ 400 mL/min

Tubing intake set @ 11 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW09
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW09-10B
Date:	5/26/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	rain 70° F		Verd Anna Cunningham/RDU

Total Depth:		19.00	FT.(BTOC)
Depth to water:	(-)	12.16	FT.(BTOC)
Water Column:		6.84	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.11	GAL.
Total Purge Vol.:		13.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/26/2010 Time: 1130	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.55	0.085	7.71	5.33	256.9	10.2	12.28	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0940	0.9	16.58	0.106	NA	6.19	173.0	307	12.26	
0950	2.0	16.51	0.094	NA	5.90	178.2	188	12.25	
1000	3.1	16.54	0.098	NA	5.01	267.9	132	12.25	
1010	4.2	16.51	0.093	7.73	5.3	259.4	83.6	12.25	
1020	5.3	16.51	0.091	7.66	5.33	262.0	47.5	12.29	
1030	6.4	16.50	0.090	7.62	5.34	263.1	38.4	12.29	
1040	7.5	16.46	0.088	7.44	5.34	264.7	25.6	12.28	
1050	8.6	16.49	0.086	7.47	5.33	263.9	18.7	12.31	
1100	9.7	16.51	0.087	7.48	5.34	263.9	16.5	12.31	
1110	10.8	16.55	0.086	7.49	5.33	261.9	13.5	12.27	
1120	11.9	16.57	0.086	7.65	5.33	259.6	11.3	12.27	
1130	13.0	16.55	0.085	7.71	5.33	256.9	10.2	12.28	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 0932

Purge Rate set @ 420 mL/min

Tubing intake set @ 17 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.: BBG-GW09D-10B @1135
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW010
Event:	Base Background 1st Quarter	Sample ID:	BBG-GW10-10B
Date:	5/24/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Partly Cloudy, 70° F		Verd Anna Cunningham/RDU

Total Depth:		15.50	FT.(BTOC)
Depth to water:	(-)	7.96	FT.(BTOC)
Water Column:		7.54	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.23	GAL.
Total Purge Vol.:		5.75	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 5/24/2010 Time: 1330	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.71	0.108	NA	5.01	248.3	10.0	8.01	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1230	0.25	19.37	0.128	NA	5.08	241.5	159	8.00	Cloudy
1235	0.75	17.38	0.117	NA	4.46	294.7	69.0	8.01	Cloudy
1240	1.25	17.24	0.114	NA	4.73	283.8	46.6	8.01	Cloudy
1245	1.75	17.11	0.111	NA	4.60	270.9	26.3	8.02	Clear
1250	2.25	17.24	0.110	NA	4.80	251.6	19.6	8.01	
1255	2.75	17.04	0.110	NA	4.87	247.8	14.2	8.01	
1300	3.25	16.85	0.109	NA	4.88	247.1	10.1	8.01	
1305	3.75	16.97	0.109	NA	4.91	245.4	12.2	8.01	
1310	4.25	16.95	0.109	NA	4.95	241.9	16.5	8.01	
1315	4.75	16.85	0.108	NA	4.97	247.2	13.4	8.01	
1320	5.25	16.77	0.108	NA	5.00	245.7	12.4	8.01	
1325	5.75	16.71	0.108	NA	5.01	248.3	10.0	8.01	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1 L HDPE	1
Chromium VI 7196A	none	125 ml HDPE	1

Observations/Notes:

Pump started @ 1225

Purge Rate set @ 300 mL/min
Tubing intake set @ 10 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW01-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 91° F		Verd Anna Cunningham/RDU

Total Depth:		10.00	FT.(BTOC)
Depth to water:	(-)	8.65	FT.(BTOC)
Water Column:		1.35	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.22	GAL.
Total Purge Vol.:		7.20	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 1730	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	22.57	0.484	0.99	5.89	-11.8	9.39	8.97	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1600	0.00	NM	NM	NM	NM	NM	NM	8.65	
1610	0.80	23.38	0.531	1.90	6.00	8.90	87.0	8.79	
1620	1.60	23.22	0.518	1.41	5.97	-4.20	83.9	8.78	
1630	2.40	23.13	0.508	1.25	5.95	-11.9	55.8	8.76	
1640	3.20	22.76	0.494	1.20	5.93	-15.4	48.4	8.89	
1650	4.00	22.85	0.475	1.23	5.93	-15.6	80.9	8.89	
1700	4.80	22.62	0.487	1.10	5.90	-15.2	38.2	8.88	
1710	5.60	22.55	0.487	1.04	5.90	-14.6	20.3	8.91	
1720	6.40	22.56	0.486	1.01	5.89	-13.4	13.4	8.96	
1730	7.20	22.57	0.484	0.99	5.89	-11.8	9.39	8.97	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1600

Purge Rate set @ 300 mL/min

Tubing intake set @ 9.5 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01UCH
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW01UCH-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 82° F		Verd Anna Cunningham/RDU

Total Depth:		44.00	FT.(BTOC)
Depth to water:	(-)	10.63	FT.(BTOC)
Water Column:		33.37	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.44	GAL.
Total Purge Vol.:		14.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 1508	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.61	0.629	0.94	6.78	-52.1	31.1	10.81	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1208	0.0	NM	NM	NM	NM	NM	NM	10.63	
1218	0.8	22.60	0.666	1.65	6.70	-6.70	99.6	10.72	
1228	1.6	22.39	0..673	1.46	6.73	-14.3	96.3	10.76	
1238	2.4	22.39	0.675	1.28	6.75	-23.0	90.9	10.72	
1248	3.3	20.56	0.646	1.17	6.70	-23.2	96.0	10.78	
1258	4.2	20.46	0.645	1.09	6.72	-25.6	74.9	10.81	
1308	5.0	20.16	0.641	1.07	6.74	-26.8	64.5	10.83	
1318	5.8	19.78	0.633	1.06	6.71	-28.0	69.1	10.84	
1328	6.7	19.71	0.633	1.04	6.72	-30.2	58.7	10.87	
1338	7.5	19.68	0.632	1.03	6.73	-32.7	56.5	10.83	
1348	8.2	19.70	0.631	1.00	6.75	-38.2	46.3	10.84	
1358	9.0	19.72	0.632	0.97	6.75	-38.9	55.5	10.84	
1408	9.8	19.63	0.630	0.97	6.75	-39.3	46.7	10.83	
1418	10.5	19.61	0.629	0.99	6.76	-41.6	40.2	10.78	
1428	11.3	19.53	0.628	0.96	6.76	-43.4	42.7	10.81	
1438	12.1	19.52	0.628	0.95	6.76	-45.2	39.7	10.80	
1448	12.9	19.47	0.627	0.95	6.76	-47.1	33.3	10.83	
1458	13.7	19.51	0.627	0.94	6.76	-48.8	33.7	10.81	
1508	14.5	19.61	0.629	0.94	6.78	-52.1	31.1	10.81	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1208

Purge Rate set @ 325 mL/min
Tubing intake set @ 41 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW02-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 66° F		Verd Anna Cunningham/RDU

Total Depth:		17	FT.(BTOC)
Depth to water:	(-)	12.95	FT.(BTOC)
Water Column:		4.05	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.66	GAL.
Total Purge Vol.:		3.2	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 0848	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.12	0.314	3.01	4.96	146.8	3.26	13.17	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0808	NM	NM	NM	NM	NM	NM	NM	12.95	Clear
0818	0.8	20.18	0.327	4.48	4.95	204.8	12.9	13.18	
0828	1.6	20.15	0.321	3.30	4.95	193.6	11.7	13.17	
0833	2.0	20.13	0.321	3.19	4.95	181.0	8.84	13.17	
0838	2.4	20.13	0.319	3.05	4.96	162.3	6.55	13.17	
0843	2.8	20.14	0.316	3.02	4.96	152.5	3.87	13.16	
0848	3.2	20.12	0.314	3.01	4.96	146.8	3.26	13.17	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0808

Purge Rate set @ 300 mL/min

Tubing intake set @ 15 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.: BBG-GW02D-10C
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02UCH
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW02UCH-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Clear 70° F		Verd Anna Cunningham/RDU

Total Depth:		58.00	FT.(BTOC)
Depth to water:	(-)	29.01	FT.(BTOC)
Water Column:		28.99	FT.
	(x)	0.163	GAL/FT.
Well Volume:		4.72	GAL.
Total Purge Vol.:		5.75	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 0910	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.34	0.256	0.82	7.61	-147.9	14.5	29.02	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0819	1.00	18.37	0.255	1.24	7.42	-130.8	114	29.02	Cloudy
0829	2.00	18.32	0.257	0.97	7.51	-143.3	58.5	29.02	Clearer
0838	3.00	18.32	0.255	0.93	7.57	-147.7	42.2	29.02	Clear
0848	4.00	18.34	0.255	0.92	7.60	-146.6	32.6	29.02	Clear
0858	5.00	18.32	0.256	0.80	7.60	-148.8	20.6	29.02	Clear
0901	5.25	18.34	0.256	0.82	7.60	-148.5	18.5	29.02	Clear
0904	5.50	18.34	0.256	0.86	7.60	-148.2	17.5	29.02	Clear
0907	5.75	18.34	0.256	0.82	7.61	-147.9	14.5	29.02	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0809

Purge Rate set @ 375-400 mL/min

Tubing intake set 56 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW03-10C
Date:	9/13/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 81° F		Verd Anna Cunningham/RDU

Total Depth:		20.00	FT.(BTOC)
Depth to water:	(-)	17.13	FT.(BTOC)
Water Column:		2.70	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.440	GAL.
Total Purge Vol.:		6.90	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/13/2010 Time: 1559	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.50	0.367	6.94	4.09	247.7	36.1	17.33	

FIELD PARAMETERS

4.09

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1419	NM	NM	NM	NM	NM	NM	NM	17.13	Very Turbid
1424	0.36	20.78	0.454	NA	3.84	203.1	>1000	17.29	Very Turbid
1434	1.08	19.82	0.497	6.97	3.98	212.6	129	17.34	
1444	1.80	19.76	0.431	6.98	4.01	223.0	84.6	17.35	
1454	2.52	19.73	0.416	7.12	4.01	231.6	74.6	17.31	
1459	2.88	19.58	0.405	7.13	4.01	236.4	145	17.33	
1504	3.24	19.46	0.399	6.82	4.01	240.7	67.8	17.31	
1514	3.96	19.45	0392	6.91	4.03	247.0	58.3	17.32	
1524	4.68	19.49	0.384	6.90	4.04	250.9	40.1	17.31	
1534	5.40	19.49	0.377	7.25	4.08	249.5	39.4	17.31	
1544	6.12	19.49	0.373	6.98	4.05	247.1	38.9	17.33	
1554	6.84	19.50	0.367	6.94	4.09	247.7	36.1	17.33	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1419

Purge Rate set @ 275 mL/min

Tubing intake set @ 19 ft btoc

NA - Not Available due to equipment error

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03UCH
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW03UCH-10C
Date:	9/13/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny		Verd Anna Cunningham/RDU

Total Depth:		63.00	FT.(BTOC)
Depth to water:	(-)	17.74	FT.(BTOC)
Water Column:		45.26	FT.
	(x)	0.163	GAL/FT.
Well Volume:		7.37	GAL.
Total Purge Vol.:		15.25	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 09/13/2010 Time: 1720	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.54	0.216	0.30	6.03	-26.2	35.0	17.80	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1350	0.25	21.19	0.325	3.26	5.76	10.3	NM	NM	Dark Gray
1402	0.75	20.29	0.260	0.67	5.33	55.9	NM	17.80	Cloudy
1425	2.50	20.07	0.251	0.39	6.09	19.3	707	17.81	Cloudy
1445	3.50	20.09	0.241	0.36	6.15	4.80	445	17.80	Cloudy
1507	5.00	20.08	0.235	0.30	6.18	-16.4	286	17.80	Cloudy
1521	6.00	20.00	0.233	0.25	6.19	-16.5	208	17.80	Clearer
1536	7.00	20.07	0.231	0.24	6.22	-23.2	165	17.80	Slightly Cloudy
1546	7.75	20.72	0.232	0.49	6.21	-24.7	130	17.80	Slightly Cloudy
1614	9.00	19.79	0.226	0.20	6.26	-35.5	96.2	17.80	Slightly Cloudy
1630	11.00	18.79	0.220	0.22	6.18	-36.5	80.0	17.80	Slightly Cloudy
1657	13.75	18.66	0.217	0.34	6.02	-30	42.3	17.80	Slightly Cloudy
1702	14.25	18.45	0.216	0.23	6.05	-31.5	39.5	17.80	Clear
1707	14.50	18.63	0.217	0.29	6.02	-28.5	36.1	17.80	Clear
1712	15.25	18.54	0.216	0.30	6.03	-26.2	35.0	NM	Clear

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1348

Purge Rate set @ 250 mL/min, increased to 350 mL/min @ 1625

Tubing intake set @ 60 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW04-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 89° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	5.54	FT.(BTOC)
Water Column:		9.46	FT.
	(x)	0.163	GAL/FT.
Well Volume:		6.54	GAL.
Total Purge Vol.:		12.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 1525	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	23.36	0.566	0.39	6.78	-81.9	25.2	5.65	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1336	1.50	24.12	0.556	1.64	6.83	-56.5	>1000	5.65	Tan
1425	6.25	NM	NM	NM	NM	NM	358	NM	Clearer
1435	7.50	NM	NM	NM	NM	NM	143	NM	
1504	10.50	23.42	0.567	0.43	6.81	-83.5	70	5.65	Slighty Cloudy
1514	11.50	23.31	0.565	0.37	6.80	-82.5	30.8	5.65	Clear
1517	12.75	23.37	0.566	0.36	6.78	-82.2	NM	5.65	Clear
1520	12.00	23.36	0.566	0.39	6.78	-81.9	25.2	5.65	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1324

Purge Rate set @ 400 mL

Tubing intake set @ 13 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04UCH
Event:	Base Background 2nd Quarter	Sample ID:	BASE-GW04UCH-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 80° F		Verd Anna Cunningham/RDU

