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FINAL PRELIMINARY ASSESSMENT/SITE INSPECTION REPORT MILITARY MUNITIONS
RESPONSE SITE UNEXPLODED ORDNANCE 07 MCB CAMP LEJEUNE NC
06/01/2011
CH2M HILL

Final
Preliminary Assessment/Site Inspection Report
MMRP Site UXO-07
Former D-6 Practice Hand Grenade Course
(ASR #2.77)

Marine Corps Base Camp Lejeune
Jacksonville, North Carolina



Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No.
N62470-08-D-1000
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June 2011

Prepared by
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Acronyms and Abbreviations

ASR	Archive Search Report
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action – Navy
COPC	constituent of potential concern
CSM	conceptual site model
CTO	contract task order
CWM	chemical warfare materiel
°F	degrees Fahrenheit
DDESB	Department of Defense Explosives Safety Board
DGM	digital geophysical mapping
DO	dissolved oxygen
DPT	direct push technology
DQO	data quality objective
EM	electromagnetic
EM61	EM61-MK2
EPC	exposure point concentration
ERS	ecological risk screening
ESS	Explosives Safety Submission
ESV	ecological screening value
FID	flame-ionization detector
ft	feet, foot
ft/ft	feet per foot
GIS	geographic information system
GPO	geophysical prove-out
GSV	geophysical system verification
HHRS	human health risk screening
HI	hazard index
HQ	hazard quotient
IDW	investigation-derived waste
µg/L	micrograms per liter
m	meter
MC	munitions constituents
MCB	Marine Corps Base
MCL	maximum contaminant level
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram

MMRP	Military Munitions Response Program
MR	munitions response
MRP	Munitions Response Program
MRSP	Munitions Response Site Prioritization Protocol
MS/MSD	matrix spike/matrix spike duplicate
mV	millivolt
NAD83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NAVFAC	Naval Facilities Engineering Command
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCEA	National Center for Environmental Assessment
NCGWQS	North Carolina Groundwater Quality Standards
NC SSL	North Carolina Soil Screening Level
NRWQC	National Recommended Water Quality Criteria
ORP	oxidation-reduction potential
PA/SI	Preliminary Assessment/Site Inspection
PETN	Pentaerythritol tetranitrate
PID	photoionization detector
PPE	personal protective equipment
PRG	preliminary remediation goal
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RSL	regional screening level
SOP	standard operating procedure
TCL	Target Compound List
TOC	top of casing
TP	technical paper
UCL	upper confidence limit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UTM	universal transverse mercator
UXO	unexploded ordnance
VOC	volatile organic compound

Introduction

This report documents the findings of a Preliminary Assessment/Site Inspection (PA/SI) conducted at United States Marine Corps Military Munitions Response Program (MMRP) Site UXO-07 – Former D-6 Practice Hand Grenade Course (Archive Search Report [ASR] #2.77) located at Marine Corps Base Camp Lejeune (MCB CamLej) in Jacksonville, North Carolina (**Figure 1-1**).

This PA/SI was conducted by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC), Navy Comprehensive Long-term Environmental Action – Navy (CLEAN) Contract N62470-08-D-1000, Contract Task Order (CTO) 0014. **Appendix A** presents the Munitions Response Site Prioritization Protocol (MRSP) Site Summary for Site UXO-07.

1.1 Objectives and Approach

MCB CamLej is in the process of investigating closed ranges at the Base following the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigation process. Reported historical range activities at Site UXO-07 have prompted this PA/SI, the first phase of the CERCLA cleanup process.

The primary objectives of this environmental investigation were to evaluate the potential presence and nature of impacts to environmental media resulting from historical munitions used at the site, and to evaluate whether additional investigation and/or remediation activities are necessary. Accordingly, this investigation focused on impacts to soil, sediment, surface water, and groundwater by munitions constituents (MC). A secondary objective was to assess the site for the presence of geophysical anomalies that may represent subsurface munitions and explosives of concern (MEC).

This PA/SI was conducted in accordance with the *Site-specific Work Plan Addendum for Preliminary Assessment/Site Inspection at Site UXO-07, D-6 Practice Hand Grenade Course (ASR #2.77), Marine Corps Base Camp Lejeune, Jacksonville, North Carolina (PA/SI Work Plan) (CH2M HILL, 2009)* and the *Munitions Response Program Master Project Plan, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina (MR Work Plan) (CH2M HILL, 2008c)*.

The general approach adopted during this PA/SI was as follows:

- Conduct research to identify historical activities that may have resulted in MEC or MC contamination at the site, including review of archival records and interviews with current and former installation personnel.
- Perform a geophysical survey of 10 percent of Site UXO-07 to evaluate the number and density of geophysical anomalies representing potential subsurface MEC.
- Evaluate the potential presence and nature of MC contamination by conducting an investigation of soil, groundwater, surface water, and sediment.

- Conduct ecological and human health risk screening using analytical data collected at the site.

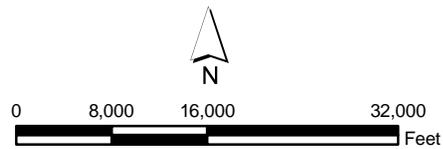
1.2 Report Organization

This PA/SI report is organized as follows:

- Section 1, Introduction
- Section 2, Site Background
- Section 3, Field Investigation Activities
- Section 4, Investigation Results
- Section 5, Human Health Risk Screening
- Section 6, Ecological Risk Screening
- Section 7, Conclusions and Recommendations
- Section 8, References



- Legend**
- ★ Cities
 - Highways
 - Site UXO-07 Boundary
 - Installation Boundary



1 inch = 16,000 feet

Figure 1-1
Site Location Map
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLej
North Carolina



Site Background

This section presents a brief summary of regional and site-specific information, including location, site setting, physical characteristics, and history.

2.1 MCB CamLej Location and Description

MCB CamLej covers approximately 236 square miles in Onslow County, North Carolina and is bisected by the New River, which flows in a southeasterly direction toward the Atlantic Ocean (**Figure 1-1**). Construction of MCB CamLej began in 1941 with the objective of developing the “World’s Most Complete Amphibious Training Base.” The mission of MCB CamLej is to maintain combat-ready units for expeditionary deployment. MCB CamLej provides housing, training facilities, logistical support, and administrative supplies for Fleet Marine Force units and other assigned units. The Base is home to an active duty, dependent, retiree, and civilian population of approximately 150,000, of whom approximately 47,000 are military personnel. Land use surrounding MCB CamLej is varied, with mainly commercial properties along the northern boundary. The eastern and western boundaries of the Base are a mix of agricultural and residential land. The southern boundary of MCB CamLej extends to the New River and Atlantic Ocean.

2.2 Site Setting

Site UXO-07 includes two separate areas located south of the intersection of McHugh Boulevard and O Street in the Hadnot Point area of ‘Mainside’ MCB CamLej (**Figure 2-1**). The northern area of the site is approximately 5 acres in size and includes buildings HP502, HP503, and SHP499, surrounding parking and grassy areas, and a surface water drainage feature. The southern area is located immediately north of Building HP500, is approximately 2 acres in size, and includes a parking lot and grassy areas. Most of the site is cleared and/or developed with a parking lot and buildings, with the exception of a small forested area in the northeast corner of the site.

The majority of the area surrounding Site UXO-07 is developed, consisting of buildings, parking lots, and other infrastructure (**Figure 2-2**). Approximately one-quarter of the immediate area southeast of Site UXO-07 includes woodlands or recreational fields. The woodlands include jurisdictional wetlands and surround an unnamed tributary of French Creek, which is located approximately 1 mile southeast of Site UXO-07. French Creek in turn discharges into the New River downstream of the site.

2.3 Site History

In August 2008, CH2M HILL conducted a detailed review of existing information related to historical activities at Site UXO-07 that could have resulted in the release of hazardous substances within the area of investigation. This review also included interviews with current and former site personnel. The information obtained from this effort is documented in the Archival Records Search Report (**Appendix B**), and summarized below.

Historical base mapping shows that prior to 1953 the area of investigation was used as a recreational facility, which included baseball and softball fields (Figure 2-2 of **Appendix B**). According to the Range Identification and Preliminary Range Assessment (United States Army Corps of Engineers [USACE], 2001), munitions were used at the D-6 Practice Hand Grenade Course from 1953 until approximately 1959, and included fuses and practice hand grenades.

The area of Site UXO-07 closest to McHugh Boulevard appears to have remained as recreational fields from the 1950s through the 1980s, while the southern area was primarily wooded. An historical aerial photograph from 1962 (Figure 2-3 of **Appendix B**) shows Site UXO-07 in relation to the fields and the wooded areas. As shown on a 1984 existing conditions map (Figure 2-4 of **Appendix B**), the southern area of Site UXO-07 appears to overlap the Former 5th Area Gun Park. This gun park was a large parking area with concrete pads and small sheds where 105 millimeter (mm) and 155mm howitzers of the 10th Marines (Artillery Regiment) were stored along with the trucks that pulled the howitzers. The sheds were also used to perform maintenance and store equipment for the howitzers (Richardson, 2008). Another historical aerial photograph (Figure 2-5 of **Appendix B**) of Site UXO-07 shows that by 1989 the northern portion had been developed and looked very similar to current conditions. The parking lot currently present in the southern portion was present in 1989, but building HP500 had not yet been constructed.

2.4 Regional Climate

The climate in the Onslow County area is characterized by short, mild winters and long, hot and humid summers. Average annual net precipitation is approximately 50 inches. Ambient air temperatures generally range from 33 degrees Fahrenheit (°F) to 53°F in the winter months, and from 71°F to 88°F during the summer months. Winds are generally south-southwesterly in the summer and north-northwesterly in the winter (Water and Air Research, 1983). The hurricane season begins on June 1 and continues through November 30. Storms of non-tropical origin, such as frontal passages, local thunderstorms, and tornadoes are more frequent and can occur year-round.

2.5 Regional Geology and Hydrogeology

Regional geology at MCB CamLej is discussed in the *MCB CamLej MRP Master Project Plans, Marine Corps Base Camp Lejeune, North Carolina* (CH2M HILL, 2008a), referred to herein as the MRP Master Project Plans.

Surface water drainage in the project vicinity flows to the southeast into an unnamed tributary of the New River. The New River flows into the Atlantic Ocean via New River inlet (MCB Camp Lejeune, 2002).

2.6 Site Geology and Hydrogeology

Inspection of the soil cores recovered from Site UXO-07 indicates that the underlying sediments consist of laterally discontinuous fine-grained sediments consistent with those of the surficial aquifer (Cardinell et al., 1993). Particle sizes noted from soil boring logs indicate sediments ranging from clay and silt to very fine to fine-grained sand. The predominant lithology directly underlying Site UXO-07 consists of poorly graded, fine-grained sand

interbedded with a lesser amount of clayey sands/sandy clays. Soil borings for Site UXO-07 ranged from 15 to 25 ft below ground surface (bgs).

Site-specific hydrogeologic information was derived from the installation of six shallow temporary monitoring wells as detailed in Section 3.3.3. The temporary wells were screened above the Castle Hayne confining unit in the undifferentiated surficial aquifer. The depth to surficial groundwater ranged from 6.91 to 3.91 feet above mean sea level at the site during the December 2009 investigation. **Figure 2-3** depicts the potentiometric surface of the water table on December 4, 2009 and indicates that groundwater mimics surface topography and generally flows to the south. Horizontal hydraulic gradients calculated from **Table 2-1** range from 0.0015 feet per foot (ft/ft) between wells TW13 and TW17, to 0.006 ft/ft between wells TW03 and TW12.

TABLE 2-1

Groundwater Elevation and Well Construction Information
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
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)	Surveyed Ground Surface of Well (ft msl)	Depth to Water December 3-4, 2009 (ft bTOC)	Groundwater Elevation December 3-4, 2009 (ft msl)
MR07-TW03	12/2/09	10-20	20	18.52	18.21	11.61	6.91
MR07-TW08	12/2/09	15-25	25	21.55	21.55	16.30	5.25
MR07-TW10	12/1/09	15-25	25	21.93	21.58	16.70	5.23
MR07-TW12	12/1/09	13.5-23.5	23.5	23.06	21.24	18.50	4.56
MR07-TW13	11/30/09	15-25	25	21.42	20.97	17.10	4.32
MR07-TW17	12/1/09	15-25	25	20.56	20.26	16.65	3.91

Notes:

ft bgs = feet below ground surface

ft bTOC = feet below top-of-casing

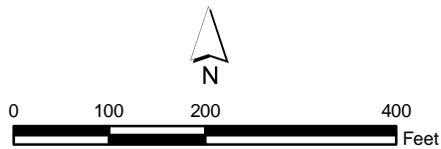
ft msl = feet above mean sea level

Prepared by: Susan Forker
Signature: Susan Forker

Checked by: David Seed
Signature: David Seed



- Legend**
- Creek
 - Site UXO-07 Boundary
 - Installation Boundary



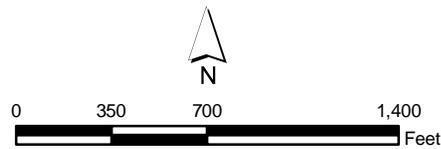
1 inch = 200 feet

Figure 2-1
 Site Map
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLej
 North Carolina





- Legend**
- Creek
 - Site UXO-07 Boundary
 - ▭ Installation Boundary
 - ▨ Jurisdictional Wetlands



1 inch = 700 feet

Figure 2-2
Site UXO-07 Proximity Map
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLej
North Carolina

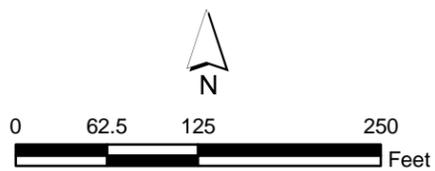




- Legend**
- Temporary Well Locations
 - Potentiometric Contour
 - - - Inferred Potentiometric Contour
 - Groundwater Flow Direction
 - ▨ Wetlands
 - ▭ Site UXO-07 Boundary

4.32 - Groundwater Elevation in feet above mean sea level (ft msl)

Note: Potentiometric surface contours have been inferred between temporary well locations. Actual conditions may differ from those shown here.



1 inch = 125 feet

Figure 2-3
Water Table Potentiometric Surface Map (December 2009)
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLeJ
North Carolina



Field Investigation Activities

The initial site reconnaissance, surveying, and DGM field activities at Site UXO-07 were conducted in May 2009. The environmental sampling activities were conducted in November 2009, December 2009, and March 2011.

Field activities were conducted in accordance with the Site UXO-07 Preliminary Assessment and Site Inspection (PA/SI) Work Plan (CH2M HILL, 2009) and MR Work Plan (CH2M HILL, 2008c). The technical approach included in the PA/SI Work Plan was developed by the MCB CamLej Tier I Partnering Team, which includes representatives from the United States Navy, MCB CamLej, United States Environmental Protection Agency (USEPA) Region 4, and North Carolina Department of Environment and Natural Resources (NCDENR).

3.1 Site Preparation and Support

3.1.1 MEC Avoidance

Due to the potential presence of MEC, avoidance measures were implemented in accordance with the Explosives Safety Submission (ESS) Determination (MARCORSYSCOM, 2009). Unexploded ordnance (UXO) technicians qualified in accordance with Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP) 18 (DDESB, 2004) provided MEC escort and avoidance services to the surveying, utility locate, geophysical services, and drilling subcontractors. MEC items were not encountered during this project.

3.1.2 Site Survey

Land surveying was conducted in accordance with the Munitions Response Program (MRP) Master Project Plans (CH2M HILL, 2008c). SEPI Engineering, a North Carolina-licensed surveyor from Raleigh, North Carolina, conducted the site surveying activities in two phases, as described below.

Phase 1 consisted of delineating the site boundary and DGM area layout. The surveyor prominently marked the boundaries of the project area using flagging tape and wooden stakes and provided all survey results to CH2M HILL. The site boundary was provided by MCB CamLej Geographical Information Systems (GIS) using the 1946 Range Overlay Map (USACE, 2001, Plate 4). The surveyor also facilitated preparation of the site for DGM by establishing transects for DGM surveys and provided the survey results for incorporation into the DGM subcontractor's GIS.

Phase 2 consisted of surveying the locations and elevations of temporary monitoring wells and subsurface soil sample locations after the completion of environmental sampling activities.

3.2 Digital Geophysical Mapping

DGM was performed at Site UXO-07 to evaluate the frequency and distribution of geophysical anomalies that represent potential subsurface MEC. The DGM was subcontracted to NAEVA Geophysics of Charlottesville, VA, with quality control (QC) performed by both NAEVA and CH2M HILL's Munitions Response (MR) QC Geophysicist. A summary of the work performed is provided below; the Geophysical Investigation Report is provided in **Appendix C**.

3.2.1 Digital Geophysical Mapping Survey

Prior to the DGM survey at Site UXO-07, Sepi Engineering installed survey stakes along 131 DGM transects. The survey information for these stakes was incorporated into the DGM data collected during the DGM survey.

The DGM data were collected using a Geonics EM61-MK2 (EM61) electromagnetic (EM) system in wheel mode configuration. The locations of the DGM transects were based on specific site conditions (e.g., avoidance of paved areas, streams). DGM transects were spaced approximately 10 meters apart, as site conditions allowed. DGM surveys were divided into two sections: the northern (Site UXO-07_1) and southern (Site UXO-07_2) areas of the site. The DGM survey area totaled 0.635 acre in UXO-07_1 and 0.18 acre in UXO-07_2, covering approximately 11.7 percent of the total area of Site UXO-07. The areas of the site covered by the survey are shown on **Figure 3-1**.

3.2.2 Geophysical Proveout

Prior to the start of DGM at Site UXO-07, a geophysical proveout (GPO) was completed for the testing and evaluation of the selected geophysical equipment, and determination that the equipment met existing project data quality objectives (DQOs). This GPO was conducted at the existing GPO plot at the former Knox Trailer Park (Site UXO-04). A threshold of 3 millivolts (mV) in Channel 2 was chosen for the selection of geophysical anomalies because this value represents the expected amplitude of the smallest-mass item expected to be present and the threshold where the item can be positively distinguished from signal noise. The GPO was conducted in accordance with Appendix B of the PA/SI Work Plan Addendum (CH2M HILL, 2009). The GPO results are presented in **Appendix C** of this report.

3.2.3 Data Quality Objectives

All DQOs outlined in the PA/SI Work Plan Addendum (CH2M HILL, 2009) were met during the DGM survey.

3.2.4 Quality Control

An extensive QC program was applied to the DGM operations at the site. **Figure 3-2** shows an overall chart of the QC steps.

The geophysical system was field tested as specified in the PA/SI Work Plan (CH2M HILL, 2009). A summary of the tests performed is presented in **Table 3-1**. Both NAEVA and CH2M HILL performed QC of geophysical data and data deliverables at each step of the processing path.

All tests outlined in the PA/SI Work Plan (CH2M HILL, 2009) were performed on the DGM instruments at the appropriate intervals (e.g., daily, weekly, at start of project). Results were checked by NAEVA's QC geophysicist prior to delivery to CH2M HILL and subsequently checked by the CH2M HILL QC Geophysicist. If necessary, corrective actions were taken as appropriate to ensure that all instruments functioned as required.

3.3 Environmental Investigation Activities

During the development of the PA/SI Work Plan Addendum (CH2M HILL, 2009), historical records were reviewed to identify potential areas of concern at Site UXO-07. However, historical records did not depict the layout of the site. Therefore in the absence of evidence to bias the sampling, sample locations were distributed evenly across accessible areas of the site. The distribution of environmental samples is shown on **Figures 3-3** and **3-4**.

Environmental samples were collected in accordance with the PA/SI Work Plan Addendum (CH2M HILL, 2009). MEC avoidance procedures were observed and a UXO technician was present at all times during sampling.

3.3.1 Surface Soil Sampling

Surface soil sampling was conducted at Site UXO-07 by CH2M HILL personnel on November 2-3, 2009 and consisted of the collection of 42 surface soil samples (designated MR07-SS01 through MR07-SS42) using the TR-02-1 approach as described in the PA/SI Work Plan Addendum (CH2M HILL, 2009). Soil samples were collected by compositing a minimum of 30 sample aliquots from random locations within each 1-m by 1-m sampling location at an interval of 0 to 2 inches bgs. Surface soil sampling locations are shown on **Figure 3-3**.

In accordance with the PA/SI Work Plan (CH2M HILL, 2009), all surface soil samples were submitted to Empirical Laboratories in Nashville, Tennessee, and analyzed for the following:

- Explosives residues, including pentaerythritol tetranitrate (PETN) and Nitroglycerine (SW-846 USEPA Method 8330)
- Perchlorate (SW-846 USEPA Method 6850)
- Target Analyte List (TAL) metals (SW-846 USEPA Method 6010B)

The analytical data were validated by Environmental Data Services, Inc. of Williamsburg, Virginia under subcontract to CH2M HILL. Data validation reports are provided in **Appendix D**.

3.3.2 Surface Water and Sediment Sampling

On November 12, 2009, two surface water and two sediment samples were collected at co-located sites MR07-SW01/02 and MR07-SD01/02) from the unnamed drainage feature in the northern portion of Site UXO-07 (**Figure 3-4**). A hand held GPS unit was used to record the locations of these samples.

The unnamed drainage feature had a stream surface approximately 2-3 ft wide with moderately sloping to steep banks incised to a depth of 6-8 ft. The drainage trends in a

northwest-southeast direction and water flows toward the southeast. Surface water and sediment sample collection occurred after a rain event and the stream was observed to have a maximum water depth of approximately 1-2 ft. Samples MR-07-SW/SD01 were collected upstream of the outflow pipe from a storm water retention pond located in the extreme northern portion of Site UXO-07. Samples MR-07-SW/SD02 were collected downstream of the retention pond outflow pipe.

At each location, the surface water samples were collected before the sediment samples. Sediment samples were collected by advancing a trowel approximately 6–12 inches into the sediment. Samples were collected from downstream to upstream to avoid cross-contamination by sediment suspension.

In accordance with the PA/SI Work Plan (CH2M HILL, 2009), all surface water samples were submitted to Empirical Laboratories and analyzed for the following:

- Explosives residues, including PETN and Nitroglycerine (SW-846 USEPA Method 8330)
- Perchlorate (SW-846 USEPA Method 6850)
- Target Analyte List (TAL) total metals (SW-846 USEPA Method 6010B)

In accordance with the PA/SI Work Plan (CH2M HILL, 2009), all sediment samples were submitted to Empirical Laboratories and analyzed for the following:

- Explosives residues, including PETN and Nitroglycerine (SW-846 USEPA Method 8330)
- Perchlorate (SW-846 USEPA Method 6850)
- TAL total metals (SW-846 USEPA Method 6010B)

The resulting analytical data were validated by Environmental Data Services, Inc. under subcontract to CH2M HILL. Data validation reports are provided in **Appendix D**.

3.3.3 Subsurface Soil Sampling

From November 30 to December 2, 2009, 17 soil borings were advanced to depths of up to 25 ft bgs, at the locations shown on **Figure 3-4**, using a direct push technology (DPT) drill rig operated by Probe Technologies. The DPT sampling method utilized an open core barrel sampling device along with disposable acetate liners. Down-hole sampling equipment was decontaminated between borings and new liners were used to retrieve each successive soil core. The continuous soil cores retrieved from these borings were examined and logged by the CH2M HILL geologist. In addition, the soil was field screened for the presence of volatile organic compounds (VOCs) using a flame-ionization detector (FID). Soil boring logs and well construction diagrams are provided in **Appendix E**.

Following completion of each soil boring, a discrete soil sample was collected from an unsaturated portion of the soil core located immediately above the estimated water table at depths ranging from 9-24 feet bgs. The majority of samples were collected between 15-20 feet bgs. Seventeen subsurface soil samples, MR07-IS01 through MR07-IS17, were collected from the locations shown on **Figure 3-4**.

Subsurface soil samples were submitted to Empirical Laboratories and analyzed for the following analytes:

- Explosives residues, including PETN and Nitroglycerine (SW-846 USEPA Method 8330)

- Perchlorate (SW-846 USEPA Method 6850)
- TAL total metals (SW-846 USEPA Method 6010B)

The analytical data were validated by Environmental Data Services, Inc. of Williamsburg, Virginia under subcontract to CH2M HILL. Data validation reports are provided in **Appendix D**.

3.3.4 Supplemental Subsurface Soil Sampling

Due to the detection of explosives residues in samples collected during the 2009 environmental sampling event, six additional deeper subsurface soil samples were collected at the site on March 10, 2011 to confirm that the subsurface soil above the water table was not impacted. Six soil borings were advanced to a depth of 8 ft bgs adjacent to previous subsurface soil sampling locations collected during the 2009, as shown on **Figure 3-4**. Each soil boring was advanced using a DPT drill rig operated by Parratt-Wolf Inc. DPT sampling was performed as described in Section 3.3.3, with the exception that a composite soil sample was collected from each soil core from an interval of 4-8 feet bgs. Six subsurface soil samples, MR07-IS18 through MR07-IS23, were collected from the locations shown on **Figure 3-4**.

Subsurface soil samples were submitted to Empirical Laboratories and analyzed for the following analytes:

- Explosives residues, including PETN and Nitroglycerine (SW-846 USEPA Method 8330)

The analytical data were validated by Environmental Data Services, Inc. of Williamsburg, Virginia under subcontract to CH2M HILL. Data validation reports are provided in **Appendix D**.

3.3.5 Temporary Well Installation

During DPT investigation activities, six temporary groundwater monitoring wells were installed at the site (MR07-TW03, MR07-TW08, MR07-TW10, MR07-TW12, MR07-TW13, and MR07-TW17) to depths ranging from 20 to 25 ft bgs. **Figure 3-4** shows the temporary well locations and **Table 2-1** summarizes the well construction details. The six temporary monitoring wells were installed by Probe Technologies under the direct supervision of a CH2M HILL geologist.

Each temporary well was constructed using 1-inch inside diameter Schedule 40 polyvinyl chloride (PVC) screen and riser. The well screens consisted of a 10-ft length of 0.010-inch machine slotted Schedule 40 PVC and were placed to bracket the water table. Each well was also equipped with a pre-packed sand filter (120 mesh) attached to the screened interval, to reduce turbidity. Additional silica filter sand was placed in the remaining annular space between the pre-packed sand filter and the borehole wall extending roughly 2 ft above the top of the screen. A layer of bentonite granules was placed above the top of the sand pack extending to the ground surface. A locking watertight cap was placed on the PVC pipe and the wells were clearly labeled using a permanent marker. Well completion diagrams are presented in **Appendix E**.

The temporary wells were developed using disposable bailers and a peristaltic pump. Development continued until the water was visually clear and water quality parameters had

stabilized. Following well development, the wells were allowed to equilibrate for at least 24 hours before sampling.

3.3.6 Groundwater Sampling

Prior to well purging and sampling, water-level measurements were recorded in each temporary well (**Table 2-1**). Water-level measurements were converted to water-level elevations using the top-of-casing (TOC) elevation survey data, and were used to construct a potentiometric surface map of the water table (**Figure 2-3**).

All groundwater samples were collected using a peristaltic pump with disposable polyethylene tubing and low-flow purging and sampling techniques in accordance with the PA/SI Work Plan (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 a YSI 556® water quality meter and Hanna® turbidity meter. Field parameters are summarized in **Table 3-2**.

Groundwater sampling data sheets are provided in **Appendix F**. Groundwater samples were collected after all field parameters had become stable over three successive readings and at least one well volume had been purged, or at least three well volumes had been purged from the well. Parameters were considered stabilized over three successive readings when successive measurements agreed as follows:

- pH within 0.1 pH units
- Temperature measurements within 10 percent
- Conductivity within 3 percent
- ORP within 10 mV
- DO 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 peristaltic pump so that the pump discharge flowed directly into the laboratory-supplied sample bottles. New pump tubing was used for the purging and sampling of each well.

Once sample collection was complete, the sample bottles were placed in iced coolers and prepared for shipment under chain-of-custody control to Empirical Laboratories and analyzed, per scope of work, for the following analytes:

- Explosives residues, including PETN and Nitroglycerine (SW-846 USEPA Method 8330)
- Perchlorate (SW-846 USEPA Method 6850)
- TCL total metals (SW-846 USEPA Method 6010B)

In addition to the above analyses, temporary wells TW-03 and TW-17 were sampled for dissolved metals to evaluate potential groundwater transport into the drainage surface water for ecological risk assessment.

- TCL dissolved metals (SW-846 USEPA Method 6010B)

The analytical data were validated by Environmental Data Services, Inc. of Williamsburg, Virginia under subcontract to CH2M HILL. Data validation reports are provided in **Appendix D**.

On December 11, 2009, following completion of sampling and surveying, all temporary wells were abandoned by the drilling subcontractor in accordance with North Carolina Well Construction Standards.

3.3.7 Quality Assurance/Quality Control Sampling

Appropriate quality assurance (QA)/QC sampling was performed in accordance with Navy CLEAN and CH2M HILL protocols, including field blanks, equipment blanks, duplicates, and matrix spike/matrix spike duplicates (MS/MSDs). Required QA/QC samples and the frequency of collection are shown in **Table 3-3**.

3.4 Investigation-derived Waste Management

Investigation-derived waste (IDW) was disposed of in accordance with the Base Waste Management Plan (CH2M HILL, 2008b). IDW generated during field events consisted of well development and purge water, decontamination fluids, disposable equipment, and personal protective equipment (PPE). Soil from the borings was spread around the borehole. The purge water and decontamination fluids were placed in labeled 55-gallon drums and staged at the storage facility on Parachute Tower Road. Disposable equipment, including PPE, poly sheeting, paper towels, and aluminum foil, was placed in black contractor's trash bags and disposed of in an on-Base trash receptacle.

3.5 Site Survey

Following completion of sampling activities, SEPI Engineering surveyed horizontal coordinates for all subsurface soil sampling locations, and horizontal coordinates, casing elevations and ground elevations for the six temporary wells. Elevations were accurate to the nearest 0.01 ft (0.1 ft for unpaved ground surface), and tied to the nearest North American Datum of 1988 (NAVD 88) datum 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, and were accurate to the nearest 0.01 in.

TABLE 3-1

DGM Instruments Standardization Tests and Acceptance Criteria
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLej
 North Carolina

Test	Test Description	Acceptance Criteria	Power On	Beginning of Day	Beginning and End of Day	First Time Instr. Used	2% of Total Area Surveyed
1	Equipment Warm-up	Equipment specific (typically 5 min)	X	X			
2	Personnel Test	Based on instrument used. Personnel, clothing, etc. should have no effect on instrument response. <2 mV		X			
3	Vibration Test (Cable Shake)	Data profile does not exhibit data spikes. <2 mV		X			
4	Static Background & Static Spike	+/- 20% of standard item response, after background correction			X		
5	Six Line Test	Repeatability of response amplitude +/-20%, Positional Accuracy +/- 20 cm				X	
6	Repeat Data	Repeatability of response amplitude					X

Prepared by: Susan Forker

Checked by: David Seed

TABLE 3-2

Groundwater Field Parameters

Site UXO-07, Former D-6 Practice Hand Grenade Course

MCB CamLej

North Carolina

Station ID	MR07-TW03	MR07-TW08	MR07-TW10	MR07-TW12	MR07-TW13	MR07-TW17
Sample Date	12/4/2009	12/3/2009	12/3/2009	12/3/2009	12/3/2009	12/4/2009
Field Parameters						
Dissolved Oxygen (mg/L)	1.97	0.54	2.59	3.04	0.94	0.67
Oxidation Reduction Potential (mV)	-101.7	-156.2	-156.7	-109.3	-215	-100.6
pH	6.6	4.75	5.73	3.93	4.86	6.13
Specific Conductance (mS/cm)	0.122	0.094	0.438	0.076	0.065	0.186
Temperature (°C)	19.54	20.92	20.93	19.84	21.26	18.04
Turbidity (NTU)	13	6.4	22	8.7	9.8	12

Prepared by: Susan Forker

Checked by: David Seed

TABLE 3-3
Sample Collection Frequencies
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLej
North Carolina

Analysis	Sample Matrix	Field Samples	Field Duplicates	Equipment Blanks	Field Blanks	MS/MSDs
Subsurface Soil						
Explosives Residues including PETN and Nitroglycerine	Solid	17	2	4	1	1
Perchlorate		17	2	4	1	1
Total Metals		17	2	4	1	1
Surface Soil						
Explosives Residues including PETN and Nitroglycerine	Solid	42	5	4	1	3
Perchlorate		42	5	4	1	3
Total Metals		42	5	4	1	3
Sediment						
Explosives Residues including PETN and Nitroglycerine	Solid	2	1	1	1	1
Perchlorate		2	1	1	1	1
Total Metals		2	1	1	1	1
Groundwater						
Explosives Residues including PETN and Nitroglycerine	Aqueous	6	1	1	1	1
Perchlorate		6	1	1	1	1
Total Metals		6	1	1	1	1
Dissolved Metals		6	1	1	1	1
Surface Water						
Explosives Residues including PETN and Nitroglycerine	Aqueous	2	1	1	1	1
Perchlorate		2	1	1	1	1
Total Metals		2	1	1	1	1
Dissolved Metals		2	1	1	1	1

Notes:

MS/MSD = Matrix Spike and Matrix Spike Duplicate

Field duplicates are collected at the rate of 1 for every 10 environmental samples

Equipment rinsate blanks are typically collected at the rate of 1 per day per media

Field blanks are typically collected at the rate of 1 per week during sampling

MS/MSDs are collected at the rate of 1 for every 20 samples

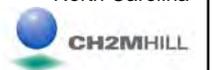
Prepared by: Verd Anna Cunningham

Checked by: Susan Forker



- Legend**
- DGM Transect
 - Site UXO-07 Boundary

Figure 3-1
DGM Transects
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLej
North Carolina



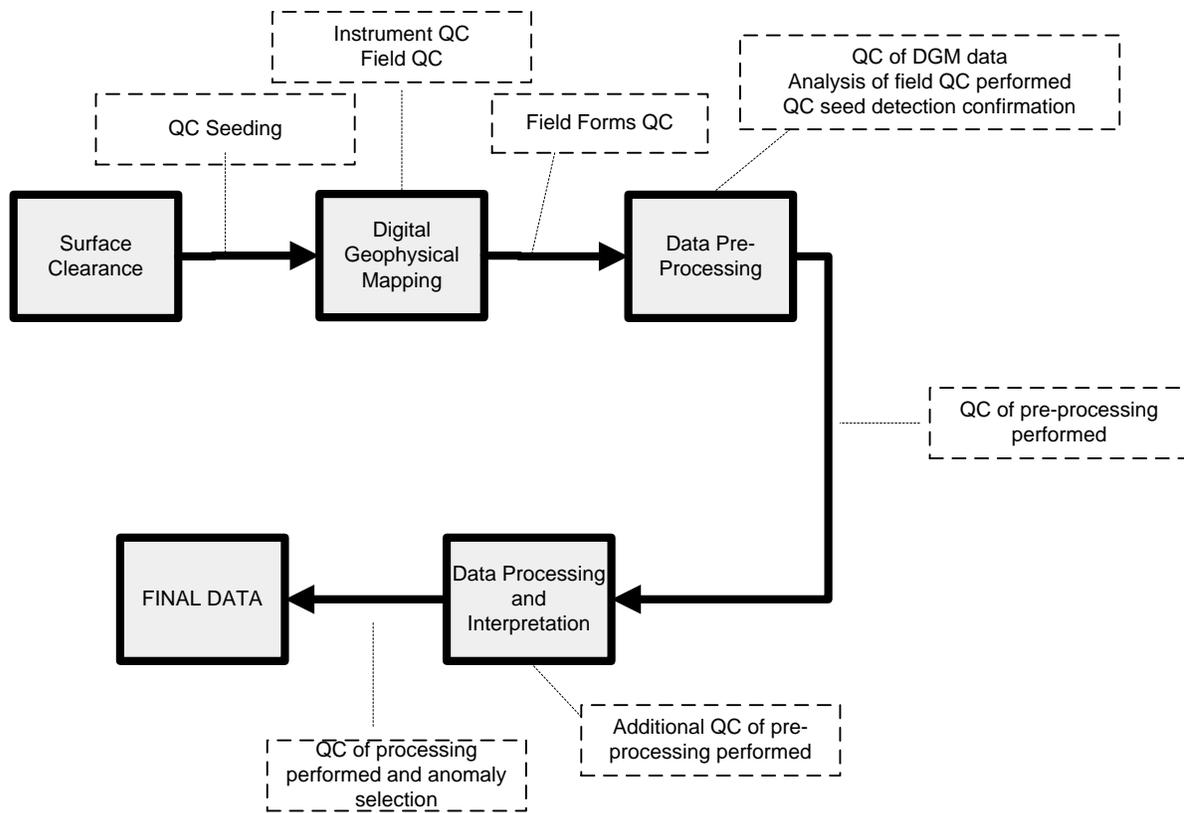
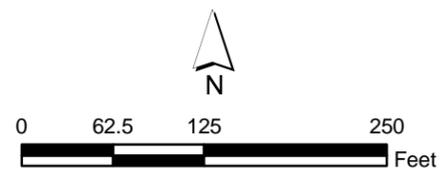


FIGURE 3-2
 Overview of DGM QC Process
 Site UXO-07 Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLej
 North Carolina



- Legend**
- Surface Soil Sampling Locations
 - Creek
 - ▨ Wetlands
 - ▭ Site UXO-07 Boundary



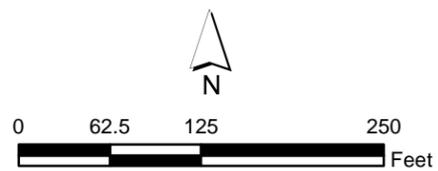
1 inch = 125 feet

Figure 3-3
 Surface Soil Sampling Locations
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLeJ
 North Carolina





- Legend**
- Surface Water/Sediment Sampling Locations
 - Temporary Well/Subsurface Soil Sampling Locations
 - Subsurface Soil Sampling Locations
 - Site UXO-07 Boundary
 - ▨ Wetlands
 - Creek



1 inch = 125 feet

Figure 3-4
Environmental Sampling Locations
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLeJ
North Carolina



Investigation Results

This section presents the findings of the investigation activities conducted at Site UXO-07 during May, November, and December 2009.

4.1 Digital Geophysical Mapping Results

The DGM survey was conducted in May 2009, in accordance with the approved PA/SI Work Plan Addendum (CH2M HILL, 2009) and covered 11.7 percent (approximately 0.82 acre) of Site UXO-07. The DGM survey yielded a total of 1,433 geophysical anomalies with a signal greater than 3 mV in Channel 2. From this total, 315 anomalies (22 percent) are deemed cultural items associated with power lines, buildings, active parking lots, subsurface utilities and chain link fences, resulting in the selection of 1,118 anomalies representing potential subsurface MEC.

The greatest density of anomalies was found near roads and buildings, including the Armory located in the southwest corner of the site. **Figure 4-1** illustrates the DGM area and the distribution of anomalies observed with a signal greater than 3 mV. **Appendix C** contains the Geophysical Investigation Report.

4.2 Environmental Investigation Results

The following subsections present and summarize the laboratory data from analysis of soil and groundwater samples collected at Site UXO-07. Summary tables are provided for analytes that exceed at least two regulatory screening criteria. Laboratory analytical data are presented in **Appendix G**.

4.2.1 Soil

Following the third-party data validation of the laboratory analytical data, surface and subsurface soil samples were screened against the North Carolina Soil Screening Levels (NC SSLs), the Adjusted¹ USEPA Industrial and Residential Regional Screening Levels (RSLs) for Chemical Contaminant Tables (USEPA, 2008), and MCB CamLej background soil concentrations (two times the mean base background soil concentration), which were available for metals only (Baker, 2001).

The January 2010 USEPA RSLs replaced the 2008 RSLs that were the proposed screening criteria in the PA/SI Work Plan (CH2M HILL, 2009). The RSLs for non-carcinogenic compounds were adjusted by dividing by 10 to conservatively account for exposure to multiple analytes. The methodology for calculating NC SSLs for contaminant migration from soil to groundwater was developed to identify chemical concentrations in soil that have the potential to impact groundwater. The NC SSLs are back calculated from acceptable groundwater concentrations and take into consideration fate and transport parameters (NCDENR, 2010).

¹ Based on noncarcinogenic effects to conservatively account for exposure to multiple constituents

Figure 4-2 illustrates the locations of the TR-02-1 surface soil samples that exceeded two times the mean base background concentration and at least one of the screening levels (NC SSLs or the Adjusted RSLs). **Figure 4-3** depicts the locations of subsurface soil samples that exceeded two times the mean base background concentration and at least one of the screening levels (NC SSLs or the Adjusted RSLs). The detected concentrations of specific target analytes are summarized in **Tables 1 and 2 in Appendix G**.

TR-02-1 Surface Soil Samples

- **Explosives Residues** – Eight explosives residues (1,3,5-trinitrobenzene, 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 3-nitrotoluene, HMX, nitroglycerin, RDX, and tetryl) were detected in surface soil samples at Site UXO-07. All concentrations were substantially below the Adjusted Soil RSLs.
- **Perchlorate** – Perchlorate was not detected in any surface soil samples.
- **Metals** -- The following table summarizes regulatory exceedances for metals analysis. Seventeen additional metals were detected at concentrations above two times the mean base background concentration in at least one TR-02-1 surface soil sample; however, no concentrations exceeded Adjusted Soil RSLs or NC SSLs.

Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (µg/kg)	Minimum Concentration (µg/kg)	Screening Criteria (µg/kg)	Frequency of Exceedances	
Aluminum	47/47	10,600	2,700	2x mean BBG	5,487	20
				Residential RS	7,700	5
Arsenic	47/47	9.58	0.901	2x mean BBG	0.626	47
				Residential RSL	0.39	47
				Industrial RSL	1.6	25
				NC SSL	5.8	1
Chromium	47/47	19.5	4.8	2x mean BBG	6.05	34
				Residential RSL	0.29	47
				Industrial RSL	5.6	47
				NC SSL	3.8	47
Cyanide	6/47	0.546	0.16	NC SSL	0.28	1
Iron	47/47	6730	1790	2x mean BBG	3,245	47
				Residential RSL	5,500	5
				NC SSL	150	47

Subsurface Soil Samples

- **Explosives Residues** – Two explosives residues, 1,3,5-trinitrobenzene and RDX, were detected in samples from Site UXO-07 collected in 2009. 1,3,5-Trinitrobenzene was found at very low concentrations in samples MR07-IS06, -IS10, -IS11, and -IS12. RDX was detected in 11 of the 17 soil sample locations at concentrations well below the screening

criterion. No explosives residues were detected in samples collected during the supplemental subsurface soil sampling event conducted in March 2011.

- **Perchlorate** – Perchlorate was not detected in any subsurface soil samples.
- **Metals** -- The following table summarizes regulatory exceedances for metals analysis. Eleven additional metals were detected at concentrations exceeding twice the mean base background concentration, but did not exceed any other screening criteria.

Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (µg/kg)	Minimum Concentration (µg/kg)	Screening Criteria (µg/kg)	Frequency of Exceedances	
Aluminum	19/19	16,000	1,650	2x mean BBG	5,487	9
				Residential RSL	7,700	13
Arsenic	19/19	15.7	0.269	2x mean BBG	0.626	7
				Residential RSL	0.39	17
				Industrial RSL	1.6	10
				NC SSL	5.8	2
Chromium	19/19	22.2	1.5	2x mean BBG	6.05	7
				Residential RSL	0.29	19
				Industrial RSL	5.6	15
Iron	19/19	16,000	348	NC SSL	3.8	15
				2x mean BBG	3,245	5
				Residential RSL	5,500	5
Vanadium	19/19	46.4	1.94	NC SSL	150	19
				2x mean BBG	17.2	5
				Residential RSL	39	1

4.2.2 Groundwater

This section presents the results for laboratory analysis of groundwater samples collected from the six shallow temporary monitoring wells. Groundwater results were screened against the North Carolina Groundwater Quality Standards (NCGWQS) (NCDENR, 2010), USEPA Tap Water RSLs, and MCB CamLej background groundwater concentrations (two times the mean base background groundwater concentration), which were available for inorganic analytes only (Baker, 2001). The NCGWQS are the maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the state, which may be tolerated without creating a threat to human health or otherwise rendering the groundwater unsuitable for its intended purpose.

The detections and exceedances of NCGWQS, USEPA RSLs, and/or two times the base background levels are shown on **Table 3** in **Appendix G**. **Figure 4-4** depicts the locations of groundwater samples that exceed two times the mean base background concentration and at least one of the screening levels (NCGWQS or USEPA Tap Water RSLs).

- Explosives Residues** -- The following table summarizes regulatory exceedances for explosives residues and perchlorate. Explosives residues, including 3-nitrotoluene, 4-nitrotoluene, PETN, and tetryl, were detected in groundwater samples with concentrations below the screening criterion.

Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (µg/L)	Minimum Concentration (µg/L)	Screening Criteria (µg/L)	Frequency of Exceedances
Nitrobenzene	4/7	1.2	UD	Adj. Tap Water RSL 0.12	4
Perchlorate	4/7	9.93	UD	NCGWQS 2	1

- Total Metals**

The following table summarizes regulatory exceedances for metals analysis.

Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (µg/L)	Minimum Concentration (µg/L)	Screening Criteria (µg/L)	Frequency of Exceedances
Chromium	7/7	3.31	0.687	2x mean BBG 3.13	1
				Adj. Tap Water RSL 0.043	7
Cobalt	2/7	35.9	UD	2x mean BBG 3.4	1
				Adj. Tap Water RSL 1.1	2
Iron	7/7	6,600	597	2x mean BBG 5,999	1
				NCGWQS 300	7
				Adj. Tap Water RSL 2,600	1
Manganese	7/7	765	12.4	2x mean BBG 214	1
				NCGWQS 50	2
				Adj. Tap Water RSL 88	2

- Dissolved Metals** -- Because of their proximity to the surface water body (drainage feature) located at Site UXO-07, samples from MR07-TW03 and MR07-TW17 were analyzed for dissolved metals in addition to total metals. Dissolved metals data is used when performing an ecological risk assessment to determine the potential mobility through the soil into surface water for detected compounds.

Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (µg/L)	Minimum Concentration (µg/L)	Screening Criteria (µg/L)		Frequency of Exceedances
Iron	2/2	5,230	330	NCGWQS	300	2
				Adj. Tap Water RSL	2,600	1
Manganese	2/2	90	10.7	NCGWQS	50	1
				Adj. Tap Water RSL	88	1

4.2.3 Sediment and Surface Water

This section presents the results for laboratory analysis of sediment and surface water samples collected from two locations at Site UXO-07. The detections and exceedances of USEPA RSLs are shown in **Tables 4 and 5 in Appendix G**. **Figure 4-5** depicts the locations of sediment samples that exceed two times the mean base background concentration and at least one of the screening levels (USEPA Residential and Industrial Soil RSLs).

Sediment samples were collected at two locations on Site UXO-07: MR07-SD01 and MR07-SD02. The table below presents a summary of screening criteria exceedances in the two sediment samples.

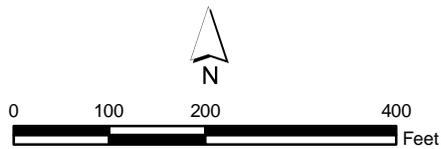
Analyte	Frequency of Detection (# detected / # sampled)	Maximum Concentration (mg/kg)	Minimum Concentration (mg/kg)	Screening Criteria (mg/kg)		Frequency of Exceedances
Arsenic	3/3	2.16	0.872	Residential RSL	0.39	3
				Industrial RSL	1.6	1
Chromium	3/3	12.8	3.58	Residential RSL	0.29	3
				Industrial RSL	5.6	1
Iron	3/3	6,870	2,190	Residential RSL	5500	1

Results from surface water sampling indicated that there were no exceedances of screening criteria: NCAC 2B SW Human Health and Water Supply values, from North Carolina 15A NCAC 02B .0202 regulations; National Recommended Water Quality Criteria (NRWQC) from USEPA's NRWQC table, Office of Water, Office of Science and Technology, 2009, available on-line at <http://www.epa.gov/waterscience/criteria/wqctable/>; and Adjusted Tap Water RSLs, from EPA's Regional Screening Level Table. Due to the lack of concentrations in exceedance of criteria, surface water sampling results are not presented on a figure.