Total Depth:		39.00	FT.(BTOC)
Depth to water:	(-)	5.4	FT.(BTOC)
Water Column:		33.60	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.47	GAL.
Total Purge Vol.:		11.50	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 09/14/2010 Time: 1725	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.23	0.353	0.43	7.31	-126.2	30.2	5.41	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1550	1.00	20.28	0.364	0.46	6.86	-99.4	>1000	5.5	Milky
1613	3.50	20.18	0.354	0.31	7.25	-124.9	566	5.41	Milky
1624	5.00	20.08	0.352	0.33	7.25	-127.1	195	5.41	Milky
1634	6.00	20.13	0.352	0.45	7.26	-127.2	122	5.41	Clear
1644	7.25	20.42	0.355	0.30	7.28	-126.7	74.3	5.41	Clear
1654	8.25	20.37	0.354	0.37	7.30	-127.5	49.3	5.41	Clear
1706	10.00	20.30	0.355	0.31	7.31	-127.8	32.6	5.41	Clear
1716	11.00	20.32	0.359	0.32	7.30	-126.6	31.2	5.41	Clear
1719	11.25	20.31	0.354	0.40	7.30	-126.2	28.0	5.41	Clear
1721	11.50	20.23	0.353	0.43	7.31	-126.2	30.2	5.41	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1541

Purge Rate set @ 400 mL/min

Tubing intake set @ 37 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Rachel Zajac	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW05-10C
Date:	9/15/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 68° F		Verd Anna Cunningham/RDU

Total Depth:		13.00	FT.(BTOC)
Depth to water:	(-)	3.97	FT.(BTOC)
Water Column:		9.03	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.47	GAL.
Total Purge Vol.:		4.50	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 09/15/2010 Time: 0825	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	24.35	0.370	1.10	3.97	-25.4	4.91	4.13	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0740	0.0	NM	NM	NM	NM	NM	NM	3.97	
0750	1.0	24.08	0.325	1.37	3.98	58.5	88.8	4.05	
0800	2.0	24.25	0.366	1.21	3.96	26.6	47.9	4.14	
0805	2.5	24.30	0.380	1.16	3.96	12.1	22.8	4.15	
0810	3.0	24.32	0.379	1.20	3.96	1.60	13.3	4.08	
0815	3.5	24.33	0.375	1.15	3.96	-12.1	8.11	4.12	
0820	4.0	24.34	0.374	1.12	3.96	-19.5	5.61	4.17	
0825	4.5	24.35	0.370	1.10	3.97	-25.4	4.91	4.13	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0740

Purge Rate set @ 400 mL/min

Tubing intake set @ 10 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05UCH
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW05-UCH-10C
Date:	9/15/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Clear 70° F		Verd Anna Cunningham/RDU

Total Depth:		55.00	FT.(BTOC)
Depth to water:	(-)	41.7	FT.(BTOC)
Water Column:		13.30	FT.
	(x)	2.16	GAL/FT.
Well Volume:		2.16	GAL.
Total Purge Vol.:		7.00	GAL.
Purge Device:		Bladdder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/15/10 Time: 0835	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.11	0.339	1.74	7.37	-108.9	11.1	44.0	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0737	1.0	18.98	0.349	1.62	6.84	-83.1	51.1	43.80	Clear
0749	2.0	19.04	0.346	1.41	7.18	-106.5	44.7	43.90	Clear
0757	3.0	19.08	0.330	1.37	7.14	-99.8	32.5	44.05	Clear
0807	4.0	19.12	0.325	1.26	7.32	-108.1	22.7	44.02	Clear
0813	5.0	19.13	0.328	1.26	7.29	-104.2	18.3	44.00	Clear
0823	6.0	19.09	0.334	1.24	7.31	-98.3	14.0	44.00	Clear
0827	7.0	19.11	0.339	1.74	7.37	-108.9	11.1	44.00	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0729

Purge Rate set @ 400 mL/min

Tubing intake set @ 52 ft btoc

MS/MSD

Duplicate ID No.:

Signature(s): Rachel Zajac

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW06
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW06-10C
Date:	9/17/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 82° F		Verd Anna Cunningham/RDU

Total Depth:		22.00	FT.(BTOC)
Depth to water:	(-)	17.16	FT.(BTOC)
Water Column:		4.84	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.79	GAL.
Total Purge Vol.:		10.10	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/17/2010 Time: 1221	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.03	0.076	NA	4.72	177.8	10	17.23	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1051	0.0	NM	NM	NM	NM	NM	NM	17.16	dark brown
1101	0.9	20.15	0.054	NA	4.45	188.1	>1000	17.23	dark brown
1111	1.8	19.75	0.067	NA	4.59	196.2	276	17.25	
1121	2.7	19.74	0.069	NA	4.60	196.6	99.7	17.21	
1131	3.6	19.69	0.071	NA	4.62	197.0	45.7	17.23	
1141	4.5	19.68	0.073	NA	4.64	196.7	32.1	17.23	
1151	5.4	19.72	0.074	NA	4.67	192.3	16.6	17.22	
1201	6.3	19.81	0.075	NA	4.68	187.9	14.3	17.20	
1211	9.2	20.03	0.076	NA	4.71	181.7	11.7	17.23	
1221	10.1	20.03	0.076	NA	4.72	177.8	10.0	17.23	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1051

Purge Rate set @ 350 mL/min
Tubing intake set @ 20 ft btoc

NA - Not Available due to equipment error

NM - Not Measured

*This sample was run only for PAHs and Metals due to a lab error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW06
Event:	Base Background 2nd Quarter	Sample ID:	BG-GW06-10C-2
Date:	11/1/2010	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Sunny/Breezy 64° F		

Total Depth:		22.00	FT.(BTOC)
Depth to water:	(-)	11.39	FT.(BTOC)
Water Column:		10.61	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.73	GAL.
Total Purge Vol.:		5.60	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 11/1/10 Time: 1325	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.46	0.108	6.20	3.67	-8.5	2.38	11.42	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1230	0.6	20.63	0.089	7.44	3.65	-1.5	12.0	11.44	Clear
1235	1.1	20.54	0.082	6.84	3.70	4.5	11.2	11.45	
1240	1.5	20.46	0.089	6.46	3.64	15.2	7.86	11.44	
1245	2.0	20.43	0.081	6.49	3.68	23.9	6.20	11.45	
1250	2.4	20.43	0.098	6.30	3.66	19.3	4.75	11.45	
1255	2.9	20.41	0.091	6.20	3.65	11.2	4.23	11.45	
1300	3.3	20.37	0.088	6.33	3.64	7.2	3.51	11.41	
1305	3.8	20.37	0.080	6.29	3.64	2.7	2.84	11.42	
1310	4.2	20.39	0.080	6.38	3.72	-6.9	2.57	11.44	
1315	4.7	20.42	0.097	6.32	3.89	-24.2	2.40	11.43	
1320	5.1	20.37	0.096	6.34	3.60	-4.9	2.21	11.44	
1325	5.6	20.46	0.108	6.20	3.67	-8.5	2.38	11.42	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Pesticides 8081B	none	1 L amber	2

Observations/Notes:

Pump started @ 1224

Purge Rate set @ 350 ml/min

Tubing intake set @ 15 ft btoc

*This well was sampled a second time to collect only for pesticide analysis, due to a lab error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW07-10C
Date:	9/13/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 81° F		Verd Anna Cunningham/RDU

Total Depth:		14.00	FT.(BTOC)
Depth to water:	(-)	6.09	FT.(BTOC)
Water Column:		7.91	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.29	GAL.
Total Purge Vol.:		6.30	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 09/13/2010 Time: 1858	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	22.83	0.076	2.22	4.43	187.4	17.8	9.91	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1738	0.0	NM	NM	NM	NM	NM	NM	6.09	
1748	0.7	23.44	0.079	3.74	4.37	174.8	41.4	7.56	
1753	1.2	23.51	0.079	2.82	4.44	176.2	126	7.89	
1758	2.0	23.44	0.079	2.00	4.48	173.6	95.8	8.14	
1808	2.8	23.33	0.076	1.84	4.54	170.3	55.4	8.39	
1818	3.6	23.27	0.076	2.00	4.52	169.5	76.5	8.69	
1828	4.3	23.14	0.076	2.06	4.46	172.9	75.4	9.18	
1838	5.0	23.02	0.076	2.14	4.46	177.6	44.9	9.41	
1848	5.7	22.93	0.076	2.25	4.45	182.0	32.0	9.72	
1858	6.3	22.83	0.076	2.22	4.43	187.4	17.8	9.91	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1738

Purge Rate set @ 300 mL/min

Tubing intake set @ 11 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW08
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW08-10C
Date:	9/15/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 72° F		Verd Anna Cunningham/RDU

Total Depth:		15	FT.(BTOC)
Depth to water:	(-)	9.23	FT.(BTOC)
Water Column:		5.77	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.94	GAL.
Total Purge Vol.:		3.2	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 09/15/2010 Time: 1010	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.88	0.371	2.66	6.61	74.5	9.81	9.44	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0930	0.0	NM	NM	NM	NM	NM	NM	9.23	Clear
0940	0.8	20.88	0.358	3.07	6.50	77.5	27.3	9.45	
0945	1.2	20.87	0.366	3.01	6.56	75.0	18.4	9.46	
0950	1.6	20.84	0.366	2.98	6.57	74.1	13.1	9.46	
0955	2.0	20.87	0.370	2.81	6.60	74.1	11.1	9.44	
1000	2.4	20.87	0.370	2.79	6.60	74.2	10.3	9.41	
1005	2.8	20.86	0.371	2.69	6.60	74..5	10.1	9.41	
1010	3.2	20.88	0.371	2.66	6.61	74.5	9.81	9.44	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0930

Purge Rate set @ 300 mL/min

Tubing intake set @ 12 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW09
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW09-10C
Date:	9/14/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Clear 80° F		Verd Anna Cunningham/RDU

Total Depth:		19.00	FT.(BTOC)
Depth to water:	(-)	15.25	FT.(BTOC)
Water Column:		3.75	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.61	GAL.
Total Purge Vol.:		7.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/14/2010 Time: 1210	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.68	0.069	7.75	4.75	169.9	25.0	15.35	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1055	0.5	19.85	0.073	8.16	4.93	209.2	>1000	NM	Opaque
1105	1.5	19.58	0.072	7.83	4.80	217.1	487	15.40	Cloudy
1115	2.5	19.67	0.071	7.73	4.87	194.3	198	15.40	Slightly Cloudy
1125	3.5	19.70	0.070	7.62	4.86	183.1	63.9	15.35	Clearer
1135	4.5	19.77	0.069	7.76	4.90	169.9	49.3	15.35	Clear
1145	5.5	19.70	0.070	7.74	4.86	167.9	41.4	15.35	Clear
1155	6.5	19.66	0.070	7.81	4.84	161.5	28.5	15.35	Clear
1205	7.5	19.68	0.069	7.75	4.75	169.9	25.0	15.35	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1052

Purge Rate set @ 400 mL/min

Tubing intake set @ 17 ft btoc

NM - Not Measured

MS/MSD | Duplicate ID No.:

Signature(s): Rachel Zajac

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW10
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW10-10C
Date:	9/17/2010	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 88° F		Verd Anna Cunningham/RDU

Total Depth:		15.50	FT.(BTOC)
Depth to water:	(-)	11.03	FT.(BTOC)
Water Column:		4.47	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.73	GAL.
Total Purge Vol.:		7.20	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 9/17/2010 Time: 1455	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	20.78	0.084	5.80	4.75	179.1	8.94	11.08	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1325	0.0	NM	NM	NM	NM	NM	NM	11.03	
1335	0.8	21.87	0.087	6.33	4.69	167.7	294	11.11	
1345	1.6	21.41	0.086	5.42	4.75	163.6	153	11.08	
1355	2.4	21.53	0.086	5.58	4.76	163.6	96.4	11.06	
1405	3.2	21.14	0.085	5.49	4.75	166.1	48.2	11.08	
1415	4.0	20.94	0.084	5.63	4.73	169.6	29.1	11.08	
1425	4.8	20.92	0.084	5.71	4.74	171.6	19.3	11.08	
1435	5.6	20.89	0.084	5.69	4.74	174.1	13.5	11.02	
1445	6.4	20.80	0.084	5.77	4.75	176.1	10.6	11.10	
1455	7.2	20.78	0.084	5.80	4.75	179.1	8.94	11.08	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1325

Purge Rate set @ 300 mL/min
Tubing intake set @ 13 ft btoc

NM - Not Measured

*This sample was run only for PAHs and Metals due to a lab error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW10
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW10-10C-2
Date:	11/1/2010	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Sunny 54° F		

Total Depth:		15.5	FT.(BTOC)
Depth to water:	(-)	7.27	FT.(BTOC)
Water Column:		8.23	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.341	GAL.
Total Purge Vol.:		4.2	GAL.
Purge Device:	Bladder Pump		

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 11/1/2010 Time: 0935	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	19.58	NA	4.04	3.85	68.3	7.67	7.32	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0900	0.7	19.35	NA	4.21	4.36	71.5	51.6	7.34	
0910	1.7	19.49	NA	4.25	4.03	61.7	27.5	7.27	
0915	2.2	19.57	NA	4.13	3.93	59.9	19.1	7.28	
0920	2.7	19.56	NA	4.09	3.92	57.5	15.4	7.28	
0925	3.2	19.58	NA	4.09	3.89	58.1	11.4	7.28	
0930	3.7	19.63	NA	4.01	3.84	58.3	9.21	7.31	
0935	4.2	19.58	NA	4.04	3.85	68.3	7.67	7.32	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Pesticides 8081B	none	1 L amber	3

Observations/Notes:

Pump started @ 0853

Purge Rate set @ 400 mL/min

Tubing intake set @ 11 ft btoc

NA - Not Available due to equipment error

*This well was sampled a second time to collect for pesticide analysis, due to a lab error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW01-10D
Date:	12/6/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Clear 40° F		Verd Anna Cunningham/RDU

Total Depth:		10.0	FT.(BTOC)
Depth to water:	(-)	6.04	FT.(BTOC)
Water Column:		3.96	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.65	GAL.
Total Purge Vol.:		5.0	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/6/2010 Time: 1720	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.73	0.401	0.35	5.74	65.2	17.2	6.31	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1625	0.25	17.32	0.319	2.86	6.64	-106.1	536	6.21	Brown/Cloudy
1635	1.50	18.77	0.367	1.29	6.17	-136.9	345	6.31	Cloudy
1645	2.25	19.00	0.378	1.05	6.12	-146.3	161	6.30	Cloudy
1655	3.00	19.01	0.377	2.75	6.09	-149.7	92.2	6.32	Slightly Cloudy
1710	4.00	18.63	0.395	0.40	6.88	69.5	21.0	6.31	Clear
1715	4.50	18.65	0.394	0.41	5.82	68.4	24.7	6.31	Clear
1717	4.75	18.77	0.402	0.35	5.85	61.5	12.5	6.31	Clear
1720	5.00	18.73	0.401	0.35	5.74	65.2	17.2	6.31	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1623

Purge Rate set @ 350 mL/min

Tubing intake set @ 7 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01UCH
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW01UCH-10D
Date:	12/6/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 40° F		Verd Anna Cunningham/RDU

Total Depth:		44	FT.(BTOC)
Depth to water:	(-)	8.21	FT.(BTOC)
Water Column:		35.79	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.83	GAL.
Total Purge Vol.:		13	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/6/2010 Time: 1540		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	17.99	0.600	0.61	7.05	-182.8	17.0	8.38	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1350	0.75	18.05	0.580	1.34	6.92	-160.9	>1000	8.37	Brown/Cloudy
1355	1.50	18.23	0.585	1.16	6.90	-156.3	1000	8.37	Brown/Cloudy
1400	2.00	18.15	0.584	1.05	7.00	-155.3	655	8.42	Brown/Cloudy
1405	2.25	18.16	0.584	0.99	7.01	-156.1	485	8.41	Cloudy
1415	3.50	18.04	0.587	2.00	7.00	-160.7	247	8.36	Slightly Cloudy
1425	4.00	18.08	0.588	0.94	7.02	-158.2	145	8.42	Slightly Cloudy
1435	5.50	18.03	0.590	0.73	7.05	-164.9	82.8	8.41	Slightly Cloudy
1445	6.50	17.96	0.592	1.70	7.04	-170.3	48.3	8.46	Slightly Cloudy
1455	7.75	18.08	0.595	0.67	7.05	-173.2	37.8	8.47	Slightly Cloudy
1505	8.50	18.03	0.596	0.61	7.04	-175.2	31.7	8.41	Clear
1515	9.50	18.01	0.598	0.57	7.04	-176.2	25.1	8.44	Clear
1525	10.50	18.09	0.600	1.60	7.05	-178.2	20.4	8.41	Clear
1530	11.00	18.11	0.601	0.99	7.05	-176.9	21.7	8.40	Clear
1532	11.25	18.01	0.599	0.93	7.05	-179.7	19.5	8.39	Clear
1535	11.50	17.98	0.599	0.80	7.05	-179.1	17.8	8.38	Clear
1540	12.50	17.99	0.600	0.61	7.05	-182.8	17.0	8.38	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1342

Purge Rate set @ 400 mL/min

Tubing intake set @ 42 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW02-10D
Date:	12/7/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Windy/Partly Cloudy 30° F		Verd Anna Cunningham/RDU

Total Depth:		17.00	FT.(BTOC)
Depth to water:	(-)	10.91	FT.(BTOC)
Water Column:		6.09	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.99	GAL.
Total Purge Vol.:		4.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/7/2010 Time: 1035	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.71	0.172	NA	5.65	-58.3	7.66	11.20	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0950	0.25	15.59	0.162	NA	5.84	11.6	408	11.02	Cloudy
1000	1.00	17.27	0.172	NA	5.72	-18.1	274	11.17	Cloudy
1010	1.75	17.62	0.173	NA	5.69	-41.7	42.6	11.16	Cloudy
1020	2.50	17.74	0.173	NA	5.67	-49.9	20.8	11.21	Cloudy
1030	3.50	17.73	0.171	NA	5.66	-55.5	13.1	11.20	Clear
1035	4.00	17.71	0.172	NA	5.65	-58.3	7.66	11.20	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0934

Purge Rate set @ 300 mL/min

Tubing intake set @ 12 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW02UCH
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW02UCH-10D
Date:	12/7/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny/Cold/Breezy 30° F		Verd Anna Cunningham/RDU

Total Depth:		58.00	FT.(BTOC)
Depth to water:	(-)	27.37	FT.(BTOC)
Water Column:		30.63	FT.
	(x)	0.163	GAL/FT.
Well Volume:		4.99	GAL.
Total Purge Vol.:		8.20	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/7/2010 Time: 1200	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.68	0.278	NA	7.6	-57.6	27.6	25.15	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1025	0.6	16.35	0.277	NA	7.57	28.6	>1000	27.03	Cloudy
1035	1.4	16.39	0.276	NA	7.64	22.8	1000	26.31	
1045	2.2	16.28	0.277	NA	7.59	-7.50	473	25.41	
1055	3.0	16.45	0.273	NA	7.59	-15.2	131	25.20	
1105	3.8	16.33	0.275	NA	7.60	-18.8	90.1	25.31	
1115	4.6	16.70	0.275	NA	7.61	-29.3	49.4	25.82	
1120	5.0	16.53	0.275	NA	7.61	-28.4	40.0	25.22	
1125	5.4	16.56	0.277	NA	7.61	-36.6	37.5	25.38	
1130	5.8	16.47	0.277	NA	7.61	-44.4	42.8	25.63	
1135	6.2	16.57	0.277	NA	7.61	-48.6	37.0	25.56	
1140	6.6	16.56	0.277	NA	7.61	-51.2	34.4	25.73	
1145	7.0	16.58	0.278	NA	7.61	-54.6	29.8	25.24	
1150	7.4	16.61	0.278	NA	7.62	-56.5	22.8	25.18	
1155	7.8	16.66	0.278	NA	7.61	-57.1	20.6	25.22	
1200	8.2	16.68	0.278	NA	7.61	-57.6	27.6	25.15	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1018

Purge Rate set @ 300 mL/min

Tubing intake set @ 55 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW03-10D
Date:	12/7/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 36° F		Verd Anna Cunningham/RDU

Total Depth:		20	FT.(BTOC)
Depth to water:	(-)	15.56	FT.(BTOC)
Water Column:		4.44	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.7	GAL.
Total Purge Vol.:		7.1	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/7/2010 Time: 1505	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.95	0.408	6.98	4.38	353.2	21.2	15.55	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1340	0.3	17.63	0.151	6.91	6.15	188.0	820	15.61	Cloudy
1350	1.1	17.64	0.231	7.09	5.49	255.7	414	15.58	
1400	1.9	17.53	0.289	7.19	5.30	278.3	159	15.57	
1410	2.7	18.03	0.324	7.07	5.06	296.3	65.9	15.59	
1420	3.5	17.81	0.353	7.15	4.87	314.1	43.6	15.61	
1425	3.9	17.82	0.360	6.87	4.79	316.0	51.3	15.60	
1430	4.3	17.74	0.370	7.10	4.71	323.7	28.3	15.58	
1440	5.1	17.92	0.391	7.11	4.58	332.6	19.3	15.61	
1445	5.5	17.86	0.397	7.17	4.53	338.6	15.5	15.63	
1455	6.3	17.85	0.405	6.94	4.44	344.9	13.6	15.62	
1500	6.7	17.90	0.408	7.09	4.40	349.0	11.8	15.35	
1505	7.1	17.95	0.408	6.98	4.38	353.2	21.2	15.55	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1336

Purge Rate set @ 300 mL/min

Tubing intake set @ 18 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03UCH
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW03UCH-10D
Date:	12/7/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny/Wind 30° F		Verd Anna Cunningham/RDU

Total Depth:		63.00	FT.(BTOC)
Depth to water:	(-)	15.96	FT.(BTOC)
Water Column:		47.04	FT.
	(x)	0.163	GAL/FT.
Well Volume:		7.67	GAL.
Total Purge Vol.:		19.0	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/7/2010 Time: 1630	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.14	0.215	0.22	6.19	-117.0	11.9	16.11	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1330	NM	NM	NM	NM	NM	NM	NM	NM	
1340	1.00	NM	NM	NM	NM	NM	596	16.14	Brown/Cloudy
1405	2.75	NM	NM	NM	NM	NM	783	16.09	Brown/Cloudy
1410	4.00	NM	NM	NM	NM	NM	473	16.09	Brown/Cloudy
1420	5.25	16.96	0.234	1.26	6.23	29.2	264	16.09	Brown/Cloudy
1430	7.00	17.42	0.224	4.25	6.20	-45.0	156	16.14	Brown/Cloudy
1450	9.00	17.60	0.221	0.69	6.21	-61.5	88.6	16.15	Brown/Cloudy
1500	10.00	17.33	0.217	0.65	6.21	-72.4	61.8	16.11	Brown/Cloudy
1510	10.50	17.22	0.218	0.57	6.19	-77.8	41.6	16.12	Cloudy
1520	11.75	17.26	0.218	0.45	6.22	-84.7	32.5	16.12	Cloudy
1530	13.00	17.21	0.216	0.36	6.21	-90.8	21.7	16.14	Cloudy
1540	14.00	17.25	0.217	0.29	6.21	-96.2	20.2	16.14	Clear
1550	15.00	17.20	0.218	0.26	6.21	-99.2	16.0	16.12	Clear
1600	16.00	17.13	0.215	0.25	6.21	-105.9	14.8	16.14	Clear
1610	17.00	17.15	0.215	0.23	6.21	-109.4	13.7	16.16	Clear
1620	18.00	17.11	0.217	0.21	6.22	-112.9	12.5	16.06	Clear
1630	19.00	17.14	0.215	0.22	6.19	-117.0	11.9	16.11	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1330

Purge Rate set @ 400 mL/min

Tubing intake set @ 60 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.: BBG-GW03UCHD-10D
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04
Event:	Base Background 3rd Quarter	Sample ID:	BBG-MW04-10D
Date:	12/9/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 40° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	4.62	FT.(BTOC)
Water Column:		10.38	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.69	GAL.
Total Purge Vol.:		7.80	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/9/2010 Time: 1425	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.21	0.488	0.60	6.78	-64.5	29.3	4.66	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1251	0.3	17.12	0.362	NA	6.78	160.4	575	4.69	Cloudy
1300	1.0	18.30	0.413	0.87	6.84	-17.4	370	4.67	
1310	1.8	18.09	0.443	0.86	6.86	-42.6	209	4.67	
1320	2.6	18.41	0.464	0.61	6.83	-53.8	124	4.68	
1330	3.4	18.17	0.469	0.62	6.83	-57.0	79.6	4.65	
1335	3.8	18.04	0.476	0.59	6.82	-58.3	60.4	4.64	
1340	4.2	17.72	0.477	0.59	6.81	-58.2	51.2	4.68	
1345	4.6	17.46	0.485	0.56	6.81	-59.1	47.7	4.66	
1350	5.0	17.17	0.483	0.57	6.80	-59.2	45.7	4.66	
1355	5.4	16.79	0.481	0.58	6.79	-59.4	39.6	4.66	
1400	5.8	17.26	0.483	0.59	6.80	-62.2	37.4	4.68	
1405	6.2	17.36	0.485	0.57	6.80	-63.3	36.5	4.68	
1410	6.6	17.20	0.483	0.61	6.80	-63.7	31.8	4.69	
1415	7.0	17.26	0.484	0.64	6.80	-64.0	33.5	4.66	
1420	7.4	17.04	0.485	0.62	6.79	-64.1	31.1	4.67	
1425	7.8	17.21	0.488	0.60	6.78	-64.5	29.3	4.66	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1247

Purge Rate set @ 300 mL/min

Tubing intake set @ 12 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04UCH
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW04UCH-10D
Date:	12/8/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 36° F		Verd Anna Cunningham/RDU

Total Depth:		39	FT.(BTOC)
Depth to water:	(-)	4.43	FT.(BTOC)
Water Column:		34.57	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.63	GAL.
Total Purge Vol.:		13.5	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/8/2010 Time: 1640	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.71	0.371	0.54	7.32	-133.8	27.9	4.57	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1400	0.7	17.97	0.377	0.27	7.21	-139.2	>1000	4.53	Cloudy
1410	1.5	17.93	0.376	0.19	7.27	-150.2	727	4.56	
1420	2.3	18.03	0.375	0.17	7.31	-153.1	434	4.51	
1430	3.1	17.79	0.374	0.18	7.32	-153.0	208	4.52	
1440	3.9	17.83	0.374	0.78	7.32	-140.3	124	4.52	
1450	4.7	17.79	0.372	0.95	7.32	-132.0	106	4.54	
1500	5.5	17.85	0.371	0.36	7.32	-135.6	93.8	4.57	
1510	6.3	17.91	0.373	0.63	7.32	-135.4	78.6	4.58	
1520	7.1	18.08	0.372	0.61	7.32	-135.4	73.7	4.52	
1530	7.9	18.30	0.372	0.57	7.32	-135.6	67.7	4.53	
1540	8.7	18.06	0.372	0.53	7.32	-135.7	51.6	4.54	
1545	9.1	17.93	0.371	0.53	7.32	-136.2	50.3	4.54	
1550	9.5	17.93	0.371	0.49	7.32	-136.9	52.3	4.57	
1555	9.9	17.87	0.371	0.57	7.32	-135.5	48.6	4.52	
1600	10.3	17.92	0.371	0.57	7.32	-135.0	46.8	4.56	
1605	10.7	17.03	0.371	0.64	7.32	-133.9	43.9	4.54	
1610	11.1	17.93	0.371	0.60	7.32	-134.1	42.5	4.57	
1615	11.5	17.81	0.371	0.66	7.32	-132.6	39.2	4.56	
1620	11.9	17.76	.0370	0.66	7.32	-132.4	35.7	4.54	
1625	12.3	17.76	0.371	0.60	7.32	-133.4	35.3	4.53	
1630	12.7	17.72	0.370	0.59	7.32	-132.9	32.5	4.58	
1640	13.5	17.71	0.371	0.54	7.32	-133.8	27.9	4.57	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1351

Purge Rate set @ 300 mL/min
Tubing intake set @ 37 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW05-10D
Date:	12/9/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Clear 45° F		Verd Anna Cunningham/RDU

Total Depth:		13.00	FT.(BTOC)
Depth to water:	(-)	2.14	FT.(BTOC)
Water Column:		10.86	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.77	GAL.
Total Purge Vol.:		6.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/9/2010 Time: 1625	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.84	0.282	0.52	5.21	-192.3	8.78	2.26	Slightly Brown

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1505	0.25	17.09	0.318	1.45	5.76	-178.7	106	2.21	Brownish
1515	0.75	17.99	0.320	0.81	5.56	-187.3	69.4	2.26	Brownish
1525	2.00	18.29	0.310	0.70	5.46	-189.1	34.8	2.29	Brownish
1535	2.75	18.08	0.302	0.69	5.39	-187.1	19.8	2.26	Brownish
1545	3.50	17.92	0.294	0.68	5.32	-188.1	10.9	2.25	Brownish
1550	4.00	17.78	0.291	0.67	5.29	-190.3	9.88	2.29	Brownish
1600	4.00	17.40	0.287	0.71	5.32	-184.4	8.43	2.32	Slightly Brown
1610	5.00	17.80	0.285	0.56	5.25	-187.4	4.26	2.24	Slightly Brown
1620	6.00	17.83	0.283	0.53	.5.22	-190.9	3.68	2.22	Slightly Brown
1625	6.50	17.84	0.282	0.52	5.21	-192.3	3.78	2.26	Slightly Brown