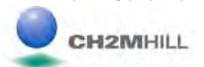
Legend

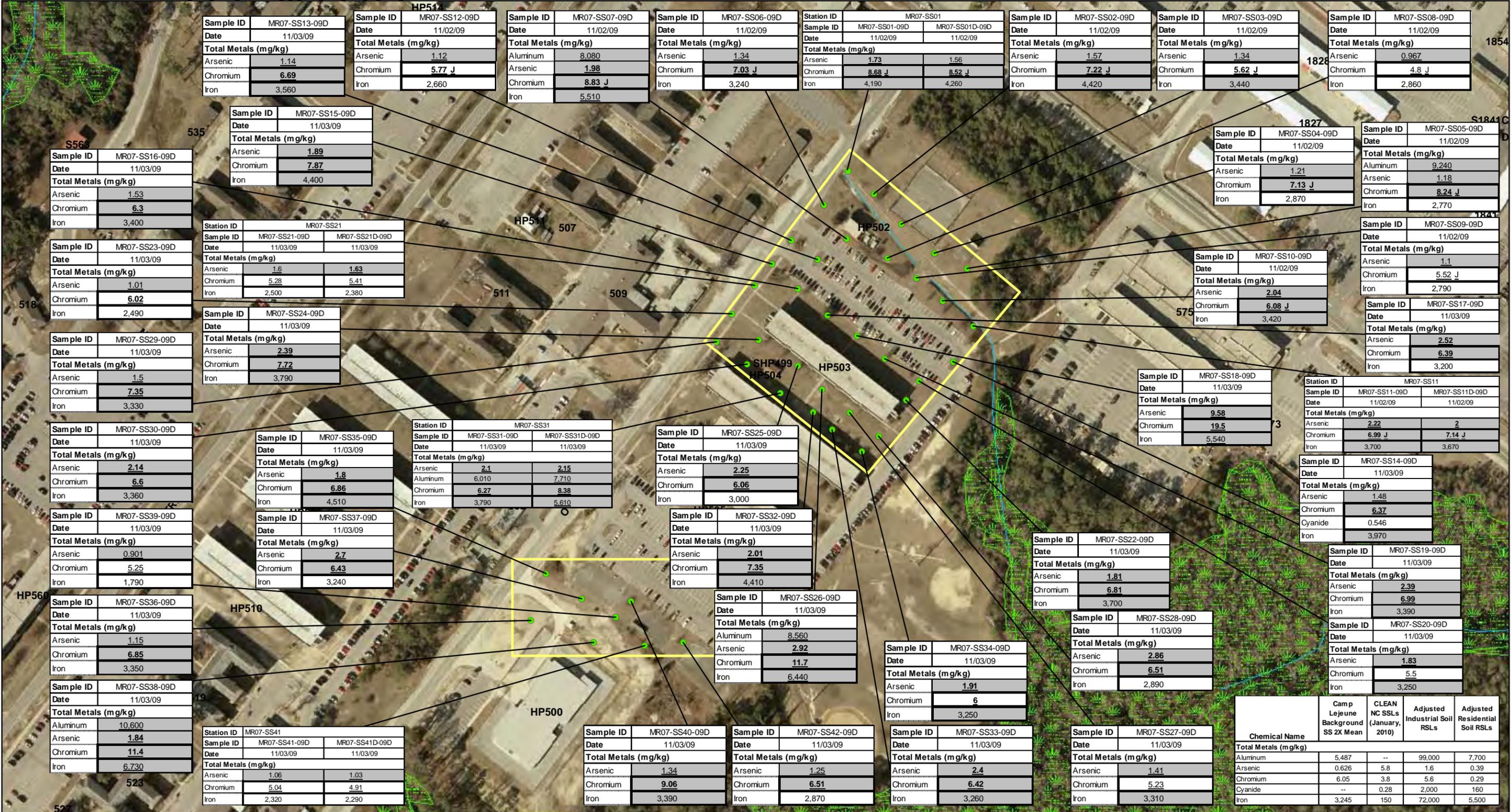
- Geophysical Anomaly (greater than 3 mV)
- DGM Transect
- Site UXO-07 Boundary



1 inch = 200 feet

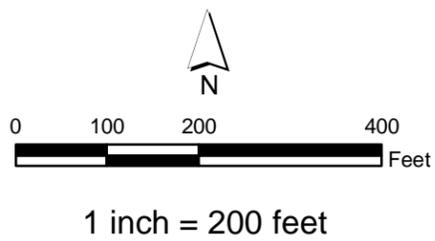
Figure 4-1
DGM Results
Site UXO-07, Former D-6 Practice Hand Grenade Course
PA/SI Report
MCB CamLej
North Carolina





- Legend**
- Surface Soil Sampling Locations
 - Creek
 - Wetlands
 - Site UXO-07 Boundary

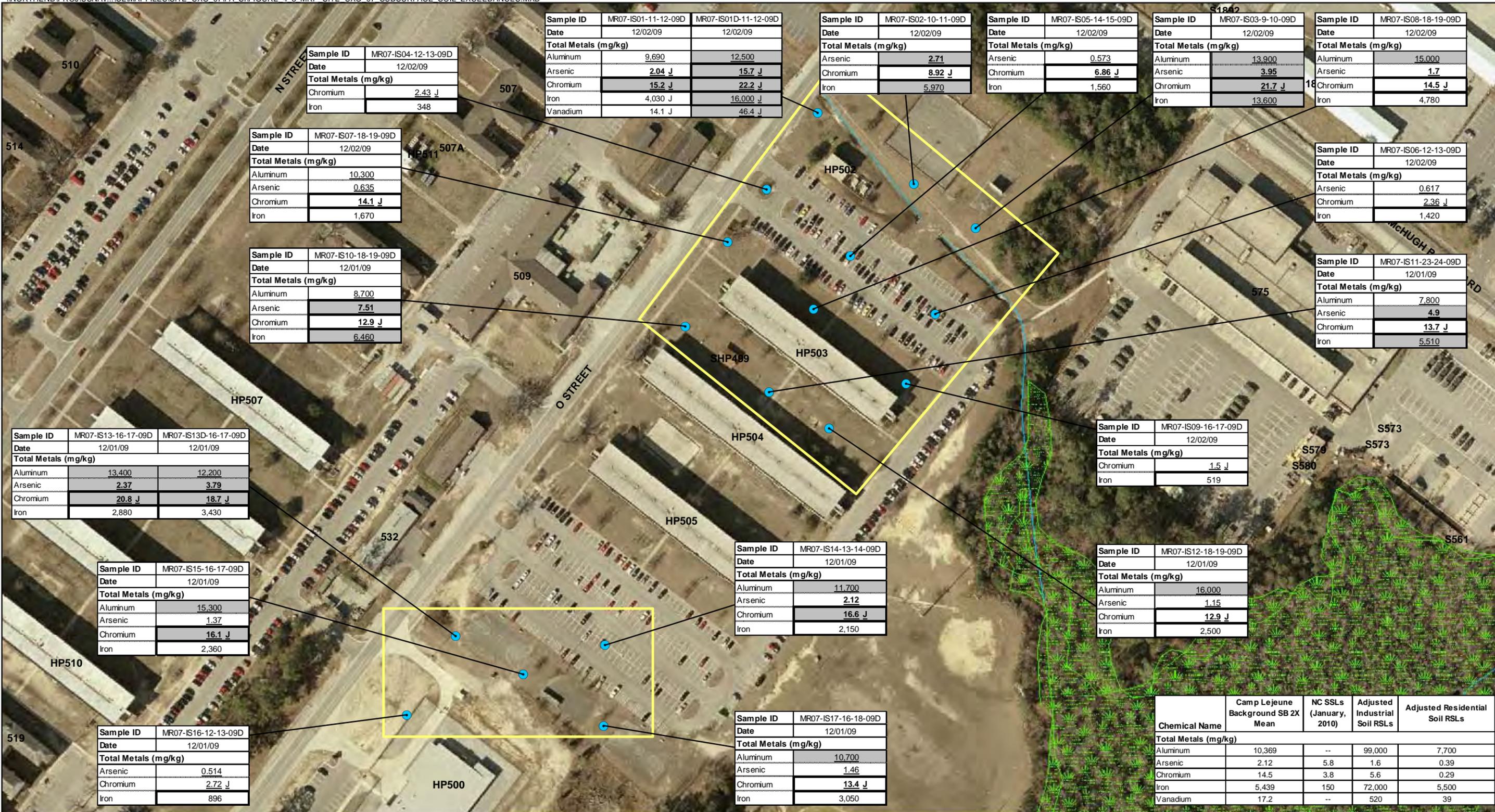
Notes:
 Metals are presented at a location if at least one concentration exceeded a comparison criterion. Exceedance of the base background is presented if an additional comparison criterion is also exceeded.
 Shading indicates exceedance of two times the mean base background concentration for surface soil
Bold box indicates exceedance of NC SSLs
Bold text indicates exceedance of Adjusted Industrial Soil RSLs
Underline indicates exceedance of Adjusted Residential Soil RSLs
 RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
 mg/kg - Milligrams per kilogram



Chemical Name	Camp Lejeune Background SS 2X Mean	CLEAN NC SSLs (January, 2010)	Adjusted Industrial Soil RSLs	Adjusted Residential Soil RSLs
Total Metals (mg/kg)				
Aluminum	5,487	--	99,000	7,700
Arsenic	0.626	5.8	1.6	0.39
Chromium	6.05	3.8	5.6	0.29
Cyanide	--	0.28	2,000	160
Iron	3,245	150	72,000	5,500

Figure 4-2
 Surface Soil Exceedances
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLej
 North Carolina





Sample ID	MR07-IS01-11-12-09D	MR07-IS01D-11-12-09D
Date	12/02/09	12/02/09
Total Metals (mg/kg)		
Aluminum	9,690	12,500
Arsenic	2.04 J	15.7 J
Chromium	15.2 J	22.2 J
Iron	4,030 J	16,000 J
Vanadium	14.1 J	46.4 J

Sample ID	MR07-IS02-10-11-09D
Date	12/02/09
Total Metals (mg/kg)	
Arsenic	2.71
Chromium	8.92 J
Iron	5,970

Sample ID	MR07-IS05-14-15-09D
Date	12/02/09
Total Metals (mg/kg)	
Arsenic	0.573
Chromium	6.86 J
Iron	1,560

Sample ID	MR07-IS03-9-10-09D
Date	12/02/09
Total Metals (mg/kg)	
Aluminum	13,900
Arsenic	3.95
Chromium	21.7 J
Iron	13,600

Sample ID	MR07-IS08-18-19-09D
Date	12/02/09
Total Metals (mg/kg)	
Aluminum	15,000
Arsenic	1.7
Chromium	14.5 J
Iron	4,780

Sample ID	MR07-IS07-18-19-09D
Date	12/02/09
Total Metals (mg/kg)	
Aluminum	10,300
Arsenic	0.635
Chromium	14.1 J
Iron	1,670

Sample ID	MR07-IS10-18-19-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	8,700
Arsenic	7.51
Chromium	12.9 J
Iron	6,460

Sample ID	MR07-IS06-12-13-09D
Date	12/02/09
Total Metals (mg/kg)	
Arsenic	0.617
Chromium	2.36 J
Iron	1,420

Sample ID	MR07-IS11-23-24-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	7,800
Arsenic	4.9
Chromium	13.7 J
Iron	5,510

Sample ID	MR07-IS13-16-17-09D	MR07-IS13D-16-17-09D
Date	12/01/09	12/01/09
Total Metals (mg/kg)		
Aluminum	13,400	12,200
Arsenic	2.37	3.79
Chromium	20.8 J	18.7 J
Iron	2,880	3,430

Sample ID	MR07-IS09-16-17-09D
Date	12/02/09
Total Metals (mg/kg)	
Chromium	1.5 J
Iron	519

Sample ID	MR07-IS15-16-17-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	15,300
Arsenic	1.37
Chromium	16.1 J
Iron	2,360

Sample ID	MR07-IS14-13-14-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	11,700
Arsenic	2.12
Chromium	16.6 J
Iron	2,150

Sample ID	MR07-IS12-18-19-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	16,000
Arsenic	1.15
Chromium	12.9 J
Iron	2,500

Sample ID	MR07-IS16-12-13-09D
Date	12/01/09
Total Metals (mg/kg)	
Arsenic	0.514
Chromium	2.72 J
Iron	896

Sample ID	MR07-IS17-16-18-09D
Date	12/01/09
Total Metals (mg/kg)	
Aluminum	10,700
Arsenic	1.46
Chromium	13.4 J
Iron	3,050

Chemical Name	Camp Lejeune Background SB 2X Mean	NC SSLs (January, 2010)	Adjusted Industrial Soil RSLs	Adjusted Residential Soil RSLs
Total Metals (mg/kg)				
Aluminum	10,369	--	99,000	7,700
Arsenic	2.12	5.8	1.6	0.39
Chromium	14.5	3.8	5.6	0.29
Iron	5,439	150	72,000	5,500
Vanadium	17.2	--	520	39

- Legend**
- Subsurface Soil Sampling Locations
 - Creek
 - Wetlands
 - Site UXO-07 Boundary

Notes:
 Metals are presented at a location if at least one concentration exceeded a comparison criterion. Exceedance of the base background is presented if an additional comparison criterion is also exceeded. Shading indicates exceedance of two times the mean base background concentration for subsurface soil. **Bold box indicates exceedance of NC SSLs**. **Bold text indicates exceedance of Adjusted Industrial Soil RSLs**. Underline indicates exceedance of Adjusted Residential Soil RSLs. RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents. J - Analyte present, value may or may not be accurate or precise mg/kg - Milligrams per kilogram

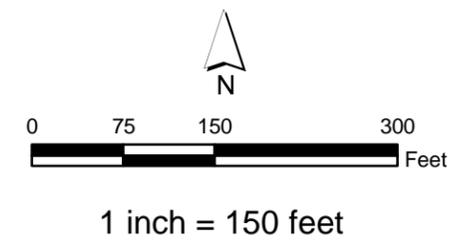
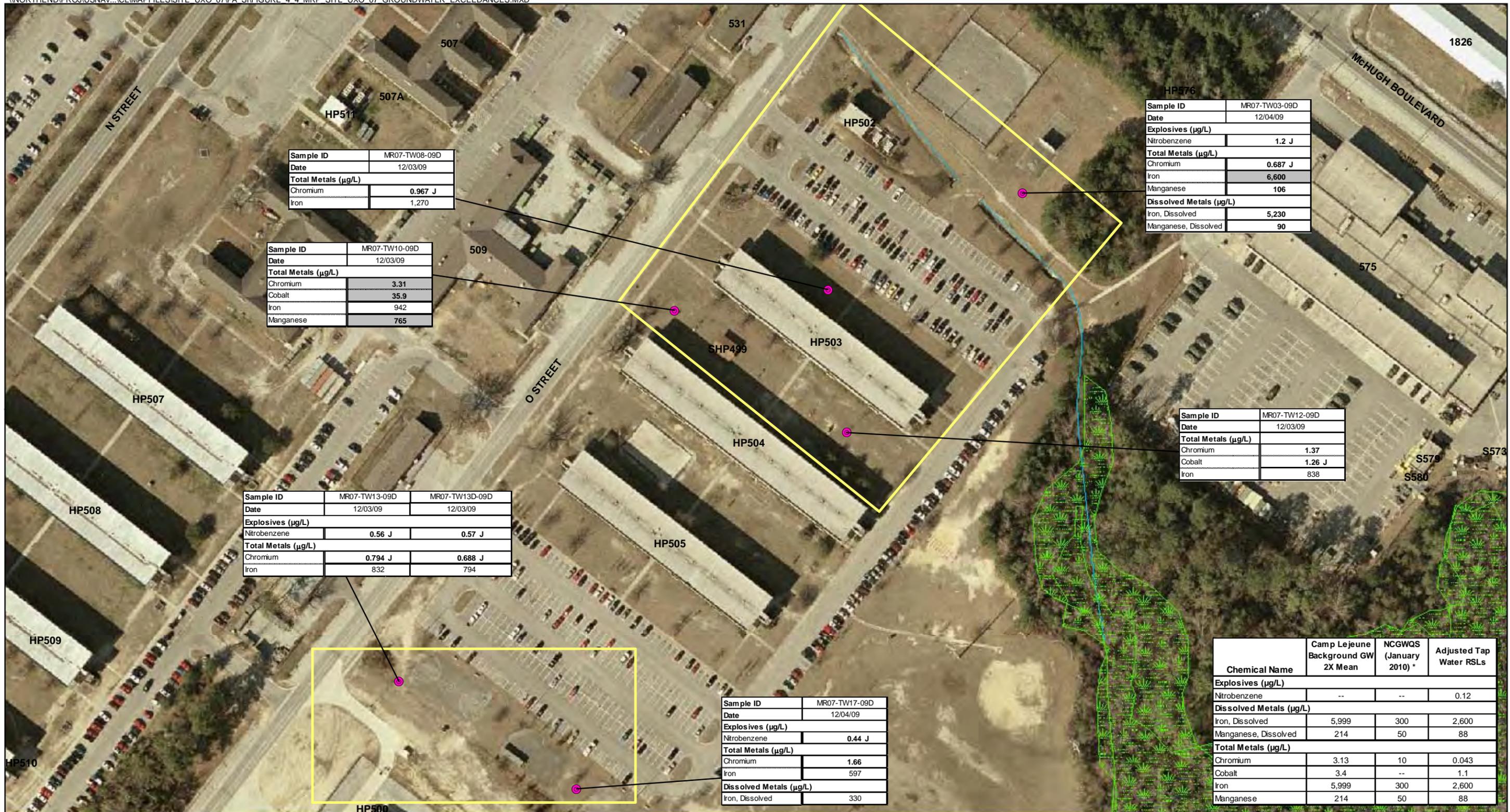


Figure 4-3
 Subsurface Soil Exceedances
 Site UXO-07, Former D-6 Practice Hand Grenade Course
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- Legend**
- Temporary Well
 - Creek
 - Wetlands
 - Site UXO-07 Boundary

Notes:
 Shading indicates exceedance of two times the mean base background concentration for Groundwater
Bold box indicates exceedance of NCGWQS or the more conservative MCL
Bold text indicates exceedance of Adjusted Tap Water RSLs
 RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
 * - The MCL-Groundwater value is reported in place of the NC2LGW where the MCL value is more conservative.
 J - Analyte present, value may or may not be accurate or precise
 µg/L - Micrograms per liter

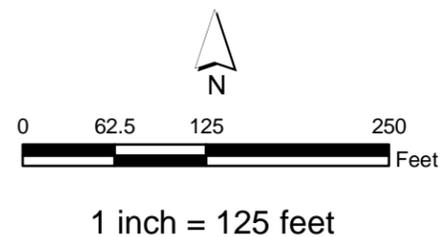


Figure 4-4
 Groundwater Exceedances
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
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 North Carolina





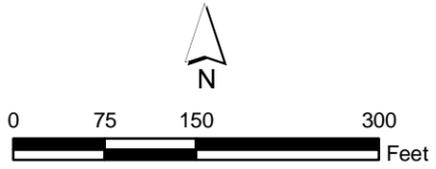
Station ID	MR07-SD01	
Sample ID	MR07-SD01-09D	MR07-SD01D-09D
Date	11/12/09	11/12/09
Total Metals (mg/kg)		
Arsenic	1.06	<u>0.872</u>
Chromium	3.93	3.58

Sample ID	MR07-SD02-09D
Date	11/12/09
Total Metals (mg/kg)	
Aluminum	8,420
Arsenic	2.16
Chromium	12.8
Iron	6,870

Chemical Name	Adjusted Industrial Soil RSLs	Adjusted Residential Soil RSLs
Total Metals (mg/kg)		
Aluminum	99,000	7,700
Arsenic	1.6	0.39
Chromium	5.6	0.29
Iron	72,000	5,500

- Legend**
- Sediment Sampling locations
 - Creek
 - ▨ Wetlands
 - ▭ Site UXO-07 Boundary

Notes:
Bold text indicates exceedance of Adjusted Industrial Soil RSLs
Underline indicates exceedance of Adjusted Residential Soil RSLs
 RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
 mg/kg - Milligrams per kilogram



1 inch = 150 feet

Figure 4-5
 Sediment Exceedances
 Site UXO-07, Former D-6 Practice Hand Grenade Course
 PA/SI Report
 MCB CamLej
 North Carolina



Human Health Risk Screening

A conservative preliminary human health risk screening (HHRS) was performed to assess the potential for human health risks associated with exposure to site media (soil, groundwater, surface water, and sediment). The results of the HHRS provide a preliminary indication of potential risks from constituents of potential concern (COPCs), and are used to help evaluate whether future residential use of the site is acceptable based on human health risks or if the site requires further evaluation (e.g., a baseline risk assessment, additional data collection).

The data included in the risk screening were all validated. The validated data were evaluated to determine the reliability of the data for use in the HHRS. A review of the data identified the following criteria for data usability:

- Estimated values flagged with a J qualifier were treated as detected concentrations
- For duplicate samples, the maximum concentration between the two samples was used as the sample concentration
- Unfiltered groundwater samples were analyzed in the risk evaluations following USEPA Region IV guidance (USEPA, 2000).

5.1 Human Health Conceptual Site Model

The human health conceptual site model (CSM) presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors. The human health CSM for soil, groundwater, surface water, and sediment is presented on **Figure 5-1**.

Potential current receptors for Site UXO-07 include visitors, trespassers, Base/industrial workers, and maintenance workers. The current receptors may come in contact with surface soil, surface water, and sediment. Exposure routes may include incidental ingestion of and dermal contact with the surface soil, surface water, and sediment, and inhalation of particulate emissions from the surface soil. Based on the site history, VOCs were not used at Site UXO-07; therefore, inhalation of VOC emissions from site media is not a potentially complete exposure route.

Future site use is not expected to change significantly from current site use; therefore, potential future receptors include current receptors and construction workers who perform any future construction projects at the site. Additionally, although unlikely, future residents are included as a worst-case scenario, to evaluate unrestricted future site use. Future receptors could be exposed to surface and subsurface soil if future construction at the site results in re-working the soil, and exposing the subsurface soil. Exposure routes for future exposure to the surface and subsurface soil are the same as those for current surface soil: incidental ingestion of and dermal contact with the soil, and inhalation of particulate

emissions from the soil. The construction worker could also be exposed to the surface water and sediment, through incidental ingestion and dermal contact.

Potable water supplies for MCB CamLej and the surrounding residential area are provided by water supply wells that pump groundwater from the Castle Hayne Aquifer; therefore, there is no current exposure to shallow groundwater at Site UXO-07. There are no active water supply wells within a 1.2 mile radius of Site UXO-07. The groundwater use patterns are already established for the Base and area around Site UXO-07, so use of shallow groundwater from Site UXO-07 for industrial or residential purposes is unlikely.

Additionally, the surficial aquifer at MCB CamLej is not suitable for potable water use due to high dissolved solids, hardness, and fluctuating water levels that negatively affect water yields. However, state and federal governing policies assume that underground fresh water resources are potable, and should be maintained as such; therefore, a potable use scenario was evaluated in this risk assessment. It was conservatively assumed that if future residential development of the site were to occur, the residents could potentially use the groundwater as a potable water supply. The residents would be exposed through ingestion and dermal contact while bathing. As VOCs are not associated with the site use, inhalation of VOCs while bathing is not a complete pathway. Additionally, due to the groundwater depth (from 4 to 7 feet bgs), construction workers could be exposed to the groundwater through dermal contact during construction activities.

Vapor intrusion from groundwater (or soil) to indoor air is not a complete pathway for UXO-07, as VOCs are not associated with historical use of the site.

5.2 Human Health Risk-Based Screening and Risk Ratio Evaluation Methodology

The HHRS was conducted in three steps using a risk ratio technique (Department of the Navy, 2000). If COPCs were identified after Step 1, they were evaluated in Step 2. If COPCs were identified after Step 2, they were evaluated in Step 3. The three-step screening process is described below.

5.2.1 Step 1

The maximum detected analyte concentrations for each medium were compared to USEPA Regional Screening Levels (RSLs; USEPA, 2009a), other HHRS levels (if appropriate), and two times the mean background concentration (for inorganic constituents in soil and groundwater). RSLs based on noncarcinogenic effects were divided by 10 to account for exposure to multiple constituents (i.e., were adjusted to a hazard quotient [HQ] of 0.1, from the HQ of 1.0 used on the RSL table). RSLs based on carcinogenic endpoints were used as presented in the RSL table, and are based on a carcinogenic risk of 1×10^{-6} .

The soil and sediment data were compared to Adjusted Residential Soil RSLs. Residential Soil RSLs are more conservative (i.e., lower) than Industrial Soil RSLs and are therefore protective of all potential receptors (e.g., residents, industrial workers, construction workers).

The groundwater data were compared to Adjusted Tap Water RSLs. Groundwater data were also compared to maximum contaminant levels (MCLs) and the NCGWQS

(15A NCAC 2L); however, these comparisons were not used to identify the groundwater COPCs to carry forward to Step 2.

The surface water data were compared to NCAC 2B water quality standards for human health and water supply (if available), or the NRWQC for human health (water and organisms criteria). If neither of these were available, the Adjusted Tap Water RSL was used for comparison.

If the maximum detected concentration in soil, groundwater, surface water, or sediment exceeded the appropriate screening value and background concentration, the screening level risk evaluation proceeded to Step 2.

In addition to comparing the detected concentrations to the screening levels, the detection limits for non-detected analytes were compared to the screening levels. Non-detected analytes with detection limits exceeding the screening level were not identified as COPCs to carry forward to Step 2, but are discussed below to evaluate the potential for underestimating the total risks.

5.2.2 Step 2

For analytes identified as COPCs in Step 1, a corresponding risk level was calculated using the following equation:

$$\text{corresponding risk level} = \frac{\text{concentration} \times \text{acceptable risk level}}{\text{RSL}}$$

The concentration is the maximum detected concentration (the same concentration that was used in Step 1). The acceptable risk level is 1 for noncarcinogens and 10^{-6} for carcinogens. RSLs for noncarcinogenic effects were not adjusted by 10 as was done in Step 1; they were used as presented in the RSL table.

All of the corresponding risk levels for each analyte within a medium were summed to calculate the cumulative corresponding hazard index (HI) (for noncarcinogens) and cumulative corresponding carcinogenic risk (for carcinogens). A cumulative corresponding HI was also calculated for each target organ/effect. If the cumulative corresponding HI for a target organ/effect was greater than 0.5, or the cumulative corresponding carcinogenic risk was greater than 5×10^{-5} , the analytes contributing to these values were retained as COPCs and carried forward to Step 3.

5.2.3 Step 3

A corresponding risk level was calculated as discussed above for Step 2; however, the 95 percent upper confidence limit (UCL) was used in place of the maximum detected concentration, if more than five samples were available for that medium, to obtain a more site-specific risk ratio. If the cumulative corresponding HI by target organ/effect was greater than 0.5, or the cumulative corresponding carcinogenic risk was greater than 5×10^{-5} , then constituents contributing to these values were considered COPCs.

ProUCL Version 4.00.04 (USEPA, 2009b) was used to test the data distribution and calculate the 95 percent UCLs used for the Step 3 risk ratio calculations (**Appendix H**).

5.3 Human Health Risk Screening Results

The human health risk-based screening (comparison to risk-based criteria and background levels, Step 1) and risk ratio evaluation (Steps 2 and 3) were performed for surface soil, subsurface soil, sediment, surface water, and groundwater.

5.3.1 Surface Soil Risk Screening

Tables 2.1 through 2.1b in **Appendix H** present the risk-based screening and risk ratio evaluation for surface soil. As shown on Table 2.1 in **Appendix H**, four metals (aluminum, arsenic, chromium, and iron) were identified as COPCs. Based on Step 2 of the screening process (Table 2.1a, **Appendix H**), aluminum and iron were eliminated as COPCs. After Step 3 (Table 2.1b, **Appendix H**), the remaining two analytes, arsenic and chromium, were eliminated as COPCs; therefore, exposure to surface soil would not pose any unacceptable risks, and further evaluation of surface soil based on human health risks is not necessary.

5.3.2 Surface Water

Table 2.2, **Appendix H** presents the risk-based screening for surface water. There were no analytes detected in surface water at concentrations exceeding the screening levels. Therefore, exposure to surface water would not result in any unacceptable human health risks, and no further evaluation of surface water is required in the HHRS.

5.3.3 Sediment

Tables 2.3 and 2.3a, **Appendix H**, present the risk-based screening and risk ratio evaluation for sediment. As shown on Table 2.3, **Appendix H**, four metals (aluminum, arsenic, chromium, and iron) exceeded the first step of the screening and were identified as COPCs for evaluation in Step 2. Based on Step 2 (risk ratio using maximum detected concentrations, Table 2.5a, **Appendix H**), the four metals were eliminated as COPCs. Therefore, exposure to sediment would not result in any unacceptable human health risks, and no further evaluation of sediment is required in the HHRS.

5.3.4 Groundwater

The risk-based screening and risk ratio evaluation for groundwater data are presented in Tables 2.4 through 2.4b of **Appendix H**. As shown on Table 2.4, **Appendix H**, two explosives residue chemicals (nitrobenzene and perchlorate) and four metals (chromium, cobalt, iron, and manganese) exceeded the first step of the screening and were identified as COPCs for evaluation in Step 2. Based on Step 2 (Table 2.4a, **Appendix H**), the two explosives residue chemicals and three of the metals (chromium, cobalt, and manganese) were identified as COPCs. Step 3 (Table 2.3b, **Appendix H**) did not eliminate any of the Step 2 COPCs.

Chromium is the main contributor to the carcinogenic risk, and is the only COPC that contributes a carcinogenic risk above target level of 5×10^{-5} . In the absence of chromium speciation information, the Tap Water RSL for hexavalent chromium, the more toxic (and carcinogenic) form of chromium, was used as the screening value for total chromium. The use of hexavalent chromium for comparison to total chromium is extremely conservative since the presence of trivalent chromium is strongly favored in natural waters. The concentrations of constituents known to reduce hexavalent chromium to trivalent chromium

generally far outweigh the concentrations of the few constituents known to oxidize trivalent chromium to hexavalent chromium. Furthermore, once reduced, trivalent chromium is very stable in aquatic environments and highly 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).

The maximum detected concentration of total chromium in the groundwater is below the Tap Water RSL for trivalent chromium. Additionally, prior to including the New Jersey EPA oral cancer slope factor for hexavalent chromium in the table, the groundwater RSL for hexavalent chromium was over three orders of magnitude higher than the value on the current RSL table. It should also be noted that there is some uncertainty associated with the hexavalent chromium oral cancer slope factor and RSL, as the value is from New Jersey EPA, and has not been included in USEPA's Integrated Risk Information System (IRIS) database. Elimination of chromium as a COPC would also result in elimination of nitrobenzene as a COPC, as it does not contribute significantly (above 5×10^{-5}) to the cumulative calculated risk.

Perchlorate alone does not contribute a non-carcinogenic hazard above the target level of 0.5; however, perchlorate affects the same target organ (thyroid) as cobalt, which contributes a non-carcinogenic hazard above 0.5. Cobalt was only detected in two of the six groundwater samples, and only one of the detected concentrations exceeded the Tap Water RSL. This is also the only detected concentration that exceeded the basewide background groundwater concentration. Additionally, the source of the cobalt toxicity value used to calculate the RSL is associated with some uncertainty, as it is from USEPA's National Center for Environmental Assessment (NCEA) Provisional Peer Reviewed Toxicity (PPRT) database, and is not included in USEPA's IRIS database.

The last COPC, manganese, is an essential human nutrient. The maximum detected concentration was below the Tap Water RSL (but not the Adjusted Tap Water RSL used for screening). The maximum detected concentration was the only detected concentration of manganese that exceeded the basewide background groundwater concentration. Therefore, it is unlikely there would be any adverse effects associated with exposure to manganese in the groundwater.

5.3.5 Subsurface Soil Risk Screening

Tables 2.5 through 2.5b, **Appendix H**, present the risk-based screening and risk ratio evaluation for the subsurface soil. As shown on Table 2.5 in **Appendix H**, five metals (aluminum, arsenic, chromium, iron, and vanadium) were identified as COPCs. Based on Step 2 of the screening process (Table 2.5a, **Appendix H**), two of the metals, arsenic and chromium, were identified as COPCs. Step 3 (Table 2.2b, **Appendix H**) did not eliminate either of the metals from consideration as a COPC.

In addition to groundwater, chromium is the main contributor to the carcinogenic risk associated with the subsurface soil. The analytical data for chromium are for total chromium. However, the RSL used for the screening is for hexavalent chromium, the more toxic (and carcinogenic) valence state of this metal. In the past, prior to including the New Jersey EPA oral cancer slope factor for hexavalent chromium, USEPA's RSL table presented a Residential Soil RSL for total chromium assuming a one to six (1:6) ratio of hexavalent chromium to trivalent chromium. Assuming this ratio is applicable to subsurface soil at

UXO-07, the maximum concentration of hexavalent chromium (the total measured chromium concentration multiplied by 1/6, or 3.7 mg/kg) would not result in an unacceptable risk associated with exposure to chromium. It should also be noted that there is some uncertainty associated with the hexavalent chromium oral cancer slope factor and RSL, as the value is from New Jersey EPA, and has not been included in USEPA's Integrated Risk Information System (IRIS) database. Elimination of chromium as a COPC would also result in elimination of arsenic, the only other carcinogenic COPC, as a COPC, as it does not contribute significantly (above 5×10^{-5}) to the cumulative calculated risk.

5.3.6 Non-Detected Analytes

There were no non-detected constituents in surface soil with detection limits above the screening values. For subsurface soil and sediment, one of the non-detected constituents, nitroglycerin, had detection limits above the screening value; however, the detection limit was within an order of magnitude of the screening value (the Adjusted Residential Soil RSL), and below the Residential Soil RSL. In surface soil, there were two explosives residues and two metals with detection limits slightly above the screening values. For groundwater, one explosives residue and two metals had detection limits above the screening values. Based on this evaluation, there are not expected to be any non-detected analytes present at the site that would result in unacceptable risks, or changes to the results of the HHRS.

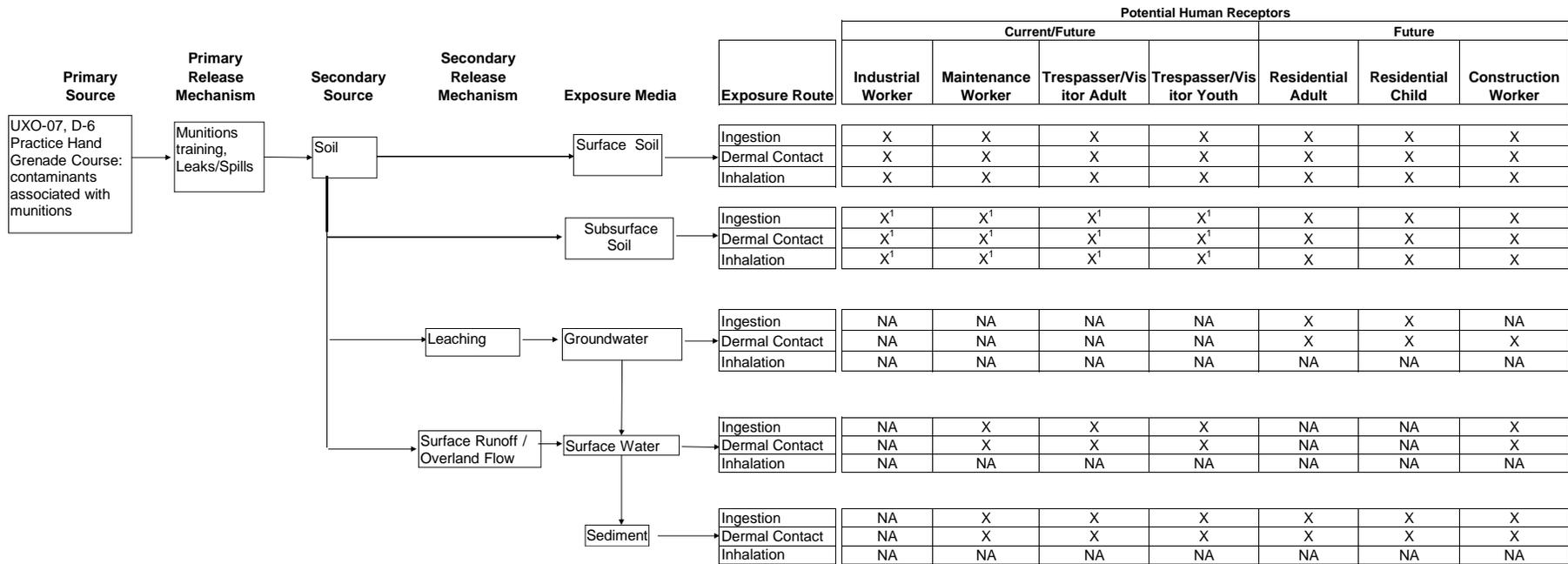


FIGURE 5-1
 Conceptual Site Model for HHRA
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¹Current receptor populations may be exposed to surface soil. Future receptor populations may be exposed to surface and subsurface soil.

NA - Not Applicable or pathway is incomplete

X - Potentially complete exposure pathways

Ecological Risk Screening

An ecological risk screening (ERS) was conducted at Site UXO-07. Potential receptors at the site may include plants, soil invertebrates, mammals (omnivorous, herbivorous, and carnivorous), reptiles, and birds (herbivorous, insectivorous, nectivorous, carnivorous, omnivorous, and granivorous). Results for constituents in surface soil, subsurface soil, sediment, surface water, and groundwater were screened against benchmarks intended to be protective of ecological receptors. All data considered in the screen were collected in 2009.

6.1 Ecological Screening Methodology

For each medium (surface soil, sediment, surface water, and groundwater), the maximum and average concentrations are presented along with representative Ecological Screening Values (ESVs) intended to be protective of ecological receptors. Subsurface soil was not screened because collection depths were all greater than 5 ft; ecological receptors would not be expected to be exposed to soils deeper than 5 ft. Hazard Quotients (HQs) were calculated by dividing these statistics by the ESVs. It should be noted that ESVs for inorganic constituents in water are generally based on dissolved concentrations, and comparing them to total metals concentrations is conservative and may over-represent risk.

For locations with multiple data points (i.e., a parent and duplicate sample were available), data were reduced to the value of the highest detected concentration or highest detection limit if there was no detection. Where average concentrations are reported, one-half of the detection limit was used for non-detects as the representative concentration when determining the average.

For soil, the USEPA Ecological Soil Screening Levels (EcoSSLs) (USEPA, 2009c) were preferentially selected over Region 4 values (USEPA, 2001). When no EcoSSL was available for a constituent, the Region 4 value was selected.

A selection hierarchy was also applied to surface water. The NRWQC were preferentially selected over the Region 4 value (USEPA, 2009d). However, when no NRWQC was available for a constituent, the Region 4 value was selected as the ESV for that constituent. For surface water, freshwater screening values were selected for the analysis. For groundwater, it is uncertain if the receiving water body is marine or freshwater, so the lowest of freshwater and marine ESVs was selected.

For sediment, USEPA Region 4 values were used.

A base background study was conducted at MCB CamLej in June and July 2000 (Baker, 2001). As part of the ERS, surface soil and groundwater background concentrations were compared to site-specific media concentrations. Additional lines of evidence in the evaluation include the frequency of detection, frequency of exceedance, magnitude of exceedance, and identification of potential laboratory contaminants.

Calcium, magnesium, potassium, and sodium were evaluated in the screening but were not considered COPCs in the ERS regardless of the results because they are macronutrients (Whitehead, 2000).

6.2 Ecological Risk Screening Results

This section addresses constituents that were detected and had available ESVs based on the selection hierarchy discussed above. Constituents not detected are not expected to pose a risk to ecological receptors.

6.2.1 Surface Soil

Nine detected constituents had concentrations in excess of ESVs (aluminum, antimony, cadmium, iron, lead, mercury, selenium, vanadium, and zinc) (Table 1 in **Appendix I**). The maximum concentrations of mercury and selenium were consistent with MCB CamLej background levels. The maximum concentrations of aluminum, iron, and vanadium exceeded two times the mean background concentration but were within the background range for surface soils at MCB CamLej and are considered to be representative of background. Only the maximum detection of antimony (1.23 mg/kg) exceeded the maximum background value (0.9 mg/kg).

For cadmium and zinc, the HQs based on the mean were less than 1 and both had low frequencies of exceedance. Cadmium exceeded the ESV in only 3 of 42 samples, while zinc exceeded the ESV in only 4 of 42 samples. Lead had a maximum-based HQ above 1 based on the selected ESV; however, when based on the USEPA Region 4 screening value for lead (50 mg/kg), the HQ was less than 1. Cadmium, zinc, and lead are not expected to pose an unacceptable risk to ecological receptors based on the low magnitude of exceedance and the low frequencies of exceedance for cadmium and zinc.

6.2.2 Groundwater

Of the total inorganic analytes detected, aluminum, cadmium, iron, nickel, and silver had concentrations in excess of the freshwater ESVs (Table 2). The maximum concentration of aluminum did not exceed the MCB CamLej background level. The maximum concentrations of iron and nickel exceeded two times the mean background concentration but were within the background range for groundwater at MCB CamLej. The maximum concentration of cadmium had a low magnitude of exceedance in groundwater and surface soil samples and is therefore not likely to pose an unacceptable risk to ecological receptors.

Of the dissolved inorganic constituents detected, only cadmium and iron had concentrations exceeding the ESVs. The maximum concentration of iron did not exceed the MCB CamLej background range and cadmium had a low magnitude of exceedance. Neither are likely to pose an unacceptable risk to ecological receptors.

Nitrobenzene was also detected, but none of the concentrations exceeded the ESV.

6.2.3 Surface Water

For the total inorganic analytes, aluminum and cadmium were the only detected constituents with concentrations in excess of the ESVs (Table 3). It should be noted that aluminum concentrations in the surface soils at the site were within the range of MCB

CamLej background levels. Because aluminum concentrations at the site are consistent with background, aluminum concentrations in surface water are not anticipated to be the result of site-related activities. Additionally, dissolved concentrations of aluminum were found to pose no risk. Consequently, aluminum concentrations in the surface water are not expected to pose an unacceptable risk to ecological receptors.

Cadmium concentrations also exceeded the ESV based on dissolved data. However, the maximum concentrations of cadmium in both total and dissolved samples had a low magnitude of exceedance, with HQs only slightly greater than 1. Consequently, risk from cadmium is considered to be low.

Nitrobenzene was also detected, but none of the concentrations exceeded the ESV.

6.2.4 Sediment

None of the detected constituents had concentrations in excess of ESVs (Table 4).

6.3 Supplemental Evaluation

This section addresses constituents that were detected but did not have an ESV based on the selection hierarchy discussed above. Supplemental values were selected as available from Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas (Texas Commission on Environmental Quality, 2006), Validation of Environmental Military Threshold Values for Explosives in Soil (National Research Council Canada, 2008), Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota (Suter and Tsao, 1996), and other publications, as needed. These comparisons are discussed along with other lines of evidences such as frequency of detection and relationship to the range of background concentrations.

6.3.1 Surface Soil

In surface soil, two SVOCs and seven explosives residues that lacked ESVs were detected. The SVOCs included 2,4-dinitrotoluene and 2,6-dinitrotoluene. The seven explosives residues included 1,3,5-trinitrobenzene; 2,4,6-trinitrotoluene; 2-amino-4,6-dinitrotoluene; HMX; nitroglycerin; RDX; and tetryl. The USEPA Region 5 Resource Conservation and Recovery Act (RCRA) ESVs for 2,4-dinitrotoluene and 2,6-dinitrotoluene were used as supplemental screening values (USEPA, 2003). Supplemental ESVs for the remaining constituents were identified in other publications.

The maximum concentrations of all the constituents were below the supplemental screening values with the exception of 2-amino-4,6-dinitrotoluene, which had a low magnitude of exceedance (HQ = 1.1). This COPC is considered to pose low risk.

6.3.2 Groundwater

In groundwater, five explosives residue and four inorganic constituents that lacked ESVs were detected. The explosive constituents included 3-nitrotoluene, 4-nitrotoluene, PETN, perchlorate, and tetryl. The inorganic constituents included barium, cobalt, manganese, and vanadium. Supplemental ESVs were identified for these constituents.

The maximum concentrations for all five explosives residue and four inorganic constituents, excluding manganese, were below the supplemental ESVs. Manganese concentrations

exceeded the ESV in the total inorganic samples, but concentrations were below the ESV in the filtered samples, suggesting that manganese is sorbed to sediments/suspended solids and not dissolved in groundwater. Consequently, none of these constituents are expected to pose an unacceptable risk.

6.3.3 Surface Water

In surface water, one explosives residue and three inorganic constituents that lacked ESVs were detected, including 4-amino-2,6-dinitrotoluene, barium, manganese, and vanadium. Supplemental ESVs were identified for these constituents. None of the maximum concentrations of the four constituents exceeded the supplemental ESVs, and risk to ecological receptors is considered negligible.

6.3.4 Sediment

In sediment, eight inorganic constituents that lacked ESVs were detected, including aluminum, barium, beryllium, cobalt, iron, selenium, manganese, and vanadium. Supplemental ESVs were identified for aluminum, cobalt, iron, and manganese, and none of the maximum concentrations of these four constituents exceeded the supplemental ESVs. Consequently, risk to ecological receptors is considered negligible.

The site surface soil concentrations of barium, beryllium, selenium, and vanadium were within the range of the MCB CamLej background levels and concentrations of these constituents are expected to be slightly higher in the sediment from runoff accumulation over time. However, since the concentrations onsite are within the range of background, none of these constituents are expected to pose an unacceptable risk to ecological receptors.

6.4 Ecological Risk Screening Conclusion

Constituents detected in the surface soil, groundwater, surface water, and sediment at UXO-07 are not expected to pose a risk to ecological receptors.

Conclusions and Recommendations

This section provides a summary of the PA/SI findings, presents conclusions, and provides recommendations.

7.1 Conclusions

7.1.1 Digital Geophysical Mapping

Following DGM protocol at MCB CamLej, approximately 11.7 percent of Site UXO-07 was surveyed yielding a total of 1,118 geophysical anomalies representing potential subsurface MEC. Intrusive investigation of the anomalies was not conducted during this phase of investigation and therefore the nature of the remaining anomalies was not determined.

7.1.2 Environmental Investigation

The PA/SI involved collection of environmental media samples (i.e., surface soil, subsurface soil, groundwater, sediments, and surface water) from several locations within Site UXO-07. Subsequent laboratory analysis of these samples detected explosives residues and metals in exceedance of their respective screening criteria. A summary of the detected target analytes is provided below.

Surface Soil

Two SVOCs (2,4-dinitrotoluene, 2,6-Dinitrotoluene), five explosives residues (2,4,6-trinitrotoluene; 2-amino-4,6-dinitrotoluene; HMX; nitroglycerin; and RDX), and 22 metals were detected in surface soil. Four metals (aluminum, arsenic, chromium, and iron) were detected at sample locations in exceedance of soil screening criteria.

Subsurface Soil

Two explosives residues (1,3,5-trinitrobenzene and RDX) were detected in subsurface soil below regulatory soil screening criteria during the 2009 environmental sampling event. Nineteen metals were detected in subsurface soil with only five metals (aluminum, arsenic, chromium, iron and vanadium) reported to exceed the regulatory screening criteria.

Groundwater

Six explosives residues (3-nitrotoluene, 4-nitrotoluene, nitrobenzene, perchlorate, PETN, and tetryl), 17 total metals and 11 dissolved metals were detected in groundwater samples. Nitrobenzene detected in four samples and perchlorate detected in one sample were in exceedance of the Adjusted Tap Water RSLs. Four metals (chromium, cobalt, iron, and manganese) and two dissolved metals (iron and manganese) were also detected in samples at concentrations exceeding screening criteria.

Sediment

Nineteen metals were detected in sediment samples. Four metals (Aluminum, arsenic, chromium, and iron) were detected in one or both of the sediment samples collected at UXO-07 at concentrations which exceeded Adjusted Residential Soil RSLs.

Surface Water

None of the target analytes were found to be in exceedance of screening criteria for surface water at Site UXO-07.

7.1.3 Human Health and Ecological Risk Screening

Constituents detected in sampled site media are not anticipated to pose any unacceptable risks to human or ecological receptors.

7.2 Recommendations

Based on the DGM results, it is recommended that an intrusive investigation be performed to assess the nature of the identified geophysical anomalies. Because no unacceptable human health or ecological risks were identified from exposure to site media, no further environmental sampling is recommended at this time. The need for additional sampling of MC will be re-evaluated based on the results of the intrusive anomaly investigation.

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Appendix A
MRSPP Site Summary Submittal to QA Panel

QA Panel Report

9/22/2010

Site Name: UXO 000007 - PRACTICE HAND
GRENADE RNG

Site POC: CLELAND DAVID

Site Location: CAMP LEJEUNE NC MCB

Stakeholder Participation: No

Cognizant FEC: MIDLANT

Regulatory Participation: No

Last QA Date:

Last QA MRS Priority:

Site Description:

MRP Site UXO-07—Practice Hand Grenade Course (ASR# 2.77a and 2.77b). The 2 acre range located in the Hadnot point Industrial area was reportedly used during the Korean War (1953 – 1959). The types of munitions employed at the site are unknown; however, it is assumed the practice hand grenades were used within the vicinity of throwing pits and targets and were the only training aids used on this range. The Draft PA/SI is complete and no MC contamination identified, geophysical anomalies are present and will be investigated.

Factors Affecting the Change in MRS Priority:

New data obtained through further study resulting in a revision to one or more subordinate MRSP ratings that had previously been completed

Reason for Addressing the MRSP Site out of Sequence:

Not Out of Sequence

Summary

Overall MRS Priority: 5	MRS Priority Source: EHE
EHE Priority: 5	EHE Rating: D
CHE Priority: NH	EHE Score: 68
HHE Priority: EP	CHE Rating:
	CHE Score:
	HHE Rating:
	HHE Priority Source:

EHE Priority:5 EHE Score: 68 EHE Rating: D

Explosive Hazard Factor Data Elements

Table 1

EHE Module: Munitions Type Data Element Table

Classification	Score
<i>Sensitive;</i>	30
<i>Practice;</i>	5
Munitions Type	30

Description:

Practice hand grenades reportedly used. Assumed that hand grenades may have been used based on limited site history.

Table 2

EHE Module: Source of Hazard Data Element Table

Classification	Score
<i>Former range;</i>	10
Source of Hazard	10

Description:

N/A

Accessibility Factor Data Elements

Table 3
EHE Module: Location of Munitions Data Element Table

Classification	Score
<i>Suspected (historical evidence);</i>	5
Location of Munitions	5

Description:

DGM conducted and 1,433 geophysical anomalies were identified.

Table 4
EHE Module: Ease of Access Data Element Table

Classification	Score
<i>Barrier to MRS access is incomplete;</i>	8
Ease of Access	8

Description:

Base is fenced but site is accessible within the Base boundary.

Table 5
EHE Module: Status of Property Data Element Table

Classification	Score
<i>DoD control;</i>	0
Status of Property	0

Description:

Base is fenced but site is accessible within the Base boundary.

Receptor Factor Data Elements

Table 6
EHE Module: Population Density Data Element Table

Classification	Score
<i>> 500 persons per square mile;</i>	5
Population Density	5

Description:

The Base has an active duty, dependent, retiree, and civilian employee population of approximately 150,000 people. The density of the surrounding population is 196 persons per square mile within a 2-mile radius of the MRS boundary. Based on the 2008 census, the population of the City of Jacksonville is over 65,000 and Onslow County is over 165,000.

Table 7
EHE Module: Population Near Hazard Data Element Table

Classification	Score
<i>26 or more inhabited structures;</i>	5
Population Near Hazard	5

Description:

There are 4 structures (3 of which are inhabited) within the MRS boundary. Approximately 3,000 structures are located within a 2 mile radius of the MRS boundary, at least 200 of them appear to be inhabited structures.

Table 8
EHE Module: Types of Activities/Structures Data Element Table

Classification	Score
<i>Residential, educational, commercial, or subsistence;</i>	5
<i>Parks and recreational areas;</i>	4
<i>Agricultural, forestry;</i>	3
<i>Industrial or warehousing;</i>	2
Types of Activities/Structures	5

Description:

N/A

Table 9
EHE Module: Ecological and/or Cultural Resources Data Element Table

Classification	Score
<i>No known or recurring activities;</i>	0
Ecological and/or Cultural Resources	0

Description:

N/A

CHE Priority: NH CHE Score: CHE Rating:

CWM Hazard Factor Data Elements

Table 11
CHE Module: CWM Configuration Data Element Table

Classification	Score
<i>Evidence of no CWM;</i>	0
CWM Configuration	0

Description:

No evidence of CWM.

Table 12

CHE Module: Sources of CWM Data Element Table

Classification	Score
<i>Evidence of no CWM;</i>	0
CWM Configuration	0

Description:

No evidence of CWM.

Accessibility Factor Data Elements

Table 13
CHE Module: Location of CWM Data Element Table

Classification	Score
<i>Evidence of no CWM;</i>	0
Location of CWM	0

Description:

No evidence of CWM.

Table 14
CHE Module: Ease of Access Data Element Table

Classification	Score
<i>Barrier to MRS access is incomplete;</i>	8
Ease of Access	8

Description:

Base is fenced but site is accessible within the Base boundary.

Table 15
CHE Module: Status of Property Data Element Table

Classification	Score
<i>DoD control;</i>	0
Status of Property	0

Description:

Base is fenced but site is accessible within the Base boundary.

Receptor Factor Data Elements

Table 16
CHE Module: Population Density Data Element Table

Classification	Score
<i>> 500 persons per square mile;</i>	5

Population Density **5**

Description:

The Base has an active duty, dependent, retiree, and civilian employee population of approximately 150,000 people. The density of the surrounding population is 196 persons per square mile within a 2-mile radius of the MRS boundary. Based on the 2008 census, the population of the City of Jacksonville is over 65,000 and Onslow County is over 165,000.

Table 17
CHE Module: Population Near Hazard Data Element Table

Classification	Score
<i>26 or more inhabited structures;</i>	5
Population Near Hazard	5

Description:

There are 4 structures (3 of which are inhabited) within the MRS boundary. Approximately 3,000 structures are located within a 2 mile radius of the MRS boundary, at least 200 of them appear to be inhabited structures.