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1500

Purge Rate set @ 350 mL/min

Tubing intake set @ 8 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05UCH
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW05UCH-10D
Date:	12/9/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Clear 35° F		Verd Anna Cunningham/RDU

Total Depth:		55	FT.(BTOC)
Depth to water:	(-)	39.9	FT.(BTOC)
Water Column:		15.10	FT.
	(x)	0.163	GAL/FT.
Well Volume:		2.46	GAL.
Total Purge Vol.:		8	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/9/2010 Time: 1410		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	18.47	0.308	0.61	7.49	-197.1	5.71	41.21	Clear
FIELD PARAMETERS		0.308					0.61		
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1240	0.75	18.40	0.331	1.17	7.19	-128.9	14.1	40.91	Clear
1250	1.25	18.52	0.328	1.06	7.31	-174.2	12.4	40.11	Clear
1300	2.00	18.46	0.319	0.77	7.39	-179.9	12.4	41.09	Clear
1310	3.00	18.47	0.309	0.70	7.42	-185.4	10.6	41.14	Clear
1320	4.00	18.52	0.306	0.70	7.44	-189.9	8.93	41.21	Clear
1345	5.25	18.36	0.312	0.70	7.46	-190.0	9.98	40.91	Clear
1355	6.00	18.47	0.308	0.61	7.47	-196.3	8.46	41.22	Clear
1405	7.00	18.57	0.309	0.59	7.48	-199.1	7.00	41.21	Clear
1410	7.75	18.47	0.308	0.61	7.49	-197.1	5.71	41.21	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1228

Purge Rate set @ 350 mL/min

Tubing intake set @ 52 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW06
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW06-10D
Date:	12/6/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny/Breezy 41° F		Verd Anna Cunningham/RDU

Total Depth:		22	FT.(BTOC)
Depth to water:	(-)	12.8	FT.(BTOC)
Water Column:		9.20	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.5	GAL.
Total Purge Vol.:		8.1	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/6/2010 Time: 1515	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.32	0.066	7.86	4.65	316.6	8.93	12.84	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1340	0.5	17.59	0.061	NA	4.92	224.5	709	12.82	Dark Brown
1345	0.9	18.20	0.061	NA	4.82	251.2	549	12.84	
1355	1.7	18.30	0.062	NA	4.80	268.4	302	12.85	
1405	2.5	18.32	0.062	7.87	4.69	282.8	175	12.84	
1415	3.3	18.33	0.064	7.93	4.74	293.4	111	12.84	
1425	4.1	18.36	0.064	7.98	4.59	302.2	83.6	12.85	
1435	4.9	18.36	0.065	7.90	4.69	316.0	41.6	12.85	
1440	5.3	18.41	0.065	7.95	4.91	305.9	34.5	12.86	
1445	5.7	18.36	0.065	7.83	4.92	296.2	26.4	12.85	
1450	6.1	18.41	0.065	7.93	4.65	313.4	17.8	12.86	
1455	6.5	18.40	0.065	7.87	5.00	297.2	16.9	12.85	
1500	6.9	18.43	0.065	7.88	4.69	290.1	15.7	12.86	
1505	7.3	18.47	0.066	7.88	4.64	314.6	13.6	12.86	
1510	7.7	18.50	0.066	7.86	4.65	319.0	11.6	12.86	
1515	8.1	18.32	0.066	7.86	4.65	316.6	8.93	12.84	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1333

Purge Rate set @ 300 mL/min

Tubing intake set @ 18 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW07-10D
Date:	12/8/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 24° F		Verd Anna Cunningham/RDU

Total Depth:		14.00	FT.(BTOC)
Depth to water:	(-)	4.00	FT.(BTOC)
Water Column:		10.00	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.69	GAL.
Total Purge Vol.:		11.40	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/8/2010 Time: 1150	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.36	0.088	0.90	4.65	233.0	9.53	6.14	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0935	0.5	17.55	0.098	4.63	5.12	164.2	567	4.38	Cloudy
0945	1.3	18.29	0.092	4.90	5.03	199.0	509	4.67	
0955	2.1	18.29	0.092	3.87	4.92	227.3	193	5.02	
1005	3.0	18.27	0.091	2.75	4.82	237.9	201	5.41	
1015	3.8	18.49	0.090	2.22	4.78	238.2	195	5.66	
1025	4.6	18.45	0.090	1.93	4.76	237.5	170	5.71	
1035	5.4	18.43	0.089	1.65	4.74	236.2	156	5.78	
1045	6.2	18.42	0.089	1.47	4.72	235.7	118	5.84	
1055	7.0	18.43	0.088	1.35	4.68	236.7	87.7	5.89	
1105	7.8	18.43	0.088	1.19	4.65	236.6	68.8	5.98	
1115	8.6	18.37	0.088	1.17	4.66	235.2	51.0	6.01	
1120	9.0	18.31	0.088	1.17	4.66	234.7	43.3	6.02	
1125	9.4	18.27	0.088	1.06	4.63	235.1	26.4	6.05	
1130	9.8	18.28	0.088	1.01	4.64	234.4	16.1	6.07	
1135	10.2	18.32	0.088	0.98	4.64	234.3	11.6	6.11	
1140	10.6	18.32	0.088	0.97	4.65	234.2	10.7	6.15	
1145	11.0	18.26	0.088	1.00	4.65	235.0	10.3	6.16	
1150	11.4	18.36	0.088	0.90	4.65	233.0	9.53	6.14	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0929

Purge Rate set @ 325 mL/min, 300 mL/min at 1015

Tubing intake set @ 12 ft btoc

MS/MSD	Yes	Duplicate ID No.:	
Signature(s):	Verd Anna Cunningham		

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW08
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW08-10D
Date:	12/8/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 25° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	7.09	FT.(BTOC)
Water Column:		7.91	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.29	GAL.
Total Purge Vol.:		4.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/8/2010 Time: 1220		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	NM	NM	NM	NM	NM	21.7	7.11	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0930	0.75	16.98	0.292	5.48	6.90	-18.0	>1000	7.36	Cloudy/Brown
0940	2.00	17.30	0.199	5.34	6.94	-49.6	113	Dry	Cloudy/Brown
1030	NM	NM	NM	NM	NM	NM	317	7.09	Cloudy
1040	NM	NM	NM	NM	NM	NM	553	7.10	Cloudy
1045	NM	NM	NM	NM	NM	NM	494	NM	Cloudy
1055	NM	NM	NM	NM	NM	NM	388	7.11	Cloudy
1100	NM	NM	NM	NM	NM	NM	270	7.11	Slightly Cloudy
1105	NM	NM	NM	NM	NM	NM	248	7.11	Slightly Cloudy
1110	NM	NM	NM	NM	NM	NM	212	7.11	Slightly Cloudy
1115	NM	NM	NM	NM	NM	NM	218	7.12	Slightly Cloudy
1120	NM	NM	NM	NM	NM	NM	161	7.11	Slightly Cloudy
1125	NM	NM	NM	NM	NM	NM	105	7.11	Slightly Cloudy
1135	NM	NM	NM	NM	NM	NM	57.7	7.11	Slightly Cloudy
1150	3.5	NM	NM	NM	NM	NM	34.8	7.11	Clear
1200	4.00	NM	NM	NM	NM	NM	24.2	7.11	Clear
1210	4.25	NM	NM	NM	NM	NM	39.2	7.11	Clear
1220	4.50	NM	NM	NM	NM	NM	21.7	7.11	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0913

Purge Rate set @ 400 mL/min

Tubing intake set @ 13 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW09
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW09-10D
Date:	12/9/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 28° F		Verd Anna Cunningham/RDU

Total Depth:		19.00	FT.(BTOC)
Depth to water:	(-)	13.57	FT.(BTOC)
Water Column:		5.43	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.89	GAL.
Total Purge Vol.:		6.40	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/9/2010 Time: 1100	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.68	0.091	6.73	4.9	300.2	22.8	13.62	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0845	0.2	13.40	0.131	7.08	4.96	196.0	315	13.61	Cloudy
0855	0.6	14.51	0.103	7.36	4.93	214.5	285	13.61	
0910	1.2	14.92	0.101	NA	4.61	252.8	374	13.56	
0935	1.4	13.33	0.102	7.74	5.02	246.8	815	13.63	
0945	1.9	15.70	0.097	6.85	5.07	248.4	411	13.58	
0955	2.4	15.68	0.095	NA	4.85	271.6	272	13.61	
1015	2.8	16.09	0.095	6.67	4.79	286.6	358	13.63	
1025	3.6	16.57	0.093	6.60	4.91	282.1	213	13.64	
1035	4.4	16.80	0.092	6.55	4.90	291.3	81.4	13.62	
1045	5.2	16.78	0.091	6.55	4.92	293.4	55.2	13.61	
1050	5.6	16.79	0.091	6.63	4.89	297.7	39.0	13.62	
1055	6.0	16.80	0.091	6.71	4.91	297.7	30.4	13.63	
1100	6.4	16.68	0.091	6.73	4.90	300.2	22.8	13.62	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0840

Purge Rate set @ 150 mL/min, 200 mL/min @ 0935, 300 mL/min @ 1015

Tubing intake set @ 16 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW10
Event:	Base Background 3rd Quarter	Sample ID:	BBG-GW10-10D
Date:	12/6/2010	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 36° F		Verd Anna Cunningham/RDU

Total Depth:		15.50	FT.(BTOC)
Depth to water:	(-)	7.93	FT.(BTOC)
Water Column:		7.57	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.23	GAL.
Total Purge Vol.:		3.70	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 12/6/2010 Time: 1030	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.88	0.095	5.53	4.77	297.8	9.87	7.92	

FIELD PARAMETERS

950	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0950	0.5	17.06	0.100	6.43	5.07	223.6	97.3	7.96	Cloudy
0955	0.9	17.47	0.098	6.12	4.86	245.0	66.6	7.93	
1000	1.3	17.57	0.097	6.12	4.88	254.5	51.7	7.96	
1005	1.7	17.72	0.096	6.02	4.43	284.4	37.7	7.94	
1010	2.1	17.77	0.096	6.01	4.82	275.7	29.6	7.94	
1015	2.5	17.81	0.095	5.92	4.81	280.7	21.1	7.93	
1020	2.9	17.83	0.095	5.67	4.79	285.7	16.2	7.94	
1025	3.3	17.83	0.095	5.47	4.80	289.0	13.0	7.93	
1030	3.7	17.88	0.095	5.53	4.77	297.8	9.87	7.92	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0943
Purge Rate set @ 300 mL/min
Tubing intake set @ 12 ft btoc

MS/MSD	Duplicate ID No.:	BBG-GW10D-10D @1035
Signature(s):	Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW01-11A
Date:	3/7/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Partly Cloudy 55° F		Verd Anna Cunningham/RDU

Total Depth:		10.00	FT.(BTOC)
Depth to water:	(-)	3.82	FT.(BTOC)
Water Column:		6.18	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.00	GAL.
Total Purge Vol.:		4.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Bladder Pump

SAMPLE DATA									
Date:	3/7/2011	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Time:	1625								
Method:	Low Flow	14.27	0.273	0.92	6.09	108.2	1.77	4.11	Clear

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1540	0.50	14.03	0.222	1.80	6.11	122.6	31.7	4.01	Clear
1550	1.25	14.11	0.226	1.30	6.10	131.5	13.3	4.06	Clear
1600	2.25	14.19	0.242	0.97	6.10	125.1	7.21	4.11	Clear
1605	2.50	14.20	0.249	0.99	6.11	116.7	4.85	4.11	Clear
1610	3.00	14.22	0.255	0.98	6.11	106.2	3.57	4.11	Clear
1615	3.50	14.23	0.262	0.92	6.10	96.2	2.87	4.12	Clear
1620	4.00	14.23	0.268	0.94	6.09	108.1	2.13	4.12	Clear
1625	4.50	14.27	0.273	0.92	6.09	108.2	1.77	4.11	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1534

Purge Rate set @ 350 mL/min

Tubing intake set @ 8 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW01UCH
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW01UCH-11A
Date:	3/7/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 60° F		Verd Anna Cunningham/RDU

Total Depth:		44.00	FT.(BTOC)
Depth to water:	(-)	6.99	FT.(BTOC)
Water Column:		37.01	FT.
	(x)	0.163	GAL/FT.
Well Volume:		6.03	GAL.
Total Purge Vol.:		13.80	GAL.
Purge Device:	Bladder Pump		

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/7/2011 Time: 1450	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.31	0.599	0.55	6.88	-104.6	20.9	7.22	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1300	0.75	18.00	0.582	0.66	6.91	-73.0	817	7.21	Cloudy
1310	1.25	17.97	0.595	0.51	6.89	-80.4	406	7.29	Cloudy
1320	2.50	17.96	0.598	0.41	6.88	-68.1	166	7.31	Cloudy
1330	3.75	18.03	0.599	0.51	6.88	-52.0	102	7.31	Cloudy
1340	5.00	18.09	0.599	0.50	6.88	-44.8	64.7	7.32	Slightly Cloudy
1350	6.25	18.13	0.600	0.47	6.88	-37.5	44.2	7.31	Slightly Cloudy
1400	7.50	18.08	0.598	0.47	6.88	-33.8	36.1	7.21	Clear
1410	8.75	18.03	0.597	0.50	6.88	-52.7	35.0	7.25	Clear
1420	10.00	18.02	0.596	0.50	6.88	-94.1	29.2	7.21	Clear
1430	11.50	18.08	0.597	0.51	6.88	-104.1	26.3	7.19	Clear
1435	12.25	18.21	0.598	0.63	6.88	-130.5	25.6	7.31	Clear
1440	12.75	18.24	0.598	0.55	6.88	-130.0	23.1	7.21	Clear
1445	13.25	18.26	0.599	0.53	6.88	-101.4	21.7	7.31	Clear
1450	13.75	18.31	0.599	0.55	6.88	-104.6	20.9	7.22	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1257

Purge Rate set @ 500 mL/min

Tubing intake set @ 42 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	Base Background 4th Quarter	Well ID:	BASE-MW02
Event:	CTO-094	Sample ID:	BBG-GW02-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 60° F		

Total Depth:		17.00	FT.(BTOC)
Depth to water:	(-)	10.38	FT.(BTOC)
Water Column:		6.62	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.08	GAL.
Total Purge Vol.:		4.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 1203	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	14.68	0.113	5.40	5.50	191.1	3.02	10.66	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1125	0.5	14.29	0.096	NM	5.65	159.8	83.3	10.62	Slightly Cloudy
1135	1.5	14.51	0.099	6.46	5.57	177.6	32.5	10.61	Clear
1145	2.5	14.62	0.105	5.45	5.53	183.7	16.4	10.61	Clear
1150	3.0	14.60	0.108	5.40	5.53	186.7	9.48	10.64	Clear
1155	3.5	14.62	0.110	5.40	5.52	188.9	6.25	10.66	Clear
1200	4.0	14.68	0.112	5.41	5.51	191.1	4.10	10.62	Clear
1203	4.0	14.68	0.113	5.40	5.50	191.1	3.02	10.66	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1120

Purge Rate set @ 350 mL/min
Tubing intake set @ 12 ft btoc

NM - Not Measured

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	Base Background 4th Quarter	Well ID:	BASE-MW02UCH
Event:	CTO-094	Sample ID:	BBG-GW02UCH-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 45° F		

Total Depth:		58.00	FT.(BTOC)
Depth to water:	(-)	26.34	FT.(BTOC)
Water Column:		31.66	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.16	GAL.
Total Purge Vol.:		7.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 1006		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	17.67	0.248	0.16	7.67	-187.5	2.00	26.37	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0915	0.25	17.02	0.241	1.08	7.65	-121.9	38.8	26.33	Clear
0925	1.50	17.58	0.248	0.28	7.68	-174.4	13.4	26.36	Clear
0935	2.50	17.58	0.248	0.21	7.68	-181.2	5.82	26.36	Clear
0945	4.00	17.71	0.248	0.19	7.67	-183.1	3.22	26.36	Clear
0955	5.00	17.66	0.248	0.13	7.67	-183.5	1.91	26.36	Clear
1000	5.25	17.67	0.248	0.16	7.67	-184.0	1.92	26.36	Clear
1003	5.75	17.65	0.247	0.16	7.67	-186.9	1.63	26.38	Clear
1006	6.25	17.67	0.248	0.16	7.67	-187.5	2.00	26.37	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0900

Purge Rate set @ 400 mL/min

Tubing intake set @ 55 ft btoc

MS/MSD		Duplicate ID No.:	BBG-GW02UCHD-11A
Signature(s):	Kelly Ramsey		

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW03-11A
Date:	3/9/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Partly Cloudy 64° F		Verd Anna Cunningham/RDU

Total Depth:		20.00	FT.(BTOC)
Depth to water:	(-)	15.06	FT.(BTOC)
Water Column:		4.94	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.81	GAL.
Total Purge Vol.:		2.90	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/9/2011 Time: 1245	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	16.92	0.314	6.04	4.37	365.7	6.01	15.16	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1215	0.55	17.40	0.153	7.33	4.95	206.4	45.6	15.12	Slightly Cloudy
1220	0.90	17.19	0.191	6.74	4.63	284.3	28.7	15.13	
1225	1.30	17.13	0.243	6.50	4.51	322.0	15.7	15.13	
1230	1.70	16.99	0.269	6.44	4.46	336.7	11.5	15.12	
1235	2.10	16.91	0.290	6.40	4.42	353.1	8.26	15.14	
1240	2.50	16.93	0.306	6.17	4.39	361.7	6.37	15.13	
1245	2.90	16.92	0.314	6.04	4.37	365.7	6.01	15.16	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1208

Purge Rate set @ 300 mL/min

Tubing intake set @ 17 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW03UCH
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW03UCH-11A
Date:	3/9/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Partly Cloudy 65° F		Verd Anna Cunningham/RDU

Total Depth:		63.00	FT.(BTOC)
Depth to water:	(-)	15.54	FT.(BTOC)
Water Column:		47.46	FT.
	(x)	0.163	GAL/FT.
Well Volume:		7.74	GAL.
Total Purge Vol.:		8.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/9/2011 Time: 1330	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.83	0.215	0.35	6.13	0.4	8.59	15.61	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1230	0.25	17.93	0.270	1.94	6.24	155.1	7.09	15.72	Clear
1240	1.50	17.88	0.239	0.67	6.17	94.2	36.0	15.61	Clear
1250	2.75	17.84	0.225	0.44	6.14	62.3	27.2	15.61	Clear
1300	4.00	17.84	0.221	0.42	6.14	35.2	19.9	15.63	Clear
1310	5.25	17.81	0.219	0.43	6.14	18.7	13.6	15.62	Clear
1320	6.25	17.84	0.218	0.39	6.14	7.40	10.6	15.71	Clear
1330	7.75	17.83	0.215	0.35	6.13	0.40	8.59	15.61	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1225

Purge Rate set @ 350 mL/min, increased to 500 mL/min @ 1237

Tubing intake set @ 60 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW04-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 60° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	2.49	FT.(BTOC)
Water Column:		12.51	FT.
	(x)	0.163	GAL/FT.
Well Volume:		2.04	GAL.
Total Purge Vol.:		9.50	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 1520	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	13.74	0.342	1.22	6.87	-24.2	9.73	2.6	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1400	0.50	13.77	0.210	3.13	7.14	116.4	942	2.59	Cloudy/Brownish
1410	1.50	13.80	0.250	2.31	7.06	44.5	398	2.59	Cloudy/Brownish
1420	2.50	13.77	0.281	1.73	7.00	4.50	109	2.61	Cloudy/Brownish
1430	3.75	13.76	0.310	1.20	6.94	-10.5	39.6	2.59	Slightly Cloudy
1440	4.50	13.73	0.320	1.08	6.92	-14.8	30.6	2.61	Clear
1450	6.00	13.74	0.329	1.11	6.90	-18.0	17.9	2.61	Clear
1500	7.00	13.70	0.335	1.34	6.89	-22.7	14.4	2.62	Clear
1510	8.50	13.73	0.339	1.20	6.88	-23.2	11.0	2.62	Clear
1520	9.50	13.74	0.342	1.22	6.87	-24.2	9.73	2.60	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1353

Purge Rate set @ 400 mL/min

Tubing intake set @ 10 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Kelly Ramsey	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW04UCH
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW04UCH-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 61°F		Verd Anna Cunningham/RDU

Total Depth:		39.00	FT.(BTOC)
Depth to water:	(-)	2.41	FT.(BTOC)
Water Column:		36.59	FT.
	(x)	0.163	GAL/FT.
Well Volume:		5.96	GAL.
Total Purge Vol.:		19.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 1855	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	17.92	0.318	0.26	7.30	-134.0	29.3	2.50	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1605	0.25	17.93	0.324	2.27	7.33	-49.8	689	2.44	Cloudy/White
1615	1.30	18.10	0.323	1.25	7.31	-106.4	784	2.44	
1625	2.40	18.13	0.322	0.65	7.31	-125.5	325	2.46	
1635	3.40	18.13	0.322	0.54	7.31	-128.2	156	2.46	
1645	4.50	18.16	0.321	0.28	7.31	-132.2	97.9	2.45	
1655	5.50	18.16	0.321	0.26	7.31	-132.4	73.6	2.45	
1705	6.60	18..19	0.321	0.31	7.32	-133.0	60.6	2.49	
1715	7.60	18.13	0.321	0.20	7.31	-137.0	54.9	2.50	
1725	8.80	18.09	0.320	0.17	7.31	-134.1	49.7	2.46	
1735	9.80	18.07	0.320	0.19	7.31	-134.0	44.2	2.47	
1745	10.90	18.04	0.320	0.12	7.31	-137.0	43.3	2.48	
1755	11.90	17.98	0.319	0.11	7.31	-135.7	85.3	2.49	
1805	13.00	17.93	0.319	NM	7.31	-136.7	67.2	2.48	
1815	14.00	17.93	0.318	0.55	7.31	-127.3	51.7	2.48	Slightly Cloudy
1825	15.00	17.99	0.319	0.64	7.31	-128.0	41.3	2.49	Slightly Cloudy
1835	16.50	17.93	0.319	0.29	7.30	-133.9	36.1	2.54	Slightly Cloudy
1845	17.50	17.96	0.319	0.33	7.30	-133.2	31.3	2.52	Slightly Cloudy
1855	19.00	17.92	0.318	0.26	7.30	-134.0	29.3	2.50	Slightly Cloudy

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1557

Purge Rate set @ 400 mL/min

Tubing intake set @ 37 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW05-11A
Date:	3/7/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Cloudy 50° F		Verd Anna Cunningham/RDU

Total Depth:		13.00	FT.(BTOC)
Depth to water:	(-)	1.03	FT.(BTOC)
Water Column:		11.94	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.95	GAL.
Total Purge Vol.:		4.10	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/7/2011 Time: 1740	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	14.42	0.154	1.47	4.64	-174.4	5.46	1.14	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1710	0.5	14.57	0.144	1.08	4.94	-132.6	32.5	1.15	Yellow Tint
1715	1.1	14.50	0.147	1.68	4.84	-156.8	15.9	1.21	Slight Odor
1720	1.7	14.48	0.150	1.64	4.79	-163.5	13.0	1.27	
1725	2.3	14.46	0.150	1.57	4.76	-169.7	9.35	1.22	
1730	2.9	14.45	0.151	1.53	4.72	-172.3	7.66	1.22	
1735	3.5	14.41	0.153	1.52	4.67	-173.7	6.14	1.18	
1740	4.1	14.42	0.154	1.47	4.64	-174.4	5.46	1.14	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1706

Purge Rate set @ 450 mL/min

Tubing intake set @ 8 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW05UCH
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW05UCH-11A
Date:	3/9/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Mostly Cloudy 55° F		Verd Anna Cunningham/RDU

Total Depth:		55.00	FT.(BTOC)
Depth to water:	(-)	39.03	FT.(BTOC)
Water Column:		15.97	FT.
	(x)	0.163	GAL/FT.
Well Volume:		2.6	GAL.
Total Purge Vol.:		6.30	GAL.
Purge Device:		Bladder Pump	

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/9/2011 Time: 1010	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	18.63	0.281	0.07	7.84	-209.6	6.27	39.28	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0900	0.7	18.24	0.249	0.31	9.91	-119.4	25.5	39.21	Slightly Cloudy
0905	1.1	18.17	0.247	0.25	9.37	-129.0	25.1	39.26	
0910	1.5	18.18	0.256	0.17	8.41	-143.8	18.4	39.26	
0915	1.9	18.20	0.264	0.15	8.58	-253.0	13.6	39.25	
0920	2.3	18.20	0.267	0.15	8.50	-254.7	12.0	39.24	Clear
0925	2.7	18.29	0.268	0.15	8.35	-251.0	10.8	39.25	
0930	3.1	18.32	0.269	0.14	8.29	-259.4	9.70	39.26	
0935	3.5	18.32	0.270	0.14	8.19	-244.5	10.2	39.25	
0940	3.9	18.41	0.271	0.13	8.11	-232.1	9.41	39.26	
0950	4.7	18.64	0.275	0.11	8.01	-230.1	9.45	39.26	
0955	5.1	18.73	0.278	0.09	7.95	-221.0	8.32	39.27	
1000	5.5	18.76	0.278	0.08	7.92	-209.7	7.60	39.24	
1005	5.9	18.79	0.280	0.08	7.88	-205.0	7.13	39.28	
1010	6.3	18.63	0.281	0.07	7.84	-209.6	6.27	39.28	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0851

Purge Rate set @ 300 mL/min

Tubing intake set @ 52 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW06
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW06-11A
Date:	3/7/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Overcast/Breezy 60° F		Verd Anna Cunningham/RDU

Total Depth:		22.00	FT.(BTOC)
Depth to water:	(-)	12.56	FT.(BTOC)
Water Column:		9.44	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.54	GAL.
Total Purge Vol.:		3.30	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/7/2011 Time: 1540		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	16.16	0.043	NA	4.90	243.5	3.28	12.64	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1515	0.8	16.00	0.042	NA	4.89	221.4	6.26	12.60	Clear
1520	1.3	16.08	0.042	NA	4.88	232.3	5.46	12.60	Clear
1525	1.8	16.11	0.042	NA	4.88	240.5	5.74	12.61	Clear
1530	2.3	16.17	0.043	NA	4.89	243.2	4.75	12.65	Clear
1535	2.8	16.16	0.043	NA	4.90	245.1	4.00	12.62	Clear
1540	3.3	16.16	0.043	NA	4.90	243.5	3.28	12.64	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1507

Purge Rate set @ 375 mL/min
Tubing intake set @ 17 ft btoc

NA - Not Available due to equipment error

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW07-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 54° F		Verd Anna Cunningham/RDU

Total Depth:		14.00	FT.(BTOC)
Depth to water:	(-)	2.02	FT.(BTOC)
Water Column:		11.98	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.95	GAL.
Total Purge Vol.:		6.10	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 1201	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	14.60	0.064	1.40	4.75	218.9	0.86	3.51	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1105	0.85	14.73	0.065	1.33	4.83	193.7	21.6	3.27	
1110	1.38	14.52	0.064	1.31	4.82	197.8	9.14	3.35	
1115	1.84	14.57	0.064	1.50	4.83	197.6	5.99	3.29	
1120	2.30	14.51	0.064	1.43	4.80	202.8	3.95	3.34	
1125	2.76	14.56	0.064	1.49	4.79	204.4	2.90	3.33	
1135	3.68	14.58	0.063	1.45	4.78	211.6	1.95	3.40	
1145	4.60	14.64	0.063	1.43	4.77	214.7	1.28	3.45	
1155	5.52	14.58	0.064	1.43	4.76	217.0	0.98	3.44	
1158	5.80	14.58	0.063	1.43	4.76	217.4	0.87	3.47	
1201	6.07	14.60	0.064	1.40	4.75	218.9	0.86	3.51	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAH 8270C	none	1 L amber	2
Pest 8081	none	1 L amber	1
Metals 6010B/7470A	HNO3	1 L HDPE	1

Observations/Notes:

Pump started @ 1057

Purge Rate set at 400 mL/min, 350 mL/min at 1110

Tubing intake set @ 9 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

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GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW08
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW08-11A
Date:	3/8/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny 39° F		Verd Anna Cunningham/RDU

Total Depth:		15.00	FT.(BTOC)
Depth to water:	(-)	6.23	FT.(BTOC)
Water Column:		8.77	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.43	GAL.
Total Purge Vol.:		6.40	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/8/2011 Time: 0940	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	14.32	0.132	NA	6.53	161.3	9.80	6.31	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0850	0.48	14.05	0.193	NA	6.71	168.1	124	6.28	Slightly Cloudy
0905	2.26	13.95	0.123	NA	6.51	160.1	41.3	6.29	Clearer
0910	2.85	13.95	0.125	NA	6.51	161.1	24.4	6.30	
0915	3.44	13.98	0.126	NA	6.52	160.2	18.4	6.32	
0920	4.03	14.00	0.127	NA	6.52	161.0	16.9	6.32	
0925	4.62	14.03	0.129	NA	6.52	161.3	13.9	6.30	Clear
0930	5.21	14.22	0.130	NA	6.52	161.5	11.8	6.32	
0935	5.80	14.30	0.131	NA	6.52	162.2	11.3	6.31	
0940	6.39	14.32	0.132	NA	6.53	161.3	9.80	6.31	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAH 8270C	none	1 L amber	2
Pest 8081	none	1 L amber	1
Metals 6010B/7470A	HNO3	1 L HDPE	1