Table 18
CHE Module: Types of Activities/Structures Data Element Table

Classification	Score
<i>Residential, educational, commercial, or subsistence;</i>	5
<i>Parks and recreational areas;</i>	4
<i>Agricultural, forestry;</i>	3
<i>Industrial or warehousing;</i>	2
Types of Activities/Structure	5

Description:

N/A

Table 19
CHE Module: Ecological and/or Cultural Resources Data Element Table

Classification	Score
<i>No known or recurring activities;</i>	0
Ecological and/or Cultural Resources	0

Description:

N/A

HHE Priority: EP	HHE Rating:	HHE Source:
Health Hazard Priority:	EP	
Receptor Description:	Evaluation pending. Environmental media sampling and risk screenings were conducted during PA/SI and potential unacceptable risks identified. Data will be loaded to the model in November 2010.	
Pathway Description:	Evaluation pending. Environmental media sampling and risk screenings were conducted during PA/SI and potential unacceptable risks identified. Data will be loaded to the	

Sediment Eco

CHF: 0

MPF:

RF:

Rating: N/A

Priority: EP

Migration Pathway Factor Desc:

N/A

Receptor Factor Desc:

N/A

Soil

CHF: 0

MPF:

RF:

Rating: N/A

Priority: EP

Migration Pathway Factor Desc:

N/A

Receptor Factor Desc:

N/A

Appendix B
Archival Records Search Report

Final

**Archival Records Search Report for the
Preliminary Assessment/Site Inspection of
Site UXO-07, D-6 Practice Hand Grenade Course
(ASR # 2.77)**

**Marine Corps Base Camp Lejeune
Jacksonville, North Carolina**

Contract Task Order 0014

December 2010

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic**

Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

Prepared by



CH2MHILL

Raleigh, North Carolina

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Attachments

1	Resource Review Summary
2	Historical Aerial Photographs

Acronyms and Abbreviations

ASR	Archive Search Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CTO	Contract Task Order
°F	degrees Fahrenheit
DGM	digital geophysical mapping
EOD	explosive ordnance disposal
ESE	Environmental Science and Engineering, Inc.
ft	feet/foot
HE	high explosive
HTW	hazardous and toxic waste
MC	munitions constituents
MCB	Marine Corps Base
MEC	munitions and explosives of concern
MNA	monitored natural attenuation
MRP	Munitions Response Program
NARA	National Archives and Records Administration
NAVFAC	Naval Facilities Engineering Command
PA/SI	Preliminary Assessment/Site Inspection
SOP	standard operating procedure
U.S.	United States
UXO	unexploded ordnance
WW II	World War II

SECTION 1

Introduction, Purpose, and Scope

The United States Marine Corps and Naval Facilities Engineering Command (NAVFAC) are in the process of investigating closed ranges at Marine Corps Base (MCB) Camp Lejeune following the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigation process. A munitions response program (MRP) Preliminary Assessment/Site Inspection (PA/SI) will be conducted at Site Unexploded Ordnance (UXO)-07, Practice Hand Grenade Course, ASR #2.77 in order to accomplish the following objectives:

- Identify historical activities at Site UXO-07 that may have resulted in environmental contamination with munitions and explosives of concern (MEC), munitions constituents (MC), or hazardous and toxic waste (HTW)
- Evaluate the presence and nature of any MC and HTW contamination that may exist at Site UXO-07
- Conduct ecological and human health risk screenings on analytical data collected at Site UXO-07
- Estimate the number and density of geophysical anomalies that may represent subsurface MEC
- Provide geophysical data for future MEC intrusive investigations.

The results of the environmental investigation will determine if any impacts to soil and groundwater have occurred at Site UXO-07 due to past range activities. To support site investigation effort, this archival records search report has been prepared to provide a narrative of historical activities at Site UXO-07 that may have resulted in environmental contamination with MEC or MC.

Figure 1-1 shows the site in relation to the entire base.

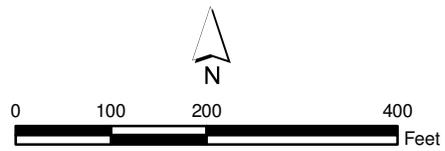
The Archival Records Search Report is an investigative review of existing information about the site and its surrounding area, with an emphasis on obtaining information from personnel and historical resources that might indicate a potentially hazardous release to the environment. The scope of the report includes:

- A review of existing information about the site (including MCB Camp Lejeune maps, drawings, reports, and interviews with MCB Camp Lejeune personnel)
- Collection of additional information about the site

A complete listing of resources identified and investigated for this report is provided in **Attachment 1**. Also included in **Attachment 1** are details concerning the reviews of the historical information from the Alfred M. Gray Research Center at MCB Quantico, National Archives and Records Administration (NARA) map and text files, and Camp Lejeune base files. **Attachment 2** contains photographs obtained during the research activities.



- Legend**
- Site UXO-07 Boundary
 - Installation Boundary



1 inch = 200 feet

Figure 1-1
Site UXO-07 Location Map
MRP Site UXO-07
MCB Camp Lejeune
North Carolina



Site Information

2.1 Facility Information

MCB Camp Lejeune is located on the Atlantic coast in Jacksonville, North Carolina. The city of Jacksonville in Onslow County is the principal support community for the base. MCB Camp Lejeune occupies 153,000 acres including more than 450 miles of roads, approximately 6,800 buildings and facilities, and 14 miles of beach on the Atlantic Ocean for amphibious training. Approximately 14,000 acres of land have been developed for administrative, maintenance, logistics and personnel support facilities. Originally established in 1941, the base is home to several tenant commands including II Marine Expeditionary Force, 2nd Marine Division, and 2nd Marine Logistics Group, two Navy commands, one Coast Guard command, and several Marine Corps formal schools. MCB Camp Lejeune supports a total population of approximately 150,000 people, including active duty military and dependants, retirees, and civilian employees (Global Security, 2008).

2.2 Ownership and Operational History

2.2.1 MCB Camp Lejeune Ownership History

The history of the land now occupied by MCB Camp Lejeune is documented primarily through land records and maps. Following the start of World War II (WW II), the War Department began purchasing tracts of land in 1941 from local residents to meet the need for an East Coast amphibious training facility. Prior to occupation by the Marine Corps, the land had been occupied by communities and farms since the Colonial era. The land contained plantation houses, cabins, farm buildings, tobacco barns, stores, and various cemeteries (Global Security, 2008).

The initial land transferred to the government was acquired in 14 different transactions between April and October 1941 and totaled 173.8 square miles or 111,155 acres, of which there were 85,155 land acres and about 26,000 acres under water (Loftfield, 1981; Louis Berger Group, 2002). The individual tracts of land were grouped into various "areas" for consolidation.

2.2.2 Site UXO-07 D-6 Practice Hand Grenade Course ASR #2.77

Site UXO-07 is approximately seven acres in area and is identified in the *Range Identification and Preliminary Range Assessment* as ASR #2.77 (USACE, 2000). Site UXO-07 includes two separate areas located south of Main Service Road off O Street on the Main Side of MCB Camp Lejeune (**Figure 1-1**). The majority of this site is covered by a parking lot and buildings (**Figure 1-1**). Underground utilities are present and utility clearing activities will be required before any subsurface sampling can be conducted.

The practice hand grenade course first appeared on the 1953 range overlay map as feature D-6 Practice Hand Grenade Range (**Figure 2-1**), located at 34°39'07" N, 77°20'30" W, military grid 854 370. According to the *Archives Search Report for the Final Range Identification and Preliminary Range Assessment*, the range was not used after 1959 (USACE, 2001). Based on the time frame of use, the range was used during the Korean War time period (1953 to approximately 1959). It is assumed the practice hand grenades were used at Site UXO-07 within the vicinity of throwing pits and targets and were the only training aids used on this range. Practice hand grenades had a small fuze (noise maker) and a re-usable stainless steel body (Richardson, 2008a). According to Base Range Safety Officer, Duane Richardson, there should not be any issues with UXO on this site.

Prior to 1953, the area is indicated as a recreational facility on existing conditions maps, which included baseball and softball fields. Aerial photographs of the area from 1948 and 1951 can be found in **Attachment 2**. The aerial photographs from the late 1940's and 1951 depict a triangle of cleared area containing recreational areas as well as several small buildings in the area of Site UXO-07.

The 1953 existing conditions map (MCB Camp Lejeune, 1953) shows a softball and baseball field where the practice hand grenade range is supposed to be located (**Figure 2-2**). The area to the east of Site UXO-07 across Main Service Road is the Division Shop Area where vehicle maintenance activities were conducted. Depending on groundwater flow and spills there is the potential for contamination from this area. The buildings that were closest to the road and are potential sources of offsite contamination from the Division Shop Area are the following:

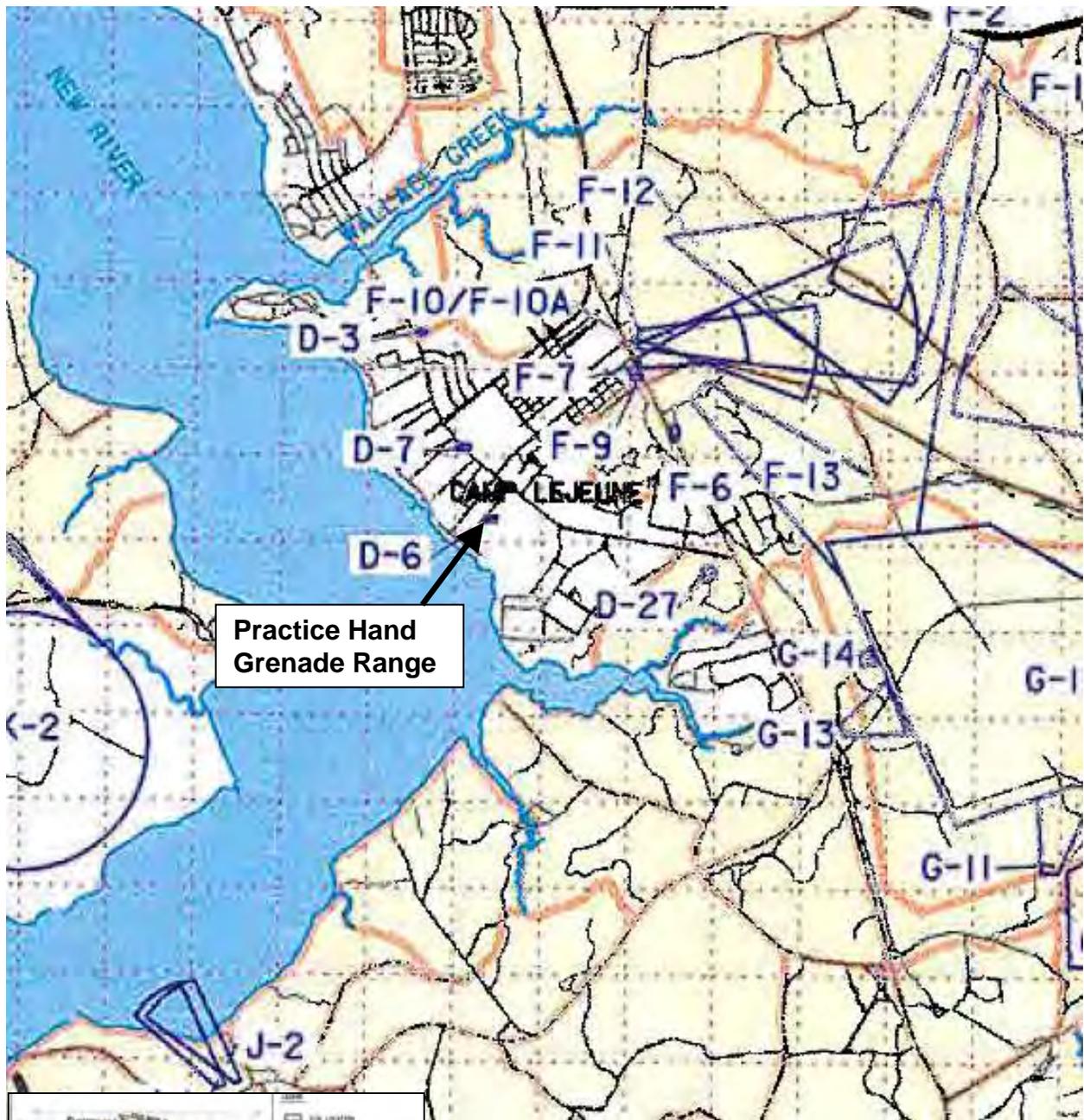
- Building 598, Paint Shop
- Buildings 1813 and 1840, Fuel Dispensing Facility
- Building 1838, Tank Maintenance and Storage Area
- Building 1839, Vehicle Grease Rack
- Building 1824, Heavy Equipment and Motor Transportation Maintenance Shop

The area of Site UXO-07 closest to McHugh Boulevard appears to have remained as recreational fields from the 1950's to the 1980's while the southern area was primarily wooded. An historical aerial photograph from 1962 (**Figure 2-3**) shows Site UXO-07 in relation to the fields and the wooded areas. According to the existing conditions map for 1984 (**Figure 2-4**), the southern area of Site UXO-07 appears to overlap the 5th Area Gun Park. The 5th Area Gun Park was also referred to in Regimental General Order #92, October 20, 1953 (NACP, 1953):

Many years ago the old 105mm and 155mm howitzers within 10th Marines (Arty Regt) would park along with the prime mover (Trucks) that pulled the heavy gun. This gun park was very large parking area with concrete pads that the gun would be parked on and gravel roads along with a small shed/metal box for each gun that would hold/store the equipment for that gun. All maintenance on the guns/howitzer would have been conducted here at this location. Training drills would also take place at the site. I would say we have a good chance of fuel/oil and other POL fluids leaking into the soil in and around this area. No ammunition or UXO would be present at this site. (Richardson 2008b).

Figure 2-4 shows the 1985 existing conditions map depicting the location of the gun park. The gun park does not appear on any other existing conditions maps, range overlay maps or historical aerial maps.

Another historical aerial photograph (**Figure 2-5**) shows that by 1989, the northern area of Site UXO-07 had buildings and a parking lot located onsite and the southern area was partially forested to the south with a parking lot on the north. Buildings HP502 and HP503, shown in the northern area of Site UXO-07, also appear in the current site map (**Figure 1-1**) and the 2005 existing conditions map (**Figure 2-6**). The use of these buildings is unknown. Tennis courts and Building HP500, which are not identified in available building descriptions, are present in the southern area by 2005 (MCB Camp Lejeune, 2005).



Practice Hand Grenade Range



0 3000 6000



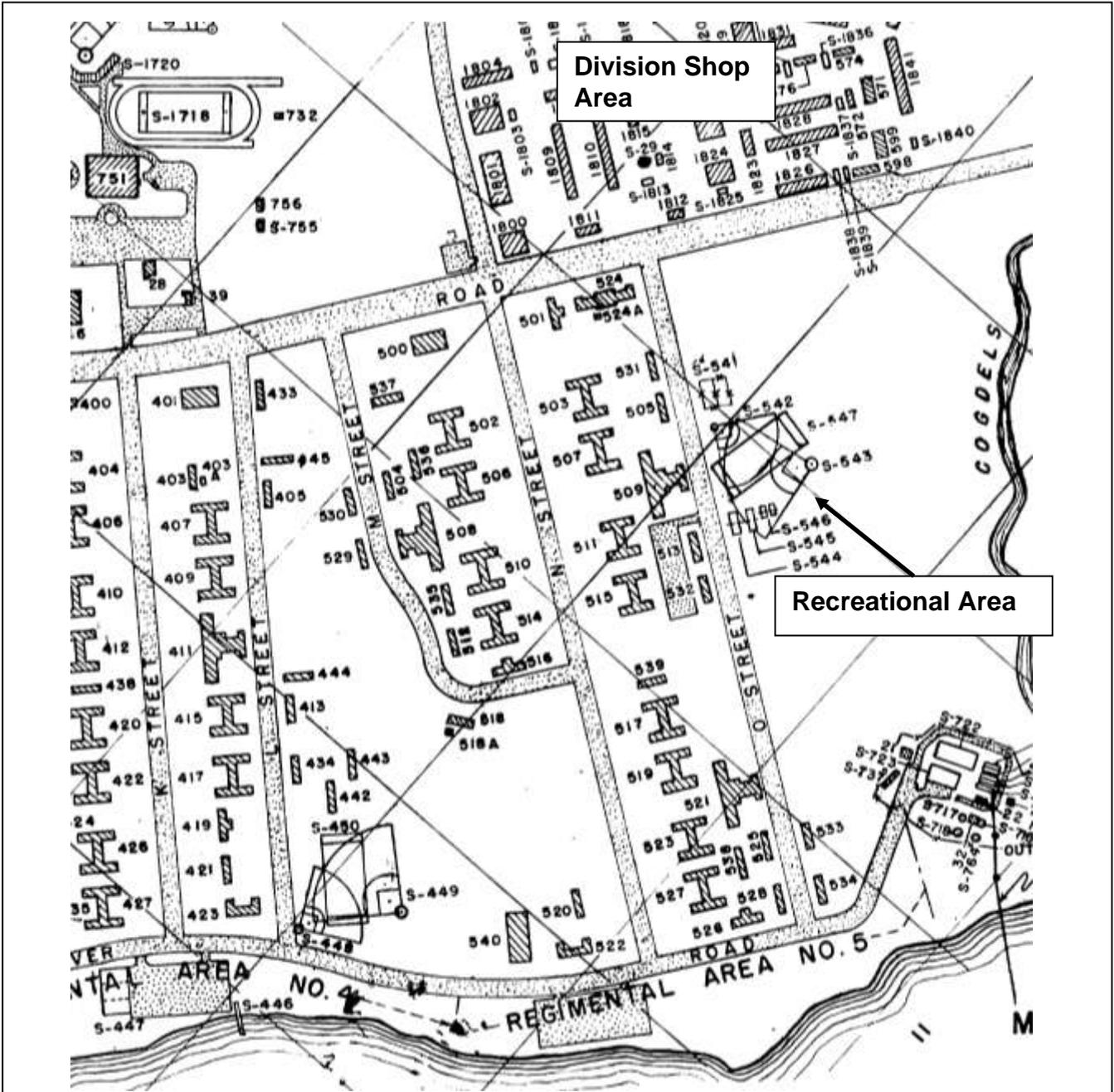
Approximate Scale in Meters



Figure 2-1
 Site UXO-07
 Range Overlay Map - 1953
 MCB Camp Lejeune
 North Carolina



CH2MHILL



Approximate Scale in Feet

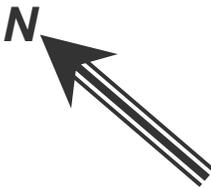


Figure 2-2
 Site UXO-07
 Existing Conditions – 1953
 MCB Camp Lejeune
 North Carolina

Source: MCB Camp Lejeune, 1953



CH2MHILL



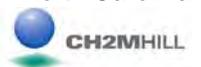
Legend

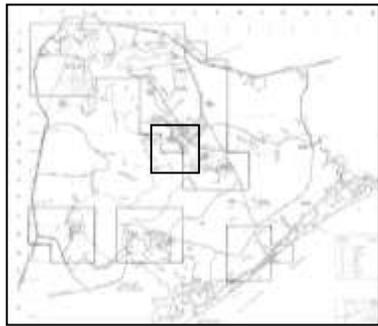
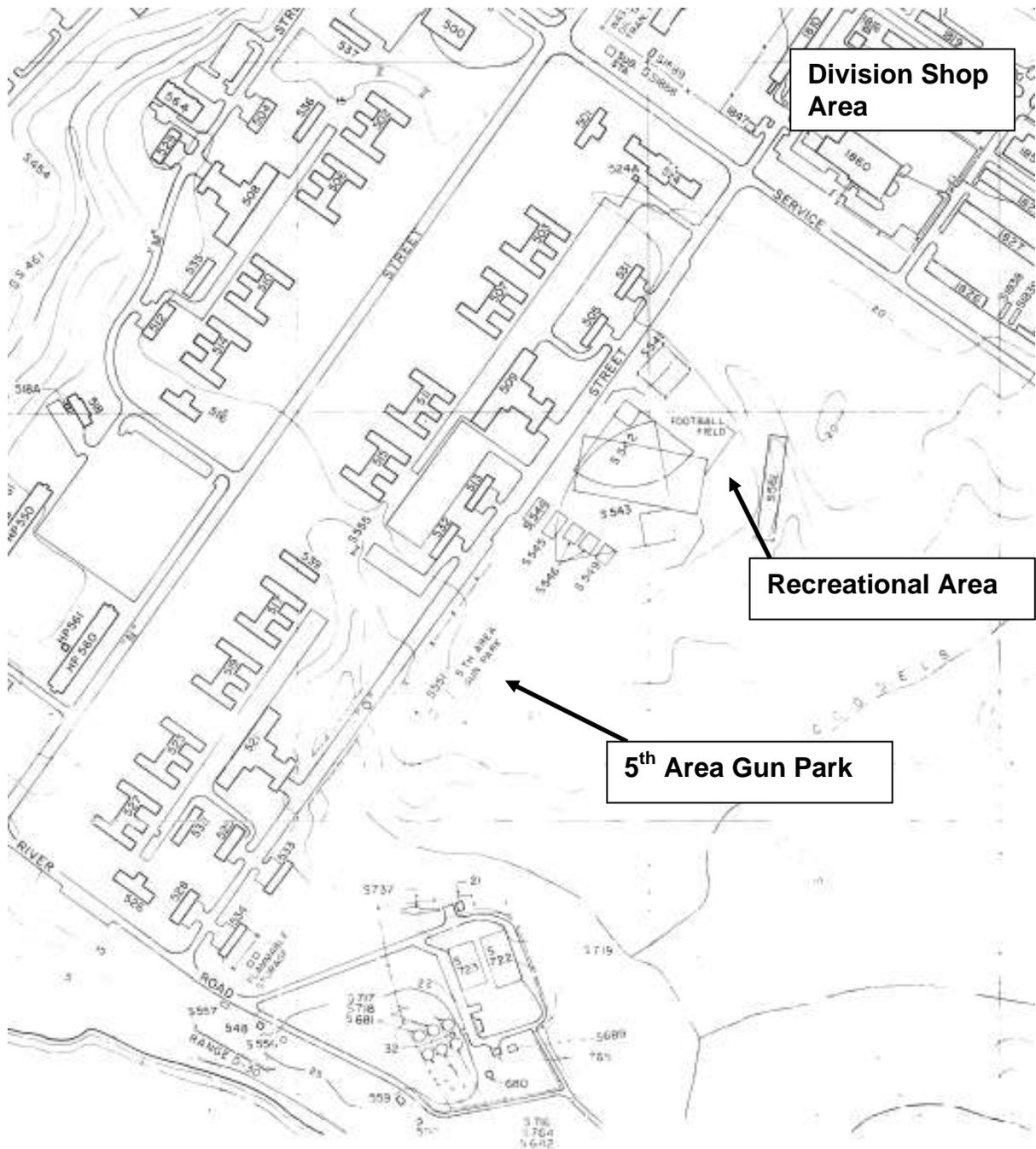
 Site UXO-07



1 inch equals 200 feet

Figure 2-3
Site UXO-07
Historical Aerial - 1962
MCB Camp Lejeune
North Carolina





0 500 1000



Approximate Scale in Feet



Figure 2-4
 Site UXO-07
 Existing Conditions – 1984
 MCB Camp Lejeune
 North Carolina

Source: MCB Camp Lejeune, 1984



CH2MHILL



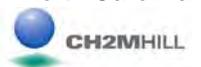
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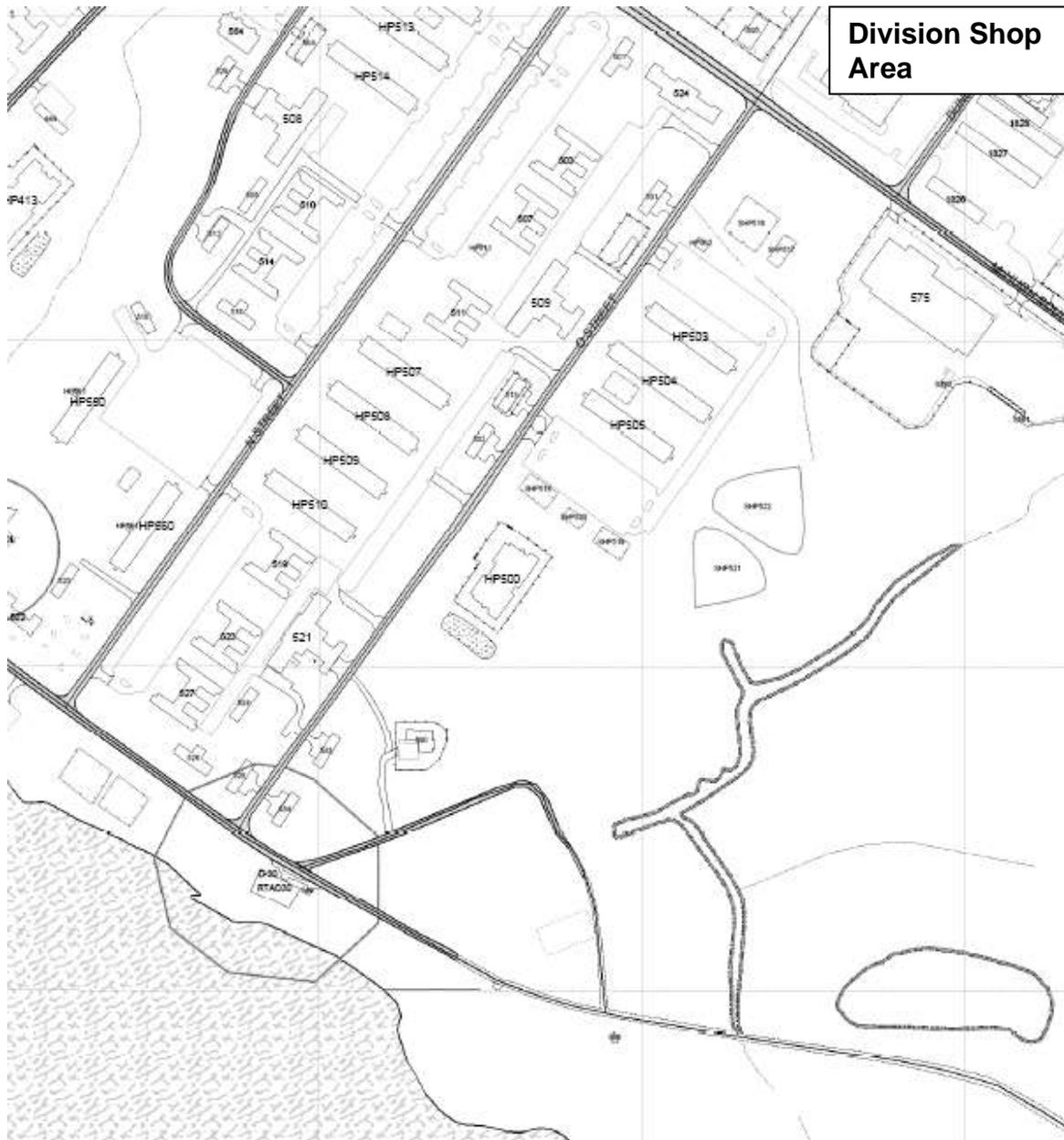
 Site UXO-07



1 inch equals 400 feet

Figure 2-5
Site UXO-07
Historical Aerial -1989
MCB Camp Lejeune
North Carolina





Source: MCB Camp Lejeune, 2005

0 500 1000



Approximate Scale in Feet



Figure 2-6
 Site UXO-07
 Existing Conditions – 2005
 MCB Camp Lejeune
 North Carolina



CH2MHILL

References

Global Security. 2008. *Camp Lejeune*. Available online: <http://www.globalsecurity.org/military/facility/camp-lejeune.htm>. Accessed August 27.

Loftfield, Thomas C., Principal Investigator. 1981. *Archeological and Historical Survey of USMC Base, Camp Lejeune*. Naval Facilities Engineering Command Norfolk, Coastal Zone Resource Corp, Vol. II. Contract # N62470-79-C-4273. University of North Carolina, Wilmington. August.

Louis Berger Group, Inc. 2002. *Semper Fidelis: A Brief History of Onslow County, North Carolina and MCB, Camp Lejeune, 2002*, U.S.M.C. LtCol Lynn J. Kimball (USMC Retired) USACE Wilmington District Contract DACWS4-99-C-0004.

MCB Camp Lejeune. 1953. *Map of Division Training Area, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1953*.

MCB Camp Lejeune. 2005. *Map of Division Shop Area, Camp Lejeune, North Carolina, Showing Conditions on July 14, 2005*. MCB Camp Lejeune. 2006. *Standard Operating Procedures for Range Control, Range and Training Regulation, BO P3570.1B*. October 17.

National Archives at College Park (NACP). 1953. *Text Division: Regimental General Order 92: Interior Guard*. Record Group 127 (USMC), Office of the Commandant, General Correspondence. October 20.

Richardson, Duane, Camp Lejeune Range Safety Officer. 2008a. Personal Communication. August 19.

Richardson, Duane, Camp Lejeune Range Safety Officer. 2008b. Personal Communication. September 12.

United States Army Corps of Engineers (USACE). 2000. *Final Range Identification and Preliminary Range Assessment, Marine Corps Base Camp Lejeune, Onslow, North Carolina*. St. Louis District. February.

USACE. 2001. *Archives Search Report for the Final Range Identification and Preliminary Range Assessment, Marine Corps Base Camp Lejeune, Onslow, North Carolina*. St. Louis District. December.

Attachment 1
Resource Review Summary

Appendix A: Resource Review Summary

The following table provides a summary of the specific references identified for review, interview, or contact for the archival report.

Resource	Actions Completed
Quantico, Virginia, Marine Corp History Division, Historical Research Branch (Kara Newcomer and Lena Kaljot)	Reviewed all available file folders related to Camp Lejeune and copied relevant reports and figures/maps (August 19, 2008)
Quantico, Virginia, Marine Corp Library Gray Research Center (Greg Cina)	Reviewed all maps related to Camp Lejeune and copied relevant maps (August 19, 2008)
US National Archives (NARA II) Historical Files	Reviewed text and drawing files from Text and Cartographic Divisions (August 20-22, 2008)
Camp Lejeune Personnel	
Andrew Smith, Environmental Management Division	Contacted and interviewed (August 21, 2008)
Dennis Dunham and Jerry Jordan (intern), Public Works Technical Records	Contacted and interviewed (August 15 and August 21, 2008)
Julie Rowe, MCB Camp Lejeune Archivist	Contacted and phone interviewed (August 21, 2008)
Duane Richardson, Base Range Safety Officer	Contacted and interviewed (August 15, August 21 and September 12, 2008)

A.1 Marine Corp Library Review

History Division: Text

Contact: Kara Newcomer
Historian, Historical Reference Branch
Quantico, Virginia
(703) 432-4872 DSN 378
kara.newcomer@usmc.mil

Site Visit: August 19, 2008

File review at Marine Corps Base, Quantico, VA, Historical Reference Branch.

Files found under **Posts and Stations: N.C., Camp Lejeune** included Activities, Guides and Base Litter, History, Maps, Administrative Papers, Linage and Honors, Acquisition and Jurisdiction and Health Survey 2000.

Copied:

1. Training Areas and Facilities. February 16, 1953. Relevant site information and maps of ranges.
2. Camp Lejeune, North Carolina. February 10, 1942. Map of area.

3. Camp Lejeune: Early History. June 1942. Discusses "Miscellaneous Marine Corps Training."
4. Brief History of Camp Lejeune, North Carolina. August 15, 1954
5. Commandant Letter dated August 25, 1951 - Subject - "Twelve quartermaster warehouses for Camp Lejeune, North Carolina; further justification for."
6. Camp Lejeune General Map. Date unknown. Map of area.

History Division: Photographic Division

Contact: Lena Kaljot

Photo Historian, Historical Reference Branch

Quantico, Virginia

(703) 432-4873 DSN 378

Lena.kaljot@usmc.mil

Site Visit: August 19, 2008

Photo review at Marine Corps Base, Quantico, VA, Historical Reference Branch.

Photo files found under **Lejeune** included Administrative Buildings, Aerial Views:1940s, Aerial Views: 1950-1960, Aerial Views: undated, Aerial Views:1948, Chapels, Ice Cream Plant, Lumber, Medical, Misc., Mess Hall; Housing, Recreation, Public Works, Storage, Training and Utilities.

Copied:

1. Aerial Photos: Camp Lejeune, NC. Various angles. May 6, 1948.
2. Aerial Photos: Tent Camp, Camp Lejeune. Various angles. June 1946.
3. Aerial Photos: Tent Camp, Camp Lejeune. Various angles. September and December 1948.
4. Aerial Photo: Tent Camp, Camp Lejeune. September 1951.
5. Aerial Photos: Division Training Area, Camp Lejeune. Looking West. September 1948.
6. Aerial Photo: Division Training Area, Camp Lejeune. Looking East. December 23, 1948.
7. Aerial Photo: Magazine Area, Camp Lejeune, NC. Looking South. September 17, 1948.
8. Aerial Photo: Officers Quarters, Camp Lejeune. October 13, 1948.
9. Aerial Photo: Officers Housing Area, Camp Lejeune, NC. September 14, 1951.
10. Aerial Photo: Montford Point, Camp Lejeune, NC. September 22, 1948.
11. Aerial Photo: Camp Knox Area, Camp Lejeune. Looking North. September 22, 1948.
12. Aerial Photo: Rifle Range Area, Camp Lejeune. Various angles. September 17, 1948.
13. Aerial Photo: Rifle Range Area, Camp Lejeune, NC. September 14, 1951.
14. Aerial Photo: Airfield, Camp Lejeune, NC. September 16, 1948.
15. Aerial Photo: New River Administration Building and Circle, Camp Lejeune. August 22, 1944.
16. Aerial Photo: MCAAF Camp Lejeune, NC. October 30, 1947.
17. Aerial Photo: USMCAF, Camp Lejeune, NC. November 5, 1951.
18. Aerial Photo: Peter Point Field, MCAAF, Camp Lejeune, NC. April, 13, 1948.
19. Aerial Photo: Peter Point Field, Camp Lejeune, NC: Building No. PP-106.
20. Seven Aerial Photos of "Unknown dates and locations".

Achieve and Special Collections: Maps

Contact: Greg Cina
 Archivist, Achieves and Special Collections
 Quantico, Virginia
 (703) 784-4685
 cinagl@grc.usmc.edu

Site Visit: August 19, 2008

Map review at Marine Corps Base, Quantico, VA, Achieves and Special Collections in Gray Research Center.

Maps were the only items in the collection pertaining to Camp Lejeune. Reviewed 12-15 maps all pertaining to Camp Lejeune through time.

Copied:

1. Topographical Map: Sneads Ferry, N.C. 1971.
2. Topographical Map: New River Inlet, N.C. 1971
3. Topographical Map: New River N.C. 1972
4. Topographical Map: Approaches to the New River. 1956

A.2 National Archives and Records Administration Review

Text Division

Site visit: August 20-22, 2008

Below are the topics and boxes of files reviewed in association with the Marine Corps.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. USMC Exercises, 1960-1983. 170A/54/07, Boxes 1-2.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Record of Training Exercise and Maneuvers, 1941-1950. 370/23/22 Boxes 5-15.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Division of Public Information, General Correspondence, 1942-1950. 370/23/18 Box 1.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Command Chronologies, 2nd Marine Regiment, 1965-1979.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Command Chronologies, 2nd Marine Regiment, 1st Marine Battalion, 2nd Marine Battalion, 3rd Marine Battalion, 1965-1972.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Record of Field Organizations: 2nd Marine Division Regimental Orders and Other Issuance, 1951-1953. Boxes 1-11.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Record of Field Organizations: 2nd Marine Division, 10th Marine Regiment, 6th Marine Regiment and 8th Marine Regiment, 1960-1983. Boxes 1-11.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Ordnance, 1939-1950, Box 501.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Infantry Weapons, 1945, Box 508.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Geography, Boxes 885-886.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Experiments, Grenades, and Explosives, Box 1206.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. SOPs, Boxes 1158-1159.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Pistols, Box 1237.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Training Bullitins-1943, Box 1437.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Reports. Boxes 1470-1476.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Ranges. Box 1990.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Practice/Teams Pistols. Boxes 1994-1995.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Marine Corps Communications. Boxes 1059-1064.

Record Group 127 (USMC), Records of the USMC, Offices of the Commandant, General Correspondence, January 1939-1950. Co. Drills and Instructions. Boxes 1076-1082.

The boxes contained information primarily related to weapons test results, weapons cost distribution, weapons training classes, weapon specifications, and cleaning and maintenance. The material was not specific to Camp Lejeune and included information for several MC bases.

Record Group 127 (USMC), Camp Lejeune, Command Chronologies, 1965-1979, Boxes 690-698.

List of Documents Obtained from National Archives

1. "Memorandum for the Personnel Division." June 6, 1942.
2. "Modification No. 2 to General Order Number 163: Training Facilities and Regulations Governing the Use of." October 11, 1942.
3. "Memorandum to the Quartermaster: Fuel Thickener (Napalm) for Flame Thrower H1A1." January 5, 1944.
4. "Marine Corps Training Bulletin: Use of Chlorine in Training" January 19, 1944.
5. Commandant Letter dated May 13, 1944 - Subject - "Chemical Warfare Class"
6. Commandant Letter dated May 19, 1944 - Subject - "Chemical Warfare Instruction"
7. Commandant Letter dated May 30, 1944 - Subject - "Chemical Warfare Class"
8. Commandant Letter dated July 7, 1944 - Subject - "Requirement Factors for Flame Thrower Fuels"
9. "Administrative Command Training Memorandum Number 5-44: Chemical Warfare." July 14, 1944.
10. Commandant Letter dated August 12, 1944 - Subject - "Chemical Warfare Training"
11. Commandant Letter dated September 6, 1944 - Subject - "Chemical Warfare Training"
12. Commandant Letter dated September 19, 1944 - Subject - "Distribution of Chemical Warfare Letter"
13. Commandant Letter dated December 2, 1944 - Subject - "Compressed Gases"
14. Commandant Letter dated December 15, 1944 - Subject - "Flame Thrower Expendable Supplies, requirement factors for."
15. "Marine Barracks Camp Lejeune Annual Report, North Carolina, Naval District Five." October 1, 1946.
16. "Camp General Order Number 163: Training Facilities and Regulations Governing the Use of." August 17, 1949.
17. "Lesson Plans for Training of the Organized Reserves" June -September 1950.
18. "Regimental General Order Number 39: Defense against Chemical and Radiological Warfare." August 28, 1951.
19. "Regimental Training Order Number 157-52: Training Schedule 4.2 Mortar Co, 16-21 June 1952." June 10, 1952.
20. "Regimental Training Order Number 180-52: Training Program 1 July to 30 September. 1952." June 30, 1952.
21. "Regimental Training Order Number 241-52: Training Program 1 October to 31 December 1952." September 29, 1952.

22. "Regimental Training Order Number 259-52: Preliminary Marksmanship Training Schedule for 6th Marines and attached Division Units from 4 to 11 October 1952." October 3, 1952.
23. "Regimental Training Order Number 9-53: Training Program 6 July-3 October 53" June 24, 1953.
24. "Change No.2 to Regimental Training Order Number 8-53: Training Facilities, Maneuver Areas and Firing Ranges" August 20, 1953.
25. "Regimental General Order 92: Interior Guard" October 20, 1953.

Cartographic Division

Site visit: August 22, 2008

Information for Camp Lejeune is located under Record Group (RG) 71-Bureau of Yards and Docks. The index for locating cartographic materials is then grouped by subject codes. The only available drawing for Camp Lejeune was for Subject Area 19- Water Systems, which contained no relevant materials. Subject Areas 44 is Rifle ranges, machine gun ranges, sighting ranges, bombing targets; however, no materials were located under this Subject Area.

A.3 MCB Camp Lejeune Base Records Review

Contact: Andrew Smith

Environmental Engineer, Environmental Management Division
Marine Corps Base, Camp Lejeune
(910) 451-9017
stephen.a.smith2@usmc.mil

Andrew provided electronic color copies of the RI/PRA Range Overlay Maps. Also suggested looking in documents that CH2M HILL has access to, including:

- US Army Corps of Engineers (USACE), St. Louis District. 2000. *Final Range Identification and Preliminary Range Assessment*, Marine Corps Base Camp Lejeune, Onslow, North Carolina, February.
- US Army Corps of Engineers (USACE), St. Louis District. 2001. *Archives Search Report for the Final Range Identification and Preliminary Range Assessment*, Marine Corps Base Camp Lejeune, Onslow, North Carolina, December.
- Water and Air Research. 1983. Water and Air Research, Inc. *Initial Assessment Study of Marine Corps Base, Camp Lejeune. North Carolina*. Prepared for Naval Energy and Environmental Support Activity.

Contact: Duane Richardson

Base Range Safety Officer
Marine Corps Base, Camp Lejeune
(910)451-1240
Duane.richardson@usmc.mil

Per email and phone conversations Duane described the areas as follows:

“Site UXO 02 ASR Area 2.201: This one could be a hard one. Other than the list in the manual you have, I have nothing on file. It was very common to bury ammunition, ammunition dunnage, trash in those days and I would be very surprised if we don't have soil and water contamination of some type, to some degree. I am surprised it was so close to the water. This area is heavy wooded now and I am not aware of anything being done in that area after the late 1970. This area will need to be inspected in detail.

Site UXO 07 ASR Area 2.77: It was very common to have a practice hand grenade ranges close to where the Marines lived to make it easy to conduct training. Should not be any live ordnance/UXO in this area, it is in the present built up area of main side so I am sure the dirt berms, surrounding areas have been leveled out. Practice hand grenades had a small fuze (noise maker) and the steel body that was re-useable.

Site UXO 10 ASR Area 2.136: I know this site real good, because I trained there in 1975. We used Demolitions (C-4), White Smoke Grenades, White phosphorous Hand Grenades, and Flame Thrower Weapons and blank ammunition for small arms, presently it is a borrow pit for dirt, large pond, filled with water and woods all around. I would state we have no issues with UXO in that area. If anything I would say the soil in and around the site may be contaminated.

Site UXO 11 ASR Area 2.81: same comments as above ASR 2.77. It was very common to have a practice hand grenade ranges close to where the Marines lived to make it easy to conduct training. Should not be any live ordnance/UXO in this area, it is in the present built up area of main side so I am sure the dirt berms, surrounding areas have been leveled out. Practice hand grenades had a small fuze (noise maker) and the steel body that was re-useable.

Site UXO 12 ASR Area 2.5: Battle Site Zero range dating back to 1942-45, Common practice to pile up a large dirt berm in the units area and set up, small targets next so the rifle sights could be set. Possible lead in the soil issue, area presently very wooded area.

Site UXO 14 ASR 1.199: Indoor Pistol Range/Gas Chamber. Can only assume that it had some type of bullet trap for the pistol range inside some type of structure and the Gas Chamber would have been in some type of building also. No UXO issues, but we could possibly see contaminated soil issues in and around the site. Area is presently wooded.”

In reference to the 5th Area Gun Park:

“Many years ago the old 105mm and 155mm howitzers within 10th Marines (Arty Regt) would park along with the prime mover (Trucks) that pulled the heavy gun. This gun park was very large parking area with concrete pads that the gun would be parked on and gravel roads along with a small shed/metal box for each gun that would hold/store the equipment for that gun. All maintenance on the guns/howitzer would have been conducted here at this location. Training drills would also take place at the site. I would say we have a good chance of fuel/oil and other POL fluids leaking into the soil in and around this area. No ammunition or UXO would be present at this site. Just off O Street.”

Contact: Dennis Dunham
Technical Records, Public Works Office
Marine Corps Base, Camp Lejeune
(910) 451-2818 ext 273

Per phone and e-mail conversations provided existing conditions maps. All maps and plans have been converted to electronic files and Dennis is happy to look up any information needed on builds and any civil work, sewage, electrical, etc.

Existing conditions for the all available areas of the base were provided for the following years:

1943, 1946 through 1960, 1963, 1966, 1985 and 2005.

Contact: Julie Rowe
Archivist, Combat Camera
Marine Corps Base, Camp Lejeune
(910) 451-1238

The archivist position at Camp Lejeune was create about a year ago and is still in development. Currently the office holds photos and oral histories of the main area of Camp Lejeune and the collection is growing. Julie did not have any information related to historical use of range areas.

Documents Reviewed at the Base Library

Site Visit: August 20 and 21, 2008

1. Lotfield, Thomas, C. Principal Investigator. UNCW, August 1981. *Archeological and Historical Survey of USMC Base, Camp Lejeune; Naval Facilities Engineering Command Norfolk, Coastal Zone Resource Corp., Vol. II, Contract No. N62470-79-C-4273.*
2. Camp Lejeune Marines, On Land, On Sea, In the Air. Pamphlet (several from 1944 - 1988).
3. Carraway, Gertrude S. Camp Lejeune Leathernecks, United States Marine Corps Training Center, Camp Lejeune, North Carolina. October 1946.
4. Baker Environmental, 1992, Administrative Record (CTO-0021) *Section 1: Site Identification- Correspondence.* May

Copies from Baker Source:

5 Pages from "Doc. No: CLEJ-00648-01.02-02/20/81" (Related to site 69)

5 Pages from "Doc. No: CLEJ-00226-1.02-01/01/01" (Related to site 69)

1 Page from "Doc. No: CLEJ-00208-1.01- (unable to read date at the top of page, the date of the memo is 11/22/82)

1 Page from "Doc. No: CLEJ-0090(?) -1.01-9/11/83"

13 Pages from "Doc. No: CLEJ-00247-1.02-10/25/85"

8 Pages from "Doc. No: CLEJ-00253-1.02-10/31/80"

Attachment 2
Historical Aerial Photographs





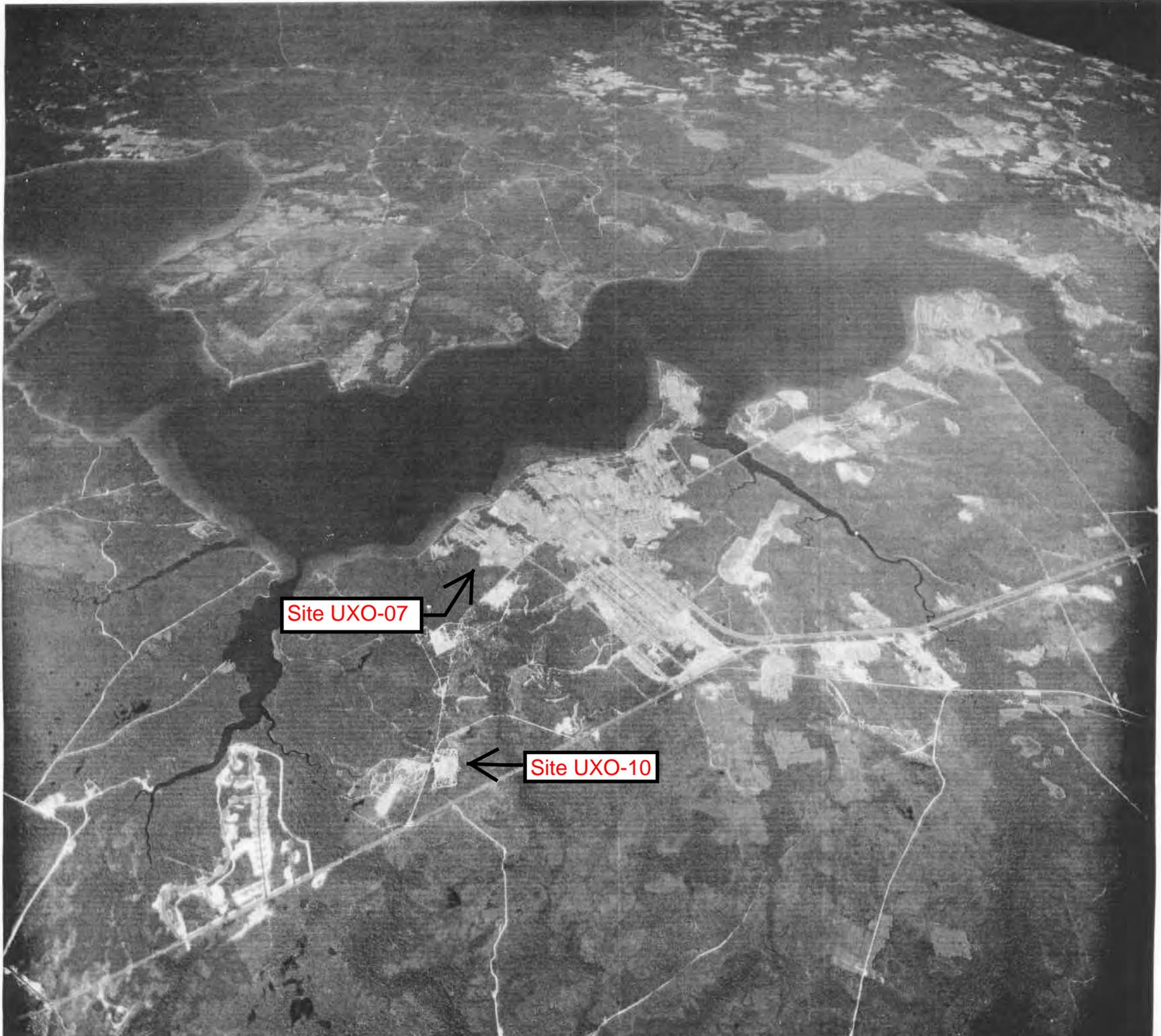
Site UXO-07

N TRAINING AREA CAMP LEJEUNE, NC. FL. 6, ELE. 4900' 21 SEPT 48 LOOKING NW

DIVISION TRAINING AREA



Site UXO-07



Site UXO-07

Site UXO-10

Appendix C
Geophysical System Verification and
Geophysical Prove Out Reports

GPR
MAGNETICS
ELECTROMAGNETICS
SEISMICS
RESISTIVITY
UTILITY LOCATION
UXO DETECTION
BOREHOLE CAMERA
STAFF SUPPORT

GEOPHYSICAL INVESTIGATION REPORT

**Focused Preliminary Assessment/Site Inspection
Sites UXO-07 and UXO-11
Former Practice Hand Grenade Ranges,
Site UXO-10
Former Flame Tank and Flame Thrower Range
&
Site UXO-14
Former Indoor Pistol Range and Gas Chamber
Marine Corps Base (MCB) Camp Lejeune, North Carolina**

Task Order 0014

Dates of Investigation:

May 19th – May 22nd, 2009

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Figure 4: UXO-10A looking towards the SE from a midpoint of the area

Figure 5: Proposed Transect locations for UXO-11

Figure 6: UXO-14 shot from the SW to the NE

PLATES

Plate 1: EM61-MK2 Mosaic – UXO-07_1 Practice Hand Grenade Course

Plate 2: EM61-MK2 Mosaic – UXO-07_2 Practice Hand Grenade Course

Plate 3: EM61-MK2 Mosaic – UXO-10 Flame Tank and Flame Thrower Range

Plate 4: EM61-MK2 Mosaic – UXO-10A Flame Tank and Flame Thrower Range

Plate 5: EM61-MK2 Mosaic – UXO-11 Practice Hand Grenade Course

Plate 6: EM61-MK2 Mosaic – UXO-14 Former Indoor Pistol Range and Gas Chamber

APPENDICES & CD

Appendix A: GPO color contour maps

Appendix B: Example QC test results

Contents of CD: Project deliverables

ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
ASR	Archive Search Report
DGM	Digital Geophysical Mapping
DQO	Data Quality Objectives
GGA	Global Positioning System Fix Data Format
GLONASS	Global Navigation Satellite System (Russian)
GPO	Geophysical Prove-Out
GPS	Global Positioning System
MCB	Marine Corps Base
MEC	Munitions and Explosives of Concern
MR	Munitions Response
MRP	Munitions Response Program
mV	Millivolts
NAD83	North American Datum of 1983
QA	Quality Assurance
QC	Quality Control
RTK	Real Time Kinematic
SI	Site Inspection
SOP	Standard Operating Procedures
SOW	Statement of Work
TO	Task Order
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

NAEVA Geophysics, Inc. (NAEVA) was contracted by CH2M HILL to conduct Digital Geophysical Mapping (DGM) at the following Munitions Response Sites in various locations at Marine Corps Base (MCB) Camp Lejeune, North Carolina: UXO-07, D-6 Practice Hand Grenade Course; UXO-10, D-11A Flame Tank and Flame Thrower Range; UXO-11, B-5 Practice Hand Grenade Course; and UXO-14 Former Indoor Pistol Range and Gas Chamber. Field operations were conducted from May 19th to May 21st, 2009.

1.1 BACKGROUND AND OBJECTIVES

The purpose of this geophysical investigation was to detect and map subsurface metal potentially representing munitions and explosives of concern (MEC) in four locations. The investigation involved DGM of transects totaling to 2.12 acres and covered approximately 10 percent of each of the targeted areas of sites UXO-07, UXO-10, and UXO-11. Due to site conditions, a smaller area of coverage was attained at Site UXO-14. Prior to the commencement of mapping, a Geophysical Prove-Out (GPO) was completed for the purpose of establishing an appropriate anomaly targeting threshold and to test the effectiveness of the geophysical instrument.

1.2 SCOPE OF WORK

NAEVA Geophysics provided all personnel and geophysical survey equipment to perform the DGM surveys at Camp Lejeune. A total of four separate locations were identified for DGM surveying and were completed according to the scope of work and work plan addendums. Geophysical data were collected in transect lines to provide 10% coverage of each of the targeted areas. Prior to starting the production geophysical surveying, a GPO was performed to demonstrate the capabilities of the personnel and equipment to meet the data quality objectives (DQOs) defined in the CH2M HILL project work plan. All production data were to be processed, interpreted and delivered to the CH2M HILL Project Geophysicist on the schedule and in the formats specified in the Statement of Work.

1.3 SITE LOCATION AND DESCRIPTION

The four sites selected for mapping under Task Order 14 (TO-14) are Site UXO-07, D-6 Practice Hand Grenade Course (ASR Site 2.77); Site UXO-10, D11A Flame Tank and Flame Thrower Range (ASR Site 2.136); Site UXO-11, B-5 Practice Hand Grenade Course (ASR Site 2.81); and Site UXO-14 Former Indoor Pistol Range (ASR Site 2.199) and Gas Chamber (ASR Site 2.200).

Site UXO-07, D-6 Practice Hand Grenade Course

The Site UXO-07, D-6 Practice Hand Grenade Course investigation area is composed of two separate areas located south of Main Service Road off of O Street on the Main Side of Camp Lejeune and is approximately seven acres in size. The northern area of the site, UXO-07_1 contains 91 transects spaced at 10 meter intervals with the exception of the northeast transects, which are spaced at five meter intervals; the southern portion of the site, UXO-07_2 consists of 35 transects evenly spaced at 10 meter intervals. Both portions of the site are composed primarily of cleared and developed land with active parking lots and buildings, including an Armory in the southern portion, which bound transects within each area. The topography is generally flat in both areas, with an isolated trench running southeast in the northern transects. The presence of underground and overhead utilities is confirmed on this site, and active roads run parallel to the westernmost and easternmost transects.

Site UXO-10, D-11A Flame Tank and Flame Thrower Range

The Site UXO-10, D-11A Flame Tank and Flame Thrower Range investigation area is bisected by Gonzalez Boulevard and Main Service Road located just west of Sneads Ferry Road on the Main Side of Camp Lejeune and is approximately 10 acres in size. The site is predominantly developed with parking lots and paved roads and may contain underground utilities. The 43 transects spaced at 10 meter intervals north of Main Service Road are relatively flat, with some hummocky terrain and are bounded by active parking lots and Gonzalez Boulevard to the west. The area bounded to the north by Main Service Road is relatively flat, and is scattered with large sewer piping, lumber, vegetation with some larger trees and a container from a 16-wheel truck. The area south of Main Service Road was not laid out with pre-planned transects due to the conditions of the area. NAEVA, under the guidance of CH2M HILL, conducted a meandering path transect using Real Time Kinematic (RTK) Global Positioning System (GPS), attempting to cover as much area as feasible to reach the 10 percent coverage goal, while avoiding existing surface metal.

Site UXO-11, B-5 Practice Grenade Course

The Site UXO-11, B-5 Practice Grenade Course investigation area is located north of Sixth Street and east of Seventh Street at the New River Air Station and is approximately one to two acres in size. The area contains 8 transects at 10 meter intervals on undeveloped, flat terrain that is primarily free of vegetation. The site is bound by the investigation boundary on all sides and is bisected by a water-filled trench on the southeast edge.

Site UXO-14 Former Indoor Pistol Range and Gas Chamber

The Site UXO-14 Former Indoor Pistol Range and Gas Chamber investigation area is located west of Powder Lane in the Stones Bay Area of Camp Lejeune and is approximately one acre in size. DGM

activities were only conducted at the former Gas Chamber site, which included only two transects spaced approximately 5 meters apart. The presence of dense vegetation and minimal brush clearance prevented the use of global positioning systems (GPS) for data positioning. Data collection is bounded on all sides by the edge of cleared vegetation.

2.0 EQUIPMENT

2.1 GEONICS EM61-MK2

The geophysical instrument used for the investigation at MCB Camp Lejeune is the Geonics EM61-MK2 metal detector. The EM61-MK2 is a high resolution time-domain electromagnetic instrument designed to detect, with high spatial resolution, shallow ferrous and non-ferrous metallic objects. In comparison with other metal detectors, especially magnetometers, it is much better suited for work in close proximity to man-made structures and in areas of dense subsurface metallic debris (i.e., impact ranges). This instrument was chosen based on multiple previous investigations successfully using the EM61-MK2 at MCB Camp Lejeune.

The EM61-MK2 system consists of two 1 meter by 0.5 meter air-cored coils, a digital data recorder, batteries and processing electronics. The EM61-MK2's transmitter generates a pulsed primary magnetic field, which then induces eddy currents in nearby metallic objects. The receivers either measure the eddy currents at three distinct time intervals in the bottom coil and one time interval in the top coil or four intervals in the bottom coil if no top coil measurements are recorded. Four time gates from the bottom coil were recorded for the DGM surveys at MCB Camp Lejeune. Earlier time gates provide enhanced detection of smaller metallic objects. Secondary voltages induced in both coils are measured in millivolts (mV). The arrangement of coils is such that there is a vertical separation of 40 cm from the ground to the bottom coil. Assuming accurate data positioning, target resolution of approximately 0.5 meters can be expected. The data are collected using Geomar's NAV61MK2 program and temporarily stored in a Juniper Allegro CX data logger prior to downloading to a laptop computer.

2.2 TRIMBLE 5700/R7/R8 REAL TIME KINEMATIC GLOBAL POSITIONING SYSTEM

Trimble's 5700/R7/R8 RTK GPS is a 24-channel dual frequency RTK receiver that uses both L1 and L2 satellites. This system operates with a base and a rover unit; the base sends corrections to the rover via radio link, thus maintaining a 3-cm horizontal accuracy and a 5-cm vertical accuracy. For configuration with the EM61-MK2, the rover is set to output a GGA NMEA (National Marine Electronics Association) string at 1 Hz, which is captured into the NAV61MK2 program and temporarily stored on the Juniper Allegro CX. The base station utilized for this survey was a Trimble R8 GNSS. The R8 GNSS is a

multichannel, multi-frequency receiver, antenna, and data-link radio combined into one device. It uses Trimble R-Track technology to support all GPS signals, including the new L2C signal and the planned L5 signal of GPS Modernization, and also supports GLONASS (Global Navigation Satellite System).

3.0 METHODOLOGY

3.1 DGM SURVEY ACTIVITIES

DGM surveying at MCB Camp Lejeune was accomplished using the EM61-MK2 in wheel mode configuration, with data positioning provided by RTK GPS. Wheel mode was tested in a GPO (see Section 5.1) and the generally flat terrain without many mounds or ruts allowed for its use on the two sites. In wheel mode, the EM61-MK2 bottom coil is mounted on two 40-cm wheels, and has four fiberglass spacers used to support the top coil. A tripod attached to the top coil holds the GPS antenna over the center of the EM coils. All data collected at MCB Camp Lejeune were recorded at a sample rate of 10 readings per second.

A survey transect spacing of 0.75-m was used for the GPO survey area. This spacing results in coil overlap on successive lines, reducing the likelihood of data gaps and improving the chance of detecting small MEC items. Low stretch polypropylene ropes painted with alternating bands of fluorescent orange and blue paint were placed across the GPO at 10-m intervals, perpendicular to the direction of travel. These ropes provided guidance to the geophysicist maneuvering the EM61-MK2 across the grid, to maintain parallel lines spaced 0.75-m apart.

Prior to DGM activities, licensed surveyors contracted by CH2M HILL placed color-coded stakes to mark the start and end of each transect in each of the four sites. For transects, which require only a single pass in one direction with no overlap, measuring tapes were pulled and secured as tightly and straight as possible; plastic pin flags were then placed at 10-m intervals to provide a line of sight to the geophysicist maneuvering the EM61-MK2 along the transect.

When in fiducial mode, in order to maximize control over positioning, tapes running along the transect line direction were made as straight as possible. Using the measuring tapes, fiducial points/markers and start and stop stations for each line were recorded. Using known UTM (Universal Transverse Mercator) coordinates for each stake, local coordinates recorded for each transect setup can be converted to meter coordinates in the data processing phase.

3.2 DATA PROCESSING AND INTERPRETATION

3.2.1 Data Storage and Initial Editing

EM61-MK2 data are temporarily stored in an Allegro CX data logger using Geomar's NAV61MK2 software and then downloaded into a laptop computer for further on-site processing using Geomar's Trackmaker and Geosoft Oasis Montaj software version 7.0.1.

Daily logs, field notes and survey report forms were input digitally into a handheld PDA while in the field each day. Initial data processing was performed by the field team, which included reviewing the data for integrity, repeatability, and data density issues, positioning the data based on the field notes and creating XYZ files for each grid and QC test for use in further processing the geophysical data. If an issue with a file was noted, such as a missing line or bad readings, the cause was investigated and corrected as necessary.

3.2.2 Preprocessing

Data were transferred to NAEVA's data processor in the Charlottesville, Virginia office where converted raw data files were imported into Geosoft's Oasis Montaj to perform the following:

- Review and finalize all QC tests (cable shake, personnel, static and latency) prior to processing of the DGM data for that day
- Set projection of NAD83 UTM Zone 18 North
- Evaluate data density and RTK GPS quality
- Apply auto leveling and instrument drift corrections
- Apply default lag correction
- Generate preliminary contour map(s) from submitted data
- Generate preliminary original vs. repeat profiles by transect
- Generate formatted ASCII files containing preprocessed data by transect

3.2.3 Final Processing

After completion of preprocessing, the data were further evaluated and processed to generate final processed data files. Final processing steps included:

- Evaluation and refinement of auto leveling and instrument drift corrections in the channel selected for target analysis (Channel 2)
- Evaluation and refinement of lag correction in the channel selected for target analysis (Channel 2)
- Additional digital filtering and enhancement, as necessary, in the channel selected for target analysis (Channel 2)

- Targeting of data, as described in Section 3.2.4
- Generation of formatted ASCII files containing processed data by transect
- Generation of final maps for each transect showing contoured data, target locations, and culture
- Generation of final original vs. repeat profiles by transect

3.2.4 Analysis and Target Selection

The UX-Detect module within Oasis Montaj identifies peak amplitude responses associated with, but not limited to, MEC items. Data was gridded using the Kriging method, and initial targets were selected along the profiles that were produced. The data profiles corresponding to the anomalies selected by Geosoft were then analyzed by trained geophysicists, with the targets evaluated as to their validity and position, as single-source anomalies may generate multiple target designations depending on shape and orientation. Targets found to be invalid or incorrectly located were removed or adjusted. Additionally, anomalies that were not selected by the UX-Detect module, yet deemed to represent a potential MEC target, were manually selected. All target selection was performed on final processed data from Channel 2 of the bottom coil of the EM61-MK2.

Final processed XYZ (ASCII) files were created for each transect and individual geophysical maps and target lists were created for each transect. When all data at a particular site had been collected mosaic maps were created by combining color contour maps from all the transects at that site. All anomalies occurring at or above the targeting threshold of 3 mV Channel 2 were identified using a unique ID number.

Each target list provides a Target ID, Transect ID, Easting (x) and Northing (y) UTM coordinate location for each target, the recorded peak response in millivolts, and any processor comments. The target IDs were prioritized by designating the highest amplitude response as the number one target in each transect.

All raw, preprocessed, and processed data have been submitted to CH2M HILL's project geophysicist and can be found on the enclosed CD (see Contents of CD).

4.0 RESULTS

4.1 SUMMARY OF WORK PERFORMED

The digital geophysical mapping of selected areas of MCB Camp Lejeune took place from May 19th to May 21st. After the majority of May 19th was spent surveying the GPO, Site UXO-14 Former Indoor Pistol Range and Gas Chamber was completed. The former gas chamber consists of two transects measuring 17 and 17.5-meters in length, respectively and is densely wooded, preventing the use of RTK GPS.

DGM was conducted in UXO-10, D-11A Flame Tank and Flame Thrower Range and UXO-11, B-5 Practice Hand Grenade Course on May 20th. UXO-10 is an area approximately 10 acres in size surrounding a developed parking lot and an adjacent field to the southwest. UXO-10 was collected in two portions: UXO-10 and UXO-10A. UXO-10 includes 43 transects and has minimal natural and cultural obstacles hindering data production and quality. UXO-10A is the area located to the southwest of Main Service Road. Although relatively flat, the area is scattered with dense vegetation and construction materials, which prevented the placement of transects prior to NAEVA's arrival. Consequently, UXO-10A was run as a continuous meandering path using RTK GPS.

Following the completion of UXO-10, collection of UXO-11, B-5 Practice Hand Grenade Course commenced. UXO-11 included eight transects and was on level ground; deep standing water in the southeast corner of the site created the only obstacle.

DGM took place at UXO-07, D-6 Practice Hand Grenade Course on May 21st. Site UXO-07 includes two separate areas – UXO-07_1 and UXO-07_2 – that combine for 126 transects. There are a large number of cultural items, including power lines, buildings, chain-link fence, active parking lots and roads, and vegetation that hindered production slightly.

Table 1 (at the end of the text) provides a full breakdown of acreage and targets by transect block. Plates 1 – 6 display the EM61-MK2 bottom coil mosaic maps for UXO-07_1 and UXO-07_2, UXO-10 and UXO-10A, UXO-11 and UXO-14, respectively.

4.2 MOBILIZATION AND SITE SETUP

Prior to mobilization an Activity Hazard Analysis (AHA) and Standard Operating Procedures (SOPs) were provided to CH2M HILL, and all personnel had current 8-hour and/or 40-hour OSHA HAZWOPER training.

NAEVA mobilized one field crew to Jacksonville, North Carolina on May 18th. Color-coded survey control stakes had been installed prior to arrival on site. Work was initiated on May 19th and all specified collection activities were completed by May 21st. Site-specific health and safety briefs were given each morning by the CH2M HILL site manager. No equipment was staged on site.

4.3 DGM SURVEY ACTIVITIES

4.3.1 Site UXO-07, D-6 Practice Hand Grenade Course

The Former Practice Hand Grenade Course designated as UXO-07 and subdivided into UXO-07_1 and UXO-07_2 (Figures 1 and 2) is a former practice hand grenade range used to train troops how to use hand grenades. Since it was not an actual hand grenade range, the level of MEC present is expected to be very low. The site has since been developed into a living facility with a surrounding parking lot with an Armory

in the south west portion. The ground was generally flat which aided the data quality, however a number of cultural objects are present; buildings, parking lots, chain-link fences, moving cars and vegetation acted as obstacles and in some cases caused GPS dropout and created gaps in the transect paths.

On the seven acre site, 126 total transects were collected in two separated areas. UXO-07_1, the larger of the two areas, consisted of 91 transects totaling .635 acres. 1105 targets were selected above the targeting threshold of 3 mV in Channel 2 in this area, giving an estimated target density of approximately 1740 targets per acre. The greatest anomaly distribution is generally located next to the buildings and roadways, possibly due to the presence of underground structures such as reinforced concrete. 196 of the 1105 selected targets – approximately 17 percent – have been designated as culture. The eastern-most area, farthest from the building and roads, were generally clear.

UXO-07_2, located to the southwest of the first area, was considerably smaller. 35 transects, totaling 0.18 acres were collected in this region. Transects were collected on a smooth but slight hill and were bounded by a parking lot and fences. Roads, utilities, and concrete pads were observed and avoided as much as possible. Dense concentrations of short trees also caused breaks in transect paths. 328 targets were selected in this area, resulting in an estimated target density of approximately 1822 targets per acre. The general concentration of these targets located near the Armory and roads in the southwest corner. A total of 113, or approximately 34 percent, of the selected targets have been deemed as culture-related.

4.3.2 Site UXO-10, D-11A Flame Tank and Flame Thrower Range

The Flame Tank and Flame Thrower Range, also composed of two separate areas, UXO-10 and UXO-10A (Figures 3 and 4), was only used as a flame thrower range, and as such no actual munitions are expected, however hand grenades and C-4 may have been used.

The area is currently a parking lot (UXO-10) to the north and an undeveloped field (UXO-10A) to the south, transected by a service road used primarily for tank traffic. UXO-10 was generally smooth with a small ravine located parallel to Main Service Road and another parallel to Gonzalez Boulevard. Cultural items in the area included a paved parking lot with cars, active roads, culverts and light posts and overhead power lines along Gonzalez Boulevard. No MEC surface debris was noted.

43 transects were collected over 0.35 acres; with 434 targets selected, the estimated target density is approximately 1251 targets per acre. Target distribution was generally uniform increasing slightly in proximity to the roads and power lines. Culture-related items were the source of 115 targets, or 26 percent of all selected targets for the area.

UXO-10A is located across Main Service Road from the northern area and is predominately level ground. Due to a large number of closely spaced obstructions, including lumber, sewer piping, dense vegetation and a container truck, stakes were not placed by surveyors prior to NAEVA's arrival. Under the guidance of

CH2M HILL, one meandering transect was used as an alternative method of collection. The path of collection was done in sweeps generally parallel to the main service road in order to reduce the amount of data overlap, and therefore ensuring the goal of 10 percent coverage would be met.

794 targets were selected along a path that totaled 0.72 acres, giving an estimated target density of approximately 1097 targets per acre. The main concentration of targets is located along the western boundary near the overhead power lines and utility markers and along the southern portions where the construction materials were present. A small percentage (less than 10 percent) of the selected targets was considered culture-sourced.

4.3.3 Site UXO-11, B-5 Practice Hand Grenade Course

The Practice Hand Grenade Course, UXO-11 (Figure 5), was used to train troops how to use hand grenades. Since it was not an actual hand grenade range, the level of MEC present is expected to be very low. The area is now a parade/training ground used sporadically for non-munitions related work.

Work at UXO-11 was begun immediately following the completion of UXO-10. Eight transect lines, each approximately 120 meters in length, were collected over smooth ground with no cultural influences for a total of 0.23 acres. A ditch containing deep standing water created a gap in the southernmost transect and tall trees were noted on the southern boundary but caused no GPS dropouts.

In the area collected, 86 targets were selected with slightly higher concentrations of targets were in the center of the area. The approximate estimated target density observed for UXO-11 is 379 targets per acre. Approximately 18 percent of all selected targets were considered culture related; however, these 16 targets represent the surveyor nails placed at the end of each transect. No MEC-related surface debris was observed in this area.

4.3.4 Site UXO-14, Former Indoor Pistol Range and Gas Chamber

Site UXO-14 (Figure 6), Former Indoor Pistol Range and Gas Chamber, was used for small arms practice and gas training, thus no actual munitions are expected. Due to dense forest with thick underbrush and minimal vegetation clearance, steep terrain, and scrap metal, only a small portion of the Former Gas Chamber was collected. The dense vegetation of Site UXO-14 also prevented the use of RTK GPS; in lieu of GPS, wheel mode with fiducial positioning was used with the EM61-MK2.

Two transects were collected on this site for a total of 33.9 meters and .01 acres, which was a reduced area compared to the original .96 acres that were expected to be surveyed. The area designated for collection is steep on the western edge and levels out to the east. Abundant scrap metal was observed at the surface; large pieces of sheet metal were removed from the survey area prior to collection. No MEC-related surface debris was observed.

The transects were 17 and 17.5 meters long, respectively, and yielded a total of 17 targets. A more concentrated area of high-response targets is present on the east side of the surveyed transects. Only two targets were designated as culture-related for the two transects, which represent the surveyor nails placed at stake locations 10138 and 10137 (Plate 6). The target density for UXO-14, based on the number of targets detected in comparison to the area collected, is approximately 2125 targets per acre; however, since such a small area was surveyed and in an area where surface metal was abundant, this number is not statistically accurate.

4.4 DATA PROCESSING AND INTERPRETATION

All data were processed as described in-depth in Section 3.2. Part of the process included analyzing channel decay in order to identify possible noise or other false positive responses. Any anomalies suspected as originating from noise (e.g., channel readings out of phase) and not metallic objects are noted in the processing reports included on the CD. These reports list down-line data density statistics, leveling, lag, and parameters used in processing each transect. Processors examined all data prior to NAEVA demobilizing from the site.

5.0 QUALITY CONTROL

To establish confidence in the data reliability, QC tests were conducted throughout the project. Tests were conducted prior to, during, and after all data collection sessions. All QC tests for the EM61-MK2 were conducted after a minimum 15 minute warm-up period for the electronics. Sample graphical displays of QC data are included in Appendix B.

5.1 SYSTEM VALIDATION - GEOPHYSICAL PROVE-OUT (GPO)

Prior to mapping the four sites, a survey of a pre-existing GPO area was completed. The purpose of surveying the GPO is to demonstrate the effectiveness of all instrumentation, methods, and personnel prior to the initiation of fieldwork and document the site-specific capabilities of a DGM system. Serial number identifications were recorded for all instrumentation (i.e. data logger, coils, EM61-MK2 electronics), and the GPO was mapped using the same personnel, equipment, and methodologies employed for the DGM survey.

The existing GPO location in Knox Park used by NAEVA for all prior work at MCB Camp Lejeune was used for this project as well. A background survey was not conducted, as the GPO has been in place for several years and many collected datasets exist for comparison. Inert seed items were emplaced by CH2M HILL at various depths and orientations in order to test the detection capabilities of the instrument and establish a targeting threshold for geophysical anomalies. The GPO was originally established using the

North Carolina State Plane coordinate system under the NAD83 (1986) datum. Both corner stakes and corner flags were present in the ground, and noted on the contour maps (Appendix A), displaying the shift in coordinates that has occurred with the new datum.

The EM61-MK2 was used to survey the GPO twice in wheel mode, using RTK GPS and fiducial positioning. The EM61-MK2 was chosen based on its ability to detect small, near-surface ferrous and non-ferrous munitions and its high data resolution. The unconsolidated sands at MCB Camp Lejeune should not adversely affect the instrument response, however the EM61-MK2 is susceptible to interference from power lines or other objects that create an electromagnetic field (e.g., junction boxes, radios in transmit mode).

It was determined that a threshold of 3 mV in Channel 2 (the same threshold used in prior work) would detect the MEC items of interest. See Appendix A for color contour maps of the RTS- and fiducial-collected GPO.

5.2 QC TEST DESCRIPTIONS AND ACCEPTANCE CRITERIA

The following QC procedures were performed and documented during the data collection process and reviewed by a qualified geophysicist on a daily basis:

GPS QC: Positioning accuracy of the geophysical data was demonstrated by testing the GPS equipment over one or more known points. The accuracy of the data positioning was evaluated by comparing NAEVA's point coordinates provided by the professional land surveying team. The project DQO's called for the positions to be within 10-cm of the known points. The sensor position test was conducted prior to starting DGM surveying each workday. Errors noted in the positioning were less than 10-cm each day with typical errors on the order of 3-4 centimeters.

Static Background and Static Spike: Static tests were performed by positioning the survey equipment within or near the survey boundaries in an area free of metallic response and collecting data for a 3-minute period. During this time, the instrument was held in a fixed position through the use of a PVC pipe stand. The static tests consisted of one minute without a spike (known standard), one minute with a spike (a wood board fitted to the bottom coil with a bolt secured through the center), and then one minute without a spike. The purpose of the static test is to determine whether unusual levels of instrument or ambient noise exist, and to ensure consistent response to the spike item. The static background and static spike test were conducted at the beginning of each day and the end of each site investigation.

Cable Shake Test: Each morning, prior to production surveying, data were collected while the EM coil was held in a stationary position, and each of the cables were shaken, one at a time. The response was monitored in the field for immediate corrective action, transmitted back to a processor, analyzed, and checked for spikes in the data that can possibly create false anomalies. Any data spike greater than 2 mV

from the mean would constitute a QC failure. The cable shake test was conducted at the beginning of the survey operation for each workday and cables were not disconnected during the day.

Personnel Test: This test checks the response of instruments to personnel and their clothing/proximity to the system. Each morning, prior to survey operation, the instrument was checked for its response to the personnel operating the system. The response was observed in the field for immediate corrective action and transmitted back to a processor, and analyzed and checked for spikes in the data that can possibly create false anomalies. Any data spike greater than 2 mV from the mean would constitute a QC failure.

Latency Test: A 20-meter long single survey line was established near the first transect of the day with the static item placed at the center point (10-m). A line of data was collected in each direction along the test line prior to daily collection operations to demonstrate consistency in instrument performance (both response and positioning) throughout the course of the survey, with acceptance criteria of $\pm 20\%$ response amplitude and ± 20 cm positional accuracy.

Repeat Data: This test is performed to verify repeatability of the data and was performed at the end of each of the four UXO sites. At least 2% of the survey lines were repeated and evaluated for consistency. Since small deviations in line path can affect the instrument response the profiles were evaluated qualitatively. The spike test is used to assess quantitative repeatability.

5.3 QC TEST RESULTS

QC data were evaluated using Geosoft's QA/QC software. Static, cable shake, and personnel test profiles were plotted with an acceptance criterion of ± 2 mV from the mean. Any readings outside this range were flagged on the profiles and an associated failure percentage was reported. The following provides a summary of the QC results:

GPS QC: All daily checks of GPS accuracy were within 10-cm of the recorded positions.

Static Background / Spike Test: All static and spike tests were within acceptance criteria; stable, repeatable, and without spikes.

Cable Shake Test: No spikes were observed in any of the tests.

Personnel Test: No deviation from background response was observed.

Latency Test: Latency tests were plotted showing the line path and gridded response. A comparison of tests shows that response amplitudes are consistent and test item positions are accurate.

Repeat Data: Repeat lines generally showed good repeatability. Discrepancies in repeat lines were often a result of line path deviation or noise in the data.

All QC tests were well within acceptance criteria. As QC tests were conducted in the vicinity of the

associated grids, variations in noise levels are apparent. Especially noisy tests are noted on the data plots as containing influence from power lines. Most static spike tests show an initial drop in response at the beginning of the collection period, likely due to software behavior, as readings were completely stable in monitoring mode, yet when data collection was started the recorded values dropped. This behavior was observed on multiple occasions but the effect was reduced during data leveling and did not result in any QC failures.

6.0 CONCLUSIONS

Work under TO-14 was completed after one working day for the GPO and Site UXO-14 Former Indoor Pistol Range and Gas Chamber, one day for Site UXO-10, D-11A Flame Tank and Flame Thrower Range and Site UXO-11, B-5 Practice Hand Grenade Course, and one day at UXO-07, D-6 Practice Hand Grenade Course. Mapping activities were slightly slower at site UXO-07 due to its large size and increased number of obstacles including buildings, roadways/parking lots, fences and vegetation that fragmented transects. This survey serves as the initial focused SI of all aforementioned areas in which NAEVA has conducted 10 percent transect surveys.

A qualitative analysis highlights the effectiveness of the transect survey in identifying areas of higher metallic concentrations. In particular, the higher densities of targets were generally located near cultural objects such as buildings and fences. The anomaly density observed for UXO-07_1 is more concentrated near the buildings in the southern portion of the site and near the road to the west; these areas composed more than half the targets selected. The surveyed area at Site UXO-07_1 is currently an in-use housing complex and therefore contains many cultural structures that may have affected target detection and densities. UXO-07_2 is similar with regards to target density array; the targets are even distributed throughout the area, but where there was a building, fence, or other structure present, anomaly density increased. Underground utilities associated with the housing complex may have been, in conjunction with aboveground influences, responsible for the increase in target density. However, since the area was not a full coverage survey, it is not possible to accurately identify the presence of underground utility lines.

MRP Site UXO-10, similar to UXO-07, shows high concentrations of targets near man-made objects. UXO-10 had a number of overhead power lines and light posts, near which target densities tended to increase. Approximately one-third of the targets were located below the overhead power lines on the western side of the site; however, the same area also included several metal culverts and light posts as features, which are also known to be responsible for increasing the target density. A saturated area is visible on the eastern portion of the site (Plate 3), but no cultural influences were apparent in the field.

UXO-10A displayed comparable target densities to UXO-10. The main concentrations of targets are

located in two areas and comprise approximately two-thirds of the selected targets. On the western edge of the collected area, a large saturated region is shown. This area is in close proximity to overhead power lines, and several cultural objects including a large utility cover, which suggests the possible existence of underground utilities. The second saturated region is located at the southern end of the collected area. Several construction items including large, metallic sewer pipes were noted on the surface here. It is possible that these large construction items, in addition to smaller discarded pieces of metal, could be the cause of the increased target density in this area.

Lacking in cultural influences, UXO-11 collection yielded a considerably decreased quantity of targets. The main concentration of the targets producing the highest mV responses is located in the center of the site, but does not exhibit saturation or any predictable cultural pattern.

UXO-14 produced a similar number of targets for each transect collected. The two transects, being only five meters apart, displayed analogous patterns of target location. Cultural influences were not noted in the dense vegetation surrounding the collected area of UXO-14; however, large pieces of sheet metal were observed upon arrival and moved prior to collection. It is possible that pieces of scrap metal that were not removed from the area are the cause of the large mV values that were recorded by the EM61-MK2.

While there are a low number of suspected noise targets, noise levels were not severe enough to adversely affect the detection of actual metallic objects, and there are no areas on the map that exhibit noise saturation. Even at the southwest boundary of UXO-10, where data collection passed directly under the lines, noise was only moderate. The overhead line location can be seen in Plate 3.

Since both UXO-07 and UXO-11 were used as training and education sites rather than live ranges or impact areas, any MEC present is expected to be quite shallow. Given that all the MRP Sites investigated during this survey have been previously redeveloped, with the exception of UXO-14, which is heavily wooded, no trenches or holes from training activities are visible. It is probable that any MEC, whether discrete objects in the top foot or so of soil, or items in burial pits, have been accurately located by this geophysical survey.

The enclosed CD contains all raw, preprocessed, and processed data, including processing reports, QC test results, color contour maps and target lists for each grid, and mosaic maps for both sites. A copy of this report may also be found in Adobe PDF and Microsoft Word formats.

7.0 REFERENCES

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- CH2M HILL. 2009. *Preliminary Assessment/Site Inspection at Site UXO-14, Former Indoor Pistol Range and Gas Chamber (Rifle Range Area) ASR #2.199 and #2.200*. Prepared for Department of the Navy Naval Facilities Engineering Command. April.
- CH2M HILL. 2006. *Master Ordering Agreement*. April.
- Geonics Limited. 2005. *EM61-MK2 and EM61-MK2HP 4 Channel High Sensitivity Metal Detectors Operating Manual*. July.

TABLE 1: TRANSECT STATISTICS

Site	Data Set	Transects	Distance Traveled (m)	Acreage	Targets
UXO-07	UXO-07_1	91	2568.991	0.635	1105
UXO-07	UXO-07_2	35	725.990	0.180	328
UXO-10	UXO-10	43	1405.267	0.347	434
UXO-10	UXO-10A	1	2931.121	0.724	794
UXO-11	UXO-11	8	919.530	0.227	86
UXO-14	UXO-14	2	33.910	0.008	17
TOTALS	6 Data Sets	180	8584.809	2.121	2764

* Total data sets and targets do not include GPO figures

FIGURES



Figure 1: Proposed transect location for UXO-07_1



Figure 2: Proposed transect locations for UXO-07_2



Figure 3: SE portion of UXO-10 shot from Parking lot looking to SE corner



Figure 4: UXO-10A looking towards the SE from a midpoint of the area



Figure 5: Proposed Transect locations for UXO-11



Figure 6: UXO-14 shot from the SW to the NE

PLATES:

**PLATE 1: EM61-MK2 MOSAIC – UXO-07_1 PRACTICE HAND
GRENADE COURSE**

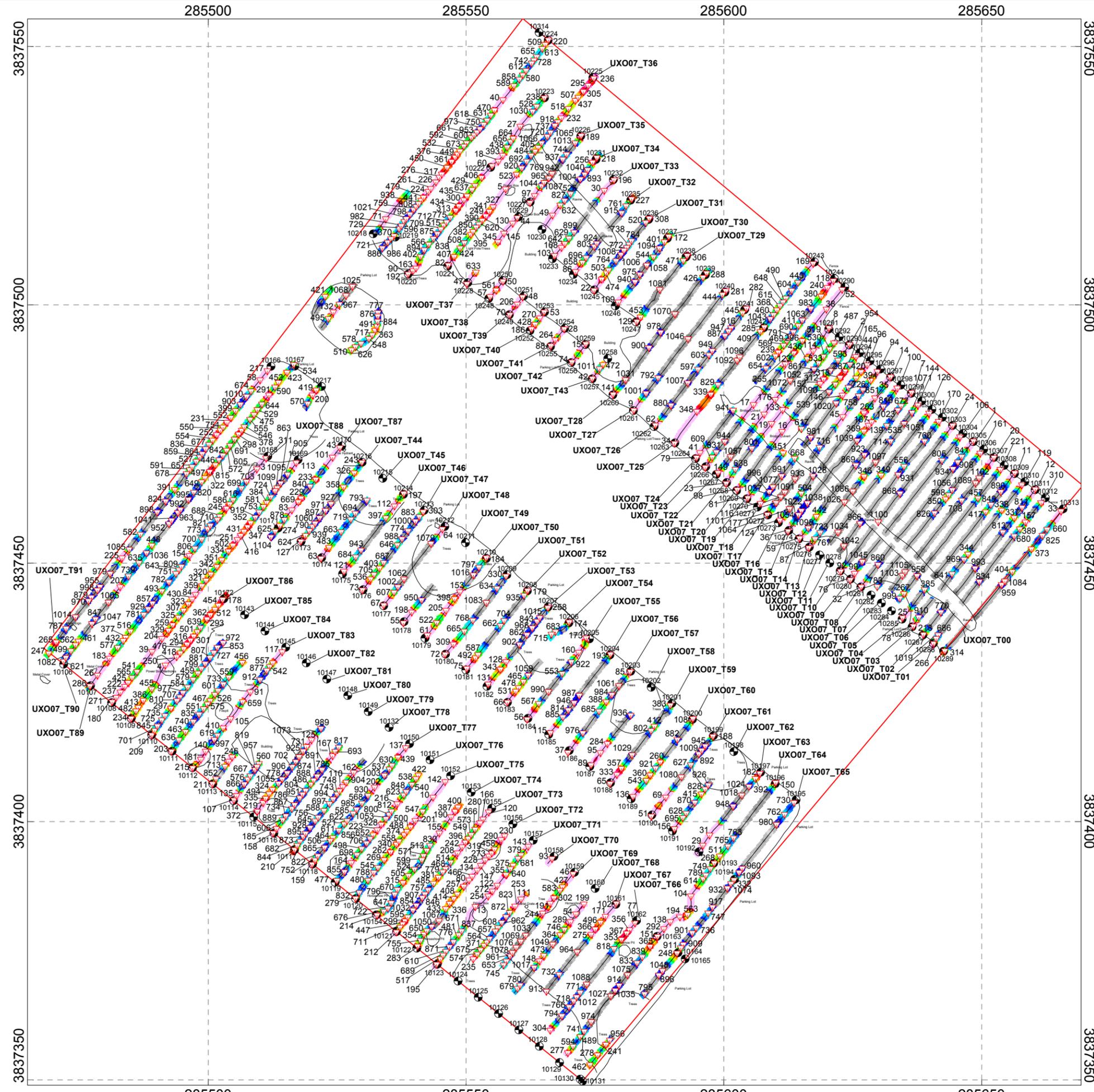
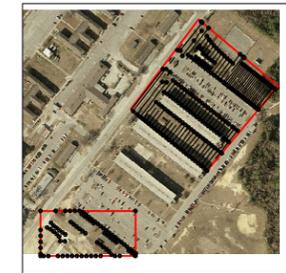
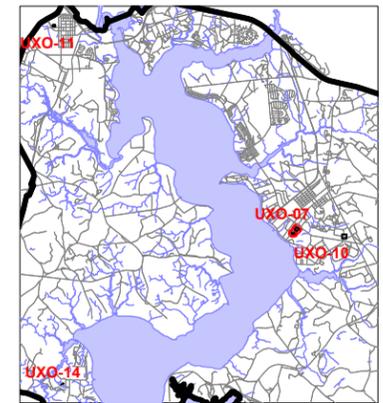
**PLATE 2: EM61-MK2 MOSAIC – UXO-07_2 PRACTICE HAND
GRENADE COURSE**

**PLATE 3: EM61-MK2 MOSAIC – UXO-10 FLAME TANK AND
FLAME THROWER RANGE**

**PLATE 4: EM61-MK2 MOSAIC – UXO-10A FLAME TANK AND
FLAME THROWER RANGE**

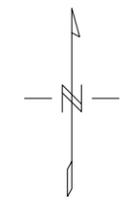
**PLATE 5: EM61-MK2 MOSAIC – UXO-11 PRACTICE HAND
GRENADE COURSE**

**PLATE 6: EM61-MK2 MOSAIC – UXO-14 FORMER INDOOR
PISTOL RANGE AND GAS CHAMBER**

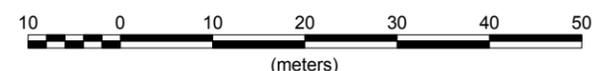


Legend

- Transect Path
- Surveyed Transect End Point(s)
- Thin black lines, symbols and text indicate field culture sketch (Accuracy in the range of 1-3m)
- Selected Target (See Target Pick List For Response and Location)



1:780



NAD83 / UTM zone 18N

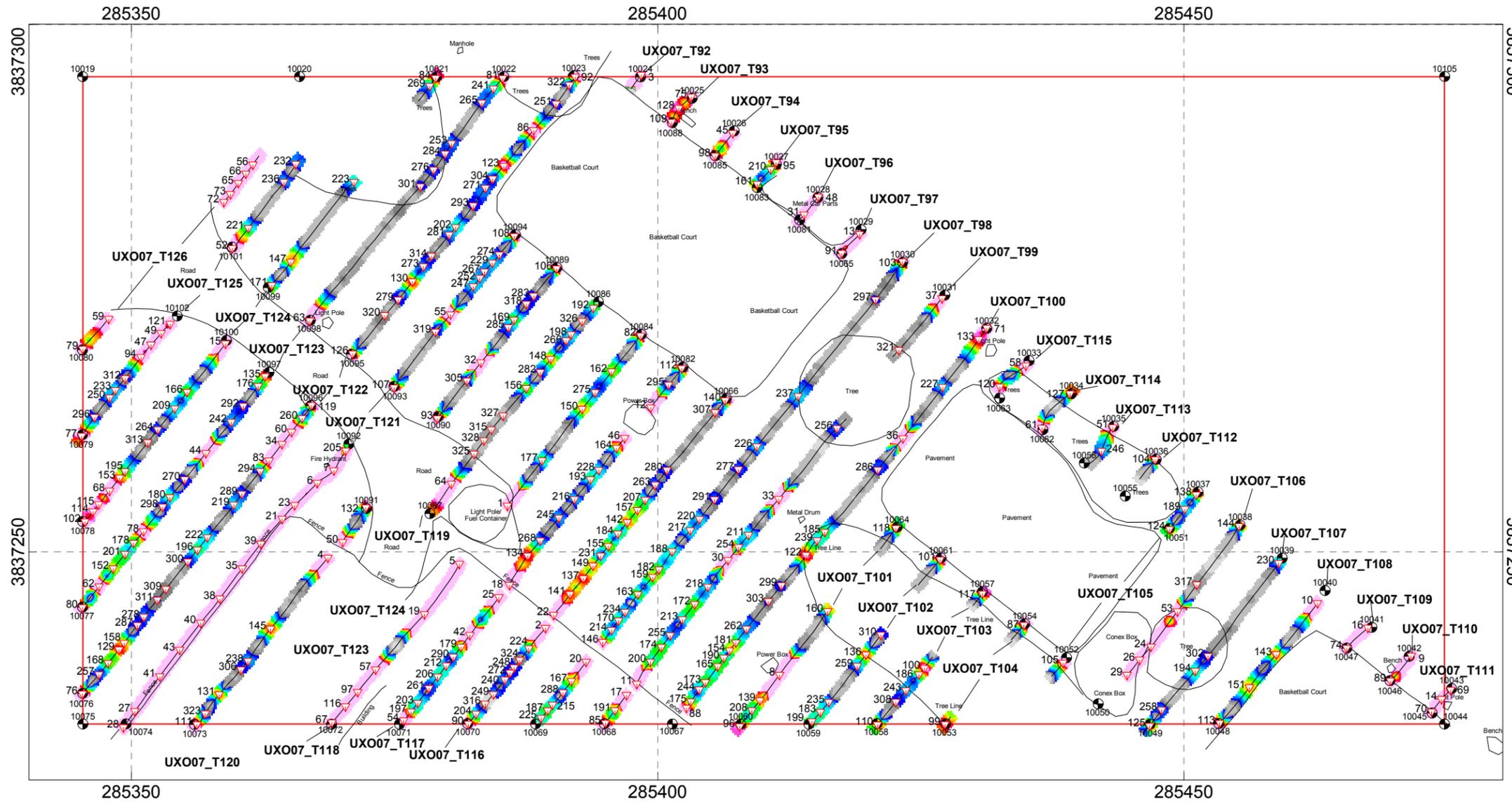
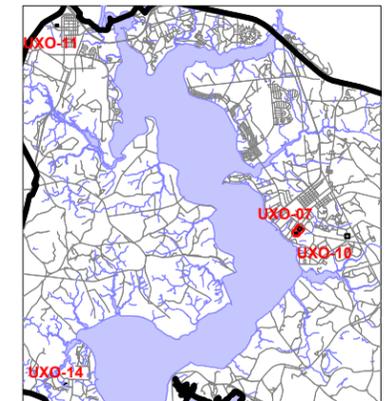
Plate 1

Client: CH2M HILL

EM61 MK2 Bottom Coil
Block UXO07 Transects UXO07_T00 - UXO07_T91
Site UXO-07
CTO-014_MRP Site Inspections
Marine Corps Base, Camp Lejeune, North Carolina

Date of Survey: May 21, 2009
Date of Map Creation: May 27, 2009

Map Approver: J. Guillard



- Legend**
- Transect Path
 - Surveyed Transect End Point(s)
 - Thin black lines, symbols and text indicate field culture sketch (Accuracy in the range of 1-3m)
 - Selected Target (See Target Pick List For Response and Location)



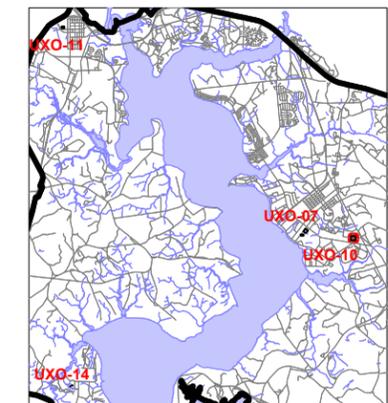
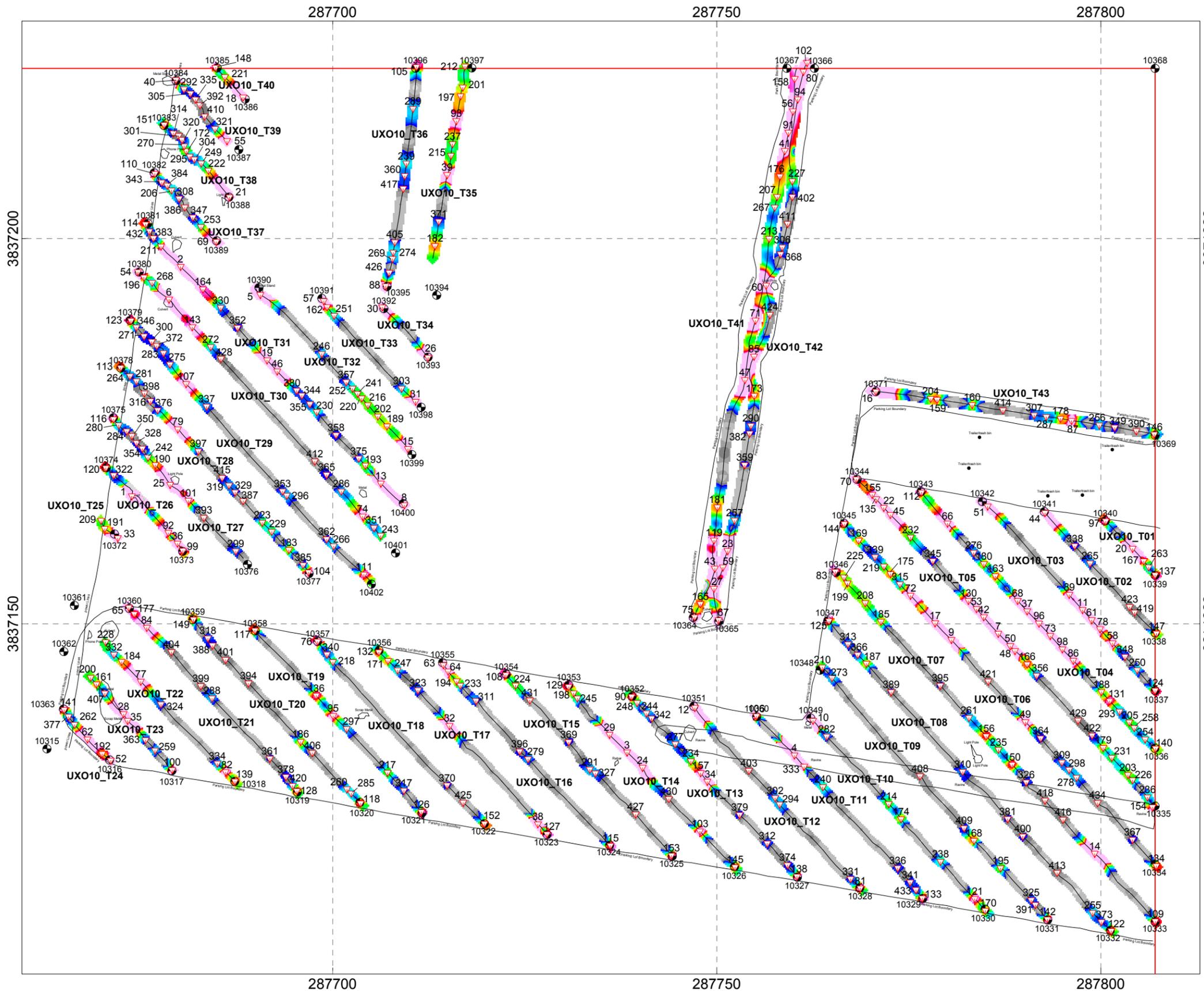
1:480



(meters)
 NAD83 / UTM zone 18N

Plate 2

Client: CH2M HILL
EM61 MK2 Bottom Coil Block UXO07 Transects UXO07_T92 - UXO07_T126 Site UXO-07
CTO-014_MRP Site Inspections Marine Corps Base, Camp Lejeune, North Carolina
Date of Survey: May 21, 2009 Date of Map Creation: May 28, 2009
Map Approver: J. Guillard



Legend

- Transect Path
- Surveyed Transect End Point(s)
- Thin black lines, symbols and text indicate field culture sketch (Accuracy in the range of 1-3m)
- Selected Target (See Target Pick List For Response and Location)

mV
Channel 2

10 0 10 20 30
(meters)

1:540

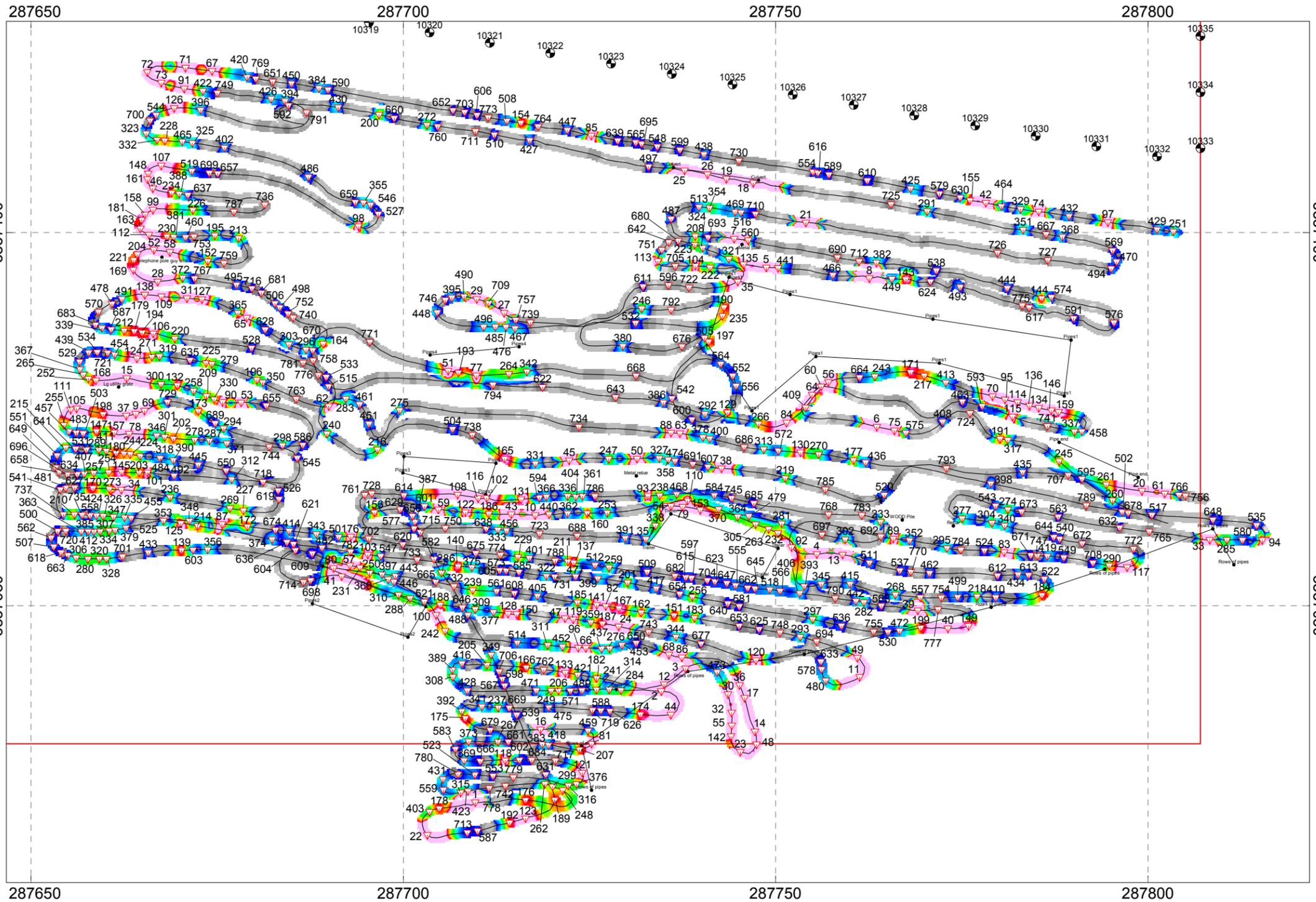
Plate 3

Client: CH2M HILL

EM61 MK2 Bottom Coil
 Block UXO10 Transects UXO10_T01 - UXO10_T43
 Site UXO-10
 CTO-014_MRP Site Inspections
 Marine Corps Base, Camp Lejeune, North Carolina