Observations/Notes:

Pump started @ 0846

Purge Rate set @ 450 mL/min
Tubing intake set @ 10 ft btoc

NA - Not Available due to equipment error

MS/MSD | Duplicate ID No.:

Signature(s): Verd Anna Cunningham

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE- MW09
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW09-11A
Date:	3/9/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Cloudy 60° F		Verd Anna Cunningham/RDU

Total Depth:		19.00	FT.(BTOC)
Depth to water:	(-)	12.96	FT.(BTOC)
Water Column:		6.04	FT.
	(x)	0.163	GAL/FT.
Well Volume:		0.98	GAL.
Total Purge Vol.:		5.00	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/9/2011 Time: 1040	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	15.93	0.068	7.85	5.36	220.7	7.48	13.07	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
0955	0.25	15.41	0.101	7.62	5.62	205.5	97.3	13.04	Cloudy
1005	1.25	15.70	0.079	7.83	5.46	227.0	119	13.11	Cloudy
1015	2.50	15.80	0.072	7.84	5.40	233.5	44.9	13.11	Slightly Cloudy
1025	3.25	15.85	0.070	7.66	5.35	236.7	19.8	13.04	Clear
1035	4.00	15.91	0.069	7.92	5.34	235.2	11.6	13.07	Clear
1040	4.25	15.93	0.068	7.85	5.36	220.7	7.48	13.07	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 0947

Purge Rate set @ 350 mL/min

Tubing intake set at 15 ft btoc

MS/MSD yes	Duplicate ID No.:
Signature(s): Kelly Ramsey	

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW10
Event:	Base Background 4th Quarter	Sample ID:	BBG-GW10-11A
Date:	3/7/2011	Sampling Team:	Kelly Ramsey/CLT
Weather:	Sunny/Breezy 60° F		Verd Anna Cunningham/RDU

Total Depth:		15.50	FT.(BTOC)
Depth to water:	(-)	7.64	FT.(BTOC)
Water Column:		7.86	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.28	GAL.
Total Purge Vol.:		4.30	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Purge Device: Bladder Pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/7/2011 Time: 1320	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method: Low Flow	14.19	0.072	6.03	4.95	242.4	4.86	7.66	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1255	1.45	14.30	0.073	6.16	4.95	252.1	21.8	7.70	Clear
1300	2.01	14.31	0.073	6.12	4.94	250.9	15.3	7.66	Clear
1305	2.57	14.24	0.073	6.07	4.95	250.3	11.8	7.67	Clear
1310	3.13	14.23	0.072	6.04	4.95	252.3	8.20	7.66	Clear
1315	3.69	14.17	0.072	6.04	4.95	243.8	5.84	7.68	Clear
1320	4.25	14.19	0.072	6.03	4.95	242.4	4.86	7.66	Clear

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PAHs 8270C	none	1 L amber	2
Pesticides 8081	none	1 L amber	2
Metals 6010B/7470A	HNO3	1L HDPE	1

Observations/Notes:

Pump started @ 1242

Purge Rate set @ 425 mL/min

Tubing intake set @ 11 ft btoc

MS/MSD	Duplicate ID No.:
Signature(s): Verd Anna Cunningham	

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW07-12A
Date:	2/9/2012	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Sunny 50° F		

Total Depth:		14	FT.(BTOC)
Depth to water:	(-)	3.73	FT.(BTOC)
Water Column:		10.27	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.67	GAL.
Total Purge Vol.:		7.3	GAL.

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peristaltic Pump

SAMPLE DATA

Date:	2/9/2012	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Time:	1300								
Method:	Low Flow	15.99	0.067	1.63	4.50	-50.0	0.43	5.86	clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1154	1.0	16.40	0.078	3.64	4.59	3.5	7.63	4.54	Clear
1200	1.7	16.01	0.075	3.67	4.51	-8.2	4.89	4.58	
1210	2.7	15.97	0.074	3.44	4.48	-11.1	1.22	5.05	
1220	3.7	15.89	0.072	2.88	4.46	-23.9	0.54	5.28	
1230	4.6	16.00	0.070	2.23	4.49	-23.3	0.28	5.55	
1240	5.5	16.06	0.069	1.92	4.50	-37.8	0.04	5.69	
1250	6.4	16.05	0.068	1.77	4.51	-44.4	0.06	5.76	
1255	6.9	16.05	0.068	1.63	4.50	-46.8	0.57	5.82	
1300	7.3	15.99	0.067	1.63	4.50	-50.0	0.43	5.86	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Total Chromium	HNO3	250 mL poly	1
Hexavalent Chromium	none	125 mL poly	1

Observations/Notes:

Pump started @ 1144

Purge Rate set @ 400 mL/min

Tubing intake set @ 10 ft btoc

MS/MSD YES | Duplicate ID No.: BBG-GW07D-12A @ 1305

Signature(s): Verd Anna Cunningham

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW07-12A-2
Date:	3/15/2012	Sampling Team:	Rachel Zajac/RDU
Weather:	Sunny 70° F		

Total Depth:		14	FT.(BTOC)
Depth to water:	(-)	2.8	FT.(BTOC)
Water Column:		11.20	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.82	GAL.
Total Purge Vol.:		3.5	GAL.
Purge Device:	Bladder Pump		

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: 3/15/2012	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Time: 1140								
Method: Low Flow	16.20	0.066	2.68	4.12	260.3	2.42	3.81	Clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1105	0.5	16.35	0.070	2.92	4.14	246.3	8.22	3.35	Clear
1110	1.0	16.23	0.068	2.78	3.88	264.9	6.58	3.55	
1115	1.5	16.14	0.067	2.65	4.06	259.5	10.28	3.70	
1120	2.0	16.32	0.066	2.50	4.17	255.9	3.33	3.70	
1125	2.5	16.20	0.066	2.64	4.13	257.3	2.77	3.70	
1130	3.0	16.16	0.066	2.63	4.11	259.0	2.76	3.81	
1135	3.5	16.20	0.066	2.68	4.12	260.3	2.42	3.81	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Total Chromium	HNO3	250 mL poly	1
Hexavalent Chromium	none	125 mL poly	1

Observations/Notes:
Pump started @ 1055
Purge Rate set @ 300 mL/min
Tubing intake set @ 12 ft btoc

MS/MSD	YES	Duplicate ID No.:	BBG-GW07D-12A-2 @ 1145
Signature(s):	Rachel Zajac		

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	Project Number:	395307.FI.FS
Location:	MCB Camp Lejeune	Well ID:	BASE-MW07
Event:	Base Background 2nd Quarter	Sample ID:	BBG-GW07-12B
Date:	4/11/2012	Sampling Team:	Verd Anna Cunningham/RDU
Weather:	Sunny 60° F		

Total Depth:		14	FT.(BTOC)
Depth to water:	(-)	2.86	FT.(BTOC)
Water Column:		11.14	FT.
	(x)	0.163	GAL/FT.
Well Volume:		1.82	GAL.
Total Purge Vol.:		5.5	GAL.

Purge Device: Peristaltic Pump

Measuring Device: YSI 556, Hanna Turbidimeter, Solinst water level meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

SAMPLE DATA

Date: / Time:		Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
Method:	Low Flow	18.22	0.067	1.39	4.59	123.0	0.49	4.03	clear

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Depth to Water	Color / Odor / Comments
1540	0.6	18.26	0.078	0.87	4.92	126.3	1.70	3.77	Clear
1545	1.0	18.14	0.071	0.89	4.81	126.1	2.69	3.80	
1550	1.5	18.53	0.068	0.94	4.73	125.9	1.05	3.93	
1600	2.4	17.90	0.066	1.39	4.63	125.2	0.64	4.12	
1610	3.3	17.92	0.067	1.45	4.66	124.6	0.50	4.14	
1615	3.7	17.71	0.066	1.36	4.64	123.0	0.39	4.09	
1620	4.2	17.99	0.066	1.38	4.61	123.2	0.43	4.03	
1625	4.6	18.20	0.066	1.36	4.59	123.1	0.70	4.02	
1630	5.1	18.22	0.066	1.37	4.59	123.2	0.53	4.03	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Total Chromium	HNO3	250 mL poly	1
Hexavalent Chromium	none	125 mL poly	1

Observations/Notes:
Pump started @ 1532
Purge Rate set @ 300 mL/min
Tubing intake set @ 11 ft btoc

MS/MSD	YES	Duplicate ID No.:	BBG-GW07D-12B @ 1640
Signature(s):	Verd Anna Cunningham		

Appendix C
Raw Analytical Data

APPENDIX C
Validated Groundwater Raw Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW01				BASE-MW01UCH					BASE-MW02				
Sample ID	BBG-GW01-10B	BBG-GW01-10C	BBG-GW01-10D	BBG-GW01-11A	BBG-GW01UCH-10B	BBG-GW01UCH-10C	BBG-GW01UCHD-10C	BBG-GW01UCH-10D	BBG-GW01UCH-11A	BBG-GW02-10B	BBG-GW02-10C	BBG-GW02D-10C	BBG-GW02-10D	BBG-GW02-11A
Sample Date	05/25/10	09/14/10	12/06/10	03/07/11	06/02/10	09/14/10	09/14/10	12/06/10	03/07/11	05/27/10	09/14/10	09/14/10	12/07/10	03/08/11
Chemical Name														
Semivolatile Organic Compounds (µg/l)														
2-Methylnaphthalene	0.22 UJ	0.2 U	0.2 U	0.0567 J	0.21 U	0.2 U	0.2 U	0.2 U	0.0474 J	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Anthracene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)anthracene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.138 J	0.21 UJ	0.2 U	0.2 U	0.2 U	0.138 J
Benzo(g,h,i)perylene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Dibenz(a,h)anthracene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Fluorene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Naphthalene	0.22 UJ	0.2 U	0.2 U	0.0346 J	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Phenanthrene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Pyrene	0.22 UJ	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)														
4,4'-DDD	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.1 U	0.011 U	0.011 U	0.023 J	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Aldrin	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.05 U	0.01 U	0.01 U	0.01 U	0.056 U	0.011 U	0.01 U	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan sulfate	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin aldehyde	0.1 U	0.019 U	0.019 U	0.019 U	0.11 U	0.02 U	0.019 U	0.019 U	0.019 U	0.1 U	0.019 U	0.019 U	0.019 U	0.019 U
Endrin ketone	0.1 U	0.011 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.056 U	0.0047 U	0.0045 U	0.0045 U	0.019 J	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Methoxychlor	0.5 U	0.025 U	0.025 U	0.025 U	0.56 U	0.026 U	0.025 U	0.025 U	0.025 U	0.5 U	0.025 U	0.025 U	0.025 U	0.025 U
Toxaphene	2.5 U	1 U	1 U	1 U	2.8 U	1.1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U
Total Metals (µg/l)														
Aluminum	5,760	435 J	893 J+	62.1 J	615	321 J	343 J	251 J+	338	169 J	125 J	139 J	159 U	117 J
Antimony	10 U	5 U	5 U	5 U	5.6 J	5 U	2.16 J	5.53 U	5 U	10 U	5 U	5 U	7.93 U	5 U
Arsenic	10 U	5 U	5 U	5 U	6.4 J	3.47 J	4.63 J	5.38 J	5 U	10 U	5 U	5 U	5 U	5 U
Barium	24.9 J	100 U	19.5 J	16.4 J	31.3 J	28.1 J	29.3 J	30 J	31.1 J	71.1 J	86.2 J	87.6 J	32.7 J	24.2 J
Beryllium	0.98 J	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cadmium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	89,300 J	92,000	73,800	60,700	136,000 J	133,000	140,000	143,000	146,000	14,400 J	9,560	9,870	16,300	10,600
Chromium	7 J	5 UJ	5 U	5 U	3.8 J	1.24 J	1.81 J	5 U	5 U	10 U	5 UJ	5 UJ	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	10 U	NA	NA	NA	NA
Chromium III and compounds	7	NA	NA	NA	3.8 J	NA	NA	NA	NA	5 U	NA	NA	NA	NA
Cobalt	5 U	2.5 U	2.97 U	2.5 U	5 U	2.5 U	2.5 U	3.29 U	2.5 U	5 U	2.5 U	2.5 U	3.04 U	2.5 U
Copper	1.1 J	2.5 U	2.5 U	2.5 U	2.1 J	2.5 U	2.5 U	1.17 J	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Iron	2,060	642	407 J	211	1,040	840	894	664 J	804	100 U	63.2 J	51.8 J	120 U	17 J
Lead	3.7	5 U	2.83 J	5 U	3 U	5 U	5 U	5 U	5 U	3 U	5 U	5 U	5 U	5 U
Magnesium	2,570 J	2,500 U	2,500 U	2,500 U	5,000 U	2,500 U	2,500 U	2,500 U	2,500 U	7,300	10,400	10,800	2,500 U	3,270 U
Manganese	15.1	10.7	12.7 J	9.3 J	58.5	57	60.1	54.5 J	45.4	28.2	18	18.5	5.89 U	4.03 J
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	5 U	2.5 U	2.5 U	2.5 U	3.6 J	0.93 J	1.73 J	2.54 U	2.5 U	2.2 J	2.5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	410 J	548 J	300 J	5,000 U	874 J	914 J	1,160 J	1,010 J	5,000 U	1,160 J	1,200 J	1,020 J	650 J
Selenium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	0.828 J	2.5 U
Sodium	6,930	6,880	8,050 J	8,530	31,300	12,700	13,600	13,600 J	13,100	17,000	30,600	31,800	15,900 J	10,900
Thallium	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	5 U
Vanadium	9.3 J	10 U	10 U	10 U	3.2 J	2.62 J	2.18 J	10 U	2 J	20 U	10 U	10 U	10 U	10 U
Zinc	5.9 J	10 U	10 U	10 U	5.4 J	4.43 J	4.53 J	14 J	10 U	16.5 J	10 U	10 U	4.89 J	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