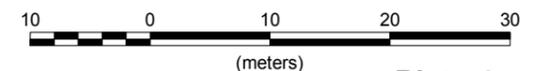
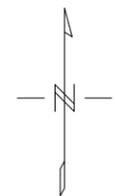
Date of Survey: May 21, 2009
 Date of Map Creation: May 20, 2009

Map Approver: J. Guillard



Legend

- Meandering Path
- Surveyed Transect End Point(s)
- Thin black lines, symbols and text indicate field culture sketch (Accuracy in the range of 1-3m)
- Selected Target (See Target Pick List For Response and Location)



(meters)
NAD83 / UTM zone 18N

Plate 4

Client: CH2M HILL
EM61 MK2 Bottom Coil Block UXO10A Meandering Paths UXO10_MP Site UXO-10 CTO-014_MRP Site Inspections Marine Corps Base, Camp Lejeune, North Carolina
Date of Survey: May 20, 2009 Date of Map Creation: May 26, 2009
Map Approver: J. Guillard

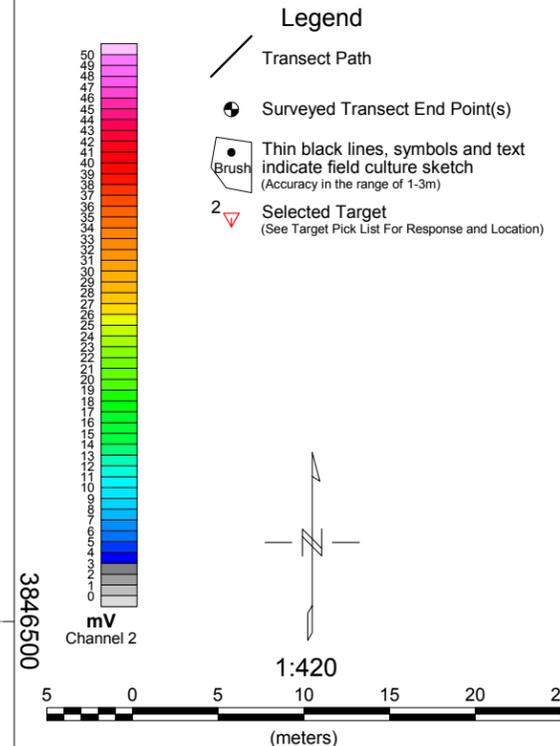
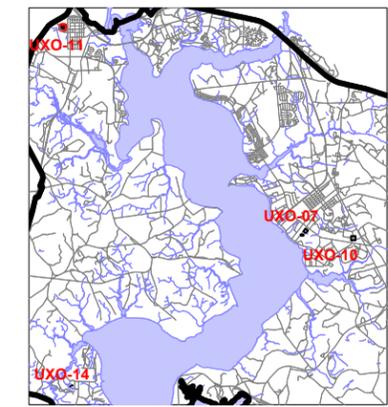
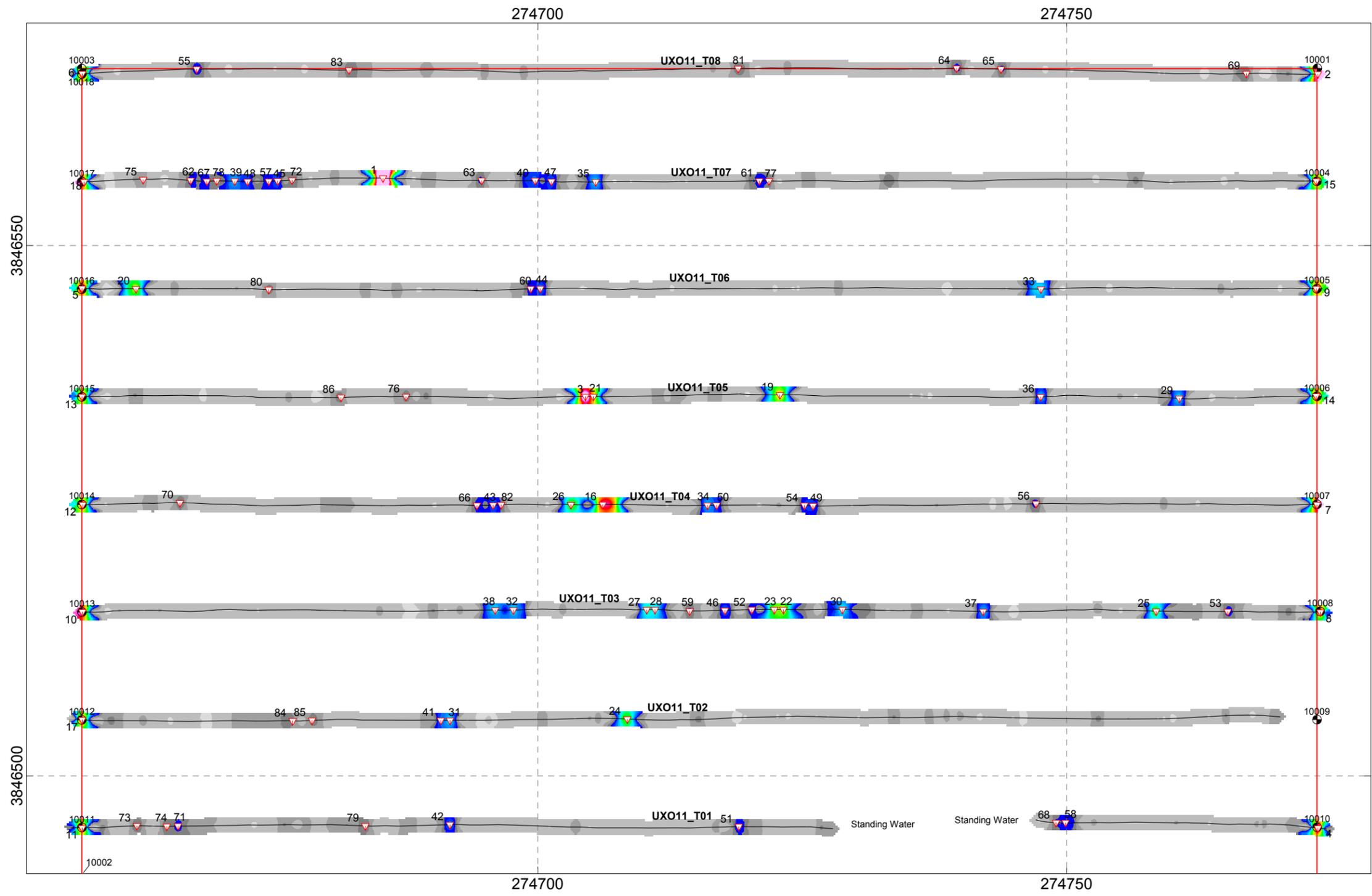


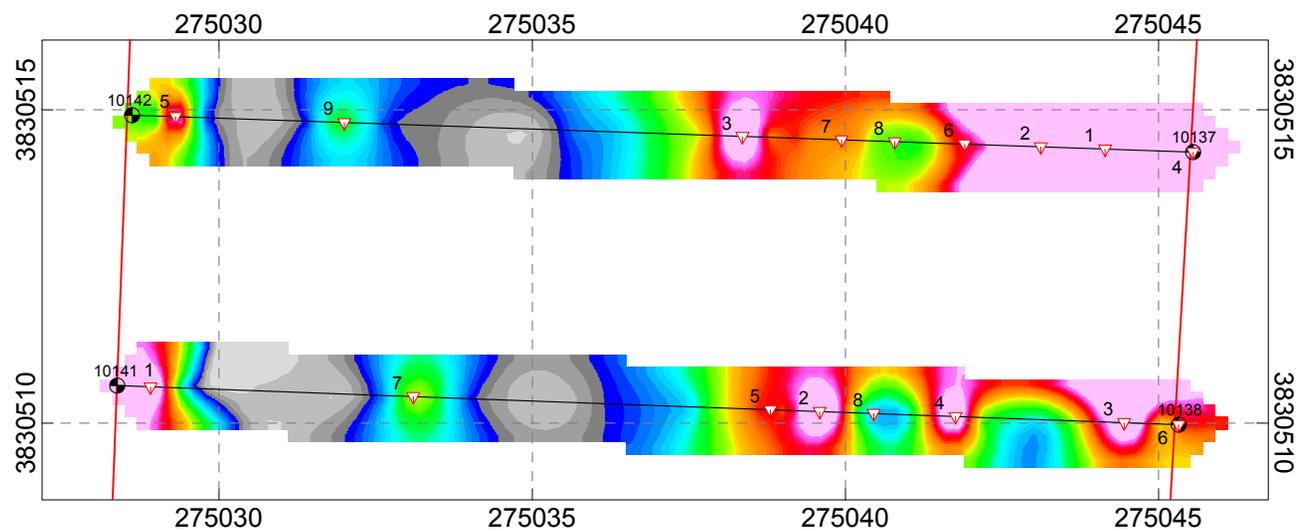
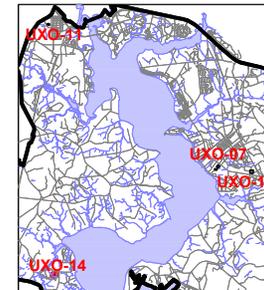
Plate 5
 NAD83 / UTM zone 18N

Client: CH2M HILL

EM61 MK2 Bottom Coil
 Block UXO11 Transects UXO11_T01 - UXO11_T08
 Site UXO-11
 CTO-014_MRP Site Inspections
 Marine Corps Base, Camp Lejeune, North Carolina

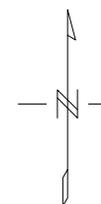
Date of Survey: May 20, 2009
 Date of Map Creation: May 22, 2009

Map Approver: J. Guillard



mV
Channel 2

- Legend**
- Transect Path
 - Surveyed Transect End Point(s)
 - Thin black lines, symbols and text indicate field culture sketch (Accuracy in the range of 1-3m)
 - Selected Target (See Target Pick List For Response and Location)

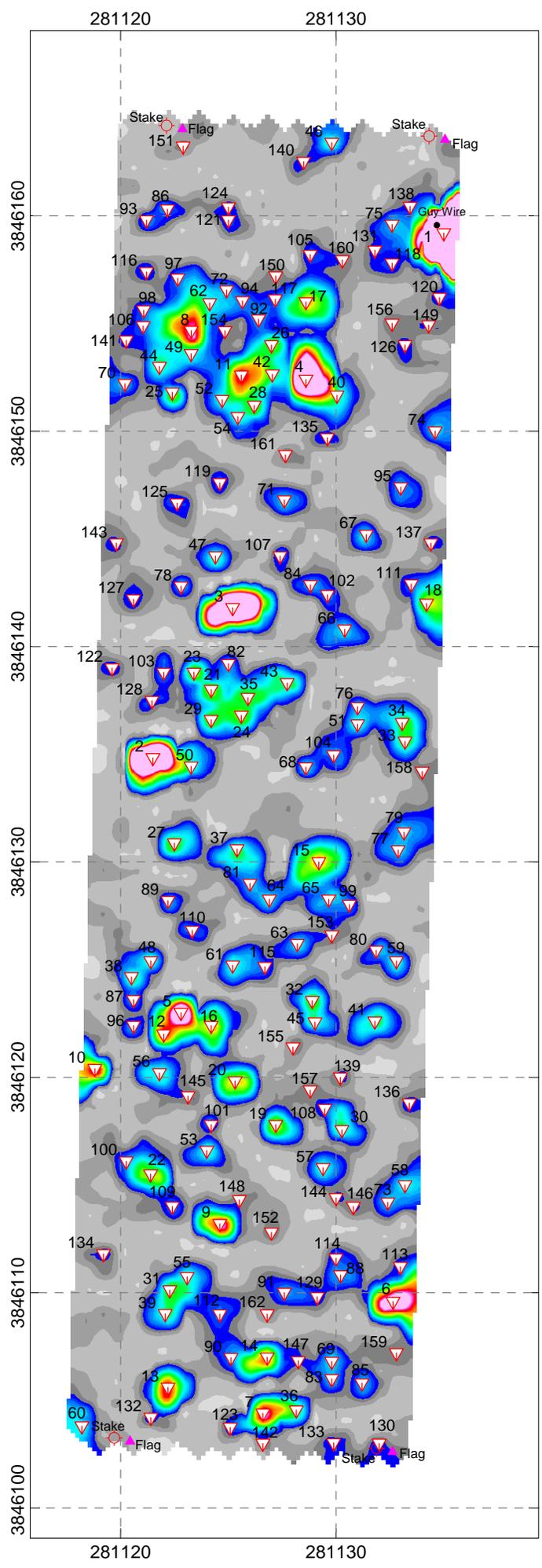


(meters)

Plate 6 NAD83 / UTM zone 18N

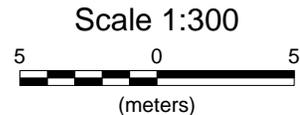
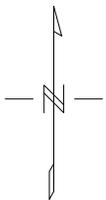
Client: CH2M HILL
EM61 MK2 Bottom Coil Block UXO14 Transects UXO14_T01, UXO14_T02 Site UXO-14
CTO-014_MRP Site Inspections Marine Corps Base, Camp Lejeune, North Carolina
Date of Survey: May 19, 2009 Date of Map Creation: May 21, 2009
Map Approver: J. Guillard

**APPENDIX A:
GPO COLOR CONTOUR
MAPS**



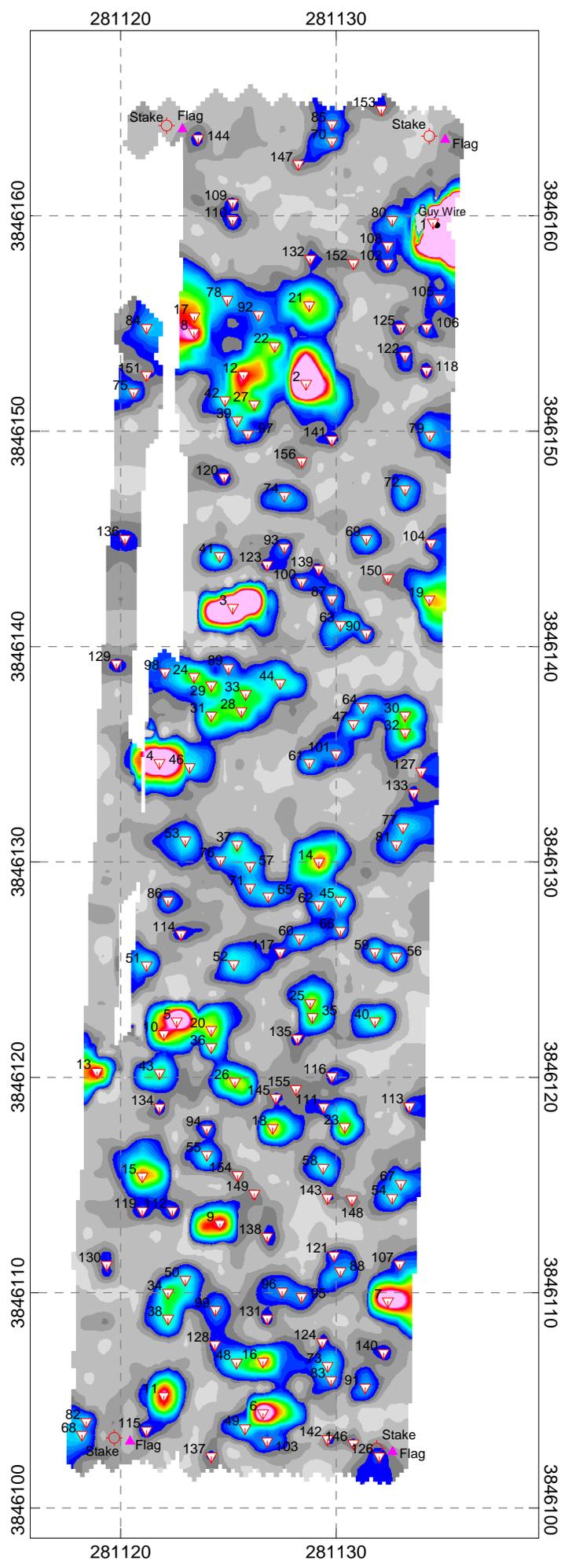
mV
Channel 2

- Legend**
- 2 ▽ Selected Target
(See Target Pick List For Response and Location)
 (Unique Target ID is XXX, eg. 002)
 - brush ● Culture (if noted)
 - Grid Corner (Idealized)
 - ▲ Flag Location



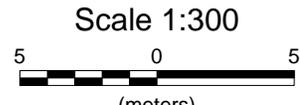
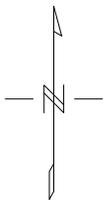
NAD83(NSRS2007) / UTM zone 18N

Client: CH2M HILL
EM61 MK2 Bottom Coil Geophysical Prove Out (GPO - FID) Camp Lejeune CTO-014_MRP Site Inspections Marine Corps Base, Camp Lejeune, North Carolina
Date of Survey: 05/19/2009 Date of Map Creation: 05/20/2009
Map Approver: K. Lemley



mV
Channel 2

- Legend**
- 2 ▽ Selected Target
(See Target Pick List For Response and Location)
(Unique Target ID is XXX, eg. 002)
 - brush ● Culture (if noted)
 - Grid Corner (Idealized)
 - ▲ Flag Location



NAD83(NSRS2007) / UTM zone 18N

Client: CH2M HILL
EM61 MK2 Bottom Coil Geophysical Prove Out (GPO - GPS) Camp Lejeune CTO-014_MRP Site Inspections Marine Corps Base, Camp Lejeune, North Carolina
Date of Survey: 05/19/2009 Date of Map Creation: 05/20/2009
Map Approver: K. Lemley

**APPENDIX B:
EXAMPLES OF QC TEST
RESULTS**

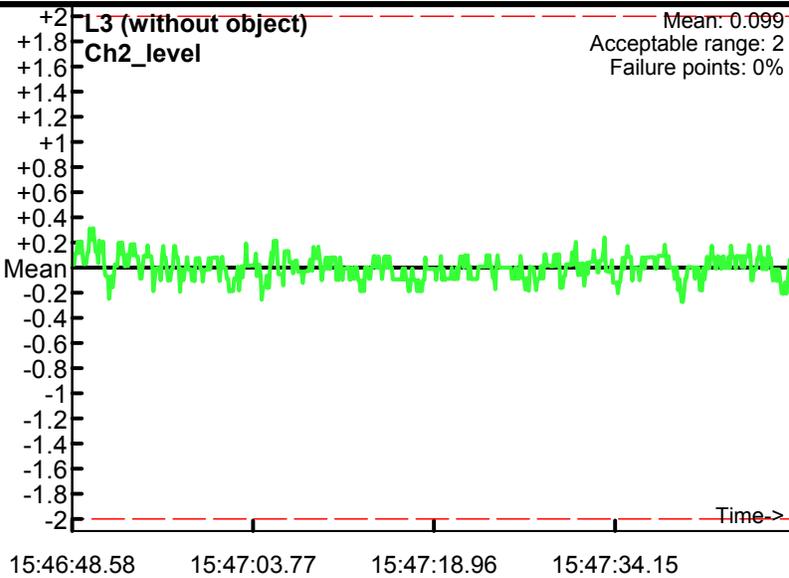
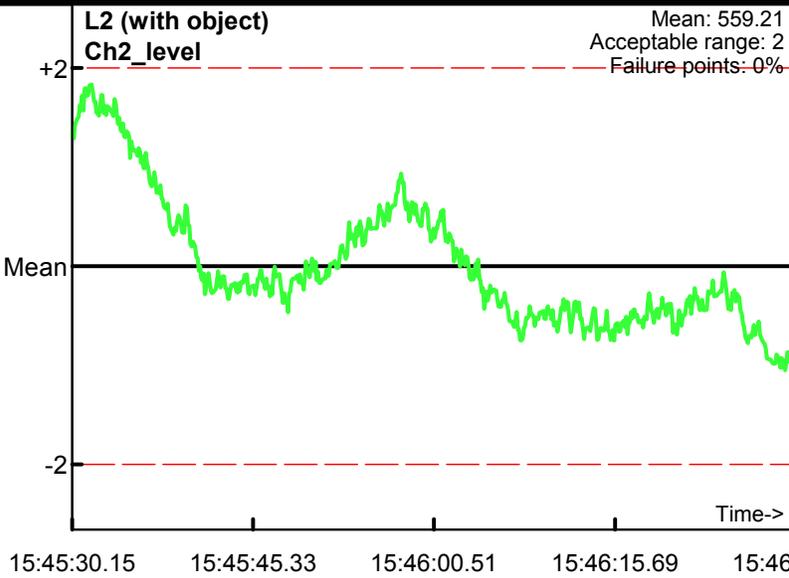
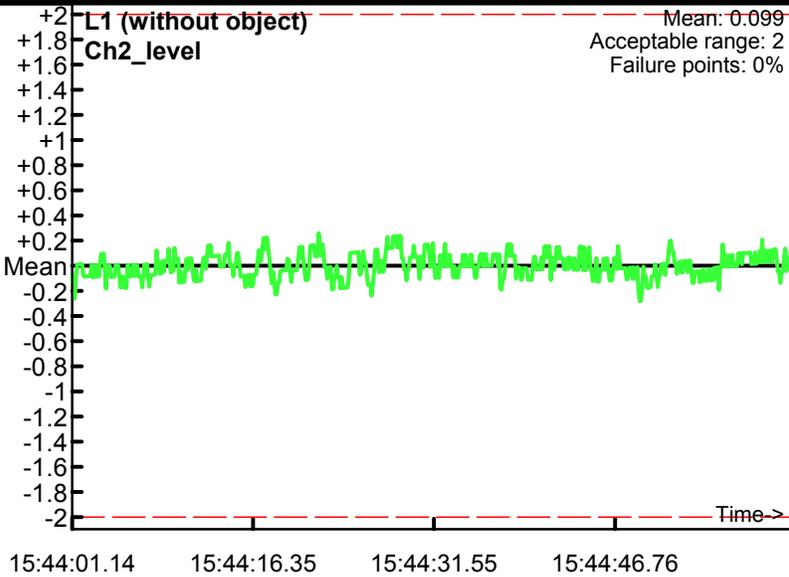
Static Calibration Test

Project: CTO-014_MRP Site Inspections Camp Lejeune
Equipment: EM-61 Mark II
Grid/Location: Localized QC Area

Instrument Threshold: 20%

● Outside range
- - - Acceptable limits

PM test
Operator: Geo1
Date: 2009/05/19

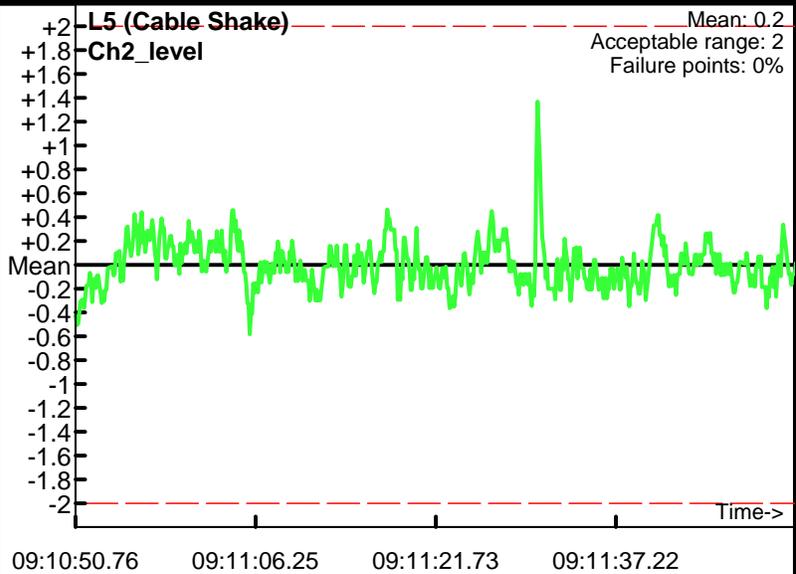
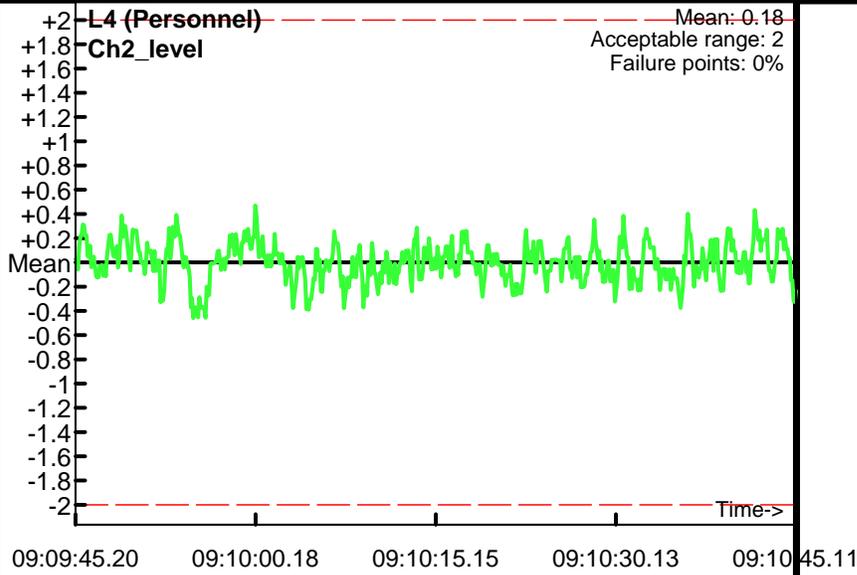


Personnel & Cable Shake Tests

Project: CTO-014_MRP Site Inspections Camp Lejeune
Equipment: EM-61 Mark II
Grid/Location: Localized QC Area

Instrument Threshold: 20%
● Outside range
--- Acceptable limits

QC1 test
Operator: Geo1
Date: 2009/05/21



Dynamic Response Test

Peak Tolerance(Value): 20(%)

Operator: Geo1

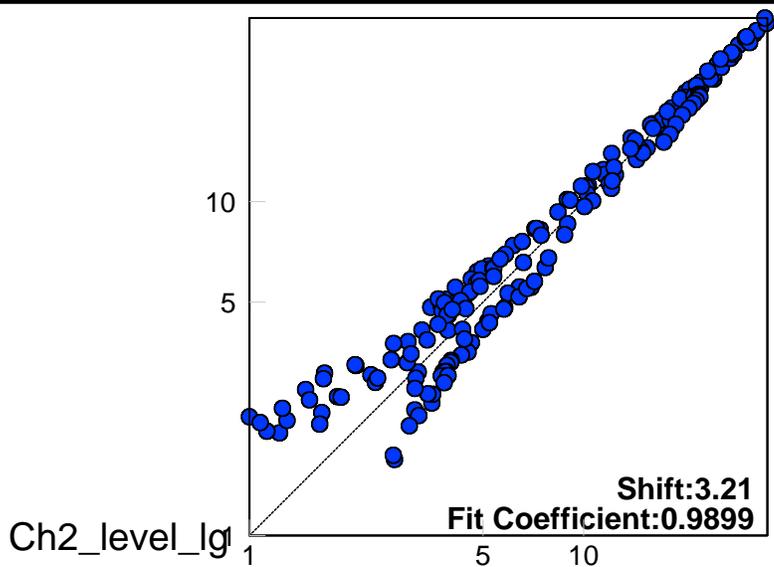
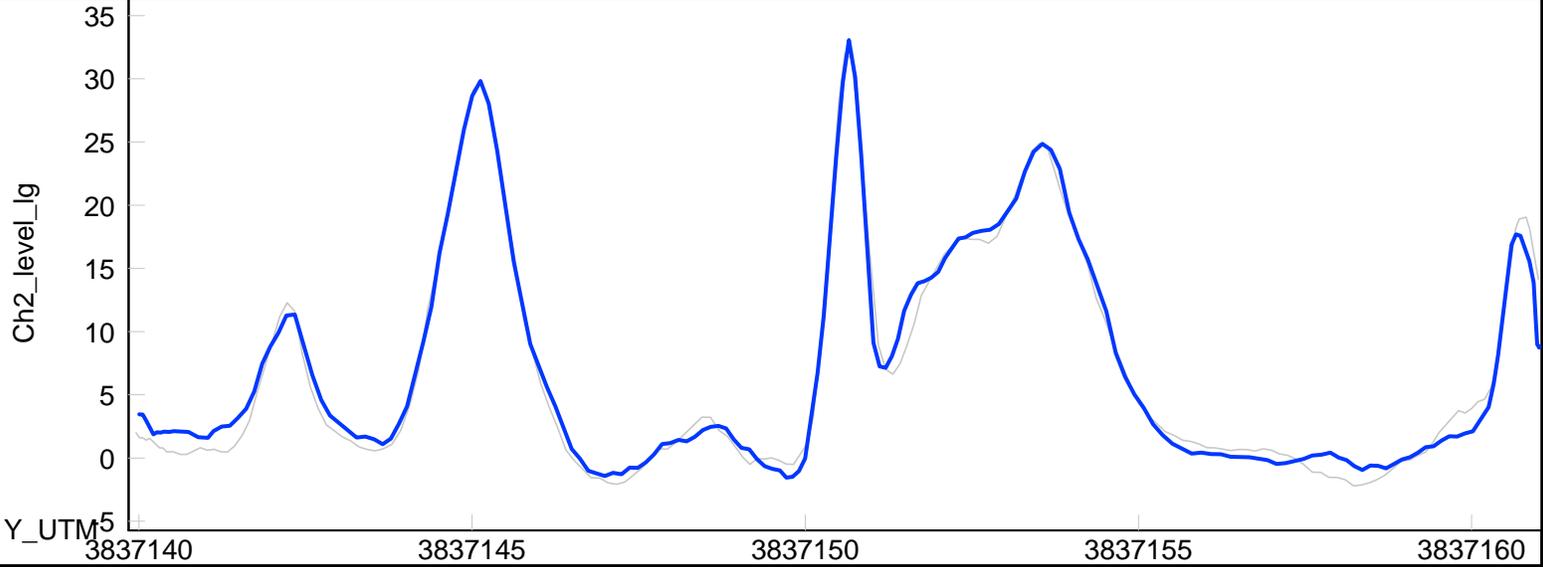
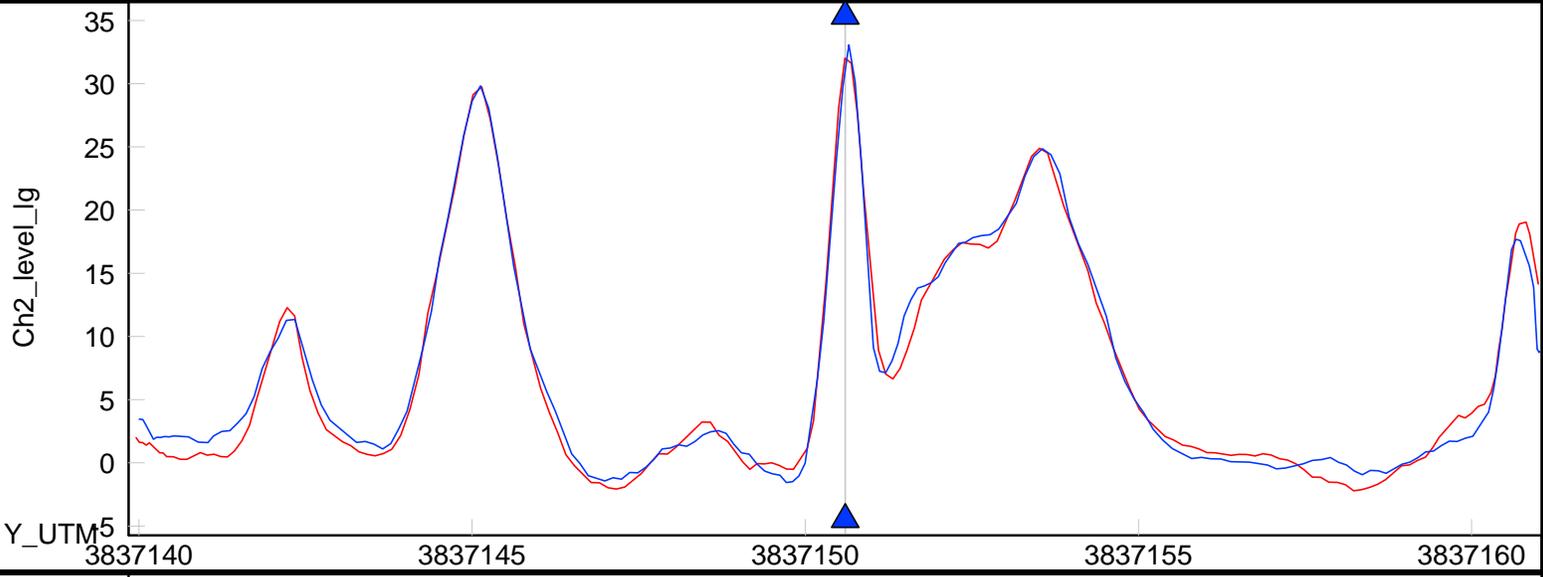
Project: CTO-014_MRP Site Inspections Camp Lejeune

Equipment: EM-61 Mark II

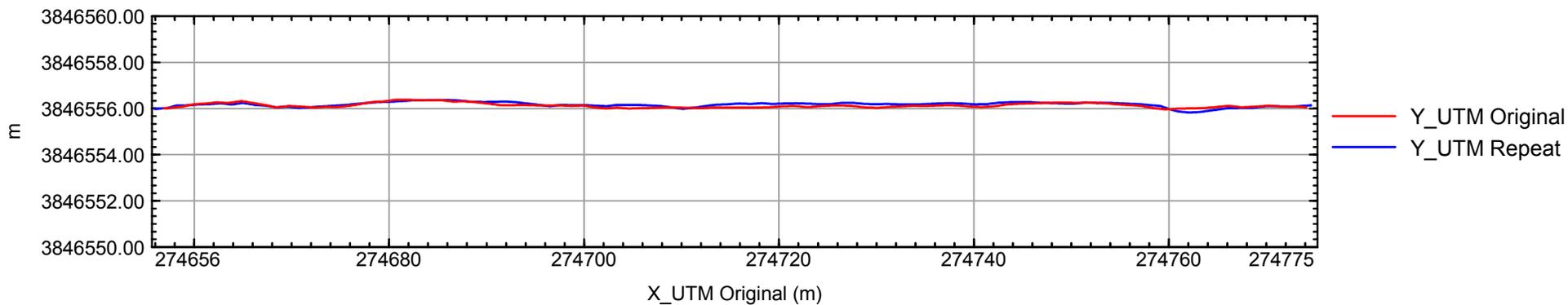
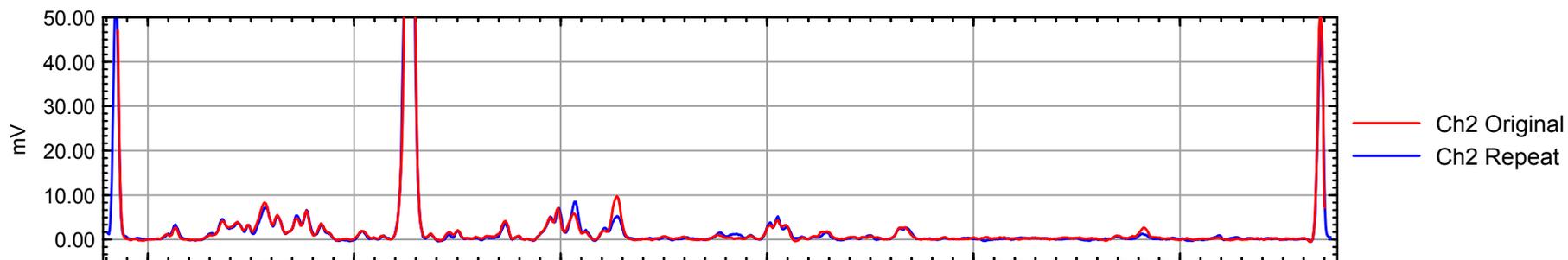
Grid/Location: Localized QC Area

— Previous Profiles
 — Reference Profile
 — Comparison Profile

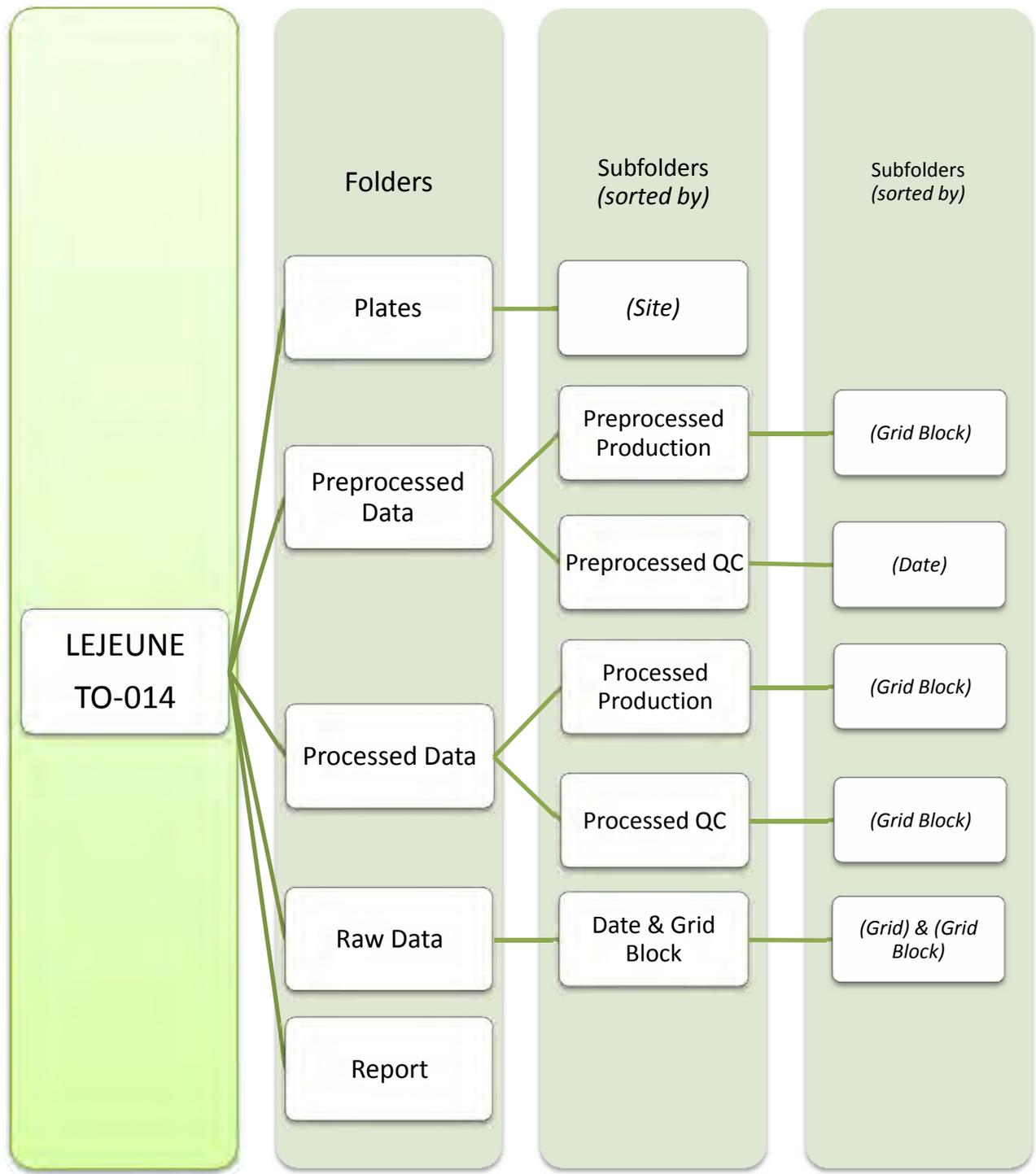
△ Top:First/Bottom:Second Profile
 ▲ Target Value ≤ Tolerance
 ▲ Target Value > Tolerance
 ▲ No Data at Target



CTO-014_MRP Site Inspections - Camp Lejeune, North Carolina EM61MK2 - Block UXO11 - Repeat Line 7



CONTENTS OF CD



Appendix D
Data Validation Summary Reports

METALS & CYANIDE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_001

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: January 22, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-SS08-09D	0911020-01	Soil
2	MR07-SS09-09D	0911020-02	Soil
3	MR07-EB110209-SS	0911020-03	Water
4	MR07-SS12-09D	0911020-04	Soil
5	MR07-SS11-09D	0911020-05	Soil
6	MR07-SS11D-09D	0911020-06	Soil
7	MR07-SS10-09D	0911020-07	Soil
8	MR07-SS01-09D	0911020-08	Soil
9	MR07-SS01D-09D	0911020-09	Soil
10	MR07-SS02-09D	0911020-10	Soil
10MS	MR07-SS02-09DMS	0911020-10MS	Soil
10MSD	MR07-SS02-09DMSD	0911020-10MSD	Soil
11	MR07-SS03-09D	0911020-11	Soil
12	MR07-SS04-09D	0911020-12	Soil
13	MR07-SS05-09D	0911020-13	Soil
14	MR07-SS06-09D	0911020-14	Soil
15	MR07-SS07-09D	0911020-15	Soil
15MS*	MR07-SS07-09DMS	0911020-15MS	Soil
15MSD*	MR07-SS07-09DMSD	0911020-15MSD	Soil

* - Cyanide only

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 14 days for cyanide, 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable except the following.

Compound	%R	Qualifier	Affected Samples
Sodium	111%	None	All ND or already qualified
Selenium	111%	J	1, 2, 5
Zinc	111%	None	Already qualified

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
9K05005-BLK1	Cadmium	0.307	1.535	U	3
9K10002-BLK1	Cadmium	0.100 mg/kg	0.50 mg/kg	U	1, 2, 4-15

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
MR07-EB110209-SS	None - ND	-	-	-	-
MR07-FB110309	Cadmium	0.381	0.0953	None	See MB

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Duplicate - The matrix spike/duplicate samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	%R	Qualifier	Affected Samples
10	Antimony	41.6%/40.7%/Ok	J/UJ	1, 2, 4-15
	Chromium	124%/Ok/Ok	J	1, 2, 4-15
	Cobalt	123%/Ok/Ok	J	2, 4-15
	Copper	127%/Ok/Ok	J	1, 2, 4-15
	Magnesium	40.1%/35.3%/Ok	J/UJ	1, 2, 4-15
	Nickel	123%/Ok/Ok	J	1, 2, 4-15
	Potassium	138%/141%/Ok		
	Sodium	132%/128%/Ok	J	12
	Zinc	132%/122%/Ok	J	1, 2, 4-15

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-SS11-09D mg/kg	MR07-SS11D-09D mg/kg	RPD	Qualifier
Mercury	0.0320	0.0316	1%	None
Aluminum	5330	5240	2%	None
Antimony	0.430	0.525	20%	None
Arsenic	2.22	2.00	10%	None
Barium	14.1	14.2	1%	None
Beryllium	0.0777	0.0762	2%	None
Calcium	3470	4280	21%	None
Chromium	6.99	7.14	2%	None
Cobalt	0.456	0.505	10%	None
Copper	5.34	5.71	7%	None
Iron	3700	3670	1%	None
Lead	13.8	14.3	4%	None
Magnesium	267	276	3%	None
Manganese	26.9	28.8	7%	None
Nickel	3.11	3.42	9%	None
Potassium	251	258	3%	None
Selenium	0.323	0.361	11%	None
Vanadium	12.7	13.7	8%	None
Zinc	56.1	79.7	35%	None

Compound	MR07-SS01-09D mg/kg	MR07-SS01D-09D mg/kg	RPD	Qualifier
Cyanide	0.196	0.326 U	NC	None
Mercury	0.0386	0.0447	15%	None
Aluminum	7260	7190	1%	None
Arsenic	1.73	1.56	10%	None
Barium	17.3	17.5	1%	None
Beryllium	0.0850	0.0860	1%	None
Calcium	5520	3780	37%	None
Chromium	8.68	8.52	2%	None
Cobalt	0.463	0.451	3%	None
Copper	4.87	5.12	5%	None
Iron	4190	4260	2%	None
Lead	41.4	40.3	3%	None
Magnesium	446	380	16%	None
Manganese	21.4	17.8	18%	None
Nickel	2.31	2.27	2%	None
Potassium	346	357	3%	None
Selenium	0.458	0.487	6%	None
Vanadium	11.3	11.3	0%	None
Zinc	60.0	61.5	2%	None

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-SS08-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911020-01

Sampled: 11/02/09 15:00

Received: 11/03/09 08:15

% Solids: 80.80

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.155	0.309	1	U	SW9012A	9K05007	11/05/09 15:19
7439-97-6	Mercury		0.0172	0.0438	1	U	SW7471A	9K10004	11/12/09 09:10
7429-90-5	Aluminum	3850	3.08	12.3	1		SW6010B	9K10002	11/11/09 17:58
7440-36-0	Antimony		0.308	0.924	1	UNUJ	SW6010B	9K10002	11/11/09 17:58
7440-38-2	Arsenic	0.967	0.185	0.308	1		SW6010B	9K10002	11/11/09 17:58
7440-39-3	Barium	7.80	0.308	2.46	1		SW6010B	9K10002	11/11/09 17:58
7440-41-7	Beryllium		0.0616	0.308	1	U	SW6010B	9K10002	11/11/09 17:58
7440-43-9	Cadmium	0.308	0.172	0.0616	0.308	JU	SW6010B	9K10002	11/11/09 17:58
7440-70-2	Calcium	1180	61.6	308	1		SW6010B	9K10002	11/11/09 17:58
7440-47-3	Chromium	4.80	0.123	0.308	1	XJ	SW6010B	9K10002	11/11/09 17:58
7440-48-4	Cobalt		0.308	0.770	1	UJ	SW6010B	9K10002	11/11/09 17:58
7440-50-8	Copper	1.76	0.308	0.616	1	XJ	SW6010B	9K10002	11/11/09 17:58
7439-89-6	Iron	2860	1.85	6.16	1		SW6010B	9K10002	11/11/09 17:58
7439-92-1	Lead	6.01	0.0924	0.185	1		SW6010B	9K10002	11/11/09 17:58
7439-95-4	Magnesium	241	61.6	308	1	JXJ	SW6010B	9K10002	11/11/09 17:58
7439-96-5	Manganese	11.5	0.185	0.924	1		SW6010B	9K10002	11/11/09 17:58
7440-02-0	Nickel	1.01	0.308	0.616	1	XJ	SW6010B	9K10002	11/11/09 17:58
7440-09-7	Potassium	236	61.6	308	1	JXJ	SW6010B	9K10002	11/11/09 17:58
7782-49-2	Selenium	0.358	0.185	0.308	1	J	SW6010B	9K10002	11/11/09 17:58
7440-22-4	Silver		0.123	0.308	1	U	SW6010B	9K10002	11/11/09 17:58
7440-23-5	Sodium		61.6	308	1	UJ	SW6010B	9K10002	11/11/09 17:58
7440-28-0	Thallium		0.185	0.493	1	U	SW6010B	9K10002	11/11/09 17:58
7440-62-2	Vanadium	6.79	0.308	0.770	1		SW6010B	9K10002	11/11/09 17:58
7440-66-6	Zinc	20.2	0.308	1.23	1	XJ	SW6010B	9K10002	11/11/09 17:58

MSL

MSL

MSH

MSH

MSL

MSH

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luw
11/22/10

ANALYSIS DATA SHEET

MR07-SS09-09D

2

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 15:25
 % Solids: 83.38

SDG: UX07 001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-02
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.150	0.300	1	U	SW9012A	9K05007	11/05/09 15:20
7439-97-6	Mercury	0.0276	0.0167	0.0424	1	J	SW7471A	9K10004	11/12/09 09:12
7429-90-5	Aluminum	4380	2.98	11.9	1		SW6010B	9K10002	11/11/09 18:02
7440-36-0	Antimony		0.298	0.895	1	UXUJ	SW6010B	9K10002	11/11/09 18:02
7440-38-2	Arsenic	1.10	0.179	0.298	1		SW6010B	9K10002	11/11/09 18:02
7440-39-3	Barium	12.0	0.298	2.39	1		SW6010B	9K10002	11/11/09 18:02
7440-41-7	Beryllium	0.0765	0.0597	0.298	1	J	SW6010B	9K10002	11/11/09 18:02
7440-43-9	Cadmium	0.298	0.266	0.0597	1	JU	SW6010B	9K10002	11/11/09 18:02
7440-70-2	Calcium	5530	59.7	298	1		SW6010B	9K10002	11/11/09 18:02
7440-47-3	Chromium	5.52	0.119	0.298	1	XJ	SW6010B	9K10002	11/11/09 18:02
7440-48-4	Cobalt	0.326	0.298	0.746	1	XJ	SW6010B	9K10002	11/11/09 18:02
7440-50-8	Copper	5.37	0.298	0.597	1	XJ	SW6010B	9K10002	11/11/09 18:02
7439-89-6	Iron	2790	1.79	5.97	1		SW6010B	9K10002	11/11/09 18:02
7439-92-1	Lead	16.4	0.0895	0.179	1		SW6010B	9K10002	11/11/09 18:02
7439-95-4	Magnesium	276	59.7	298	1	XJ	SW6010B	9K10002	11/11/09 18:02
7439-96-5	Manganese	16.1	0.179	0.895	1		SW6010B	9K10002	11/11/09 18:02
7440-02-0	Nickel	1.44	0.298	0.597	1	XJ	SW6010B	9K10002	11/11/09 18:02
7440-09-7	Potassium	212	59.7	298	1	XJ	SW6010B	9K10002	11/11/09 18:02
7782-49-2	Selenium	0.259	0.179	0.298	1	XJ	SW6010B	9K10002	11/11/09 18:02
7440-22-4	Silver		0.119	0.298	1	U	SW6010B	9K10002	11/11/09 18:02
7440-23-5	Sodium		59.7	298	1	UX	SW6010B	9K10002	11/11/09 18:02
7440-28-0	Thallium		0.179	0.477	1	U	SW6010B	9K10002	11/11/09 18:02
7440-62-2	Vanadium	7.60	0.298	0.746	1		SW6010B	9K10002	11/11/09 18:02
7440-66-6	Zinc	17.3	0.298	1.19	1	XJ	SW6010B	9K10002	11/11/09 18:02

MSL

MBL

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MSH

MSL

MSH

MSH

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MSH

lew
11/22/10

ANALYSIS DATA SHEET

3

MR07-EB110209-SS

Laboratory: Empirical Laboratories, LLC

SDG: UX07_001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911020-03

Sampled: 11/02/09 15:30

Received: 11/03/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K05004	11/06/09 07:20
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9K05005	11/09/09 13:37
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K05005	11/09/09 13:37
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K05005	11/09/09 13:37
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9K05005	11/09/09 13:37
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K05005	11/09/09 13:37
7440-43-9	Cadmium	1.25	0.250	0.250	1.25	1	U	SW6010B	9K05005
7440-70-2	Calcium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:37
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K05005	11/09/09 13:37
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K05005	11/09/09 13:37
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9K05005	11/09/09 13:37
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9K05005	11/09/09 13:37
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9K05005	11/09/09 13:37
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:37
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9K05005	11/09/09 13:37
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K05005	11/09/09 13:37
7440-09-7	Potassium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:37
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K05005	11/11/09 12:59
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K05005	11/11/09 12:59
7440-23-5	Sodium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:37
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K05005	11/09/09 13:37
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9K05005	11/11/09 12:59
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9K05005	11/09/09 13:37
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K05006	11/05/09 15:13

MGL

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11/22/10

ANALYSIS DATA SHEET

MR07-SS12-09D

4

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 15:40
 % Solids: 84.78

SDG: UX07_001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-04
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.147	0.295	1	U	SW9012A	9K05007	11/05/09 15:23
7439-97-6	Mercury	0.0247	0.0144	0.0365	1	J	SW7471A	9K10004	11/12/09 09:19
7429-90-5	Aluminum	4850	2.92	11.7	1		SW6010B	9K10002	11/11/09 18:07
7440-36-0	Antimony		0.292	0.876	1	UN UJ	SW6010B	9K10002	11/11/09 18:07 MSL
7440-38-2	Arsenic	1.12	0.175	0.292	1		SW6010B	9K10002	11/11/09 18:07
7440-39-3	Barium	13.7	0.292	2.34	1		SW6010B	9K10002	11/11/09 18:07
7440-41-7	Beryllium	0.0714	0.0584	0.292	1	J	SW6010B	9K10002	11/11/09 18:07
7440-43-9	Cadmium	0.292	0.277	0.0584	1	X U	SW6010B	9K10002	11/11/09 18:07 MBL
7440-70-2	Calcium	12700	58.4	292	1		SW6010B	9K10002	11/11/09 18:07
7440-47-3	Chromium	5.77	0.117	0.292	1	X J	SW6010B	9K10002	11/11/09 18:07 MSH
7440-48-4	Cobalt	0.391	0.292	0.730	1	JX J	SW6010B	9K10002	11/11/09 18:07 MSH
7440-50-8	Copper	3.01	0.292	0.584	1	X J	SW6010B	9K10002	11/11/09 18:07 MSH
7439-89-6	Iron	2660	1.75	5.84	1		SW6010B	9K10002	11/11/09 18:07
7439-92-1	Lead	12.9	0.0876	0.175	1		SW6010B	9K10002	11/11/09 18:07
7439-95-4	Magnesium	434	58.4	292	1	X J	SW6010B	9K10002	11/11/09 18:07 MSL
7439-96-5	Manganese	21.3	0.175	0.876	1		SW6010B	9K10002	11/11/09 18:07
7440-02-0	Nickel	1.82	0.292	0.584	1	X J	SW6010B	9K10002	11/11/09 18:07 MSH
7440-09-7	Potassium	238	58.4	292	1	JX J	SW6010B	9K10002	11/11/09 18:07 MSH
7782-49-2	Selenium		0.175	0.292	1	U	SW6010B	9K10002	11/11/09 18:07
7440-22-4	Silver		0.117	0.292	1	U	SW6010B	9K10002	11/11/09 18:07
7440-23-5	Sodium		58.4	292	1	UN	SW6010B	9K10002	11/11/09 18:07
7440-28-0	Thallium		0.175	0.467	1	U	SW6010B	9K10002	11/11/09 18:07
7440-62-2	Vanadium	8.11	0.292	0.730	1		SW6010B	9K10002	11/11/09 18:07
7440-66-6	Zinc	29.7	0.292	1.17	1	X J	SW6010B	9K10002	11/11/09 18:07 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS11-09D

5

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 15:45
 % Solids: 78.24

SDG: UX07_001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-05
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.160	0.320	1	U	SW9012A	9K05007	11/05/09 15:25
7439-97-6	Mercury	0.0320	0.0166	0.0422	1	J	SW7471A	9K10004	11/12/09 09:20
7429-90-5	Aluminum	5330	3.15	12.6	1		SW6010B	9K10002	11/11/09 18:12
7440-36-0	Antimony	0.430	0.315	0.944	1	N J	SW6010B	9K10002	11/11/09 18:12
7440-38-2	Arsenic	2.22	0.189	0.315	1		SW6010B	9K10002	11/11/09 18:12
7440-39-3	Barium	14.1	0.315	2.52	1		SW6010B	9K10002	11/11/09 18:12
7440-41-7	Beryllium	0.0777	0.0630	0.315	1	J	SW6010B	9K10002	11/11/09 18:12
7440-43-9	Cadmium	0.407	0.0630	0.315	1	U	SW6010B	9K10002	11/11/09 18:12
7440-70-2	Calcium	3470	63.0	315	1		SW6010B	9K10002	11/11/09 18:12
7440-47-3	Chromium	6.99	0.126	0.315	1	X J	SW6010B	9K10002	11/11/09 18:12
7440-48-4	Cobalt	0.456	0.315	0.787	1	N J	SW6010B	9K10002	11/11/09 18:12
7440-50-8	Copper	5.34	0.315	0.630	1	N J	SW6010B	9K10002	11/11/09 18:12
7439-89-6	Iron	3700	1.89	6.30	1		SW6010B	9K10002	11/11/09 18:12
7439-92-1	Lead	13.8	0.0944	0.189	1		SW6010B	9K10002	11/11/09 18:12
7439-95-4	Magnesium	267	63.0	315	1	N J	SW6010B	9K10002	11/11/09 18:12
7439-96-5	Manganese	26.9	0.189	0.944	1		SW6010B	9K10002	11/11/09 18:12
7440-02-0	Nickel	3.11	0.315	0.630	1	X J	SW6010B	9K10002	11/11/09 18:12
7440-09-7	Potassium	251	63.0	315	1	N J	SW6010B	9K10002	11/11/09 18:12
7782-49-2	Selenium	0.323	0.189	0.315	1	J	SW6010B	9K10002	11/11/09 18:12
7440-22-4	Silver		0.126	0.315	1	U	SW6010B	9K10002	11/11/09 18:12
7440-23-5	Sodium		63.0	315	1	U	SW6010B	9K10002	11/11/09 18:12
7440-28-0	Thallium		0.189	0.504	1	U	SW6010B	9K10002	11/11/09 18:12
7440-62-2	Vanadium	12.7	0.315	0.787	1		SW6010B	9K10002	11/11/09 18:12
7440-66-6	Zinc	56.1	0.315	1.26	1	N J	SW6010B	9K10002	11/11/09 18:12

MSL
 MBL
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 MSH
 CCH
 MSH

luw
1122110

ANALYSIS DATA SHEET

MR07-SS11D-09D

6

Laboratory: Empirical Laboratories, LLC

SDG: UXO7 001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UXO7)

Matrix: Soil

Laboratory ID: 0911020-06

Sampled: 11/02/09 15:55

Received: 11/03/09 08:15

% Solids: 77.76

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.161	0.322	1	U	SW9012A	9K05007	11/05/09 15:26
7439-97-6	Mercury	0.0316	0.0143	0.0364	1	J	SW7471A	9K10004	11/12/09 09:21
7429-90-5	Aluminum	5240	3.22	12.9	1		SW6010B	9K10002	11/11/09 18:30
7440-36-0	Antimony	0.525	0.322	0.965	1	X J	SW6010B	9K10002	11/11/09 18:30 MSL
7440-38-2	Arsenic	2.00	0.193	0.322	1		SW6010B	9K10002	11/11/09 18:30
7440-39-3	Barium	14.2	0.322	2.57	1		SW6010B	9K10002	11/11/09 18:30
7440-41-7	Beryllium	0.0762	0.0643	0.322	1	J	SW6010B	9K10002	11/11/09 18:30
7440-43-9	Cadmium	0.494	0.0643	0.322	1	U	SW6010B	9K10002	11/11/09 18:30 MBL
7440-70-2	Calcium	4280	64.3	322	1		SW6010B	9K10002	11/11/09 18:30
7440-47-3	Chromium	7.14	0.129	0.322	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH
7440-48-4	Cobalt	0.505	0.322	0.804	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH
7440-50-8	Copper	5.71	0.322	0.643	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH
7439-89-6	Iron	3670	1.93	6.43	1		SW6010B	9K10002	11/11/09 18:30
7439-92-1	Lead	14.3	0.0965	0.193	1		SW6010B	9K10002	11/11/09 18:30
7439-95-4	Magnesium	276	64.3	322	1	X J	SW6010B	9K10002	11/11/09 18:30 MSL
7439-96-5	Manganese	28.8	0.193	0.965	1		SW6010B	9K10002	11/11/09 18:30
7440-02-0	Nickel	3.42	0.322	0.643	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH
7440-09-7	Potassium	258	64.3	322	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH
7782-49-2	Selenium	0.361	0.193	0.322	1		SW6010B	9K10002	11/11/09 18:30
7440-22-4	Silver		0.193	0.322	1	U	SW6010B	9K10002	11/11/09 18:30
7440-23-5	Sodium		64.3	322	1	U X	SW6010B	9K10002	11/11/09 18:30
7440-28-0	Thallium		0.257	0.514	1	U	SW6010B	9K10002	11/11/09 18:30
7440-62-2	Vanadium	13.7	0.322	0.804	1		SW6010B	9K10002	11/11/09 18:30
7440-66-6	Zinc	79.7	0.322	1.29	1	X J	SW6010B	9K10002	11/11/09 18:30 MSH

Handwritten: JW
11/22/10

ANALYSIS DATA SHEET

MR07-SS10-09D

7

Laboratory: Empirical Laboratories, LLC

SDG: UX07_001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911020-07

Sampled: 11/02/09 15:20

Received: 11/03/09 08:15

% Solids: 75.22

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.166	0.332	1	U	SW9012A	9K05007	11/05/09 15:27
7439-97-6	Mercury	0.0298	0.0167	0.0425	1	J	SW7471A	9K10004	11/12/09 09:22
7429-90-5	Aluminum	5350	3.26	13.0	1		SW6010B	9K10002	11/11/09 18:35
7440-36-0	Antimony	0.377	0.326	0.977	1	<i>INJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSL</i>
7440-38-2	Arsenic	2.04	0.195	0.326	1		SW6010B	9K10002	11/11/09 18:35
7440-39-3	Barium	13.4	0.326	2.61	1		SW6010B	9K10002	11/11/09 18:35
7440-41-7	Beryllium	0.0762	0.0652	0.326	1	J	SW6010B	9K10002	11/11/09 18:35
7440-43-9	Cadmium	<i>0.326</i> 0.257	0.0652	0.326	1	<i>U</i>	SW6010B	9K10002	11/11/09 18:35 <i>MBL</i>
7440-70-2	Calcium	1460	65.2	326	1		SW6010B	9K10002	11/11/09 18:35
7440-47-3	Chromium	6.08	0.130	0.326	1	<i>YJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>
7440-48-4	Cobalt	0.347	0.326	0.815	1	<i>INJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>
7440-50-8	Copper	5.15	0.326	0.652	1	<i>YJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>
7439-89-6	Iron	3420	1.95	6.52	1		SW6010B	9K10002	11/11/09 18:35
7439-92-1	Lead	18.8	0.0977	0.195	1		SW6010B	9K10002	11/11/09 18:35
7439-95-4	Magnesium	301	65.2	326	1	<i>INJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSL</i>
7439-96-5	Manganese	21.6	0.195	0.977	1		SW6010B	9K10002	11/11/09 18:35
7440-02-0	Nickel	1.40	0.326	0.652	1	<i>YJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>
7440-09-7	Potassium	222	65.2	326	1	<i>INJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>
7782-49-2	Selenium	0.351	0.195	0.326	1		SW6010B	9K10002	11/11/09 18:35
7440-22-4	Silver		0.130	0.326	1	U	SW6010B	9K10002	11/11/09 18:35
7440-23-5	Sodium		65.2	326	1	<i>UN</i>	SW6010B	9K10002	11/11/09 18:35
7440-28-0	Thallium		0.195	0.521	1	U	SW6010B	9K10002	11/11/09 18:35
7440-62-2	Vanadium	8.58	0.326	0.815	1		SW6010B	9K10002	11/11/09 18:35
7440-66-6	Zinc	31.0	0.326	1.30	1	<i>YJ</i>	SW6010B	9K10002	11/11/09 18:35 <i>MSH</i>

W
11/22/10

ANALYSIS DATA SHEET

MR07-SS01-09D

8

Laboratory: Empirical Laboratories, LLC

SDG: UX07_001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911020-08

Sampled: 11/02/09 13:34

Received: 11/03/09 08:15

% Solids: 78.28

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.196	0.160	0.319	1	J	SW9012A	9K05007	11/05/09 15:28
7439-97-6	Mercury	0.0386	0.0147	0.0372	1		SW7471A	9K10004	11/12/09 09:24
7429-90-5	Aluminum	7260	3.16	12.6	1		SW6010B	9K10002	11/11/09 18:39
7440-36-0	Antimony		0.316	0.949	1	UXUJ	SW6010B	9K10002	11/11/09 18:39 MSL
7440-38-2	Arsenic	1.73	0.190	0.316	1		SW6010B	9K10002	11/11/09 18:39
7440-39-3	Barium	17.3	0.316	2.53	1		SW6010B	9K10002	11/11/09 18:39
7440-41-7	Beryllium	0.0850	0.0632	0.316	1	J	SW6010B	9K10002	11/11/09 18:39
7440-43-9	Cadmium	0.356	0.0632	0.316	1	U	SW6010B	9K10002	11/11/09 18:39 MBL
7440-70-2	Calcium	5520	63.2	316	1		SW6010B	9K10002	11/11/09 18:39
7440-47-3	Chromium	8.68	0.126	0.316	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH
7440-48-4	Cobalt	0.463	0.316	0.791	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH
7440-50-8	Copper	4.87	0.316	0.632	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH
7439-89-6	Iron	4190	1.90	6.32	1		SW6010B	9K10002	11/11/09 18:39
7439-92-1	Lead	41.4	0.0949	0.190	1		SW6010B	9K10002	11/11/09 18:39
7439-95-4	Magnesium	446	63.2	316	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSL
7439-96-5	Manganese	21.4	0.190	0.949	1		SW6010B	9K10002	11/11/09 18:39
7440-02-0	Nickel	2.31	0.316	0.632	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH
7440-09-7	Potassium	346	63.2	316	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH
7782-49-2	Selenium	0.458	0.190	0.316	1		SW6010B	9K10002	11/11/09 18:39
7440-22-4	Silver		0.126	0.316	1	U	SW6010B	9K10002	11/11/09 18:39
7440-23-5	Sodium		63.2	316	1	UN	SW6010B	9K10002	11/11/09 18:39
7440-28-0	Thallium		0.253	0.506	1	U	SW6010B	9K10002	11/11/09 18:39
7440-62-2	Vanadium	11.3	0.316	0.791	1		SW6010B	9K10002	11/11/09 18:39
7440-66-6	Zinc	60.0	0.316	1.26	1	XJ	SW6010B	9K10002	11/11/09 18:39 MSH

LW
11/22/10

ANALYSIS DATA SHEET

MR07-SS01D-09D

9

Laboratory: Empirical Laboratories, LLC

SDG: UX07 001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911020-09

Sampled: 11/02/09 13:42

Received: 11/03/09 08:15

% Solids: 76.65

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.163	0.326	1	U	SW9012A	9K11002	11/12/09 13:42
7439-97-6	Mercury	0.0447	0.0170	0.0431	1		SW7471A	9K10004	11/12/09 09:25
7429-90-5	Aluminum	7190	3.26	13.0	1		SW6010B	9K10002	11/11/09 18:44
7440-36-0	Antimony		0.326	0.979	1	N UJ	SW6010B	9K10002	11/11/09 18:44
7440-38-2	Arsenic	1.56	0.196	0.326	1		SW6010B	9K10002	11/11/09 18:44
7440-39-3	Barium	17.5	0.326	2.61	1		SW6010B	9K10002	11/11/09 18:44
7440-41-7	Beryllium	0.0860	0.0652	0.326	1	J	SW6010B	9K10002	11/11/09 18:44
7440-43-9	Cadmium	0.352	0.0652	0.326	1	U	SW6010B	9K10002	11/11/09 18:44
7440-70-2	Calcium	3780	65.2	326	1		SW6010B	9K10002	11/11/09 18:44
7440-47-3	Chromium	8.52	0.130	0.326	1	N J	SW6010B	9K10002	11/11/09 18:44
7440-48-4	Cobalt	0.451	0.326	0.815	1	N J	SW6010B	9K10002	11/11/09 18:44
7440-50-8	Copper	5.12	0.326	0.652	1	N J	SW6010B	9K10002	11/11/09 18:44
7439-89-6	Iron	4260	1.96	6.52	1		SW6010B	9K10002	11/11/09 18:44
7439-92-1	Lead	40.3	0.0979	0.196	1		SW6010B	9K10002	11/11/09 18:44
7439-95-4	Magnesium	380	65.2	326	1	N J	SW6010B	9K10002	11/11/09 18:44
7439-96-5	Manganese	17.8	0.196	0.979	1		SW6010B	9K10002	11/11/09 18:44
7440-02-0	Nickel	2.27	0.326	0.652	1	N J	SW6010B	9K10002	11/11/09 18:44
7440-09-7	Potassium	357	65.2	326	1	N J	SW6010B	9K10002	11/11/09 18:44
7782-49-2	Selenium	0.487	0.196	0.326	1		SW6010B	9K10002	11/11/09 18:44
7440-22-4	Silver		0.130	0.326	1	U	SW6010B	9K10002	11/11/09 18:44
7440-23-5	Sodium		65.2	326	1	U N	SW6010B	9K10002	11/11/09 18:44
7440-28-0	Thallium		0.196	0.522	1	U	SW6010B	9K10002	11/11/09 18:44
7440-62-2	Vanadium	11.3	0.326	0.815	1		SW6010B	9K10002	11/11/09 18:44
7440-66-6	Zinc	61.5	0.326	1.30	1	N J	SW6010B	9K10002	11/11/09 18:44

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11/22/10

ANALYSIS DATA SHEET

MR07-SS02-09D

10

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 13:50
 % Solids: 83.28

SDG: UX07_001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-10
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.160	0.150	0.300	1	J	SW9012A	9K05007	11/05/09 15:29
7439-97-6	Mercury	0.0436	0.0151	0.0383	1		SW7471A	9K10005	11/12/09 09:30
7429-90-5	Aluminum	6950	2.90	11.6	1		SW6010B	9K10002	11/11/09 18:49
7440-36-0	Antimony		0.290	0.870	1	U J	SW6010B	9K10002	11/11/09 18:49
7440-38-2	Arsenic	1.57	0.174	0.290	1		SW6010B	9K10002	11/11/09 18:49
7440-39-3	Barium	19.6	0.290	2.32	1		SW6010B	9K10002	11/11/09 18:49
7440-41-7	Beryllium	0.0874	0.0580	0.290	1	J	SW6010B	9K10002	11/11/09 18:49
7440-43-9	Cadmium	0.234 0.290	0.0580	0.290	1	U J	SW6010B	9K10002	11/11/09 18:49
7440-70-2	Calcium	2360	58.0	290	1		SW6010B	9K10002	11/11/09 18:49
7440-47-3	Chromium	7.22	0.116	0.290	1	X J	SW6010B	9K10002	11/11/09 18:49
7440-48-4	Cobalt	0.419	0.290	0.725	1	J J	SW6010B	9K10002	11/11/09 18:49
7440-50-8	Copper	3.67	0.290	0.580	1	X J	SW6010B	9K10002	11/11/09 18:49
7439-89-6	Iron	4420	1.74	5.80	1		SW6010B	9K10002	11/11/09 18:49
7439-92-1	Lead	18.3	0.0870	0.174	1		SW6010B	9K10002	11/11/09 18:49
7439-95-4	Magnesium	881	58.0	290	1	X J	SW6010B	9K10002	11/11/09 18:49
7439-96-5	Manganese	21.1	0.174	0.870	1		SW6010B	9K10002	11/11/09 18:49
7440-02-0	Nickel	1.87	0.290	0.580	1	X J	SW6010B	9K10002	11/11/09 18:49
7440-09-7	Potassium	247	58.0	290	1	J J	SW6010B	9K10002	11/11/09 18:49
7782-49-2	Selenium	0.217	0.174	0.290	1	J	SW6010B	9K10002	11/11/09 18:49
7440-22-4	Silver		0.174	0.290	1	U	SW6010B	9K10002	11/11/09 18:49
7440-23-5	Sodium		58.0	290	1	U J	SW6010B	9K10002	11/11/09 18:49
7440-28-0	Thallium		0.174	0.464	1	U	SW6010B	9K10002	11/11/09 18:49
7440-62-2	Vanadium	10.7	0.290	0.725	1		SW6010B	9K10002	11/11/09 18:49
7440-66-6	Zinc	30.8	0.290	1.16	1	X J	SW6010B	9K10002	11/11/09 18:49

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11/22/10

ANALYSIS DATA SHEET

MR07-SS03-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_001

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911020-11

Sampled: 11/02/09 14:05

Received: 11/03/09 08:15

% Solids: 85.31

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.147	0.293	1	U	SW9012A	9K11002	11/12/09 13:43
7439-97-6	Mercury	0.0502	0.0143	0.0363	1		SW7471A	9K10004	11/12/09 09:26
7429-90-5	Aluminum	5670	2.93	11.7	1		SW6010B	9K10002	11/11/09 19:13
7440-36-0	Antimony		0.293	0.879	1	UXUJ	SW6010B	9K10002	11/11/09 19:13 MSL
7440-38-2	Arsenic	1.34	0.176	0.293	1		SW6010B	9K10002	11/11/09 19:13
7440-39-3	Barium	16.3	0.293	2.34	1		SW6010B	9K10002	11/11/09 19:13
7440-41-7	Beryllium	0.0864	0.0586	0.293	1	J	SW6010B	9K10002	11/11/09 19:13
7440-43-9	Cadmium	0.293	0.219	0.0586	1	UX	SW6010B	9K10002	11/11/09 19:13 MBL
7440-70-2	Calcium	1250	58.6	293	1		SW6010B	9K10002	11/11/09 19:13
7440-47-3	Chromium	5.62	0.117	0.293	1	XJ	SW6010B	9K10002	11/11/09 19:13 MSH
7440-48-4	Cobalt	0.339	0.293	0.733	1	UXJ	SW6010B	9K10002	11/11/09 19:13 MSH
7440-50-8	Copper	3.22	0.293	0.586	1	XJ	SW6010B	9K10002	11/11/09 19:13 MSH
7439-89-6	Iron	3440	1.76	5.86	1		SW6010B	9K10002	11/11/09 19:13
7439-92-1	Lead	19.1	0.0879	0.176	1		SW6010B	9K10002	11/11/09 19:13
7439-95-4	Magnesium	320	58.6	293	1	XJ	SW6010B	9K10002	11/11/09 19:13 MSL
7439-96-5	Manganese	20.7	0.176	0.879	1		SW6010B	9K10002	11/11/09 19:13
7440-02-0	Nickel	1.63	0.293	0.586	1	XJ	SW6010B	9K10002	11/11/09 19:13 MSH
7440-09-7	Potassium	215	58.6	293	1	UXJ	SW6010B	9K10002	11/11/09 19:13 MSH
7782-49-2	Selenium	0.220	0.176	0.293	1	J	SW6010B	9K10002	11/11/09 19:13
7440-22-4	Silver		0.117	0.293	1	U	SW6010B	9K10002	11/11/09 19:13
7440-23-5	Sodium		58.6	293	1	UX	SW6010B	9K10002	11/11/09 19:13
7440-28-0	Thallium		0.234	0.469	1	U	SW6010B	9K10002	11/11/09 19:13
7440-62-2	Vanadium	8.45	0.293	0.733	1		SW6010B	9K10002	11/11/09 19:13
7440-66-6	Zinc	28.6	0.293	1.17	1	XJ	SW6010B	9K10002	11/11/09 19:13 MSH

EW
11/22/10

ANALYSIS DATA SHEET

MR07-SS04-09D

12

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 14:10
 % Solids: 89.25

SDG: UX07_001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-12
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.140	0.280	1	U	SW9012A	9K11002	11/12/09 13:44
7439-97-6	Mercury	0.0297	0.0146	0.0370	1	J	SW7471A	9K10005	11/12/09 09:51
7429-90-5	Aluminum	6140	5.49	22.0	2	U	SW6010B	9K10002	12/01/09 02:52
7440-36-0	Antimony		0.275	0.824	1	UX UJ	SW6010B	9K10002	11/11/09 19:18
7440-38-2	Arsenic	1.21	0.165	0.275	1		SW6010B	9K10002	11/11/09 19:18
7440-39-3	Barium	13.3	0.275	2.20	1		SW6010B	9K10002	11/11/09 19:18
7440-41-7	Beryllium	0.0890	0.0549	0.275	1	J	SW6010B	9K10002	11/11/09 19:18
7440-43-9	Cadmium	0.303	0.0549	0.275	1	U	SW6010B	9K10002	11/11/09 19:18
7440-70-2	Calcium	32800	110	549	2	U	SW6010B	9K10002	12/01/09 02:52
7440-47-3	Chromium	7.13	0.110	0.275	1	XJ	SW6010B	9K10002	11/11/09 19:18
7440-48-4	Cobalt	0.387	0.275	0.687	1	XJ	SW6010B	9K10002	11/11/09 19:18
7440-50-8	Copper	2.30	0.275	0.549	1	XJ	SW6010B	9K10002	11/11/09 19:18
7439-89-6	Iron	2870	1.65	5.49	1		SW6010B	9K10002	11/11/09 19:18
7439-92-1	Lead	7.79	0.165	0.330	2	U	SW6010B	9K10002	12/01/09 02:52
7439-95-4	Magnesium	705	54.9	275	1	XJ	SW6010B	9K10002	11/11/09 19:18
7439-96-5	Manganese	17.7	0.165	0.824	1		SW6010B	9K10002	11/11/09 19:18
7440-02-0	Nickel	1.41	0.275	0.549	1	XJ	SW6010B	9K10002	11/11/09 19:18
7440-09-7	Potassium	303	54.9	275	1	XJ	SW6010B	9K10002	11/11/09 19:18
7782-49-2	Selenium		0.165	0.275	1	U	SW6010B	9K10002	11/11/09 19:18
7440-22-4	Silver		0.110	0.275	1	U	SW6010B	9K10002	11/11/09 19:18
7440-23-5	Sodium	106	54.9	275	1	XJ	SW6010B	9K10002	11/11/09 19:18
7440-28-0	Thallium		0.165	0.439	1	U	SW6010B	9K10002	11/11/09 19:18
7440-62-2	Vanadium	8.80	0.275	0.687	1		SW6010B	9K10002	11/11/09 19:18
7440-66-6	Zinc	16.6	0.549	2.20	2	DNJ	SW6010B	9K10002	12/01/09 02:52

MSL

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Handwritten notes:
 New
 11/22/10

ANALYSIS DATA SHEET

MR07-SS05-09D

13

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 14:25
 % Solids: 87.86

SDG: UX07 001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-13
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.142	0.285	1	U	SW9012A	9K11002	11/12/09 13:47
7439-97-6	Mercury	0.0702	0.0135	0.0341	1		SW7471A	9K10005	11/12/09 09:52
7429-90-5	Aluminum	9240	2.85	11.4	1		SW6010B	9K10002	11/11/09 19:23
7440-36-0	Antimony		0.285	0.854	1	UXUJ	SW6010B	9K10002	11/11/09 19:23
7440-38-2	Arsenic	1.18	0.171	0.285	1		SW6010B	9K10002	11/11/09 19:23
7440-39-3	Barium	19.0	0.285	2.28	1		SW6010B	9K10002	11/11/09 19:23
7440-41-7	Beryllium	0.0802	0.0569	0.285	1	J	SW6010B	9K10002	11/11/09 19:23
7440-43-9	Cadmium	0.285	0.0569	0.285	1	UJ	SW6010B	9K10002	11/11/09 19:23
7440-70-2	Calcium	8400	56.9	285	1		SW6010B	9K10002	11/11/09 19:23
7440-47-3	Chromium	8.24	0.114	0.285	1	XJ	SW6010B	9K10002	11/11/09 19:23
7440-48-4	Cobalt	0.389	0.285	0.711	1	XJ	SW6010B	9K10002	11/11/09 19:23
7440-50-8	Copper	2.06	0.285	0.569	1	XJ	SW6010B	9K10002	11/11/09 19:23
7439-89-6	Iron	2770	1.71	5.69	1		SW6010B	9K10002	11/11/09 19:23
7439-92-1	Lead	6.28	0.0854	0.171	1		SW6010B	9K10002	11/11/09 19:23
7439-95-4	Magnesium	415	56.9	285	1	AJ	SW6010B	9K10002	11/11/09 19:23
7439-96-5	Manganese	11.7	0.171	0.854	1		SW6010B	9K10002	11/11/09 19:23
7440-02-0	Nickel	1.89	0.285	0.569	1	XJ	SW6010B	9K10002	11/11/09 19:23
7440-09-7	Potassium	330	56.9	285	1	XJ	SW6010B	9K10002	11/11/09 19:23
7782-49-2	Selenium		0.171	0.285	1	U	SW6010B	9K10002	11/11/09 19:23
7440-22-4	Silver		0.171	0.285	1	U	SW6010B	9K10002	11/11/09 19:23
7440-23-5	Sodium		56.9	285	1	UJ	SW6010B	9K10002	11/11/09 19:23
7440-28-0	Thallium		0.171	0.455	1	U	SW6010B	9K10002	11/11/09 19:23
7440-62-2	Vanadium	10.3	0.285	0.711	1		SW6010B	9K10002	11/11/09 19:23
7440-66-6	Zinc	17.3	0.285	1.14	1	AJ	SW6010B	9K10002	11/11/09 19:23

MSL

MBL

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11/22/10

ANALYSIS DATA SHEET

MR07-SS06-09D

14

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/02/09 14:40
 % Solids: 76.23

SDG: UX07_001
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911020-14
 Received: 11/03/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.164	0.328	1	U	SW9012A	9K11002	11/12/09 13:48
7439-97-6	Mercury	0.0296	0.0171	0.0433	1	J	SW7471A	9K10005	11/12/09 09:54
7429-90-5	Aluminum	5790	3.15	12.6	1		SW6010B	9K10002	11/11/09 19:27
7440-36-0	Antimony		0.315	0.946	1	UWJ	SW6010B	9K10002	11/11/09 19:27 MSL
7440-38-2	Arsenic	1.34	0.189	0.315	1		SW6010B	9K10002	11/11/09 19:27
7440-39-3	Barium	16.2	0.315	2.52	1		SW6010B	9K10002	11/11/09 19:27
7440-41-7	Beryllium	0.0843	0.0631	0.315	1	J	SW6010B	9K10002	11/11/09 19:27
7440-43-9	Cadmium	0.315	0.0631	0.315	1	UJ	SW6010B	9K10002	11/11/09 19:27 MBL
7440-70-2	Calcium	10200	63.1	315	1		SW6010B	9K10002	11/11/09 19:27
7440-47-3	Chromium	7.03	0.126	0.315	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH
7440-48-4	Cobalt	0.414	0.315	0.788	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH
7440-50-8	Copper	4.62	0.315	0.631	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH
7439-89-6	Iron	3240	1.89	6.31	1		SW6010B	9K10002	11/11/09 19:27
7439-92-1	Lead	19.1	0.0946	0.189	1		SW6010B	9K10002	11/11/09 19:27
7439-95-4	Magnesium	542	63.1	315	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSL
7439-96-5	Manganese	24.1	0.189	0.946	1		SW6010B	9K10002	11/11/09 19:27
7440-02-0	Nickel	2.07	0.315	0.631	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH
7440-09-7	Potassium	269	63.1	315	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH
7782-49-2	Selenium	0.207	0.189	0.315	1	J	SW6010B	9K10002	11/11/09 19:27
7440-22-4	Silver		0.126	0.315	1	U	SW6010B	9K10002	11/11/09 19:27
7440-23-5	Sodium		63.1	315	1	UJ	SW6010B	9K10002	11/11/09 19:27
7440-28-0	Thallium		0.189	0.505	1	U	SW6010B	9K10002	11/11/09 19:27
7440-62-2	Vanadium	10.0	0.315	0.788	1		SW6010B	9K10002	11/11/09 19:27
7440-66-6	Zinc	33.5	0.315	1.26	1	XJ	SW6010B	9K10002	11/11/09 19:27 MSH

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11/22/10

ANALYSIS DATA SHEET

 MR07-SS07-09D 15

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 001

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0911020-15

 Sampled: 11/02/09 15:00

 Received: 11/03/09 08:15

 % Solids: 83.63

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.149	0.299	1	U	SW9012A	9K11002	11/12/09 13:49
7439-97-6	Mercury	0.0254	0.0141	0.0359	1	J	SW7471A	9K10005	11/12/09 09:55
7429-90-5	Aluminum	8080	2.87	11.5	1		SW6010B	9K10002	11/11/09 19:32
7440-36-0	Antimony		0.287	0.862	1	UX UJ	SW6010B	9K10002	11/11/09 19:32 MS
7440-38-2	Arsenic	1.98	0.172	0.287	1		SW6010B	9K10002	11/11/09 19:32
7440-39-3	Barium	16.1	0.287	2.30	1		SW6010B	9K10002	11/11/09 19:32
7440-41-7	Beryllium	0.0760	0.0575	0.287	1	J	SW6010B	9K10002	11/11/09 19:32
7440-43-9	Cadmium	0.287	0.138	0.0575	1	U ✓	SW6010B	9K10002	11/11/09 19:32 MS
7440-70-2	Calcium	1840	57.5	287	1		SW6010B	9K10002	11/11/09 19:32
7440-47-3	Chromium	8.83	0.115	0.287	1	X J	SW6010B	9K10002	11/11/09 19:32 MS
7440-48-4	Cobalt	0.510	0.287	0.719	1	X J	SW6010B	9K10002	11/11/09 19:32
7440-50-8	Copper	1.89	0.287	0.575	1	X J	SW6010B	9K10002	11/11/09 19:32
7439-89-6	Iron	5510	1.72	5.75	1		SW6010B	9K10002	11/11/09 19:32
7439-92-1	Lead	8.12	0.0862	0.172	1		SW6010B	9K10002	11/11/09 19:32
7439-95-4	Magnesium	344	57.5	287	1	X J	SW6010B	9K10002	11/11/09 19:32 MS
7439-96-5	Manganese	16.6	0.172	0.862	1		SW6010B	9K10002	11/11/09 19:32
7440-02-0	Nickel	4.56	0.287	0.575	1	X J	SW6010B	9K10002	11/11/09 19:32 MS
7440-09-7	Potassium	265	57.5	287	1	X J	SW6010B	9K10002	11/11/09 19:32 MS
7782-49-2	Selenium	0.245	0.172	0.287	1	J	SW6010B	9K10002	11/11/09 19:32
7440-22-4	Silver		0.172	0.287	1	U	SW6010B	9K10002	11/11/09 19:32
7440-23-5	Sodium		57.5	287	1	U ✓	SW6010B	9K10002	11/11/09 19:32
7440-28-0	Thallium		0.230	0.460	1	U	SW6010B	9K10002	11/11/09 19:32
7440-62-2	Vanadium	12.6	0.287	0.719	1		SW6010B	9K10002	11/11/09 19:32
7440-66-6	Zinc	14.3	0.287	1.15	1	X J	SW6010B	9K10002	11/11/09 19:32 MS

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 3/2/10

METALS & CYANIDE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07 002

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: January 22, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-SS35-09D	0911026-01	Soil
2	MR07-SS36-09D	0911026-02	Soil
3	MR07-SS37-09D	0911026-03	Soil
4	MR07-SS38-09D	0911026-04	Soil
5	MR07-SS40-09D	0911026-05	Soil
6	MR07-SS41-09D	0911026-06	Soil
7	MR07-SS41D-09D	0911026-07	Soil
8	MR07-SS42-09D	0911026-08	Soil
8MS	MR07-SS42-09DMS	0911026-08MS	Soil
8MSD	MR07-SS42-09DMSD	0911026-08MSD	Soil
9	MR07-SS39-09D	0911026-09	Soil
10	MR07-SS19-09D	0911026-10	Soil
11	MR07-SS22-09D	0911026-11	Soil
11MS	MR07-SS22-09DMS	0911026-11MS	Soil
11MSD	MR07-SS22-09DMSD	0911026-11MSD	Soil
12	MR07-SS21-09D	0911026-12	Soil
13	MR07-SS21D-09D	0911026-13	Soil
14	MR07-SS23-09D	0911026-14	Soil
15	MR07-SS24-09D	0911026-15	Soil
16	MR07-SS25-09D	0911026-16	Soil
17	MR07-SS26-09D	0911026-17	Soil
18	MR07-SS28-09D	0911026-18	Soil
19	MR07-SS30-09D	0911026-19	Soil
20	MR07-SS32-09D	0911026-20	Soil
21	MR07-EB110309-SS	0911026-21	Water
22	MR07-SS34-09D	0911026-22	Soil
23	MR07-SS29-09D	0911026-23	Soil
24	MR07-SS27-09D	0911026-24	Soil
25	MR07-SS31-09D	0911026-25	Soil
26	MR07-SS31D-09D	0911026-26	Soil
27	MR07-SS33-09D	0911026-27	Soil
28	MR07-SS14-09D	0911026-28	Soil
29	MR07-SS13-09D	0911026-29	Soil
30	MR07-SS16-09D	0911026-30	Soil
31	MR07-SS18-09D	0911026-31	Soil

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
32	MR07-FB110309	0911026-32	Water
33	MR07-SS15-09D	0911026-33	Soil
34	MR07-SS20-09D	0911026-34	Soil
35	MR07-SS17-09D	0911026-35	Soil

The USEPA “Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,” October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 14 days for cyanide, 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable except the following.

Compound	%R	Qualifier	Affected Samples
Barium (many CCVs)	88.3%, 85.8%, 86.9%	J/UJ	22-31, 33-35

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

Blank ID	Compound	Conc. mg/kg	Action Level mg/kg	Qualifier	Affected Samples
9K11008-BLK1	Cadmium	0.0786	0.393	U	1-12, 14-20
9K11010-BLK1	Cadmium	0.0596	0.298	U	22-26, 29, 30, 33-35

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
MR07-FB110309	Cadmium	0.381	0.0953	None	See MB
MR07-EB110309-SS	Cadmium	0.342	0.0855	None	See MB
	Copper	19.5	4.875	U	1, 2, 4-13, 15, 16, 18-20, 22-26, 29, 30, 33, 34
	Lead	1.12	0.28	None	All >5X
	Zinc	13.1	3.275		

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Duplicate - The matrix spike/duplicate samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	%R	Qualifier	Affected Samples
8	Antimony	51.7%/47.3%/Ok	J/UJ	1-20
	Potassium	132%/130%/Ok	J	1-20
	Sodium	128%/128%/Ok	J	4, 9
	Calcium	Ok/Ok/74	J	1-20
11	Antimony	48.0%/52.1%/Ok	J/UJ	1-20
	Lead	Ok/127%/Ok	J	1-20
	Potassium	144%/134%/Ok		
	Sodium	126%/126%/Ok	J	4, 9
	Zinc	150%/130%/Ok	J	1-20

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-SS41-09D mg/kg	MR07-SS41D-09D mg/kg	RPD	Qualifier
Mercury	0.0330	0.0353	7%	None
Aluminum	4150	3940	5%	None
Arsenic	1.06	1.03	3%	None
Barium	14.4	14.1	2%	None
Beryllium	0.0834	0.0832	0%	None
Calcium	1880	1450	26%	None
Chromium	5.04	4.91	3%	None
Cobalt	0.327	0.317	3%	None
Iron	2320	2290	1%	None
Lead	22.5	22.2	1%	None
Magnesium	230	230	0%	None
Manganese	16.9	15.7	7%	None
Nickel	1.55	1.48	5%	None
Potassium	156	148	5%	None
Selenium	0.274	0.394	36%	None
Vanadium	6.64	6.42	3%	None
Zinc	17.3	18.0	4%	None

Compound	MR07-SS21-09D mg/kg	MR07-SS21D-09D mg/kg	RPD	Qualifier
Mercury	0.0175	0.0230	27%	None
Aluminum	3890	3710	5%	None
Antimony	0.337	0.448	28%	None

Compound	MR07-SS21-09D mg/kg	MR07-SS21D-09D mg/kg	RPD	Qualifier
Arsenic	1.60	1.63	2%	None
Barium	15.8	12.1	27%	None
Beryllium	0.0626	0.0704	12%	None
Cadmium	0.348	0.394	12%	None
Calcium	11900	18200	42%	None
Chromium	5.28	5.41	2%	None
Cobalt	0.384	0.412	7%	None
Iron	2500	2380	5%	None
Lead	13.7	13.9	1%	None
Magnesium	366	460	23%	None
Manganese	22.0	28.4	25%	None
Nickel	1.61	1.66	3%	None
Potassium	234	240	3%	None
Selenium	0.309	0.225	31%	None
Vanadium	6.87	6.95	1%	None
Zinc	30.1	33.0	9%	None

Compound	MR07-SS31-09D mg/kg	MR07-SS31D-09D mg/kg	RPD	Qualifier
Mercury	0.0302	0.0366	19%	None
Aluminum	6010	7710	25%	None
Antimony	0.546	0.322	52%	None
Arsenic	2.10	2.15	2%	None
Barium	13.8	16.5	18%	None
Beryllium	0.0795	0.0799	1%	None
Calcium	1100	1270	14%	None
Chromium	6.27	8.38	29%	None
Cobalt	0.374	0.460	21%	None
Iron	3790	5610	39%	None
Lead	11.6	11.1	4%	None
Magnesium	245	314	25%	None
Manganese	13.2	14.4	9%	None
Nickel	1.71	2.00	16%	None
Potassium	217	256	16%	None
Selenium	0.379	0.363	4%	None
Vanadium	9.00	12.3	31%	None
Zinc	18.3	19.1	4%	None

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-SS35-09D

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/03/09 13:20
 % Solids: 88.78

SDG: UX07_002
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911026-01
 Received: 11/04/09 08:00

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.141	0.282	1	U	SW9012A	9K16006	11/17/09 09:38
7439-97-6	Mercury	0.116	0.0157	0.0398	1		SW7471A	9K10005	11/12/09 09:56
7429-90-5	Aluminum	5870	2.71	10.8	1		SW6010B	9K11008	11/12/09 15:21
7440-36-0	Antimony	0.289	0.271	0.812	1	JN	SW6010B	9K11008	11/12/09 15:21 MSL
7440-38-2	Arsenic	1.80	0.162	0.271	1		SW6010B	9K11008	11/12/09 15:21
7440-39-3	Barium	13.5	0.271	2.17	1		SW6010B	9K11008	11/12/09 15:21
7440-41-7	Beryllium	0.0679	0.0542	0.271	1	J	SW6010B	9K11008	11/12/09 15:21
7440-43-9	Cadmium	0.211	0.260	0.0542	1	JU	SW6010B	9K11008	11/12/09 15:21 MBL
7440-70-2	Calcium	1250	54.2	271	1	JS	SW6010B	9K11008	11/12/09 15:21 MDP
7440-47-3	Chromium	6.86	0.108	0.271	1		SW6010B	9K11008	11/12/09 15:21
7440-48-4	Cobalt	0.387	0.271	0.677	1	J	SW6010B	9K11008	11/12/09 15:21
7440-50-8	Copper	3.07	0.271	0.542	1	U	SW6010B	9K11008	11/12/09 15:21
7439-89-6	Iron	4510	1.62	5.42	1		SW6010B	9K11008	11/12/09 15:21 EBL
7439-92-1	Lead	10.9	0.0812	0.162	1	JN	SW6010B	9K11008	11/12/09 15:21 MSH
7439-95-4	Magnesium	254	54.2	271	1	J	SW6010B	9K11008	11/12/09 15:21
7439-96-5	Manganese	14.8	0.162	0.812	1		SW6010B	9K11008	11/12/09 15:21
7440-02-0	Nickel	1.41	0.271	0.542	1		SW6010B	9K11008	11/12/09 15:21
7440-09-7	Potassium	238	54.2	271	1	JN	SW6010B	9K11008	11/12/09 15:21 MSH
7782-49-2	Selenium	0.364	0.162	0.271	1		SW6010B	9K11008	11/12/09 15:21
7440-22-4	Silver		0.108	0.271	1	U	SW6010B	9K11008	11/12/09 15:21
7440-23-5	Sodium		54.2	271	1	U	SW6010B	9K11008	11/12/09 15:21
7440-28-0	Thallium		0.162	0.433	1	U	SW6010B	9K11008	11/12/09 15:21
7440-62-2	Vanadium	10.4	0.271	0.677	1		SW6010B	9K11008	11/12/09 15:21
7440-66-6	Zinc	16.1	0.271	1.08	1	JN	SW6010B	9K11008	11/12/09 15:21 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS36-09D

2

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/03/09 13:20
 % Solids: 89.40

SDG: UX07 002
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911026-02
 Received: 11/04/09 08:00

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.140	0.280	1	U	SW9012A	9K16006	11/17/09 10:03
7439-97-6	Mercury	0.0295	0.0136	0.0346	1	J	SW7471A	9K10005	11/12/09 09:57
7429-90-5	Aluminum	5220	2.73	10.9	1		SW6010B	9K11008	11/12/09 15:26
7440-36-0	Antimony		0.273	0.818	1	U J X	SW6010B	9K11008	11/12/09 15:26
7440-38-2	Arsenic	1.15	0.164	0.273	1		SW6010B	9K11008	11/12/09 15:26
7440-39-3	Barium	10.9	0.273	2.18	1		SW6010B	9K11008	11/12/09 15:26
7440-41-7	Beryllium	0.0582	0.0546	0.273	1	J	SW6010B	9K11008	11/12/09 15:26
7440-43-9	Cadmium	0.273	0.0546	0.273	1	U X	SW6010B	9K11008	11/12/09 15:26
7440-70-2	Calcium	12500	54.6	273	1	J X	SW6010B	9K11008	11/12/09 15:26
7440-47-3	Chromium	6.85	0.109	0.273	1		SW6010B	9K11008	11/12/09 15:26
7440-48-4	Cobalt	0.442	0.273	0.682	1	J	SW6010B	9K11008	11/12/09 15:26
7440-50-8	Copper	4.31	0.273	0.546	1	U	SW6010B	9K11008	11/12/09 15:26
7439-89-6	Iron	3350	1.64	5.46	1		SW6010B	9K11008	11/12/09 15:26
7439-92-1	Lead	15.2	0.0818	0.164	1	J X	SW6010B	9K11008	11/12/09 15:26
7439-95-4	Magnesium	375	54.6	273	1		SW6010B	9K11008	11/12/09 15:26
7439-96-5	Manganese	16.7	0.164	0.818	1		SW6010B	9K11008	11/12/09 15:26
7440-02-0	Nickel	1.59	0.273	0.546	1		SW6010B	9K11008	11/12/09 15:26
7440-09-7	Potassium	294	54.6	273	1	J X	SW6010B	9K11008	11/12/09 15:26
7782-49-2	Selenium	0.383	0.164	0.273	1		SW6010B	9K11008	11/12/09 15:26
7440-22-4	Silver		0.109	0.273	1	U	SW6010B	9K11008	11/12/09 15:26
7440-23-5	Sodium		54.6	273	1	U X	SW6010B	9K11008	11/12/09 15:26
7440-28-0	Thallium		0.218	0.437	1	U	SW6010B	9K11008	11/12/09 15:26
7440-62-2	Vanadium	8.21	0.273	0.682	1		SW6010B	9K11008	11/12/09 15:26
7440-66-6	Zinc	19.1	0.273	1.09	1	J X	SW6010B	9K11008	11/12/09 15:26

MSL
MB
MOP
EBC
MSH
MSH

hw
11/22/10

ANALYSIS DATA SHEET

MR07-SS37-09D

3

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-03

Sampled: 11/03/09 13:40

Received: 11/04/09 08:00

% Solids: 82.59

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.151	0.303	1	U	SW9012A	9K16006	11/17/09 09:41
7439-97-6	Mercury	0.0627	0.0163	0.0413	1		SW7471A	9K10005	11/12/09 09:59
7429-90-5	Aluminum	5160	2.95	11.8	1		SW6010B	9K11008	11/12/09 15:30
7440-36-0	Antimony	0.531	0.295	0.886	1	JN	SW6010B	9K11008	11/12/09 15:30
7440-38-2	Arsenic	2.70	0.177	0.295	1		SW6010B	9K11008	11/12/09 15:30
7440-39-3	Barium	14.3	0.295	2.36	1		SW6010B	9K11008	11/12/09 15:30
7440-41-7	Beryllium	0.0737	0.0591	0.295	1	J	SW6010B	9K11008	11/12/09 15:30
7440-43-9	Cadmium	0.318	0.0591	0.295	1	U	SW6010B	9K11008	11/12/09 15:30
7440-70-2	Calcium	2030	59.1	295	1	JY	SW6010B	9K11008	11/12/09 15:30
7440-47-3	Chromium	6.43	0.118	0.295	1		SW6010B	9K11008	11/12/09 15:30
7440-48-4	Cobalt	0.368	0.295	0.738	1	J	SW6010B	9K11008	11/12/09 15:30
7440-50-8	Copper	6.28	0.295	0.591	1		SW6010B	9K11008	11/12/09 15:30
7439-89-6	Iron	3240	1.77	5.91	1		SW6010B	9K11008	11/12/09 15:30
7439-92-1	Lead	13.0	0.0886	0.177	1	JN	SW6010B	9K11008	11/12/09 15:30
7439-95-4	Magnesium	264	59.1	295	1	J	SW6010B	9K11008	11/12/09 15:30
7439-96-5	Manganese	15.3	0.177	0.886	1		SW6010B	9K11008	11/12/09 15:30
7440-02-0	Nickel	1.46	0.295	0.591	1		SW6010B	9K11008	11/12/09 15:30
7440-09-7	Potassium	252	59.1	295	1	JN	SW6010B	9K11008	11/12/09 15:30
7782-49-2	Selenium	0.449	0.177	0.295	1		SW6010B	9K11008	11/12/09 15:30
7440-22-4	Silver		0.118	0.295	1	U	SW6010B	9K11008	11/12/09 15:30
7440-23-5	Sodium		59.1	295	1	UN	SW6010B	9K11008	11/12/09 15:30
7440-28-0	Thallium		0.236	0.473	1	U	SW6010B	9K11008	11/12/09 15:30
7440-62-2	Vanadium	8.77	0.295	0.738	1		SW6010B	9K11008	11/12/09 15:30
7440-66-6	Zinc	26.0	0.295	1.18	1	JN	SW6010B	9K11008	11/12/09 15:30