APPENDIX C
Validated Groundwater Raw Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW02UCH						BASE-MW03				BASE-MW03UCH				
Sample ID	BBG-GW02UCH-10B	BBG-GW02UCHD-10B	BBG-GW02UCH-10C	BBG-GW02UCH-10D	BBG-GW02UCH-11A	BBG-GW02UCHD-11A	BBG-GW03-10B	BBG-GW03-10C	BBG-GW03-10D	BBG-GW03-11A	BBG-GW03UCH-10B	BBG-GW03UCH-10C	BBG-GW03UCH-10D	BBG-GW03UCHD-10D	BBG-GW03UCH-11A
Sample Date	06/02/10	06/02/10	09/14/10	12/07/10	03/08/11	03/08/11	05/25/10	09/13/10	12/07/10	03/09/11	05/27/10	09/13/10	12/07/10	12/07/10	03/09/11
Chemical Name															
Semivolatile Organic Compounds (µg/l)															
2-Methylnaphthalene	0.22 U	0.2 U	0.22 U	0.21 U	0.026 J	0.0217 J	0.2 UJ	0.21 U	0.2 U	0.0292 J	0.22 UJ	0.22 U	0.2 U	0.2 U	0.0479 J
Acenaphthene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.014 J	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Anthracene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(a)anthracene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.22 U	0.2 U	0.22 U	0.21 U	0.121 J	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(g,h,i)perylene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Chrysene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Dibenz(a,h)anthracene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Fluoranthene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Fluorene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Naphthalene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.0302 J
Phenanthrene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Pyrene	0.22 U	0.2 U	0.22 U	0.21 U	0.2 U	0.2 U	0.2 UJ	0.21 U	0.2 U	0.2 U	0.22 UJ	0.22 U	0.2 U	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)															
4,4'-DDD	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.02 J	0.1 J	0.011 U	0.011 U	0.011 U	0.011 U
Aldrin	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-BHC	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0033 J	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0026 J	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.053 U	0.054 U	0.011 U	0.01 U	0.01 U	0.01 U	0.05 U	0.011 U	0.01 U	0.01 U	0.051 U	0.01 U	0.01 U	0.016 U	0.01 U
delta-BHC	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0033 J	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan sulfate	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin aldehyde	0.11 U	0.11 U	0.021 U	0.019 U	0.019 U	0.019 U	0.1 U	0.021 U	0.019 U	0.019 U	0.1 U	0.019 U	0.019 U	0.019 U	0.019 U
Endrin ketone	0.11 U	0.11 U	0.012 U	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0071 J	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.053 U	0.054 U	0.005 U	0.0045 U	0.0045 U	0.017 J	0.05 U	0.005 U	0.0045 U	0.01 U	0.051 U	0.0045 U	0.0045 U	0.0045 U	0.008 J
Methoxychlor	0.53 U	0.54 U	0.028 U	0.025 U	0.025 U	0.025 U	0.5 U	0.028 U	0.025 U	0.025 U	0.51 U	0.025 U	0.025 U	0.025 U	0.025 U
Toxaphene	2.6 U	2.7 U	1.1 U	1 U	1 U	1 U	2.5 U	1.1 U	1 U	1 U	2.6 U	1 U	1 U	1 U	1 U
Total Metals (µg/l)															
Aluminum	47.8 J	47.6 J	244 J	411 J+	79.5 J	72.2 J	982	43,200 J	4,140 J+	3,580	92 J	1,540 J	1,050 J+	982 J+	676
Antimony	7.2 J	4.6 J	2.27 J	12.3 U	5 U	5 U	10 U	5 U	5.71 U	5 U	10 U	5 U	5 U	5 U	5 U
Arsenic	10 U	10 U	5 U	5 U	5 U	5 U	10 U	24	5 U	5 U	3.4 J	9.48 J	5 U	8.16 U	2.99 J
Barium	200 U	200 U	16.4 J	15.9 J	100 U	100 U	84.6 J	328	264	284	200 U	21.8 J	100 U	100 U	100 U
Beryllium	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cadmium	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	41,500 J	43,100 J	47,900	49,700	49,200	49,600	5,000 U	8,460	8,600	9,400	32,500 J	31,500	33,000	32,200	33,000
Chromium	1.3 J	0.82 J	5 UJ	5 U	5 U	0.926 J	1.7 J	63.8 J	5 U	5 U	2.3 J	8.05 J	5.06 U	5.65 U	1.5 J
Chromium (hexavalent)	10 U	10 U	NA	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA	NA
Chromium III and compounds	1.3 J	0.82 J	NA	NA	NA	NA	1.7 J	NA	NA	NA	5 U	NA	NA	NA	NA
Cobalt	5 U	5 U	2.5 U	5.15 U	2.5 U	2.5 U	5 U	2.03 J	5.82 U	2.5 U	5 U	2.5 U	4.55 U	6.08 U	2.5 U
Copper	5 U	5 U	2.5 U	2.01 J	2.5 U	2.5 U	5 U	15.2	2.03 J	2.5 U	4.2 J	1.09 J	1.06 J	2.5 U	2.5 U
Iron	573	604	907	571 J	788	799	62.1 J	11,600	121 U	50 U	290	2,370	1,090 J	1,090 J	704
Lead	3 U	3 U	5 U	5 U	5 U	5 U	3 U	28.3	2.81 J	2.89 J	3 U	5 U	1.93 J	5 U	5 U
Magnesium	5,000 U	5,000 U	2,500 U	2,500 U	1,610 J	1,620 J	8,740	26,900	24,100 J	20,200	5,000 U	2,500 U	2,500 U	2,500 U	2,500 U
Manganese	18.2	19.4	20.6	15 J	20.5 J	20.7 J	10 U	28.6	16.8 J	18	17.7	19.1	16 J	16.2 J	13.9
Mercury	0.2 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	0.78 J	5 U	2.5 U	3.3 U	2.5 U	2.5 U	5 U	6.36 J	2.98 U	2.5 U	1.4 J	2.09 J	2.5 U	3.39 U	2.5 U
Potassium	5,000 U	5,000 U	1,280 J	1,650 J	1,090 J	1,080 J	5,000 U	4,100 J	1,590 J	1,410 J	5,000 U	1,380 J	1,560 J	1,500 J	1,210 J
Selenium	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Silver	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	9,250	9,430	10,100	10,500 J	9,950 J	9,980 J	8,320	13,200	13,600 J	14,000	18,300	12,800	12,700 J	12,500 J	11,600
Thallium	10 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	5 U
Vanadium	20 U	20 U	1.71 J	10 U	10 U	10 U	20 U	98.8	10 U	10 U	20 U	5.34 J	2.02 J	2.51 J	2.73 J
Zinc	20 U	20 U	10 U	9.46 J	4.34 J	10 U	7.7 J	16.2 J	24.4 J	10 U	5.4 J	7.96 J	5.91 J	7.42 J	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

APPENDIX C
Validated Groundwater Raw Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW04				BASE-MW04UCH				BASE-MW05				BASE-MW05UCH			
Sample ID	BBG-GW04-10B	BBG-GW04-10C	BBG-GW04-10D	BBG-GW04-11A	BBG-GW04UCH-10B	BBG-GW04UCH-10C	BBG-GW04UCH-10D	BBG-GW04UCH-11A	BBG-GW05-10B	BBG-GW05-10C	BBG-GW05-10D	BBG-GW05-11A	BBG-GW05UCH-10B	BBG-GW05UCH-10C	BBG-GW05UCH-10D	BBG-GW05UCH-11A
Sample Date	05/27/10	09/14/10	12/09/10	03/08/11	06/02/10	09/14/10	12/08/10	03/08/11	06/02/10	09/15/10	12/09/10	03/07/11	06/02/10	09/15/10	12/09/10	03/09/11
Chemical Name																
Semivolatile Organic Compounds (µg/l)																
2-Methylnaphthalene	0.2 UJ	0.22 U	0.2 U	0.0243 J	0.21 U	0.22 U	0.2 U	0.0502 J	0.21 U	0.2 U	0.2 U	0.0166 J	0.2 U	0.21 U	0.2 U	0.0817 J
Acenaphthene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Acenaphthylene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Anthracene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(a)anthracene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(a)pyrene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.2 UJ	0.22 U	0.2 U	0.138 J	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(g,h,i)perylene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Chrysene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Dibenz(a,h)anthracene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Fluoranthene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Fluorene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Naphthalene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.0303 J	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.0533 J
Phenanthrene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Pyrene	0.2 UJ	0.22 U	0.2 U	0.2 U	0.21 U	0.22 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)																
4,4'-DDD	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.0042 J	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Aldrin	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0047 U	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
alpha-BHC	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0037 J	0.0045 U	0.0045 U	0.056 U	0.0047 J	0.0045 U	0.0045 U
alpha-Chlordane	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0064 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.056 U	0.011 U	0.01 U	0.01 U	0.05 U	0.015 J	0.013 U	0.01 U	0.053 U	0.03 J	0.01 U	0.01 U	0.056 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.051 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0074 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.0075 J	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Endosulfan sulfate	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Endrin	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
Endrin aldehyde	0.11 U	0.021 U	0.019 U	0.019 U	0.1 U	0.021 U	0.019 U	0.019 U	0.11 U	0.02 U	0.019 U	0.019 U	0.11 U	0.019 U	0.019 U	0.019 U
Endrin ketone	0.11 U	0.012 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	0.11 U	0.012 U	0.011 U	0.011 U	0.11 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0071 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.0047 U	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.056 U	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0045 U	0.053 U	0.07 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.0068 J	0.005 U	0.0045 U	0.0045 U	0.05 U	0.005 U	0.0045 U	0.0066 U	0.053 U	0.005 J	0.0045 U	0.0045 U	0.056 U	0.0045 U	0.0045 U	0.015 J
Methoxychlor	0.56 U	0.028 U	0.025 U	0.025 U	0.5 U	0.028 U	0.025 U	0.025 U	0.53 U	0.026 U	0.025 U	0.025 U	0.56 U	0.025 U	0.025 U	0.025 U
Toxaphene	2.8 U	1.1 U	1 U	1 U	2.5 U	1.1 U	1 U	1 U	2.6 U	1.1 U	1 U	1 U	2.8 U	1 U	1 U	1 U
Total Metals (µg/l)																
Aluminum	182 J	279 J	235	440	112 J	53 J	100 U	84.3 J	5,760	5,240 J	1,920 J+	3,370 J	730	83.2 J	100 U	59.1 J
Antimony	10 U	5 U	11.9 U	5 U	5.7 J	5 U	5.97 U	5 U	3.8 J	5 U	5.04 U	5 U	5.2 J	2.57 J	5 U	5 U
Arsenic	4.4 J	3.9 J	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U
Barium	18.8 J	22.2 J	100 U	22.5 J	200 U	100 U	16.7 J	17.9 J	131 J	167 J	67.8 J	77.4 J	31.4 J	23.3 J	23.2 J	29.1 J
Beryllium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Cadmium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Calcium	125,000 J	115,000	101,000	89,600	78,900 J	79,300	81,200	83,100	27,700 J	22,300	37,200	14,900	50,900 J	49,100	48,700	47,500
Chromium	10 U	4.16 J	5 U	2.39 J	1.7 J	5 UJ	5 U	5 U	10 U	1.19 J	5 U	2 J	10 U	0.81 J	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	NA	NA	NA	1.68 J	NA	NA	NA	10 U	NA	NA	NA
Chromium III and compounds	5 U	NA	NA	NA	1.7 J	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Cobalt	5 U	2.5 U	3.81 J	2.5 U	5 U	2.5 U	4.77 U	2.5 U	5 U	2.5 U	5.93 U	2.5 U	5 U	2.5 U	3.7 U	2.5 U
Copper	5 U	2.5 U	2.5 U	2.5 U	1.6 J	2.5 U	2.5 U	2.5 U	5 U	2.5 U	1.08 J	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Iron	1,180	3,300	2,050	1,240	908	1,400	1,180 J	1,110	1,500	2,400	1,580 J	1,330	1,390	1,040	1,030	945
Lead	3 U	5 U	5 U	5 U	3 U	5 U	5 U	5 U	1.6 J	5 U	5 U	5 U	3 U	5 U	5 U	5 U
Magnesium	5,000 U	2,510 J	2,500 U	2,500 U	5,000 U	2,500 U	2,500 U	2,500 U	6,580	8,480	6,090 J	3,840 J	5,000 U	2,610 J	2,580 U	2,500 U
Manganese	26.4	49.7	41	35.9	11.7	17.2	16.5 J	16.2	22.1	33	75.8 J	18.2 J	65.8	89.3	92.6 J	87.3
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U
Nickel	9.3	18.8	22.3	21.7	0.72 J	2.5 U	2.5 U	2.5 U	5 U	2.3 J	2.94 U	1.79 J	5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	621 J	605 J	432 J	5,000 U	542 J	2,500 U	1,020 J	5,000 U	4,110 J	6,810	4,010 J	5,220	1,800 J	2,500 U	1,850 J
Selenium	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	2.5 U	0.913 J
Sodium	3,500 J	4,440 J	5,680	4,400 U	5,000 U	3,780 J	3,800 U	3,770 U	10,400	13,200	10,900 J	7,870 J	17,800	27,700	22,300 J	19,300
Thallium	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U
Vanadium	3.4 J	1.76 J	2.2 J	2.88 J	20 U	10 U	10 U	10 U	1.7 J	2.56 J	1.8 J	2.19 J	2.5 J	10 U	10 U	10 U
Zinc	4.5 J	5.82 J	14.4 J	10 U	20 U	10 U	10 U	10 U	31.4	44.6	20.4 J	38.2	4.4 J	10 U	10 U	10 U