MSL

MBL
MDP

MSH

MSH

MSH

aw
112210

ANALYSIS DATA SHEET

MR07-SS38-09D

4

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-04

Sampled: 11/03/09 13:35

Received: 11/04/09 08:00

% Solids: 88.06

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.142	0.284	1	U	SW9012A	9K16006	11/17/09 09:42
7439-97-6	Mercury	0.0271	0.0148	0.0375	1	J	SW7471A	9K10005	11/12/09 10:00
7429-90-5	Aluminum	10600	2.74	11.0	1		SW6010B	9K11008	11/12/09 15:35
7440-36-0	Antimony		0.274	0.823	1	UJUN	SW6010B	9K11008	11/12/09 15:35 MSL
7440-38-2	Arsenic	1.84	0.165	0.274	1		SW6010B	9K11008	11/12/09 15:35
7440-39-3	Barium	18.8	0.274	2.19	1		SW6010B	9K11008	11/12/09 15:35
7440-41-7	Beryllium	0.0865	0.0549	0.274	1	J	SW6010B	9K11008	11/12/09 15:35
7440-43-9	Cadmium	0.274 0.109	0.0549	0.274	1	UJ	SW6010B	9K11008	11/12/09 15:35 MBL
7440-70-2	Calcium	22100	54.9	274	1	JJ	SW6010B	9K11008	11/12/09 15:35 MDP
7440-47-3	Chromium	11.4	0.110	0.274	1		SW6010B	9K11008	11/12/09 15:35
7440-48-4	Cobalt	0.829	0.274	0.686	1		SW6010B	9K11008	11/12/09 15:35
7440-50-8	Copper	1.47	0.274	0.549	1	U	SW6010B	9K11008	11/12/09 15:35 EBL
7439-89-6	Iron	6730	1.65	5.49	1		SW6010B	9K11008	11/12/09 15:35
7439-92-1	Lead	6.89	0.0823	0.165	1	JY	SW6010B	9K11008	11/12/09 15:35 MSH
7439-95-4	Magnesium	611	54.9	274	1		SW6010B	9K11008	11/12/09 15:35
7439-96-5	Manganese	15.6	0.165	0.823	1		SW6010B	9K11008	11/12/09 15:35
7440-02-0	Nickel	2.75	0.274	0.549	1		SW6010B	9K11008	11/12/09 15:35
7440-09-7	Potassium	352	54.9	274	1	JY	SW6010B	9K11008	11/12/09 15:35 MSH
7782-49-2	Selenium	0.535	0.165	0.274	1		SW6010B	9K11008	11/12/09 15:35
7440-22-4	Silver		0.165	0.274	1	U	SW6010B	9K11008	11/12/09 15:35
7440-23-5	Sodium	75.7	54.9	274	1	JY	SW6010B	9K11008	11/12/09 15:35 MSH
7440-28-0	Thallium		0.165	0.439	1	U	SW6010B	9K11008	11/12/09 15:35
7440-62-2	Vanadium	15.5	0.274	0.686	1		SW6010B	9K11008	11/12/09 15:35
7440-66-6	Zinc	7.13	0.274	1.10	1	JY	SW6010B	9K11008	11/12/09 15:35 MSH

JW
11/22/10

ANALYSIS DATA SHEET

5

MR07-SS40-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-05

Sampled: 11/03/09 13:55

Received: 11/04/09 08:00

% Solids: 83.59

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.150	0.299	1	U	SW9012A	9K16006	11/17/09 09:44
7439-97-6	Mercury	0.0285	0.0161	0.0408	1	J	SW7471A	9K10005	11/12/09 10:04
7429-90-5	Aluminum	6110	2.95	11.8	1		SW6010B	9K11008	11/12/09 15:40
7440-36-0	Antimony		0.295	0.884	1	U J X	SW6010B	9K11008	11/12/09 15:40 MSL
7440-38-2	Arsenic	1.34	0.177	0.295	1		SW6010B	9K11008	11/12/09 15:40
7440-39-3	Barium	15.3	0.295	2.36	1		SW6010B	9K11008	11/12/09 15:40
7440-41-7	Beryllium	0.0897	0.0589	0.295	1	J	SW6010B	9K11008	11/12/09 15:40
7440-43-9	Cadmium	0.329	0.0589	0.295	1	U	SW6010B	9K11008	11/12/09 15:40 MBL
7440-70-2	Calcium	8530	58.9	295	1	J X	SW6010B	9K11008	11/12/09 15:40 MDP
7440-47-3	Chromium	9.06	0.118	0.295	1		SW6010B	9K11008	11/12/09 15:40
7440-48-4	Cobalt	0.402	0.295	0.737	1	J	SW6010B	9K11008	11/12/09 15:40
7440-50-8	Copper	3.48	0.295	0.589	1	U	SW6010B	9K11008	11/12/09 15:40 EBL
7439-89-6	Iron	3390	1.77	5.89	1		SW6010B	9K11008	11/12/09 15:40
7439-92-1	Lead	32.0	0.0884	0.177	1	J X	SW6010B	9K11008	11/12/09 15:40 MSH
7439-95-4	Magnesium	349	58.9	295	1		SW6010B	9K11008	11/12/09 15:40
7439-96-5	Manganese	18.2	0.177	0.884	1		SW6010B	9K11008	11/12/09 15:40
7440-02-0	Nickel	1.94	0.295	0.589	1		SW6010B	9K11008	11/12/09 15:40
7440-09-7	Potassium	219	58.9	295	1	J X	SW6010B	9K11008	11/12/09 15:40 MSH
7782-49-2	Selenium	0.417	0.177	0.295	1		SW6010B	9K11008	11/12/09 15:40
7440-22-4	Silver		0.118	0.295	1	U	SW6010B	9K11008	11/12/09 15:40
7440-23-5	Sodium		58.9	295	1	U	SW6010B	9K11008	11/12/09 15:40
7440-28-0	Thallium		0.236	0.471	1	U	SW6010B	9K11008	11/12/09 15:40
7440-62-2	Vanadium	9.42	0.295	0.737	1		SW6010B	9K11008	11/12/09 15:40
7440-66-6	Zinc	30.9	0.295	1.18	1	J X	SW6010B	9K11008	11/12/09 15:40 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS41-09D

6

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-06

Sampled: 11/03/09 14:10

Received: 11/04/09 08:00

% Solids: 83.91

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.149	0.298	1	U	SW9012A	9K16006	11/17/09 09:45
7439-97-6	Mercury	0.0330	0.0133	0.0337	1	J	SW7471A	9K10005	11/12/09 10:05
7429-90-5	Aluminum	4150	2.94	11.7	1		SW6010B	9K11008	11/12/09 15:45
7440-36-0	Antimony		0.294	0.881	1	UJ LN	SW6010B	9K11008	11/12/09 15:45 MSL
7440-38-2	Arsenic	1.06	0.176	0.294	1		SW6010B	9K11008	11/12/09 15:45
7440-39-3	Barium	14.4	0.294	2.35	1		SW6010B	9K11008	11/12/09 15:45
7440-41-7	Beryllium	0.0834	0.0587	0.294	1	J	SW6010B	9K11008	11/12/09 15:45
7440-43-9	Cadmium	0.294	0.288	0.0587	1	UJ	SW6010B	9K11008	11/12/09 15:45 MBL
7440-70-2	Calcium	1880	58.7	294	1	J	SW6010B	9K11008	11/12/09 15:45 MDP
7440-47-3	Chromium	5.04	0.117	0.294	1		SW6010B	9K11008	11/12/09 15:45
7440-48-4	Cobalt	0.327	0.294	0.734	1	J	SW6010B	9K11008	11/12/09 15:45
7440-50-8	Copper	3.26	0.294	0.587	1	U	SW6010B	9K11008	11/12/09 15:45 EBL
7439-89-6	Iron	2320	1.76	5.87	1		SW6010B	9K11008	11/12/09 15:45
7439-92-1	Lead	22.5	0.0881	0.176	1	J	SW6010B	9K11008	11/12/09 15:45 MSH
7439-95-4	Magnesium	230	58.7	294	1	J	SW6010B	9K11008	11/12/09 15:45
7439-96-5	Manganese	16.9	0.176	0.881	1		SW6010B	9K11008	11/12/09 15:45
7440-02-0	Nickel	1.55	0.294	0.587	1		SW6010B	9K11008	11/12/09 15:45
7440-09-7	Potassium	156	58.7	294	1	J	SW6010B	9K11008	11/12/09 15:45 MSH
7782-49-2	Selenium	0.274	0.176	0.294	1	J	SW6010B	9K11008	11/12/09 15:45
7440-22-4	Silver		0.117	0.294	1	U	SW6010B	9K11008	11/12/09 15:45
7440-23-5	Sodium		58.7	294	1	U	SW6010B	9K11008	11/12/09 15:45
7440-28-0	Thallium		0.176	0.470	1	U	SW6010B	9K11008	11/12/09 15:45
7440-62-2	Vanadium	6.64	0.294	0.734	1		SW6010B	9K11008	11/12/09 15:45
7440-66-6	Zinc	17.3	0.294	1.17	1	J	SW6010B	9K11008	11/12/09 15:45 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS41D-09D

7

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_002

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0911026-07

 Sampled: 11/03/09 14:20

 Received: 11/04/09 08:00

 % Solids: 82.93

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.151	0.301	1	U	SW9012A	9K16006	11/17/09 09:46
7439-97-6	Mercury	0.0353	0.0152	0.0385	1	J	SW7471A	9K10005	11/12/09 10:06
7429-90-5	Aluminum	3940	2.91	11.7	1		SW6010B	9K11008	11/12/09 15:50
7440-36-0	Antimony		0.291	0.874	1	UJ UN	SW6010B	9K11008	11/12/09 15:50
7440-38-2	Arsenic	1.03	0.175	0.291	1		SW6010B	9K11008	11/12/09 15:50
7440-39-3	Barium	14.1	0.291	2.33	1		SW6010B	9K11008	11/12/09 15:50
7440-41-7	Beryllium	0.0832	0.0583	0.291	1	J	SW6010B	9K11008	11/12/09 15:50
7440-43-9	Cadmium	0.291	0.271	0.0583	1	UJ	SW6010B	9K11008	11/12/09 15:50
7440-70-2	Calcium	1450	58.3	291	1	JN	SW6010B	9K11008	11/12/09 15:50
7440-47-3	Chromium	4.91	0.117	0.291	1		SW6010B	9K11008	11/12/09 15:50
7440-48-4	Cobalt	0.317	0.291	0.728	1	J	SW6010B	9K11008	11/12/09 15:50
7440-50-8	Copper	2.80	0.291	0.583	1	U	SW6010B	9K11008	11/12/09 15:50
7439-89-6	Iron	2290	1.75	5.83	1		SW6010B	9K11008	11/12/09 15:50
7439-92-1	Lead	22.2	0.0874	0.175	1	JN	SW6010B	9K11008	11/12/09 15:50
7439-95-4	Magnesium	230	58.3	291	1	J	SW6010B	9K11008	11/12/09 15:50
7439-96-5	Manganese	15.7	0.175	0.874	1		SW6010B	9K11008	11/12/09 15:50
7440-02-0	Nickel	1.48	0.291	0.583	1		SW6010B	9K11008	11/12/09 15:50
7440-09-7	Potassium	148	58.3	291	1	JN	SW6010B	9K11008	11/12/09 15:50
7782-49-2	Selenium	0.394	0.175	0.291	1		SW6010B	9K11008	11/12/09 15:50
7440-22-4	Silver		0.117	0.291	1	U	SW6010B	9K11008	11/12/09 15:50
7440-23-5	Sodium		58.3	291	1	UN	SW6010B	9K11008	11/12/09 15:50
7440-28-0	Thallium		0.175	0.466	1	U	SW6010B	9K11008	11/12/09 15:50
7440-62-2	Vanadium	6.42	0.291	0.728	1		SW6010B	9K11008	11/12/09 15:50
7440-66-6	Zinc	18.0	0.291	1.17	1	JN	SW6010B	9K11008	11/12/09 15:50

MSL

MBL

MDT

EBL

MSH

MSH

MSH

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ANALYSIS DATA SHEET

MR07-SS42-09D

8

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-08

Sampled: 11/03/09 14:15

Received: 11/04/09 08:00

% Solids: 82.23

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.162	0.152	0.304	1	J	SW9012A	9K16006	11/17/09 09:47
7439-97-6	Mercury	0.0282	0.0153	0.0388	1	J	SW7471A	9K10005	11/12/09 10:08
7429-90-5	Aluminum	4970	2.98	11.9	1		SW6010B	9K11008	11/12/09 15:54
7440-36-0	Antimony		0.298	0.894	1	U J UN	SW6010B	9K11008	11/12/09 15:54 MSL
7440-38-2	Arsenic	1.25	0.179	0.298	1		SW6010B	9K11008	11/12/09 15:54
7440-39-3	Barium	27.5	0.298	2.38	1		SW6010B	9K11008	11/12/09 15:54
7440-41-7	Beryllium	0.0846	0.0596	0.298	1	J	SW6010B	9K11008	11/12/09 15:54
7440-43-9	Cadmium	0.298	0.298	0.298	1	U J	SW6010B	9K11008	11/12/09 15:54 MBL
7440-70-2	Calcium	7070	59.6	298	1	J	SW6010B	9K11008	11/12/09 15:54 MDP
7440-47-3	Chromium	6.51	0.119	0.298	1		SW6010B	9K11008	11/12/09 15:54
7440-48-4	Cobalt	0.382	0.298	0.745	1	J	SW6010B	9K11008	11/12/09 15:54
7440-50-8	Copper	2.80	0.298	0.596	1	U	SW6010B	9K11008	11/12/09 15:54 EBL
7439-89-6	Iron	2870	1.79	5.96	1		SW6010B	9K11008	11/12/09 15:54
7439-92-1	Lead	20.9	0.0894	0.179	1	J X	SW6010B	9K11008	11/12/09 15:54 MSH
7439-95-4	Magnesium	375	59.6	298	1		SW6010B	9K11008	11/12/09 15:54
7439-96-5	Manganese	18.9	0.179	0.894	1		SW6010B	9K11008	11/12/09 15:54
7440-02-0	Nickel	1.65	0.298	0.596	1		SW6010B	9K11008	11/12/09 15:54
7440-09-7	Potassium	200	59.6	298	1	J X	SW6010B	9K11008	11/12/09 15:54 MSH
7782-49-2	Selenium	0.432	0.179	0.298	1		SW6010B	9K11008	11/12/09 15:54
7440-22-4	Silver		0.119	0.298	1	U	SW6010B	9K11008	11/12/09 15:54
7440-23-5	Sodium		59.6	298	1	U	SW6010B	9K11008	11/12/09 15:54
7440-28-0	Thallium		0.238	0.477	1	U	SW6010B	9K11008	11/12/09 15:54
7440-62-2	Vanadium	8.14	0.298	0.745	1		SW6010B	9K11008	11/12/09 15:54
7440-66-6	Zinc	24.3	0.298	1.19	1	J X	SW6010B	9K11008	11/12/09 15:54 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS39-09D

9

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-09

Sampled: 11/03/09 13:50

Received: 11/04/09 08:00

% Solids: 86.08

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.145	0.290	1	U	SW9012A	9K16006	11/17/09 09:50
7439-97-6	Mercury	0.0189	0.0146	0.0371	1	J	SW7471A	9K10005	11/12/09 10:11
7429-90-5	Aluminum	2700	5.78	23.1	2	D	SW6010B	9K11008	11/13/09 12:38
7440-36-0	Antimony		0.289	0.867	1	U J UN	SW6010B	9K11008	11/12/09 16:18 MSL
7440-38-2	Arsenic	0.901	0.173	0.289	1		SW6010B	9K11008	11/12/09 16:18
7440-39-3	Barium	9.80	0.289	2.31	1		SW6010B	9K11008	11/12/09 16:18
7440-41-7	Beryllium	0.0642	0.0578	0.289	1	J	SW6010B	9K11008	11/12/09 16:18
7440-43-9	Cadmium	0.359	0.0578	0.289	1	U	SW6010B	9K11008	11/12/09 16:18 MBL
7440-70-2	Calcium	42000	116	578	2	JDN	SW6010B	9K11008	11/13/09 12:38 MDP
7440-47-3	Chromium	5.25	0.116	0.289	1		SW6010B	9K11008	11/12/09 16:18
7440-48-4	Cobalt	0.304	0.289	0.722	1	J	SW6010B	9K11008	11/12/09 16:18
7440-50-8	Copper	2.73	0.289	0.578	1	U	SW6010B	9K11008	11/12/09 16:18 EBL
7439-89-6	Iron	1790	1.73	5.78	1		SW6010B	9K11008	11/12/09 16:18
7439-92-1	Lead	12.1	0.173	0.347	2	JDN	SW6010B	9K11008	11/13/09 12:38 MSH
7439-95-4	Magnesium	749	57.8	289	1		SW6010B	9K11008	11/12/09 16:18
7439-96-5	Manganese	16.9	0.173	0.867	1		SW6010B	9K11008	11/12/09 16:18
7440-02-0	Nickel	0.953	0.289	0.578	1		SW6010B	9K11008	11/12/09 16:18
7440-09-7	Potassium	193	57.8	289	1	J JN	SW6010B	9K11008	11/12/09 16:18 MSH
7782-49-2	Selenium	0.188	0.173	0.289	1	J	SW6010B	9K11008	11/12/09 16:18
7440-22-4	Silver		0.116	0.289	1	U	SW6010B	9K11008	11/12/09 16:18
7440-23-5	Sodium	92.0	57.8	289	1	J JN	SW6010B	9K11008	11/12/09 16:18 MSH
7440-28-0	Thallium		0.231	0.462	1	U	SW6010B	9K11008	11/12/09 16:18
7440-62-2	Vanadium	5.45	0.289	0.722	1		SW6010B	9K11008	11/12/09 16:18
7440-66-6	Zinc	20.3	0.578	2.31	2	JDN	SW6010B	9K11008	11/13/09 12:38 MSH

aw
11/22/10

ANALYSIS DATA SHEET

10

MR07-SS19-09D

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UXO7)

Matrix: Soil

Laboratory ID: 0911026-10

Sampled: 11/03/09 09:35

Received: 11/04/09 08:00

% Solids: 82.89

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.151	0.302	1	U	SW9012A	9K16006	11/17/09 09:51
7439-97-6	Mercury	0.0377	0.0138	0.0351	1		SW7471A	9K10005	11/12/09 10:13
7429-90-5	Aluminum	5020	2.96	11.8	1		SW6010B	9K11008	11/12/09 16:23
7440-36-0	Antimony	0.435	0.296	0.887	1	JX	SW6010B	9K11008	11/12/09 16:23 MSL
7440-38-2	Arsenic	2.39	0.177	0.296	1		SW6010B	9K11008	11/12/09 16:23
7440-39-3	Barium	12.9	0.296	2.37	1		SW6010B	9K11008	11/12/09 16:23
7440-41-7	Beryllium	0.0743	0.0591	0.296	1	J	SW6010B	9K11008	11/12/09 16:23
7440-43-9	Cadmium	0.296	0.0591	0.296	1	U	SW6010B	9K11008	11/12/09 16:23 MCL
7440-70-2	Calcium	1040	59.1	296	1	JX	SW6010B	9K11008	11/12/09 16:23 MDP
7440-47-3	Chromium	6.99	0.118	0.296	1		SW6010B	9K11008	11/12/09 16:23
7440-48-4	Cobalt	0.359	0.296	0.739	1	J	SW6010B	9K11008	11/12/09 16:23
7440-50-8	Copper	3.45	0.296	0.591	1	U	SW6010B	9K11008	11/12/09 16:23 EBL
7439-89-6	Iron	3390	1.77	5.91	1		SW6010B	9K11008	11/12/09 16:23
7439-92-1	Lead	15.7	0.0887	0.177	1	JX	SW6010B	9K11008	11/12/09 16:23 MSH
7439-95-4	Magnesium	222	59.1	296	1	J	SW6010B	9K11008	11/12/09 16:23
7439-96-5	Manganese	15.4	0.177	0.887	1		SW6010B	9K11008	11/12/09 16:23
7440-02-0	Nickel	1.36	0.296	0.591	1		SW6010B	9K11008	11/12/09 16:23
7440-09-7	Potassium	220	59.1	296	1	JX	SW6010B	9K11008	11/12/09 16:23 MSH
7782-49-2	Selenium	0.449	0.177	0.296	1		SW6010B	9K11008	11/12/09 16:23
7440-22-4	Silver		0.118	0.296	1	U	SW6010B	9K11008	11/12/09 16:23
7440-23-5	Sodium		59.1	296	1	UN	SW6010B	9K11008	11/12/09 16:23
7440-28-0	Thallium		0.177	0.473	1	U	SW6010B	9K11008	11/12/09 16:23
7440-62-2	Vanadium	8.00	0.296	0.739	1		SW6010B	9K11008	11/12/09 16:23
7440-66-6	Zinc	17.1	0.296	1.18	1	JX	SW6010B	9K11008	11/12/09 16:23 MSH

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ANALYSIS DATA SHEET

MR07-SS22-09D

11

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Solid

Laboratory ID: 0911026-11

Sampled: 11/03/09 09:15

Received: 11/04/09 08:00

% Solids: 81.09

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.154	0.308	1	U	SW9012A	9K16020	11/17/09 11:30
7439-97-6	Mercury	0.0229	0.0160	0.0407	1	J	SW7471A	9K10006	11/12/09 10:25
7429-90-5	Aluminum	5300	3.08	12.3	1		SW6010B	9K11008	11/12/09 16:42
7440-36-0	Antimony	0.376	0.308	0.925	1	JX	SW6010B	9K11008	11/12/09 16:42 MSL
7440-38-2	Arsenic	1.81	0.185	0.308	1		SW6010B	9K11008	11/12/09 16:42
7440-39-3	Barium	13.4	0.308	2.47	1		SW6010B	9K11008	11/12/09 16:42
7440-41-7	Beryllium	0.0628	0.0617	0.308	1	J	SW6010B	9K11008	11/12/09 16:42
7440-43-9	Cadmium	0.308	0.0617	0.308	1	U	SW6010B	9K11008	11/12/09 16:42 MSL
7440-70-2	Calcium	1270	61.7	308	1	J	SW6010B	9K11008	11/12/09 16:42 MDP
7440-47-3	Chromium	6.81	0.123	0.308	1		SW6010B	9K11008	11/12/09 16:42
7440-48-4	Cobalt	0.382	0.308	0.771	1	J	SW6010B	9K11008	11/12/09 16:42
7440-50-8	Copper	3.08	0.308	0.617	1	U	SW6010B	9K11008	11/12/09 16:42 EBL
7439-89-6	Iron	3700	1.85	6.17	1		SW6010B	9K11008	11/12/09 16:42
7439-92-1	Lead	11.9	0.0925	0.185	1	JX	SW6010B	9K11008	11/12/09 16:42 MSH
7439-95-4	Magnesium	256	61.7	308	1	J	SW6010B	9K11008	11/12/09 16:42
7439-96-5	Manganese	13.8	0.185	0.925	1		SW6010B	9K11008	11/12/09 16:42
7440-02-0	Nickel	1.76	0.308	0.617	1		SW6010B	9K11008	11/12/09 16:42
7440-09-7	Potassium	253	61.7	308	1	JX	SW6010B	9K11008	11/12/09 16:42 MSH
7782-49-2	Selenium	0.307	0.185	0.308	1	J	SW6010B	9K11008	11/12/09 16:42
7440-22-4	Silver		0.123	0.308	1	U	SW6010B	9K11008	11/12/09 16:42
7440-23-5	Sodium		61.7	308	1	U	SW6010B	9K11008	11/12/09 16:42
7440-28-0	Thallium		0.185	0.493	1	U	SW6010B	9K11008	11/12/09 16:42
7440-62-2	Vanadium	8.68	0.308	0.771	1		SW6010B	9K11008	11/12/09 16:42
7440-66-6	Zinc	40.6	0.308	1.23	1	J	SW6010B	9K11008	11/12/09 16:42 MSH

MSW
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ANALYSIS DATA SHEET

MR07-SS21-09D

12

Laboratory: Empirical Laboratories, LLC

SDG: UXO7 002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-12

Sampled: 11/03/09 09:55

Received: 11/04/09 08:00

% Solids: 88.42

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.141	0.283	1	U	SW9012A	9K16006	11/17/09 09:55
7439-97-6	Mercury	0.0175	0.0152	0.0386	1	J	SW7471A	9K10005	11/12/09 10:14
7429-90-5	Aluminum	3890	2.72	10.9	1		SW6010B	9K11008	11/12/09 17:06
7440-36-0	Antimony	0.337	0.272	0.816	1	JJX	SW6010B	9K11008	11/12/09 17:06 MSL
7440-38-2	Arsenic	1.60	0.163	0.272	1		SW6010B	9K11008	11/12/09 17:06
7440-39-3	Barium	15.8	0.272	2.17	1		SW6010B	9K11008	11/12/09 17:06
7440-41-7	Beryllium	0.0626	0.0544	0.272	1	J	SW6010B	9K11008	11/12/09 17:06
7440-43-9	Cadmium	0.348	0.0544	0.272	1	U	SW6010B	9K11008	11/12/09 17:06 MBL
7440-70-2	Calcium	11900	54.4	272	1	JY	SW6010B	9K11008	11/12/09 17:06 MDP
7440-47-3	Chromium	5.28	0.109	0.272	1		SW6010B	9K11008	11/12/09 17:06
7440-48-4	Cobalt	0.384	0.272	0.680	1	J	SW6010B	9K11008	11/12/09 17:06
7440-50-8	Copper	3.42	0.272	0.544	1	U	SW6010B	9K11008	11/12/09 17:06 EBL
7439-89-6	Iron	2500	1.63	5.44	1		SW6010B	9K11008	11/12/09 17:06
7439-92-1	Lead	13.7	0.0816	0.163	1	JX	SW6010B	9K11008	11/12/09 17:06 MSH
7439-95-4	Magnesium	366	54.4	272	1		SW6010B	9K11008	11/12/09 17:06
7439-96-5	Manganese	22.0	0.163	0.816	1		SW6010B	9K11008	11/12/09 17:06
7440-02-0	Nickel	1.61	0.272	0.544	1		SW6010B	9K11008	11/12/09 17:06
7440-09-7	Potassium	234	54.4	272	1	JJX	SW6010B	9K11008	11/12/09 17:06 MSH
7782-49-2	Selenium	0.309	0.163	0.272	1		SW6010B	9K11008	11/12/09 17:06
7440-22-4	Silver		0.109	0.272	1	U	SW6010B	9K11008	11/12/09 17:06
7440-23-5	Sodium		54.4	272	1	UJ	SW6010B	9K11008	11/12/09 17:06
7440-28-0	Thallium		0.163	0.435	1	U	SW6010B	9K11008	11/12/09 17:06
7440-62-2	Vanadium	6.87	0.272	0.680	1		SW6010B	9K11008	11/12/09 17:06
7440-66-6	Zinc	30.1	0.272	1.09	1	JY	SW6010B	9K11008	11/12/09 17:06 MSH

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ANALYSIS DATA SHEET

13

MR07-SS21D-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-13

Sampled: 11/03/09 10:05

Received: 11/04/09 08:00

% Solids: 88.76

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.141	0.282	1	U	SW9012A	9K16006	11/17/09 09:56
7439-97-6	Mercury	0.0230	0.0137	0.0349	1	J	SW7471A	9K10005	11/12/09 10:15
7429-90-5	Aluminum	3710	2.77	11.1	1		SW6010B	9K11008	11/12/09 17:11
7440-36-0	Antimony	0.448	0.277	0.832	1	JX	SW6010B	9K11008	11/12/09 17:11 MSL
7440-38-2	Arsenic	1.63	0.166	0.277	1		SW6010B	9K11008	11/12/09 17:11
7440-39-3	Barium	12.1	0.277	2.22	1		SW6010B	9K11008	11/12/09 17:11
7440-41-7	Beryllium	0.0704	0.0555	0.277	1	J	SW6010B	9K11008	11/12/09 17:11
7440-43-9	Cadmium	0.394	0.0555	0.277	1		SW6010B	9K11008	11/12/09 17:11
7440-70-2	Calcium	18200	55.5	277	1	JY	SW6010B	9K11008	11/12/09 17:11 MDP
7440-47-3	Chromium	5.41	0.111	0.277	1		SW6010B	9K11008	11/12/09 17:11
7440-48-4	Cobalt	0.412	0.277	0.694	1	J	SW6010B	9K11008	11/12/09 17:11
7440-50-8	Copper	3.81	0.277	0.555	1	U	SW6010B	9K11008	11/12/09 17:11 EBL
7439-89-6	Iron	2380	1.66	5.55	1		SW6010B	9K11008	11/12/09 17:11
7439-92-1	Lead	13.9	0.0832	0.166	1	JX	SW6010B	9K11008	11/12/09 17:11 MSH
7439-95-4	Magnesium	460	55.5	277	1		SW6010B	9K11008	11/12/09 17:11
7439-96-5	Manganese	28.4	0.166	0.832	1		SW6010B	9K11008	11/12/09 17:11
7440-02-0	Nickel	1.66	0.277	0.555	1		SW6010B	9K11008	11/12/09 17:11
7440-09-7	Potassium	240	55.5	277	1	JX	SW6010B	9K11008	11/12/09 17:11 MSH
7782-49-2	Selenium	0.225	0.166	0.277	1	J	SW6010B	9K11008	11/12/09 17:11
7440-22-4	Silver		0.111	0.277	1	U	SW6010B	9K11008	11/12/09 17:11
7440-23-5	Sodium		55.5	277	1	UN	SW6010B	9K11008	11/12/09 17:11
7440-28-0	Thallium		0.166	0.444	1	U	SW6010B	9K11008	11/12/09 17:11
7440-62-2	Vanadium	6.95	0.277	0.694	1		SW6010B	9K11008	11/12/09 17:11
7440-66-6	Zinc	33.0	0.277	1.11	1	JX	SW6010B	9K11008	11/12/09 17:11 MSH

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11/22/10

ANALYSIS DATA SHEET

MR07-SS23-09D

14

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UXO7)

Matrix: Soil

Laboratory ID: 0911026-14

Sampled: 11/03/09 10:35

Received: 11/04/09 08:00

% Solids: 83.87

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.149	0.298	1	U	SW9012A	9K16006	11/17/09 09:57
7439-97-6	Mercury	0.0208	0.0150	0.0381	1	J	SW7471A	9K10005	11/12/09 10:19
7429-90-5	Aluminum	4220	2.88	11.5	1		SW6010B	9K11008	11/12/09 17:15
7440-36-0	Antimony		0.288	0.864	1	UXO7	SW6010B	9K11008	11/12/09 17:15 MSL
7440-38-2	Arsenic	1.01	0.173	0.288	1		SW6010B	9K11008	11/12/09 17:15
7440-39-3	Barium	14.4	0.288	2.30	1		SW6010B	9K11008	11/12/09 17:15
7440-41-7	Beryllium	0.0631	0.0576	0.288	1	J	SW6010B	9K11008	11/12/09 17:15
7440-43-9	Cadmium	0.378	0.0576	0.288	1	U	SW6010B	9K11008	11/12/09 17:15 MBL
7440-70-2	Calcium	11900	57.6	288	1	JY	SW6010B	9K11008	11/12/09 17:15 MBL
7440-47-3	Chromium	6.02	0.115	0.288	1		SW6010B	9K11008	11/12/09 17:15 MBL
7440-48-4	Cobalt	0.502	0.288	0.720	1	J	SW6010B	9K11008	11/12/09 17:15
7440-50-8	Copper	5.28	0.288	0.576	1		SW6010B	9K11008	11/12/09 17:15
7439-89-6	Iron	2490	1.73	5.76	1		SW6010B	9K11008	11/12/09 17:15
7439-92-1	Lead	11.8	0.0864	0.173	1	JY	SW6010B	9K11008	11/12/09 17:15 MBL
7439-95-4	Magnesium	401	57.6	288	1		SW6010B	9K11008	11/12/09 17:15
7439-96-5	Manganese	28.4	0.173	0.864	1		SW6010B	9K11008	11/12/09 17:15
7440-02-0	Nickel	2.17	0.288	0.576	1		SW6010B	9K11008	11/12/09 17:15
7440-09-7	Potassium	270	57.6	288	1	JY	SW6010B	9K11008	11/12/09 17:15 MBL
7782-49-2	Selenium	0.487	0.173	0.288	1		SW6010B	9K11008	11/12/09 17:15
7440-22-4	Silver		0.115	0.288	1	U	SW6010B	9K11008	11/12/09 17:15
7440-23-5	Sodium		57.6	288	1	U	SW6010B	9K11008	11/12/09 17:15
7440-28-0	Thallium		0.288	0.461	1	U	SW6010B	9K11008	11/12/09 17:15
7440-62-2	Vanadium	7.48	0.288	0.720	1		SW6010B	9K11008	11/12/09 17:15
7440-66-6	Zinc	45.8	0.288	1.15	1	JY	SW6010B	9K11008	11/12/09 17:15 MBL

JW
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ANALYSIS DATA SHEET

MR07-SS24-09D

15

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-15

Sampled: 11/03/09 09:50

Received: 11/04/09 08:00

% Solids: 70.74

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.177	0.353	1	U	SW9012A	9K16006	11/17/09 09:58
7439-97-6	Mercury	0.0291	0.0184	0.0467	1	J	SW7471A	9K10005	11/12/09 10:20
7429-90-5	Aluminum	6500	3.55	14.2	1		SW6010B	9K11008	11/12/09 17:20
7440-36-0	Antimony		0.355	1.07	1	<i>W J</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSL</i>
7440-38-2	Arsenic	2.39	0.213	0.355	1		SW6010B	9K11008	11/12/09 17:20
7440-39-3	Barium	13.3	0.355	2.84	1		SW6010B	9K11008	11/12/09 17:20
7440-41-7	Beryllium	0.0845	0.0710	0.355	1	J	SW6010B	9K11008	11/12/09 17:20
7440-43-9	Cadmium	<i>0.355</i> 0.197	0.0710	0.355	1	<i>U J</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSL</i>
7440-70-2	Calcium	1180	71.0	355	1	<i>J</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSL</i>
7440-47-3	Chromium	7.72	0.142	0.355	1		SW6010B	9K11008	11/12/09 17:20
7440-48-4	Cobalt	0.432	0.355	0.888	1	J	SW6010B	9K11008	11/12/09 17:20
7440-50-8	Copper	2.31	0.355	0.710	1	<i>U</i>	SW6010B	9K11008	11/12/09 17:20 <i>EB</i>
7439-89-6	Iron	3790	2.13	7.10	1		SW6010B	9K11008	11/12/09 17:20
7439-92-1	Lead	14.7	0.107	0.213	1	<i>J X</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSH</i>
7439-95-4	Magnesium	289	71.0	355	1	J	SW6010B	9K11008	11/12/09 17:20
7439-96-5	Manganese	11.3	0.213	1.07	1		SW6010B	9K11008	11/12/09 17:20
7440-02-0	Nickel	1.78	0.355	0.710	1		SW6010B	9K11008	11/12/09 17:20
7440-09-7	Potassium	334	71.0	355	1	<i>J X</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSH</i>
7782-49-2	Selenium	0.514	0.213	0.355	1		SW6010B	9K11008	11/12/09 17:20
7440-22-4	Silver		0.142	0.355	1	U	SW6010B	9K11008	11/12/09 17:20
7440-23-5	Sodium		71.0	355	1	<i>U J</i>	SW6010B	9K11008	11/12/09 17:20
7440-28-0	Thallium		0.213	0.568	1	U	SW6010B	9K11008	11/12/09 17:20
7440-62-2	Vanadium	10.1	0.355	0.888	1		SW6010B	9K11008	11/12/09 17:20
7440-66-6	Zinc	21.5	0.355	1.42	1	<i>J X</i>	SW6010B	9K11008	11/12/09 17:20 <i>MSH</i>

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1122/10

ANALYSIS DATA SHEET

MR07-SS25-09D

16

Laboratory: Empirical Laboratories, LLC

SDG: UX07 002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-16

Sampled: 11/03/09 10:45

Received: 11/04/09 08:00

% Solids: 84.41

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.148	0.296	1	U	SW9012A	9K16006	11/17/09 09:59
7439-97-6	Mercury	0.0431	0.0154	0.0391	1		SW7471A	9K10005	11/12/09 10:21
7429-90-5	Aluminum	4680	2.93	11.7	1		SW6010B	9K11008	11/12/09 17:25
7440-36-0	Antimony	0.455	0.293	0.880	1	JH	SW6010B	9K11008	11/12/09 17:25
7440-38-2	Arsenic	2.25	0.176	0.293	1		SW6010B	9K11008	11/12/09 17:25
7440-39-3	Barium	10.7	0.293	2.35	1		SW6010B	9K11008	11/12/09 17:25
7440-41-7	Beryllium	0.0707	0.0586	0.293	1	J	SW6010B	9K11008	11/12/09 17:25
7440-43-9	Cadmium	0.293 0.177	0.0586	0.293	1	U	SW6010B	9K11008	11/12/09 17:25
7440-70-2	Calcium	527	58.6	293	1	J	SW6010B	9K11008	11/12/09 17:25
7440-47-3	Chromium	6.06	0.117	0.293	1		SW6010B	9K11008	11/12/09 17:25
7440-48-4	Cobalt	0.318	0.293	0.733	1	J	SW6010B	9K11008	11/12/09 17:25
7440-50-8	Copper	3.45	0.293	0.586	1	U	SW6010B	9K11008	11/12/09 17:25
7439-89-6	Iron	3000	1.76	5.86	1		SW6010B	9K11008	11/12/09 17:25
7439-92-1	Lead	13.1	0.0880	0.176	1	JH	SW6010B	9K11008	11/12/09 17:25
7439-95-4	Magnesium	204	58.6	293	1	J	SW6010B	9K11008	11/12/09 17:25
7439-96-5	Manganese	9.05	0.176	0.880	1		SW6010B	9K11008	11/12/09 17:25
7440-02-0	Nickel	1.43	0.293	0.586	1		SW6010B	9K11008	11/12/09 17:25
7440-09-7	Potassium	239	58.6	293	1	JH	SW6010B	9K11008	11/12/09 17:25
7782-49-2	Selenium	0.367	0.176	0.293	1		SW6010B	9K11008	11/12/09 17:25
7440-22-4	Silver		0.117	0.293	1	U	SW6010B	9K11008	11/12/09 17:25
7440-23-5	Sodium		58.6	293	1	U	SW6010B	9K11008	11/12/09 17:25
7440-28-0	Thallium		0.176	0.469	1	U	SW6010B	9K11008	11/12/09 17:25
7440-62-2	Vanadium	7.41	0.293	0.733	1		SW6010B	9K11008	11/12/09 17:25
7440-66-6	Zinc	23.7	0.293	1.17	1	JH	SW6010B	9K11008	11/12/09 17:25

MSL

MSL

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EBL

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11/22/10

ANALYSIS DATA SHEET

MR07-SS28-09D

18

Laboratory: Empirical Laboratories, LLC

SDG: UXO7 002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-18

Sampled: 11/03/09 10:40

Received: 11/04/09 08:00

% Solids: 79.52

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.157	0.314	1	U	SW9012A	9K16006	11/17/09 10:01
7439-97-6	Mercury	0.0237	0.0149	0.0377	1	J	SW7471A	9K10006	11/12/09 10:30
7429-90-5	Aluminum	4240	2.99	12.0	1		SW6010B	9K11008	11/12/09 17:34
7440-36-0	Antimony	0.408	0.299	0.898	1	JN	SW6010B	9K11008	11/12/09 17:34 MSL
7440-38-2	Arsenic	2.86	0.180	0.299	1		SW6010B	9K11008	11/12/09 17:34
7440-39-3	Barium	12.2	0.299	2.40	1		SW6010B	9K11008	11/12/09 17:34
7440-41-7	Beryllium	0.0700	0.0599	0.299	1	J	SW6010B	9K11008	11/12/09 17:34
7440-43-9	Cadmium	0.303	0.0599	0.299	1	U	SW6010B	9K11008	11/12/09 17:34 MBL
7440-70-2	Calcium	5170	59.9	299	1	J	SW6010B	9K11008	11/12/09 17:34 MDP
7440-47-3	Chromium	6.51	0.120	0.299	1		SW6010B	9K11008	11/12/09 17:34
7440-48-4	Cobalt	0.359	0.299	0.749	1	J	SW6010B	9K11008	11/12/09 17:34
7440-50-8	Copper	3.82	0.299	0.599	1	U	SW6010B	9K11008	11/12/09 17:34 EBL
7439-89-6	Iron	2890	1.80	5.99	1		SW6010B	9K11008	11/12/09 17:34
7439-92-1	Lead	12.3	0.0898	0.180	1	JN	SW6010B	9K11008	11/12/09 17:34 WSH
7439-95-4	Magnesium	286	59.9	299	1	J	SW6010B	9K11008	11/12/09 17:34
7439-96-5	Manganese	18.1	0.180	0.898	1		SW6010B	9K11008	11/12/09 17:34
7440-02-0	Nickel	1.48	0.299	0.599	1		SW6010B	9K11008	11/12/09 17:34
7440-09-7	Potassium	268	59.9	299	1	JN	SW6010B	9K11008	11/12/09 17:34 MSH
7782-49-2	Selenium	0.372	0.180	0.299	1		SW6010B	9K11008	11/12/09 17:34
7440-22-4	Silver		0.0599	0.299	1	U	SW6010B	9K11008	11/12/09 17:34
7440-23-5	Sodium		59.9	299	1	U	SW6010B	9K11008	11/12/09 17:34
7440-28-0	Thallium		0.180	0.479	1	U	SW6010B	9K11008	11/12/09 17:34
7440-62-2	Vanadium	6.99	0.299	0.749	1		SW6010B	9K11008	11/12/09 17:34
7440-66-6	Zinc	26.0	0.299	1.20	1	JN	SW6010B	9K11008	11/12/09 17:34 MSH

MSL
11/22/10

ANALYSIS DATA SHEET

MR07-SS30-09D

19

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UXO7)

Matrix: Soil

Laboratory ID: 0911026-19

Sampled: 11/03/09 10:55

Received: 11/04/09 08:00

% Solids: 86.04

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.145	0.291	1	U	SW9012A	9K16020	11/17/09 11:34
7439-97-6	Mercury	0.0316	0.0156	0.0397	1	J	SW7471A	9K10006	11/12/09 10:34
7429-90-5	Aluminum	5100	2.89	11.6	1		SW6010B	9K11008	11/12/09 17:39
7440-36-0	Antimony	0.465	0.289	0.867	1	JN	SW6010B	9K11008	11/12/09 17:39
7440-38-2	Arsenic	2.14	0.173	0.289	1		SW6010B	9K11008	11/12/09 17:39
7440-39-3	Barium	14.1	0.289	2.31	1		SW6010B	9K11008	11/12/09 17:39
7440-41-7	Beryllium	0.0789	0.0578	0.289	1	J	SW6010B	9K11008	11/12/09 17:39
7440-43-9	Cadmium	0.289	0.0578	0.289	1	UN	SW6010B	9K11008	11/12/09 17:39
7440-70-2	Calcium	1660	57.8	289	1	JN	SW6010B	9K11008	11/12/09 17:39
7440-47-3	Chromium	6.60	0.116	0.289	1		SW6010B	9K11008	11/12/09 17:39
7440-48-4	Cobalt	0.368	0.289	0.723	1	J	SW6010B	9K11008	11/12/09 17:39
7440-50-8	Copper	3.23	0.289	0.578	1	UN	SW6010B	9K11008	11/12/09 17:39
7439-89-6	Iron	3360	1.73	5.78	1		SW6010B	9K11008	11/12/09 17:39
7439-92-1	Lead	15.8	0.0867	0.173	1	JN	SW6010B	9K11008	11/12/09 17:39
7439-95-4	Magnesium	239	57.8	289	1	J	SW6010B	9K11008	11/12/09 17:39
7439-96-5	Manganese	18.7	0.173	0.867	1		SW6010B	9K11008	11/12/09 17:39
7440-02-0	Nickel	1.67	0.289	0.578	1		SW6010B	9K11008	11/12/09 17:39
7440-09-7	Potassium	233	57.8	289	1	JN	SW6010B	9K11008	11/12/09 17:39
7782-49-2	Selenium	0.422	0.173	0.289	1		SW6010B	9K11008	11/12/09 17:39
7440-22-4	Silver		0.116	0.289	1	U	SW6010B	9K11008	11/12/09 17:39
7440-23-5	Sodium		57.8	289	1	UN	SW6010B	9K11008	11/12/09 17:39
7440-28-0	Thallium		0.231	0.463	1	U	SW6010B	9K11008	11/12/09 17:39
7440-62-2	Vanadium	8.05	0.289	0.723	1		SW6010B	9K11008	11/12/09 17:39
7440-66-6	Zinc	24.0	0.289	1.16	1	JN	SW6010B	9K11008	11/12/09 17:39

MSL
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MSW
11/22/10

ANALYSIS DATA SHEET

20

MR07-SS32-09D

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UXO7)

Matrix: Soil

Laboratory ID: 0911026-20

Sampled: 11/03/09 11:15

Received: 11/04/09 08:00

% Solids: 85.84

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.146	0.291	1	U	SW9012A	9K16020	11/17/09 11:35
7439-97-6	Mercury	0.0229	0.0126	0.0330	1	J	SW7471A	9K10006	11/12/09 10:35
7429-90-5	Aluminum	6440	2.77	11.1	1		SW6010B	9K11008	11/12/09 17:44
7440-36-0	Antimony		0.277	0.832	1	JUN	SW6010B	9K11008	11/12/09 17:44
7440-38-2	Arsenic	2.01	0.166	0.277	1		SW6010B	9K11008	11/12/09 17:44
7440-39-3	Barium	12.7	0.277	2.22	1		SW6010B	9K11008	11/12/09 17:44
7440-41-7	Beryllium	0.0731	0.0555	0.277	1	J	SW6010B	9K11008	11/12/09 17:44
7440-43-9	Cadmium	0.277	0.0555	0.277	1	U	SW6010B	9K11008	11/12/09 17:44
7440-70-2	Calcium	1350	55.5	277	1	J	SW6010B	9K11008	11/12/09 17:44
7440-47-3	Chromium	7.35	0.111	0.277	1		SW6010B	9K11008	11/12/09 17:44
7440-48-4	Cobalt	0.420	0.277	0.693	1	J	SW6010B	9K11008	11/12/09 17:44
7440-50-8	Copper	3.14	0.277	0.555	1	U	SW6010B	9K11008	11/12/09 17:44
7439-89-6	Iron	4410	1.66	5.55	1		SW6010B	9K11008	11/12/09 17:44
7439-92-1	Lead	9.97	0.0832	0.166	1	J	SW6010B	9K11008	11/12/09 17:44
7439-95-4	Magnesium	253	55.5	277	1	J	SW6010B	9K11008	11/12/09 17:44
7439-96-5	Manganese	12.6	0.166	0.832	1		SW6010B	9K11008	11/12/09 17:44
7440-02-0	Nickel	1.84	0.277	0.555	1		SW6010B	9K11008	11/12/09 17:44
7440-09-7	Potassium	289	55.5	277	1	J	SW6010B	9K11008	11/12/09 17:44
7782-49-2	Selenium	0.291	0.166	0.277	1		SW6010B	9K11008	11/12/09 17:44
7440-22-4	Silver		0.111	0.277	1	U	SW6010B	9K11008	11/12/09 17:44
7440-23-5	Sodium		55.5	277	1	U	SW6010B	9K11008	11/12/09 17:44
7440-28-0	Thallium		0.166	0.444	1	U	SW6010B	9K11008	11/12/09 17:44
7440-62-2	Vanadium	10.4	0.277	0.693	1		SW6010B	9K11008	11/12/09 17:44
7440-66-6	Zinc	31.0	0.277	1.11	1	J	SW6010B	9K11008	11/12/09 17:44

MSL
MBL
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11/22/10

ANALYSIS DATA SHEET

21

MR07-EB110309-SS

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 11/03/09 11:30
 % Solids: 0.00

SDG: UXO7 002
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911026-21
 Received: 11/04/09 08:00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K05004	11/06/09 07:29
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9K05005	11/09/09 13:41
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K05005	11/09/09 13:41
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K05005	11/09/09 13:41
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9K05005	11/09/09 13:41
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K05005	11/09/09 13:41
7440-43-9	Cadmium	0.342	0.250	1.25	1	J	SW6010B	9K05005	11/09/09 13:41
7440-70-2	Calcium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:41
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K05005	11/09/09 13:41
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K05005	11/09/09 13:41
7440-50-8	Copper	19.5	1.25	2.50	1		SW6010B	9K05005	11/09/09 13:41
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9K05005	11/09/09 13:41
7439-92-1	Lead	1.12	0.375	0.750	1		SW6010B	9K05005	11/09/09 13:41
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:41
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9K05005	11/09/09 13:41
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K05005	11/09/09 13:41
7440-09-7	Potassium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:41
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K05005	11/11/09 13:04
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K05005	11/11/09 13:04
7440-23-5	Sodium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:41
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K05005	11/09/09 13:41
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9K05005	11/11/09 13:04
7440-66-6	Zinc	13.1	1.25	5.00	1		SW6010B	9K05005	11/09/09 13:41
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K05006	11/05/09 15:14

uw
11/22/10

ANALYSIS DATA SHEET

MR07-SS34-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-22

Sampled: 11/03/09 11:30

Received: 11/04/09 08:00

% Solids: 80.97

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.154	0.309	1	U	SW9012A	9K16020	11/17/09 11:36
7439-97-6	Mercury	0.0324	0.0172	0.0437	1	J	SW7471A	9K10006	11/12/09 10:36
7429-90-5	Aluminum	4910	3.00	12.0	1		SW6010B	9K11010	11/12/09 18:14
7440-36-0	Antimony	0.428	0.300	0.899	1	J	SW6010B	9K11010	11/12/09 18:14
7440-38-2	Arsenic	1.91	0.180	0.300	1		SW6010B	9K11010	11/12/09 18:14
7440-39-3	Barium	14.2	0.300	2.40	1	J	SW6010B	9K11010	11/12/09 18:14
7440-41-7	Beryllium	0.0799	0.0600	0.300	1	J	SW6010B	9K11010	11/12/09 18:14
7440-43-9	Cadmium	0.239 0.300	0.0600	0.300	1	U	SW6010B	9K11010	11/12/09 18:14
7440-70-2	Calcium	1450	60.0	300	1		SW6010B	9K11010	11/12/09 18:14
7440-47-3	Chromium	6.00	0.120	0.300	1		SW6010B	9K11010	11/12/09 18:14
7440-48-4	Cobalt	0.367	0.300	0.749	1	J	SW6010B	9K11010	11/12/09 18:14
7440-50-8	Copper	4.25	0.300	0.600	1	U	SW6010B	9K11010	11/12/09 18:14
7439-89-6	Iron	3250	1.80	6.00	1		SW6010B	9K11010	11/12/09 18:14
7439-92-1	Lead	13.3	0.0899	0.180	1		SW6010B	9K11010	11/12/09 18:14
7439-95-4	Magnesium	275	60.0	300	1	J	SW6010B	9K11010	11/12/09 18:14
7439-96-5	Manganese	21.0	0.180	0.899	1		SW6010B	9K11010	11/12/09 18:14
7440-02-0	Nickel	1.55	0.300	0.600	1		SW6010B	9K11010	11/12/09 18:14
7440-09-7	Potassium	214	60.0	300	1	J	SW6010B	9K11010	11/12/09 18:14
7782-49-2	Selenium	0.464	0.180	0.300	1		SW6010B	9K11010	11/12/09 18:14
7440-22-4	Silver		0.120	0.300	1	U	SW6010B	9K11010	11/12/09 18:14
7440-23-5	Sodium		60.0	300	1	U	SW6010B	9K11010	11/12/09 18:14
7440-28-0	Thallium		0.180	0.480	1	U	SW6010B	9K11010	11/12/09 18:14
7440-62-2	Vanadium	7.90	0.300	0.749	1		SW6010B	9K11010	11/12/09 18:14
7440-66-6	Zinc	26.4	0.300	1.20	1		SW6010B	9K11010	11/12/09 18:14