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

APPENDIX C
Validated Groundwater Raw Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW06					BASE-MW07									
Sample ID	BBG-GW06-10B	BBG-GW06-10C	BBG-GW06-10C-2	BBG-GW06-10D	BBG-GW06-11A	BBG-GW07-10B	BBG-GW07-10C	BBG-GW07-10D	BBG-GW07-11A	BBG-GW07-12A	BBG-GW07D-12A	BBG-GW07-12A-2	BBG-GW07D-12A-2	BBG-GW07-12B	BBG-GW07D-12B
Sample Date	06/02/10	09/17/10	11/01/10	12/06/10	03/07/11	05/27/10	09/13/10	12/08/10	03/08/11	02/09/12	02/09/12	03/15/12	03/15/12	04/11/12	04/11/12
Chemical Name															
Semivolatile Organic Compounds (µg/l)															
2-Methylnaphthalene	0.2 U	0.2 U	NA	0.2 U	0.0193 J	0.2 UJ	0.2 U	0.2 U	0.0314 J	NA	NA	NA	NA	NA	NA
Acenaphthene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Anthracene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Chrysene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Fluoranthene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Fluorene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Naphthalene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Phenanthrene	0.2 U	0.2 U	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Pyrene	0.2 U	0.2 UJ	NA	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)															
4,4'-DDD	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
4,4'-DDE	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.1 U	NA	0.011 U	0.0055 J	0.011 U	0.1 U	0.0098 J	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Aldrin	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
alpha-BHC	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
alpha-Chlordane	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
beta-BHC	0.05 U	NA	0.01 U	0.01 U	0.01 U	0.05 U	0.011 U	0.01 U	0.01 U	NA	NA	NA	NA	NA	NA
delta-BHC	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Dieldrin	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Endosulfan I	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Endosulfan II	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Endrin	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
Endrin aldehyde	0.1 U	NA	0.019 U	0.019 U	0.019 U	0.1 U	0.02 U	0.019 U	0.019 U	NA	NA	NA	NA	NA	NA
Endrin ketone	0.1 U	NA	0.011 U	0.011 U	0.011 U	0.1 U	0.012 U	0.011 U	0.011 U	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
gamma-Chlordane	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Heptachlor	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	0.05 U	NA	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.0047 U	0.0045 U	0.044	NA	NA	NA	NA	NA	NA
Methoxychlor	0.5 U	NA	0.025 U	0.025 U	0.025 U	0.5 U	0.026 U	0.025 U	0.025 U	NA	NA	NA	NA	NA	NA
Toxaphene	2.5 U	NA	1 U	1 U	1 U	2.5 U	1.1 U	1 U	1 U	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)															
Aluminum	1,150	682 J	NA	1,050 J+	556 J	330	453 J	795 J+	154 J	NA	NA	NA	NA	NA	NA
Antimony	3 J	6.09 J	NA	5.68 U	5 U	10 U	5 U	5.86 U	5 U	NA	NA	NA	NA	NA	NA
Arsenic	10 U	5 U	NA	5 U	5 U	10 U	5 U	5 U	5 U	NA	NA	NA	NA	NA	NA
Barium	22.3 J	24.6 J	NA	21.5 J	19.5 J	29.7 J	29 J	24.7 J	22.2 J	NA	NA	NA	NA	NA	NA
Beryllium	5 U	2.5 U	NA	2.5 U	2.5 U	0.81 J	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Cadmium	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Calcium	5,000 U	1,280 J	NA	855 J	739 J	5,000 U	1,690 J	1,470 J	1,390 J	NA	NA	NA	NA	NA	NA
Chromium	10 U	1.17 J	NA	5 U	5 U	10 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chromium (hexavalent)	10 U	NA	NA	NA	NA	10.6	NA	NA	NA	7.4 U	7.4 U	8.79 J	5.2 J	7.4 U	7.4 U
Chromium III and compounds	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U
Cobalt	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.85 U	2.5 U	NA	NA	NA	NA	NA	NA
Copper	5 U	2.5 U	NA	1.36 J	2.5 U	2.4 J	2.39 J	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Iron	112	64.4 J	NA	161 U	46.6 J	480	883	823 J	427	NA	NA	NA	NA	NA	NA
Lead	1.8 J	5 U	NA	1.63 J	5 U	3 U	5 U	2.41 J	5 U	NA	NA	NA	NA	NA	NA
Magnesium	5,000 U	2,500 U	NA	2,500 U	683 J	5,000 U	2,500 U	2,500 U	1,320 J	NA	NA	NA	NA	NA	NA
Manganese	13.9	7.44 J	NA	6.8 U	5.71 J	21	18.2	15.8 J	13.3 J	NA	NA	NA	NA	NA	NA
Mercury	0.2 U	0.18 U	NA	0.18 U	0.18 U	0.2 U	0.18 U	0.18 U	0.18 U	NA	NA	NA	NA	NA	NA
Nickel	1.3 J	2.5 U	NA	2.5 U	2.5 U	5 U	2.45 J	2.85 U	1.68 J	NA	NA	NA	NA	NA	NA
Potassium	5,000 U	481 J	NA	477 J	247 J	5,000 U	810 J	786 J	501 J	NA	NA	NA	NA	NA	NA
Selenium	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Silver	5 U	2.5 U	NA	2.5 U	2.5 U	5 U	2.5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA	NA
Sodium	7,690	11,000	NA	8,440 J	6,290 J	8,240	8,950	10,100 J	9,310 J	NA	NA	NA	NA	NA	NA
Thallium	10 U	5 U	NA	5 U	5 U	10 U	5 U	5 U	5 U	NA	NA	NA	NA	NA	NA
Vanadium	20 U	10 U	NA	10 U	10 U	20 U	10 U	10 U	10 U	NA	NA	NA	NA	NA	NA
Zinc	20 U	10 U	NA	6.01 J	10 U	15 J	9.82 J	9.54 J	6.67 J	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

APPENDIX C
Validated Groundwater Raw Analytical Results
Expanded Groundwater Background Study Report
MCIEAST - MCB CAMLEJ, North Carolina

Station ID	BASE-MW08				BASE-MW09					BASE-MW10						
Sample ID	BBG-GW08-10B	BBG-GW08-10C	BBG-GW08-10D	BBG-GW08-11A	BBG-GW09-10B	BBG-GW09D-10B	BBG-GW09-10C	BBG-GW09-10D	BBG-GW09-11A	BBG-GW10-10B	BBG-GW10-10C	BBG-GW10-10C-2	BBG-GW10-10D	BBG-GW10D-10D	BBG-GW10-11A	BBG-GW10D-11A
Sample Date	05/26/10	09/15/10	12/08/10	03/08/11	05/26/10	05/26/10	09/14/10	12/09/10	03/09/11	05/24/10	09/17/10	11/01/10	12/06/10	12/06/10	03/07/11	03/07/11
Chemical Name																
Semivolatile Organic Compounds (µg/l)																
2-Methylnaphthalene	0.21 UJ	0.2 U	0.2 U	0.0158 J	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.0236 J	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.0467 J
Acenaphthene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Anthracene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)anthracene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(g,h,i)perylene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Dibenz(a,h)anthracene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Fluorene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Naphthalene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.0316 J
Phenanthrene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 U	NA	0.2 U	0.2 U	0.2 U	0.2 U
Pyrene	0.21 UJ	0.2 U	0.2 U	0.2 U	0.22 UJ	0.21 UJ	0.22 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	NA	0.2 U	0.2 U	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)																
4,4'-DDD	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.0068 J	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDE	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
4,4'-DDT	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Aldrin	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
alpha-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
beta-BHC	0.05 U	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U	0.012 J	0.011 J	0.01 U	0.05 U	NA	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U
delta-BHC	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0051 J	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Dieldrin	0.1 U	0.011 U	0.011 U	0.011 U	0.0028 J	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan I	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Endosulfan II	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Endosulfan sulfate	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
Endrin aldehyde	0.1 U	0.019 U	0.019 U	0.019 U	0.1 U	0.1 U	0.02 U	0.019 U	0.019 U	0.1 U	NA	0.02 U	0.019 U	0.019 U	0.019 U	0.019 U
Endrin ketone	0.1 U	0.011 U	0.011 U	0.011 U	0.1 U	0.1 U	0.012 U	0.011 U	0.011 U	0.1 U	NA	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U
gamma-BHC (Lindane)	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
gamma-Chlordane	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0022 J	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor	0.05 U	0.0045 U	0.0045 U	0.0045 U	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Heptachlor epoxide	0.05 U	0.0045 U	0.0045 U	0.033	0.05 U	0.05 U	0.0047 U	0.0045 U	0.0045 U	0.05 U	NA	0.0047 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
Methoxychlor	0.5 U	0.025 U	0.025 U	0.025 U	0.5 U	0.5 U	0.026 U	0.025 U	0.025 U	0.5 U	NA	0.026 U	0.025 U	0.025 U	0.025 U	0.025 U
Toxaphene	2.5 U	1 U	1 U	1 U	2.5 U	2.5 U	1.1 U	1 U	1 U	2.5 U	NA	1.1 U	1 U	1 U	1 U	1 U
Total Metals (µg/l)																
Aluminum	285	96.6 J	680 J+	424 J	31,500	5,110	1,620 J	454	358	908	665 J	NA	705 J+	565 J+	511 J	432 J
Antimony	10 U	5 U	9.2 U	5 U	10 U	10 U	5 U	11.7 U	5 U	10 U	5 U	NA	5.12 U	5 U	5 U	5 U
Arsenic	10 U	5 U	5 U	5 U	5.5 J	10 U	5 U	5 U	5 U	10 U	5 U	NA	5 U	2.82 J	5 U	5 U
Barium	200 U	100 U	100 U	100 U	1,210	205	90.7 J	40.7 J	33.5 J	21.3 J	18.4 J	NA	21.2 J	21.3 J	17.6 J	17.7 J
Beryllium	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Cadmium	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Calcium	82,300 J	75,500	44,000	26,200	10,300 J	9,390 J	1,450 J	4,480 J	5,190	5,860 J	850 J	NA	1,050 J	1,040 J	1,090 J	1,110 J
Chromium	10 U	1.62 J	9.32 U	4.08 J	44	10 U	2.16 J	5 U	5 U	1.3 J	1.37 J	NA	5 U	5 U	1.44 J	1.07 J
Chromium (hexavalent)	10 U	NA	NA	NA	10 U	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA
Chromium III and compounds	5 U	NA	NA	NA	44	5 U	NA	NA	NA	1.3 J	NA	NA	NA	NA	NA	NA
Cobalt	5 U	2.5 U	4.49 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	5.11 U	4.25 U	2.5 U	2.5 U
Copper	2.1 J	2.5 U	1.29 J	2.5 U	16.4	5 U	1.1 J	2.5 U	2.5 U	3.7 J	2.5 U	NA	1.43 J	2.5 U	2.5 U	2.5 U
Iron	738	245 J	1,140 J	598	3,230	557	164 J	92.9 U	28.6 J	318	149 J	NA	172 U	130 U	101 J	76.1 J
Lead	3 U	5 U	5 U	5 U	13.9	3.2	5 U	5 U	5 U	2.6 J	5 U	NA	5 U	5 U	5 U	5 U
Magnesium	2,520 J	2,500 U	2,500 U	1,540 J	5,000 U	5,000 U	2,500 U	2,500 U	2,500 U	2,850 J	2,500 U	NA	2,500 U	2,500 U	2,410 J	2,440 J
Manganese	12.6	8.18 J	13.1 J	6.54 J	12.1	10 U	5 U	5 U	2.35 J	30.3	5 U	NA	5.13 U	5 U	6.54 J	6.2 J
Mercury	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.2 U	0.18 U	0.18 U	0.18 U	0.2 U	0.909	NA	0.18 U	0.18 U	0.18 U	0.18 U
Nickel	2 J	1.91 J	3.45 U	1.32 J	7.3	5 U	2.5 U	2.5 U	2.5 U	3.8 J	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Potassium	5,000 U	587 J	2,500 U	482 J	5,000 U	5,000 U	518 J	616 J	370 J	5,000 U	509 J	NA	750 J	759 J	541 J	549 J
Selenium	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Silver	5 U	2.5 U	2.5 U	2.5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	6,310	6,760	6,420 J	6,240 J	3,280 J	4,460 J	6,560	7,290	5,540	12,000	12,500	NA	11,400 J	11,900 J	11,200 J	11,400 J
Thallium	10 U	5 U	5 U	5 U	10 U	10 U	5 U	5 U	5 U	10 U	5 U	NA	5 U	5 U	5 U	5 U
Vanadium	3.8 J	2.45 J	5.41 J	2.3 J	27.6	5.4 J	2.19 J	10 U	10 U	20 U	10 U	NA	10 U	10 U	10 U	10 U
Zinc	7.8 J	10 U	5.4 J	10 U	22.3	5.2 J	10 U	10 U	10 U	6.3 J	10 U	NA	10 U	7.85 J	4.63 J	4.99 J

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

J+ - Analyte present, value may be biased high, actual value may be lower

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/l - Micrograms per liter

Appendix D
Response to Comments

Response to Comments
Draft Expanded Groundwater Background Study Report
Marine Corps Base Camp Lejeune, North Carolina

PREPARED FOR:	Charity Rychak, MCB CamLej Nick Schultz, MCB CamLej Dave Cleland, NAVFAC Mid-Atlantic Bryan Beck, NAVFAC Mid-Atlantic Gena Townsend, USEPA Region 4 Randy McElveen, NCDENR Marti Morgan, NCDENR Beth Hartzell, NCDENR
PREPARED BY:	CH2M HILL
DATE:	March 26, 2012

Introduction

The purpose of this document is to address comments on the Draft Expanded Groundwater Background Study Report for Marine Corps Base Camp Lejeune. The North Carolina Department of Environment and Natural Resources (NCDENR) Superfund Section and United States Environmental Protection Agency (USEPA) Region 4 provided the comments listed below. Responses to comments are provided in bold.

NCDENR Comments (dated December 15, 2011)

1. Please include the ProUCL Model Version number and some discussion of its limitations in the Introduction and in Section 5.2.4 on page 5-4 where ProUCL (USEPA, 2009) is first discussed.

   We will include in the final report that ProUCL Version 4 was used and include text regarding the uncertainty that exists for upper tolerance limit (UTL) calculations related to low frequency of detections.

2. I am also concerned about the large number of non-detect values that were a part of this data set. Please discuss the models (algorithms) ability to properly deal with this issue. See the attached letter regarding ProUCL Version 3.0 problems with greater than 15% non-detects.

   For low frequency of detections, ProUCL Version 4 incorporates new state-of-the-art techniques to handle non-detects. When the percent of detections was less than 60 percent, the Kaplan-Meier approach was used for calculating a background UTL.

   ProUCL discusses the possibility of using the maximum background detection or the reporting limit as the UTL when the number of detects is small. For the cases where fewer than 15 percent detected values were available or fewer than 7 detected values were available (or both conditions), the average ratio of the maximum detect over the calculated UTLs provided in the report is approximately 1.3. Because of this, the

Kaplan-Meier approach used with lower frequencies of detects typically calculated a lower background threshold value than if the maximum detected value had been used.

In regard to using the reporting limit as the UTL, reporting limits for many of the constituents with low frequencies of detection are often many-fold higher than the detected results and could result in background threshold values much higher than the UTLs recommended in this report. By using the Kaplan-Meier approach these UTLs aimed to focus the UTL value on the assortment of detected concentrations, which also typically provided more conservative background threshold values than a maximum background detect or reporting limit.

3. Also, we should probably include the box plots in the appendix for future reviewers of the model results.

   The box and whisker plots served to help determine whether the data needs to be partitioned. For the Expanded Groundwater Background Study Report, the only potential data partition was by aquifer. The data was partition by aquifer because of the different characteristics between the two aquifers so box and whisker plots are not needed.

USEPA Comments (dated February 2, 2012)

EPA has completed its review of the Draft Expanded Groundwater Background Study Report, dated December 2011 and has no additional comments. The document can be finalized.