CCL

MBL

EBL

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1122/10

23

ANALYSIS DATA SHEET

MR07-SS29-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-23

Sampled: 11/03/09 11:20

Received: 11/04/09 08:00

% Solids: 66.09

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.189	0.378	1	U	SW9012A	9K16020	11/17/09 11:37
7439-97-6	Mercury	0.0229	0.0211	0.0535	1	J	SW7471A	9K10006	11/12/09 10:38
7429-90-5	Aluminum	6060	3.76	15.1	1		SW6010B	9K11010	11/12/09 18:18
7440-36-0	Antimony		0.376	1.13	1	U	SW6010B	9K11010	11/12/09 18:18
7440-38-2	Arsenic	1.50	0.226	0.376	1		SW6010B	9K11010	11/12/09 18:18
7440-39-3	Barium	14.6	0.376	3.01	1	J	SW6010B	9K11010	11/12/09 18:18
7440-41-7	Beryllium	0.0827	0.0753	0.376	1	J	SW6010B	9K11010	11/12/09 18:18
7440-43-9	Cadmium	0.1376 0.267	0.0753	0.376	1	J	SW6010B	9K11010	11/12/09 18:18
7440-70-2	Calcium	10400	75.3	376	1		SW6010B	9K11010	11/12/09 18:18
7440-47-3	Chromium	7.35	0.151	0.376	1		SW6010B	9K11010	11/12/09 18:18
7440-48-4	Cobalt	0.402	0.376	0.941	1	J	SW6010B	9K11010	11/12/09 18:18
7440-50-8	Copper	3.04	0.376	0.753	1	U	SW6010B	9K11010	11/12/09 18:18
7439-89-6	Iron	3330	2.26	7.53	1		SW6010B	9K11010	11/12/09 18:18
7439-92-1	Lead	12.2	0.113	0.226	1		SW6010B	9K11010	11/12/09 18:18
7439-95-4	Magnesium	421	75.3	376	1		SW6010B	9K11010	11/12/09 18:18
7439-96-5	Manganese	17.1	0.226	1.13	1		SW6010B	9K11010	11/12/09 18:18
7440-02-0	Nickel	1.70	0.376	0.753	1		SW6010B	9K11010	11/12/09 18:18
7440-09-7	Potassium	265	75.3	376	1	J	SW6010B	9K11010	11/12/09 18:18
7782-49-2	Selenium	0.361	0.226	0.376	1	J	SW6010B	9K11010	11/12/09 18:18
7440-22-4	Silver		0.151	0.376	1	U	SW6010B	9K11010	11/12/09 18:18
7440-23-5	Sodium		75.3	376	1	U	SW6010B	9K11010	11/12/09 18:18
7440-28-0	Thallium		0.226	0.602	1	U	SW6010B	9K11010	11/12/09 18:18
7440-62-2	Vanadium	9.96	0.376	0.941	1		SW6010B	9K11010	11/12/09 18:18
7440-66-6	Zinc	21.1	0.376	1.51	1		SW6010B	9K11010	11/12/09 18:18

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11/22/10

ANALYSIS DATA SHEET

MR07-SS27-09D

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/03/09 11:10
 % Solids: 64.00

SDG: UXO7_002
 Project: Lejeune CTO014 (UXO7)
 Laboratory ID: 0911026-24
 Received: 11/04/09 08:00

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.195	0.391	1	U	SW9012A	9K16020	11/17/09 11:38
7439-97-6	Mercury	0.0427	0.0210	0.0533	1	J	SW7471A	9K10006	11/12/09 10:39
7429-90-5	Aluminum	5090	3.85	15.4	1		SW6010B	9K11010	11/12/09 18:23
7440-36-0	Antimony		0.385	1.15	1	U	SW6010B	9K11010	11/12/09 18:23
7440-38-2	Arsenic	1.41	0.231	0.385	1		SW6010B	9K11010	11/12/09 18:23
7440-39-3	Barium	14.4	0.385	3.08	1	J	SW6010B	9K11010	11/12/09 18:23
7440-41-7	Beryllium		0.0770	0.385	1	U	SW6010B	9K11010	11/12/09 18:23
7440-43-9	Cadmium	0.385	0.0770	0.385	1	U	SW6010B	9K11010	11/12/09 18:23
7440-70-2	Calcium	1100	77.0	385	1		SW6010B	9K11010	11/12/09 18:23
7440-47-3	Chromium	5.23	0.154	0.385	1		SW6010B	9K11010	11/12/09 18:23
7440-48-4	Cobalt		0.385	0.962	1	U	SW6010B	9K11010	11/12/09 18:23
7440-50-8	Copper	2.83	0.385	0.770	1	U	SW6010B	9K11010	11/12/09 18:23
7439-89-6	Iron	3310	2.31	7.70	1		SW6010B	9K11010	11/12/09 18:23
7439-92-1	Lead	11.0	0.115	0.231	1		SW6010B	9K11010	11/12/09 18:23
7439-95-4	Magnesium	229	77.0	385	1	J	SW6010B	9K11010	11/12/09 18:23
7439-96-5	Manganese	15.2	0.231	1.15	1		SW6010B	9K11010	11/12/09 18:23
7440-02-0	Nickel	1.52	0.385	0.770	1		SW6010B	9K11010	11/12/09 18:23
7440-09-7	Potassium	225	77.0	385	1	J	SW6010B	9K11010	11/12/09 18:23
7782-49-2	Selenium	0.383	0.231	0.385	1	J	SW6010B	9K11010	11/12/09 18:23
7440-22-4	Silver		0.154	0.385	1	U	SW6010B	9K11010	11/12/09 18:23
7440-23-5	Sodium		77.0	385	1	U	SW6010B	9K11010	11/12/09 18:23
7440-28-0	Thallium		0.231	0.616	1	U	SW6010B	9K11010	11/12/09 18:23
7440-62-2	Vanadium	7.99	0.385	0.962	1		SW6010B	9K11010	11/12/09 18:23
7440-66-6	Zinc	17.9	0.385	1.54	1		SW6010B	9K11010	11/12/09 18:23

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ANALYSIS DATA SHEET

MR07-SS31-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-25

Sampled: 11/03/09 11:35

Received: 11/04/09 08:00

% Solids: 88.27

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.142	0.283	1	U	SW9012A	9K16020	11/17/09 11:40
7439-97-6	Mercury	0.0302	0.0134	0.0340	1	J	SW7471A	9K10006	11/12/09 10:40
7429-90-5	Aluminum	6010	2.75	11.0	1		SW6010B	9K11010	11/12/09 18:28
7440-36-0	Antimony	0.546	0.275	0.825	1	J	SW6010B	9K11010	11/12/09 18:28
7440-38-2	Arsenic	2.10	0.165	0.275	1		SW6010B	9K11010	11/12/09 18:28
7440-39-3	Barium	13.8	0.275	2.20	1	J	SW6010B	9K11010	11/12/09 18:28
7440-41-7	Beryllium	0.0795	0.0550	0.275	1	J	SW6010B	9K11010	11/12/09 18:28
7440-43-9	Cadmium	0.275	0.175	0.0550	1	JU	SW6010B	9K11010	11/12/09 18:28
7440-70-2	Calcium	1100	55.0	275	1		SW6010B	9K11010	11/12/09 18:28
7440-47-3	Chromium	6.27	0.110	0.275	1		SW6010B	9K11010	11/12/09 18:28
7440-48-4	Cobalt	0.374	0.275	0.687	1	J	SW6010B	9K11010	11/12/09 18:28
7440-50-8	Copper	2.41	0.275	0.550	1	U	SW6010B	9K11010	11/12/09 18:28
7439-89-6	Iron	3790	1.65	5.50	1		SW6010B	9K11010	11/12/09 18:28
7439-92-1	Lead	11.6	0.0825	0.165	1		SW6010B	9K11010	11/12/09 18:28
7439-95-4	Magnesium	245	55.0	275	1	J	SW6010B	9K11010	11/12/09 18:28
7439-96-5	Manganese	13.2	0.165	0.825	1		SW6010B	9K11010	11/12/09 18:28
7440-02-0	Nickel	1.71	0.275	0.550	1		SW6010B	9K11010	11/12/09 18:28
7440-09-7	Potassium	217	55.0	275	1	J	SW6010B	9K11010	11/12/09 18:28
7782-49-2	Selenium	0.379	0.165	0.275	1		SW6010B	9K11010	11/12/09 18:28
7440-22-4	Silver		0.110	0.275	1	U	SW6010B	9K11010	11/12/09 18:28
7440-23-5	Sodium		55.0	275	1	U	SW6010B	9K11010	11/12/09 18:28
7440-28-0	Thallium		0.165	0.440	1	U	SW6010B	9K11010	11/12/09 18:28
7440-62-2	Vanadium	9.00	0.275	0.687	1		SW6010B	9K11010	11/12/09 18:28
7440-66-6	Zinc	18.3	0.275	1.10	1		SW6010B	9K11010	11/12/09 18:28

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ANALYSIS DATA SHEET

26

MR07-SS31D-09D

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-26

Sampled: 11/03/09 11:45

Received: 11/04/09 08:00

% Solids: 88.64

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.141	0.282	1	U	SW9012A	9K16020	11/17/09 11:41
7439-97-6	Mercury	0.0366	0.0126	0.0330	1		SW7471A	9K10006	11/12/09 10:41
7429-90-5	Aluminum	7710	2.70	10.8	1		SW6010B	9K11010	11/12/09 18:32
7440-36-0	Antimony	0.322	0.270	0.810	1	J	SW6010B	9K11010	11/12/09 18:32
7440-38-2	Arsenic	2.15	0.162	0.270	1		SW6010B	9K11010	11/12/09 18:32
7440-39-3	Barium	16.5	0.270	2.16	1	J	SW6010B	9K11010	11/12/09 18:32
7440-41-7	Beryllium	0.0799	0.0540	0.270	1	J	SW6010B	9K11010	11/12/09 18:32
7440-43-9	Cadmium	0.270	0.172	0.0540	1	U	SW6010B	9K11010	11/12/09 18:32
7440-70-2	Calcium	1270	54.0	270	1		SW6010B	9K11010	11/12/09 18:32
7440-47-3	Chromium	8.38	0.108	0.270	1		SW6010B	9K11010	11/12/09 18:32
7440-48-4	Cobalt	0.460	0.270	0.675	1	J	SW6010B	9K11010	11/12/09 18:32
7440-50-8	Copper	2.84	0.270	0.540	1	U	SW6010B	9K11010	11/12/09 18:32
7439-89-6	Iron	5610	1.62	5.40	1		SW6010B	9K11010	11/12/09 18:32
7439-92-1	Lead	11.1	0.0810	0.162	1		SW6010B	9K11010	11/12/09 18:32
7439-95-4	Magnesium	314	54.0	270	1		SW6010B	9K11010	11/12/09 18:32
7439-96-5	Manganese	14.4	0.162	0.810	1		SW6010B	9K11010	11/12/09 18:32
7440-02-0	Nickel	2.00	0.270	0.540	1		SW6010B	9K11010	11/12/09 18:32
7440-09-7	Potassium	256	54.0	270	1	J	SW6010B	9K11010	11/12/09 18:32
7782-49-2	Selenium	0.363	0.162	0.270	1		SW6010B	9K11010	11/12/09 18:32
7440-22-4	Silver		0.108	0.270	1	U	SW6010B	9K11010	11/12/09 18:32
7440-23-5	Sodium		54.0	270	1	U	SW6010B	9K11010	11/12/09 18:32
7440-28-0	Thallium		0.162	0.432	1	U	SW6010B	9K11010	11/12/09 18:32
7440-62-2	Vanadium	12.3	0.270	0.675	1		SW6010B	9K11010	11/12/09 18:32
7440-66-6	Zinc	19.1	0.270	1.08	1		SW6010B	9K11010	11/12/09 18:32

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ANALYSIS DATA SHEET

27

MR07-SS33-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-27

Sampled: 11/03/09 11:40

Received: 11/04/09 08:00

% Solids: 76.17

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.241	0.164	0.328	1	J	SW9012A	9K16020	11/17/09 11:42
7439-97-6	Mercury	0.0286	0.0142	0.0361	1	J	SW7471A	9K10006	11/12/09 10:43
7429-90-5	Aluminum	4890	3.28	13.1	1		SW6010B	9K11010	11/12/09 18:37
7440-36-0	Antimony	0.530	0.328	0.985	1	J	SW6010B	9K11010	11/12/09 18:37
7440-38-2	Arsenic	2.40	0.197	0.328	1		SW6010B	9K11010	11/12/09 18:37
7440-39-3	Barium	16.0	0.328	2.63	1	J	SW6010B	9K11010	11/12/09 18:37
7440-41-7	Beryllium	0.0760	0.0656	0.328	1	J	SW6010B	9K11010	11/12/09 18:37
7440-43-9	Cadmium	0.352	0.0656	0.328	1		SW6010B	9K11010	11/12/09 18:37
7440-70-2	Calcium	1920	65.6	328	1		SW6010B	9K11010	11/12/09 18:37
7440-47-3	Chromium	6.42	0.131	0.328	1		SW6010B	9K11010	11/12/09 18:37
7440-48-4	Cobalt	0.357	0.328	0.821	1	J	SW6010B	9K11010	11/12/09 18:37
7440-50-8	Copper	7.02	0.328	0.656	1		SW6010B	9K11010	11/12/09 18:37
7439-89-6	Iron	3260	1.97	6.56	1		SW6010B	9K11010	11/12/09 18:37
7439-92-1	Lead	14.5	0.0985	0.197	1		SW6010B	9K11010	11/12/09 18:37
7439-95-4	Magnesium	231	65.6	328	1	J	SW6010B	9K11010	11/12/09 18:37
7439-96-5	Manganese	23.7	0.197	0.985	1		SW6010B	9K11010	11/12/09 18:37
7440-02-0	Nickel	1.77	0.328	0.656	1		SW6010B	9K11010	11/12/09 18:37
7440-09-7	Potassium	251	65.6	328	1	J	SW6010B	9K11010	11/12/09 18:37
7782-49-2	Selenium	0.376	0.197	0.328	1		SW6010B	9K11010	11/12/09 18:37
7440-22-4	Silver		0.0656	0.328	1	U	SW6010B	9K11010	11/12/09 18:37
7440-23-5	Sodium		65.6	328	1	U	SW6010B	9K11010	11/12/09 18:37
7440-28-0	Thallium		0.263	0.525	1	U	SW6010B	9K11010	11/12/09 18:37
7440-62-2	Vanadium	7.98	0.328	0.821	1		SW6010B	9K11010	11/12/09 18:37
7440-66-6	Zinc	52.4	0.328	1.31	1		SW6010B	9K11010	11/12/09 18:37

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ANALYSIS DATA SHEET

28

MR07-SS14-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-28

Sampled: 11/03/09 08:10

Received: 11/04/09 08:00

% Solids: 80.82

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.546	0.155	0.309	1		SW9012A	9K16020	11/17/09 11:43
7439-97-6	Mercury	0.0362	0.0146	0.0371	1	J	SW7471A	9K10006	11/12/09 10:44
7429-90-5	Aluminum	4760	3.03	12.1	1		SW6010B	9K11010	11/12/09 18:42
7440-36-0	Antimony		0.303	0.910	1	U	SW6010B	9K11010	11/12/09 18:42
7440-38-2	Arsenic	1.48	0.182	0.303	1		SW6010B	9K11010	11/12/09 18:42
7440-39-3	Barium	13.2	0.303	2.43	1	J	SW6010B	9K11010	11/12/09 18:42
7440-41-7	Beryllium	0.0743	0.0607	0.303	1	J	SW6010B	9K11010	11/12/09 18:42
7440-43-9	Cadmium	0.404	0.0607	0.303	1		SW6010B	9K11010	11/12/09 18:42
7440-70-2	Calcium	11200	60.7	303	1		SW6010B	9K11010	11/12/09 18:42
7440-47-3	Chromium	6.37	0.121	0.303	1		SW6010B	9K11010	11/12/09 18:42
7440-48-4	Cobalt	0.437	0.303	0.758	1	J	SW6010B	9K11010	11/12/09 18:42
7440-50-8	Copper	15.9	0.303	0.607	1		SW6010B	9K11010	11/12/09 18:42
7439-89-6	Iron	3970	1.82	6.07	1		SW6010B	9K11010	11/12/09 18:42
7439-92-1	Lead	12.7	0.0910	0.182	1		SW6010B	9K11010	11/12/09 18:42
7439-95-4	Magnesium	389	60.7	303	1		SW6010B	9K11010	11/12/09 18:42
7439-96-5	Manganese	22.1	0.182	0.910	1		SW6010B	9K11010	11/12/09 18:42
7440-02-0	Nickel	2.65	0.303	0.607	1		SW6010B	9K11010	11/12/09 18:42
7440-09-7	Potassium	289	60.7	303	1	J	SW6010B	9K11010	11/12/09 18:42
7782-49-2	Selenium	0.450	0.182	0.303	1		SW6010B	9K11010	11/12/09 18:42
7440-22-4	Silver		0.121	0.303	1	U	SW6010B	9K11010	11/12/09 18:42
7440-23-5	Sodium		60.7	303	1	U	SW6010B	9K11010	11/12/09 18:42
7440-28-0	Thallium		0.243	0.485	1	U	SW6010B	9K11010	11/12/09 18:42
7440-62-2	Vanadium	10.1	0.303	0.758	1		SW6010B	9K11010	11/12/09 18:42
7440-66-6	Zinc	35.2	0.303	1.21	1		SW6010B	9K11010	11/12/09 18:42

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ANALYSIS DATA SHEET

MR07-SS13-09D

29

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-29

Sampled: 11/03/09 08:18

Received: 11/04/09 08:00

% Solids: 82.14

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.152	0.304	1	U	SW9012A	9K16020	11/17/09 11:46
7439-97-6	Mercury	0.0293	0.0164	0.0416	1	J	SW7471A	9K10006	11/12/09 10:45
7429-90-5	Aluminum	5780	3.01	12.1	1		SW6010B	9K11010	11/12/09 18:47
7440-36-0	Antimony		0.301	0.904	1	U	SW6010B	9K11010	11/12/09 18:47
7440-38-2	Arsenic	1.14	0.181	0.301	1		SW6010B	9K11010	11/12/09 18:47
7440-39-3	Barium	14.3	0.301	2.41	1	J	SW6010B	9K11010	11/12/09 18:47
7440-41-7	Beryllium	0.0792	0.0603	0.301	1	J	SW6010B	9K11010	11/12/09 18:47
7440-43-9	Cadmium	0.301	0.206	0.0603	1	U	SW6010B	9K11010	11/12/09 18:47
7440-70-2	Calcium	7240	60.3	301	1		SW6010B	9K11010	11/12/09 18:47
7440-47-3	Chromium	6.69	0.121	0.301	1		SW6010B	9K11010	11/12/09 18:47
7440-48-4	Cobalt	0.477	0.301	0.753	1	J	SW6010B	9K11010	11/12/09 18:47
7440-50-8	Copper	2.94	0.301	0.603	1	U	SW6010B	9K11010	11/12/09 18:47
7439-89-6	Iron	3560	1.81	6.03	1		SW6010B	9K11010	11/12/09 18:47
7439-92-1	Lead	9.61	0.0904	0.181	1		SW6010B	9K11010	11/12/09 18:47
7439-95-4	Magnesium	390	60.3	301	1		SW6010B	9K11010	11/12/09 18:47
7439-96-5	Manganese	19.1	0.181	0.904	1		SW6010B	9K11010	11/12/09 18:47
7440-02-0	Nickel	2.01	0.301	0.603	1		SW6010B	9K11010	11/12/09 18:47
7440-09-7	Potassium	297	60.3	301	1	J	SW6010B	9K11010	11/12/09 18:47
7782-49-2	Selenium	0.487	0.181	0.301	1		SW6010B	9K11010	11/12/09 18:47
7440-22-4	Silver		0.121	0.301	1	U	SW6010B	9K11010	11/12/09 18:47
7440-23-5	Sodium		60.3	301	1	U	SW6010B	9K11010	11/12/09 18:47
7440-28-0	Thallium		0.181	0.482	1	U	SW6010B	9K11010	11/12/09 18:47
7440-62-2	Vanadium	10.2	0.301	0.753	1		SW6010B	9K11010	11/12/09 18:47
7440-66-6	Zinc	25.5	0.301	1.21	1		SW6010B	9K11010	11/12/09 18:47

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ANALYSIS DATA SHEET

MR07-SS16-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-30

Sampled: 11/03/09 08:30

Received: 11/04/09 08:00

% Solids: 80.49

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.155	0.311	1	U	SW9012A	9K16020	11/17/09 11:47
7439-97-6	Mercury	0.0289	0.0143	0.0362	1	J	SW7471A	9K10006	11/12/09 10:49
7429-90-5	Aluminum	4810	3.00	12.0	1		SW6010B	9K11010	11/12/09 18:51
7440-36-0	Antimony		0.300	0.900	1	U	SW6010B	9K11010	11/12/09 18:51
7440-38-2	Arsenic	1.53	0.180	0.300	1		SW6010B	9K11010	11/12/09 18:51
7440-39-3	Barium	11.6	0.300	2.40	1	J	SW6010B	9K11010	11/12/09 18:51
7440-41-7	Beryllium	0.0675	0.0600	0.300	1	J	SW6010B	9K11010	11/12/09 18:51
7440-43-9	Cadmium	0.300	0.192	0.0600	1	U	SW6010B	9K11010	11/12/09 18:51
7440-70-2	Calcium	2100	60.0	300	1		SW6010B	9K11010	11/12/09 18:51
7440-47-3	Chromium	6.30	0.120	0.300	1		SW6010B	9K11010	11/12/09 18:51
7440-48-4	Cobalt	0.374	0.300	0.750	1	J	SW6010B	9K11010	11/12/09 18:51
7440-50-8	Copper	3.35	0.300	0.600	1	U	SW6010B	9K11010	11/12/09 18:51
7439-89-6	Iron	3400	1.80	6.00	1		SW6010B	9K11010	11/12/09 18:51
7439-92-1	Lead	10.1	0.0900	0.180	1		SW6010B	9K11010	11/12/09 18:51
7439-95-4	Magnesium	257	60.0	300	1	J	SW6010B	9K11010	11/12/09 18:51
7439-96-5	Manganese	18.4	0.180	0.900	1		SW6010B	9K11010	11/12/09 18:51
7440-02-0	Nickel	1.96	0.300	0.600	1		SW6010B	9K11010	11/12/09 18:51
7440-09-7	Potassium	339	60.0	300	1		SW6010B	9K11010	11/12/09 18:51
7782-49-2	Selenium	0.433	0.180	0.300	1		SW6010B	9K11010	11/12/09 18:51
7440-22-4	Silver		0.120	0.300	1	U	SW6010B	9K11010	11/12/09 18:51
7440-23-5	Sodium		60.0	300	1	U	SW6010B	9K11010	11/12/09 18:51
7440-28-0	Thallium		0.180	0.480	1	U	SW6010B	9K11010	11/12/09 18:51
7440-62-2	Vanadium	8.75	0.300	0.750	1		SW6010B	9K11010	11/12/09 18:51
7440-66-6	Zinc	30.3	0.300	1.20	1		SW6010B	9K11010	11/12/09 18:51

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ANALYSIS DATA SHEET

MR07-SS18-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-31

Sampled: 11/03/09 08:40

Received: 11/04/09 08:00

% Solids: 66.93

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide	0.210	0.187	0.374	1	J	SW9012A	9K16020	11/17/09 11:49
7439-97-6	Mercury	0.0441	0.0171	0.0435	1		SW7471A	9K10006	11/12/09 10:50
7429-90-5	Aluminum	7050	3.64	14.6	1		SW6010B	9K11010	11/12/09 18:56
7440-36-0	Antimony	1.23	0.364	1.09	1		SW6010B	9K11010	11/12/09 18:56
7440-38-2	Arsenic	9.58	0.219	0.364	1		SW6010B	9K11010	11/12/09 18:56
7440-39-3	Barium	24.2	0.364	2.92	1	J	SW6010B	9K11010	11/12/09 18:56
7440-41-7	Beryllium	0.132	0.0729	0.364	1	J	SW6010B	9K11010	11/12/09 18:56
7440-43-9	Cadmium	0.884	0.0729	0.364	1		SW6010B	9K11010	11/12/09 18:56
7440-70-2	Calcium	6120	72.9	364	1		SW6010B	9K11010	11/12/09 18:56
7440-47-3	Chromium	19.5	0.146	0.364	1		SW6010B	9K11010	11/12/09 18:56
7440-48-4	Cobalt	1.58	0.364	0.911	1		SW6010B	9K11010	11/12/09 18:56
7440-50-8	Copper	16.6	0.364	0.729	1		SW6010B	9K11010	11/12/09 18:56
7439-89-6	Iron	5540	2.19	7.29	1		SW6010B	9K11010	11/12/09 18:56
7439-92-1	Lead	36.9	0.109	0.219	1		SW6010B	9K11010	11/12/09 18:56
7439-95-4	Magnesium	446	72.9	364	1		SW6010B	9K11010	11/12/09 18:56
7439-96-5	Manganese	60.3	0.219	1.09	1		SW6010B	9K11010	11/12/09 18:56
7440-02-0	Nickel	4.10	0.364	0.729	1		SW6010B	9K11010	11/12/09 18:56
7440-09-7	Potassium	585	72.9	364	1		SW6010B	9K11010	11/12/09 18:56
7782-49-2	Selenium	0.787	0.219	0.364	1		SW6010B	9K11010	11/12/09 18:56
7440-22-4	Silver		0.0729	0.364	1	U	SW6010B	9K11010	11/12/09 18:56
7440-23-5	Sodium		72.9	364	1	U	SW6010B	9K11010	11/12/09 18:56
7440-28-0	Thallium		0.292	0.583	1	U	SW6010B	9K11010	11/12/09 18:56
7440-62-2	Vanadium	13.5	0.364	0.911	1		SW6010B	9K11010	11/12/09 18:56
7440-66-6	Zinc	188	0.364	1.46	1		SW6010B	9K11010	11/12/09 18:56

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ANALYSIS DATA SHEET

32

MR07-FB110309

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911026-32

Sampled: 11/03/09 08:10

Received: 11/04/09 08:00

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K05004	11/06/09 07:30
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9K05005	11/09/09 13:46
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K05005	11/09/09 13:46
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K05005	11/09/09 13:46
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9K05005	11/09/09 13:46
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K05005	11/09/09 13:46
7440-43-9	Cadmium	0.381	0.250	1.25	1	J	SW6010B	9K05005	11/09/09 13:46
7440-70-2	Calcium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:46
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K05005	11/09/09 13:46
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K05005	11/09/09 13:46
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9K05005	11/09/09 13:46
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9K05005	11/09/09 13:46
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9K05005	11/09/09 13:46
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:46
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9K05005	11/09/09 13:46
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K05005	11/09/09 13:46
7440-09-7	Potassium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:46
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K05005	11/11/09 13:09
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K05005	11/11/09 13:09
7440-23-5	Sodium		250	1250	1	U	SW6010B	9K05005	11/09/09 13:46
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K05005	11/09/09 13:46
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9K05005	11/11/09 13:09
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9K05005	11/09/09 13:46
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K05006	11/05/09 15:16

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ANALYSIS DATA SHEET

33

MR07-SS15-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-33

Sampled: 11/03/09 08:35

Received: 11/04/09 08:00

% Solids: 86.40

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.145	0.289	1	U	SW9012A	9K16020	11/17/09 11:50
7439-97-6	Mercury	0.0277	0.0146	0.0370	1	J	SW7471A	9K10006	11/12/09 10:51
7429-90-5	Aluminum	6370	2.85	11.4	1		SW6010B	9K11010	11/12/09 19:14
7440-36-0	Antimony		0.285	0.855	1	U	SW6010B	9K11010	11/12/09 19:14
7440-38-2	Arsenic	1.89	0.171	0.285	1		SW6010B	9K11010	11/12/09 19:14
7440-39-3	Barium	13.9	0.285	2.28	1	J	SW6010B	9K11010	11/12/09 19:14
7440-41-7	Beryllium	0.0800	0.0570	0.285	1	J	SW6010B	9K11010	11/12/09 19:14
7440-43-9	Cadmium	0.272 0.285	0.0570	0.285	1	U	SW6010B	9K11010	11/12/09 19:14
7440-70-2	Calcium	20700	57.0	285	1		SW6010B	9K11010	11/12/09 19:14
7440-47-3	Chromium	7.87	0.114	0.285	1		SW6010B	9K11010	11/12/09 19:14
7440-48-4	Cobalt	0.454	0.285	0.713	1	J	SW6010B	9K11010	11/12/09 19:14
7440-50-8	Copper	3.00	0.285	0.570	1	U	SW6010B	9K11010	11/12/09 19:14
7439-89-6	Iron	4400	1.71	5.70	1		SW6010B	9K11010	11/12/09 19:14
7439-92-1	Lead	10.5	0.0855	0.171	1		SW6010B	9K11010	11/12/09 19:14
7439-95-4	Magnesium	629	57.0	285	1		SW6010B	9K11010	11/12/09 19:14
7439-96-5	Manganese	23.6	0.171	0.855	1		SW6010B	9K11010	11/12/09 19:14
7440-02-0	Nickel	1.80	0.285	0.570	1		SW6010B	9K11010	11/12/09 19:14
7440-09-7	Potassium	274	57.0	285	1	J	SW6010B	9K11010	11/12/09 19:14
7782-49-2	Selenium	0.483	0.171	0.285	1		SW6010B	9K11010	11/12/09 19:14
7440-22-4	Silver		0.114	0.285	1	U	SW6010B	9K11010	11/12/09 19:14
7440-23-5	Sodium		57.0	285	1	U	SW6010B	9K11010	11/12/09 19:14
7440-28-0	Thallium		0.228	0.456	1	U	SW6010B	9K11010	11/12/09 19:14
7440-62-2	Vanadium	11.3	0.285	0.713	1		SW6010B	9K11010	11/12/09 19:14
7440-66-6	Zinc	24.9	0.285	1.14	1		SW6010B	9K11010	11/12/09 19:14

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ANALYSIS DATA SHEET

34

MR07-SS20-09D

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/03/09 09:00
 % Solids: 79.70

SDG: UX07 002
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911026-34
 Received: 11/04/09 08:00

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.157	0.314	1	U	SW9012A	9K16020	11/17/09 11:51
7439-97-6	Mercury	0.0278	0.0169	0.0428	1	J	SW7471A	9K10006	11/12/09 10:53
7429-90-5	Aluminum	4560	3.08	12.3	1		SW6010B	9K11010	11/12/09 19:19
7440-36-0	Antimony	0.429	0.308	0.923	1	J	SW6010B	9K11010	11/12/09 19:19
7440-38-2	Arsenic	1.83	0.185	0.308	1		SW6010B	9K11010	11/12/09 19:19
7440-39-3	Barium	11.7	0.308	2.46	1	J	SW6010B	9K11010	11/12/09 19:19
7440-41-7	Beryllium	0.0710	0.0615	0.308	1	J	SW6010B	9K11010	11/12/09 19:19
7440-43-9	Cadmium	0.308	0.0615	0.308	1	u f	SW6010B	9K11010	11/12/09 19:19
7440-70-2	Calcium	1820	61.5	308	1		SW6010B	9K11010	11/12/09 19:19
7440-47-3	Chromium	5.50	0.123	0.308	1		SW6010B	9K11010	11/12/09 19:19
7440-48-4	Cobalt	0.318	0.308	0.769	1	J	SW6010B	9K11010	11/12/09 19:19
7440-50-8	Copper	3.42	0.308	0.615	1	u	SW6010B	9K11010	11/12/09 19:19
7439-89-6	Iron	3250	1.85	6.15	1		SW6010B	9K11010	11/12/09 19:19
7439-92-1	Lead	11.2	0.0923	0.185	1		SW6010B	9K11010	11/12/09 19:19
7439-95-4	Magnesium	232	61.5	308	1	J	SW6010B	9K11010	11/12/09 19:19
7439-96-5	Manganese	17.7	0.185	0.923	1		SW6010B	9K11010	11/12/09 19:19
7440-02-0	Nickel	1.66	0.308	0.615	1		SW6010B	9K11010	11/12/09 19:19
7440-09-7	Potassium	239	61.5	308	1	J	SW6010B	9K11010	11/12/09 19:19
7782-49-2	Selenium	0.426	0.185	0.308	1		SW6010B	9K11010	11/12/09 19:19
7440-22-4	Silver		0.123	0.308	1	U	SW6010B	9K11010	11/12/09 19:19
7440-23-5	Sodium		61.5	308	1	U	SW6010B	9K11010	11/12/09 19:19
7440-28-0	Thallium		0.246	0.492	1	U	SW6010B	9K11010	11/12/09 19:19
7440-62-2	Vanadium	7.79	0.308	0.769	1		SW6010B	9K11010	11/12/09 19:19
7440-66-6	Zinc	22.7	0.308	1.23	1		SW6010B	9K11010	11/12/09 19:19

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ANALYSIS DATA SHEET

MR07-SS17-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_002

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911026-35

Sampled: 11/03/09 09:15

Received: 11/04/09 08:00

% Solids: 84.72

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.148	0.295	1	U	SW9012A	9K16020	11/17/09 11:52
7439-97-6	Mercury	0.0335	0.0132	0.0334	1		SW7471A	9K10006	11/12/09 10:54
7429-90-5	Aluminum	4860	2.95	11.8	1		SW6010B	9K11010	11/12/09 19:24
7440-36-0	Antimony	0.300	0.295	0.885	1	J	SW6010B	9K11010	11/12/09 19:24
7440-38-2	Arsenic	2.52	0.177	0.295	1		SW6010B	9K11010	11/12/09 19:24
7440-39-3	Barium	13.5	0.295	2.36	1	J	SW6010B	9K11010	11/12/09 19:24
7440-41-7	Beryllium	0.0793	0.0590	0.295	1	J	SW6010B	9K11010	11/12/09 19:24
7440-43-9	Cadmium	0.295 0.202	0.0590	0.295	1	U	SW6010B	9K11010	11/12/09 19:24
7440-70-2	Calcium	1770	59.0	295	1		SW6010B	9K11010	11/12/09 19:24
7440-47-3	Chromium	6.39	0.118	0.295	1		SW6010B	9K11010	11/12/09 19:24
7440-48-4	Cobalt	0.407	0.295	0.738	1	J	SW6010B	9K11010	11/12/09 19:24
7440-50-8	Copper	4.97	0.295	0.590	1		SW6010B	9K11010	11/12/09 19:24
7439-89-6	Iron	3200	1.77	5.90	1		SW6010B	9K11010	11/12/09 19:24
7439-92-1	Lead	14.6	0.0885	0.177	1		SW6010B	9K11010	11/12/09 19:24
7439-95-4	Magnesium	231	59.0	295	1	J	SW6010B	9K11010	11/12/09 19:24
7439-96-5	Manganese	23.1	0.177	0.885	1		SW6010B	9K11010	11/12/09 19:24
7440-02-0	Nickel	1.82	0.295	0.590	1		SW6010B	9K11010	11/12/09 19:24
7440-09-7	Potassium	210	59.0	295	1	J	SW6010B	9K11010	11/12/09 19:24
7782-49-2	Selenium	0.335	0.177	0.295	1		SW6010B	9K11010	11/12/09 19:24
7440-22-4	Silver		0.118	0.295	1	U	SW6010B	9K11010	11/12/09 19:24
7440-23-5	Sodium		59.0	295	1	U	SW6010B	9K11010	11/12/09 19:24
7440-28-0	Thallium		0.177	0.472	1	U	SW6010B	9K11010	11/12/09 19:24
7440-62-2	Vanadium	8.14	0.295	0.738	1		SW6010B	9K11010	11/12/09 19:24
7440-66-6	Zinc	24.3	0.295	1.18	1		SW6010B	9K11010	11/12/09 19:24

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EXPLOSIVES
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_003

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 21, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-FB1112-09	0911121-01	Water
2	MR07-EB111209-SD	0911121-03	Water
3	MR07-SW01-09D	0911121-05	Water
4	MR07-SW01D-09D	0911121-07	Water
5	MR07-SD01-09D	0911121-09	Soil
6	MR07-SD01D-09D	0911121-10	Soil
7	MR07-SW02-09D	0911121-11	Water
7MS	MR07-SW02-09DMS	0911121-11MS	Water
7MSD	MR07-SW02-09DMSD	0911121-11MSD	Water
8	MR07-SD02-09D	0911121-13	Soil
8MS	MR07-SD02-09DMS	0911121-13MS	Soil
8MSD	MR07-SD02-09DMSD	0911121-13MSD	Soil

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples, 14 days for soil samples and analyzed within 40 days.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and/or correlation coefficient values.

Calibration Verification - The continuing calibrations exhibited acceptable %D values.

Surrogates - Many samples exhibited acceptable surrogate recoveries on the primary column and slightly high recoveries on the confirmation column. No action was taken since the primary column recoveries were within QC limits.

MS/MSD - The MS/MSD samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
7	HMX	54%/62%/Ok	J/UJ
	1,3,5-Trinitrobenene	15%/22%/41	
	Tetryl	12%/19%/48	
	2-Amino-4,6-Dinitrotoluene	Ok/Ok/34	None for RPD alone
	4-Nitrotoluene	Ok/Ok/32	
	3-Nitrotoluene	Ok/Ok/34	
		Nitroglycerin	55%/Ok/Ok
8	1,3,5-Trinitrobenzene	61%/Ok/36	J/UJ
	Tetryl	30%/21%/32	

Laboratory Control Sample - The LCS samples exhibited acceptable %R values except the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
9K16007-BLK1	Tetryl	32%/	J/UJ	5, 6
9K16009-BLK1	HMX	53%	J/UJ	1-4
	1,3,5-Trinitrobenzene	18%		
	Tetryl	10%		
	Nitroglycerin	56%		

Method Blank - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-FB111209	RDX	0.070	0.35	None	All ND
	Nitrobenzene	0.061	0.305		
	1,3,5-Trinitrobenzene	0.062	0.31	U	7
	2,4-Dinitrotoluene	0.11	0.55	None	All ND
	2,6-Dinitrotoluene	0.19	0.95		
	2-Amino-4,6-dinitrotoluene	0.05	0.25	U	3, 7
	2-Nitrotoluene	0.11	0.55	None	All ND
	4-Nitrotoluene	0.48	2.4	U	4
3-Nitrotoluene	0.059	0.295	U	3, 4	
MR07-EB111209-SD	HMX	0.049	0.245	None	All ND
	1,3,5-Trinitrobenzene	0.14	0.70		
	2,4-Dinitrotoluene	0.14	0.70		
	2,6-Dinitrotoluene	0.23	1.15		
	2-Amino-4,6-dinitrotoluene	0.090	0.45		
	2-Nitrotoluene	0.071	0.355		
	4-Nitrotoluene	0.57	2.85		

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-SW01-09D ug/L	MR07-SW01D-09D ug/L	RPD	Qualifier
4-Amino-2,6-dinitrotoluene	0.083	0.064	26%	None

Compound	MR07-SD01-09D ug/kg	MR07-SD01D-09D ug/kg	RPD	Qualifier
None	ND	ND	-	-

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - Several samples exhibited results with high %D values between columns and have been flagged (P) by the laboratory and further qualified (J).

FORM 1
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CLIENT SAMPLE NO. 1

MR07-FB111209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) WATER Lab Sample ID: 0911121-01

Sample wt/vol: 1070 (g/ml) ML Lab File ID: 037V3701

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/12/09 12:40

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/13/09 09:02

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	RL	CONC	
2691-41-0-----	HMX	0.047	0.14	BSL	U W J
121-82-4-----	RDX	0.047	0.14	2C 0.070	JPM J
98-95-3-----	Nitrobenzene	0.047	0.14	↓ 0.061	JPM J
99-65-0-----	1,3-Dinitrobenzene	0.047	0.14	U	U
99-35-4-----	1,3,5-Trinitrobenzene	0.047	0.14	BSL 0.062	JP J
121-14-2-----	2,4-Dinitrotoluene	0.047	0.14	2C 0.11	JP
606-20-2-----	2,6-Dinitrotoluene	0.047	0.14	↓ 0.19	DM
118-96-7-----	2,4,6-Trinitrotoluene	0.047	0.14	U	U
35572-78-2----	2-Amino-4,6-dinitrotoluene	0.047	0.14	2C 0.050	JPM J
479-45-8-----	Tetryl	0.047	0.14	BSL	U W J
19406-51-0----	4-Amino-2,6-dinitrotoluene	0.047	0.14	U	U
88-72-2-----	2-Nitrotoluene	0.047	0.14	2C 0.11	JPM J
99-99-0-----	4-Nitrotoluene	0.047	0.14	0.48	DM
99-08-1-----	3-Nitrotoluene	0.047	0.14	↓ 0.059	JPM
55-63-0-----	Nitroglycerin	0.16	0.48	BSL	U W J
78-11-5-----	PETN	0.16	0.48	U	U

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FORM 1
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CLIENT SAMPLE NO. **2**

MR07-EB1
11209-SD

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) WATER Lab Sample ID: 0911121-03

Sample wt/vol: 1070 (g/ml) ML Lab File ID: 038V3801

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/12/09 12:45

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/13/09 09:35

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
2691-41-0-----	HMX	0.047	0.14	BSL 0.049	JPM J
121-82-4-----	RDX	0.047	0.14		U
98-95-3-----	Nitrobenzene	0.047	0.14		U
99-65-0-----	1,3-Dinitrobenzene	0.047	0.14		U
99-35-4-----	1,3,5-Trinitrobenzene	0.047	0.14	BSL 0.14	J
121-14-2-----	2,4-Dinitrotoluene	0.047	0.14	ZC 0.14	JP J
606-20-2-----	2,6-Dinitrotoluene	0.047	0.14	ZC 0.23	DM J
118-96-7-----	2,4,6-Trinitrotoluene	0.047	0.14		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	0.047	0.14	ZC 0.090	JPM J
479-45-8-----	Tetryl	0.047	0.14	BSL	JP J
19406-51-0----	4-Amino-2,6-dinitrotoluene	0.047	0.14		U
88-72-2-----	2-Nitrotoluene	0.047	0.14	ZC 0.071	JPM J
99-99-0-----	4-Nitrotoluene	0.047	0.14	ZC 0.57	JP J
99-08-1-----	3-Nitrotoluene	0.047	0.14		U
55-63-0-----	Nitroglycerin	0.16	0.48	BSL	JP J
78-11-5-----	PETN	0.16	0.48		U

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FORM 1
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CLIENT SAMPLE NO. 3

MR07-SW01-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) WATER Lab Sample ID: 0911121-05

Sample wt/vol: 1040 (g/ml) ML Lab File ID: 039V3901

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/12/09 12:15

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/13/09 10:07

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L	Q
		MDL	(ug/L or ug/Kg) RL CONC		
2691-41-0-----	HMX	0.048	0.14	BSL	U UJ
121-82-4-----	RDX	0.048	0.14		U
98-95-3-----	Nitrobenzene	0.048	0.14		U
99-65-0-----	1,3-Dinitrobenzene	0.048	0.14		U
99-35-4-----	1,3,5-Trinitrobenzene	0.048	0.14	BSL	U UJ
121-14-2-----	2,4-Dinitrotoluene	0.048	0.14		U
606-20-2-----	2,6-Dinitrotoluene	0.048	0.14		U
118-96-7-----	2,4,6-Trinitrotoluene	0.048	0.14		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	0.048	0.14	FBL 0.050	JPMO.14
479-45-8-----	Tetryl	0.048	0.14	BSL	U UJ
19406-51-0----	4-Amino-2,6-dinitrotoluene	0.048	0.14	2L 0.083	U UJ
88-72-2-----	2-Nitrotoluene	0.048	0.14		U
99-99-0-----	4-Nitrotoluene	0.048	0.14		U
99-08-1-----	3-Nitrotoluene	0.048	0.14	FBL 0.15	PM U.
55-63-0-----	Nitroglycerin	0.16	0.49	BSL	U UJ
78-11-5-----	PETN	0.16	0.49		U

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CLIENT SAMPLE NO.

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MR07-SW01D-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) WATER Lab Sample ID: 0911121-07

Sample wt/vol: 1040 (g/ml) ML Lab File ID: 040V4001

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/12/09 12:25

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/13/09 10:40

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0	-----HMX	0.048	0.14	BSL	JKJ
121-82-4	-----RDX	0.048	0.14		U
98-95-3	-----Nitrobenzene	0.048	0.14		U
99-65-0	-----1,3-Dinitrobenzene	0.048	0.14		U
99-35-4	-----1,3,5-Trinitrobenzene	0.048	0.14	BSL	JKJ
121-14-2	-----2,4-Dinitrotoluene	0.048	0.14		U
606-20-2	-----2,6-Dinitrotoluene	0.048	0.14		U
118-96-7	-----2,4,6-Trinitrotoluene	0.048	0.14		U
35572-78-2	----2-Amino-4,6-dinitrotoluene	0.048	0.14		U
479-45-8	-----Tetryl	0.048	0.14	BSL	JKJ
19406-51-0	----4-Amino-2,6-dinitrotoluene	0.048	0.14	0.064	J
88-72-2	-----2-Nitrotoluene	0.048	0.14		U
99-99-0	-----4-Nitrotoluene	0.048	0.14	FBL 0.097	JPM 0.14 U
99-08-1	-----3-Nitrotoluene	0.048	0.14	FBL 0.100	JPM 0.14 U
55-63-0	-----Nitroglycerin	0.16	0.49	BSL	JKJ
78-11-5	-----PETN	0.16	0.49		U

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CLIENT SAMPLE NO.

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MR07-SD01-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) SOIL Lab Sample ID: 0911121-09

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 020V2001

% Moisture: 0 decanted: (Y/N) N Date Sampled: 11/12/09 12:30

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 11/17/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/12/09 23:43

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL CONC		
2691-41-0-----	HMX	62	190		U
121-82-4-----	RDX	62	190		U
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190	BSL	X UJ
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U E
78-11-5-----	PETN	210	640		U

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FORM 1
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CLIENT SAMPLE NO.

MR07-SD01D-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) SOIL Lab Sample ID: 0911121-10

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 021V2101

% Moisture: 0 decanted: (Y/N) N Date Sampled: 11/12/09 12:35

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 11/17/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/13/09 00:16

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL CONC		
2691-41-0-----	HMX	62	190		U
121-82-4-----	RDX	62	190		U
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190	BSL	U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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FORM 1
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CLIENT SAMPLE NO. 7

MR07-SW02-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) WATER Lab Sample ID: 0911121-11

Sample wt/vol: 1060 (g/ml) ML Lab File ID: 049V4901

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/12/09 11:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/13/09 13:59

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
2691-41-0	HMX	0.047	0.14	MSL	Y U J
121-82-4	RDX	0.047	0.14		U
98-95-3	Nitrobenzene	0.047	0.14		U
99-65-0	1,3-Dinitrobenzene	0.047	0.14	MSL	U
99-35-4	1,3,5-Trinitrobenzene	0.047	0.14	EBC 0.055	Y 0.14 U J
121-14-2	2,4-Dinitrotoluene	0.047	0.14		U
606-20-2	2,6-Dinitrotoluene	0.047	0.14		U
118-96-7	2,4,6-Trinitrotoluene	0.047	0.14		U
35572-78-2	2-Amino-4,6-dinitrotoluene	0.047	0.14	FBL 0.068	Y 0.14 U J
479-45-8	Tetryl	0.047	0.14	MSL	Y U J
19406-51-0	4-Amino-2,6-dinitrotoluene	0.047	0.14	ZC 0.061	Y U J
88-72-2	2-Nitrotoluene	0.047	0.14		U
99-99-0	4-Nitrotoluene	0.047	0.14		U
99-08-1	3-Nitrotoluene	0.047	0.14		U
55-63-0	Nitroglycerin	0.16	0.48	MSL	Y U J
78-11-5	PETN	0.16	0.48		U

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FORM 1
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CLIENT SAMPLE NO.

8

MR07-SD02-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_003

Matrix: (soil/water) SOIL Lab Sample ID: 0911121-13

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 022V2201

% Moisture: 0 decanted: (Y/N) N Date Sampled: 11/12/09 11:45

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 11/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/13/09 00:49

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190		U
121-82-4-----	RDX	62	190		U
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190	MSL	U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190	MSL	U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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METALS & CYANIDE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_003

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 21, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1*	MR07-FB1112-09 (T)	0911121-01	Water
2	MR07-FB1112-09 (D)	0911121-02	Water
3	MR07-EB111209-SD (T)	0911121-03	Water
4*	MR07-SW01-09D (T)	0911121-05	Water
5	MR07-SW01-09D (D)	0911121-06	Water
6*	MR07-SW01D-09D (T)	0911121-07	Water
7	MR07-SW01D-09D (D)	0911121-08	Water
8*	MR07-SD01-09D (T)	0911121-09	Soil
9*	MR07-SD01D-09D (T)	0911121-10	Soil
10*	MR07-SW02-09D (D)	0911121-11	Water
10MS*	MR07-SW02-09D (D)MS	0911121-11MS	Water
10MSD*	MR07-SW02-09D (D)MSD	0911121-11MSD	Water
11	MR07-SW02-09D (D)	0911121-12	Water
11MS	MR07-SW02-09D (D)MS	0911121-12MS	Water
11MSD	MR07-SW02-09D (D)MSD	0911121-12MSD	Water
12*	MR07-SD02-09D (T)	0911121-13	Soil
12MS*	MR07-SD02-09D (T)MS	0911121-13MS	Soil
12MSD*	MR07-SD02-09D (T)MSD	0911121-13MSD	Soil

* - Cyanide analyzed in samples 1, 4, 6, 8, 9, 10, 12 only

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 14 days for cyanide, 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination.

Blank ID	Compound	Conc. mg/kg	Action Level mg/kg	Qualifier	Affected Samples
9K20003-BLK1	Cadmium	0.0719	0.3595	U	8, 9
	Selenium	0.271	1.3550	None	All ND
9K20003-BLK2	Zinc	0.275	1.375	None	All >5X

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-FB111209 (T)	None - ND	-	-	-	-
MR07-FB111209 (D)	Zinc	2.00	10	U	11
MR07-EB111209-SD (T)	Cadmium	0.253	1.265	None	All ND or >5X
	Sodium	267	1335		

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Duplicate - The matrix spike/duplicate samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	%R	Qualifier	Affected Samples
10	Total Aluminum	142%/186%/Ok	J	4-7, 10, 11
12	Total Antimony	21.2%/21.7%/Ok	J/UJ	8, 9, 12
	Total Magnesium	128%/135%/Ok	J	8, 9, 12

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-SW01-09D (T) ug/L	MR07-SW01D-09D (T) ug/L	RPD	Qualifier
Aluminum	173	181	5%	None
Barium	7.86	7.96	1%	None
Cadmium	0.386	0.388	1%	None
Calcium	20900	21200	1%	None
Chromium	0.662	1.25 U	NC	None

Compound	MR07-SW01-09D (T) ug/L	MR07-SW01D-09D (T) ug/L	RPD	Qualifier
Copper	4.47	4.44	1%	None
Iron	69.5	72.4	4%	None
Lead	0.724	0.427	52%	None
Magnesium	822	833	1%	None
Manganese	1.84	1.90	3%	None
Potassium	1350	1350	0%	None
Sodium	1060	1050	1%	None
Vanadium	3.12 U	1.32	NC	None
Zinc	11.1	8.52	26%	None

Compound	MR07-SW01-09D (D) ug/L	MR07-SW01D-09D (D) ug/L	RPD	Qualifier
Aluminum	40.1	41.2	3%	None
Barium	6.50	6.63	2%	None
Cadmium	0.339	0.356	5%	None
Calcium	18100	18800	4%	None
Copper	3.27	3.30	1%	None
Iron	13.8	12.0	14%	None
Magnesium	713	737	3%	None
Manganese	0.904	0.927	3%	None
Potassium	1160	1180	2%	None
Sodium	935	968	3%	None
Zinc	6.37	5.69	11%	None

Compound	MR07-SD01-09D (T) ug/kg	MR07-SD01D-09D (T) ug/kg	RPD	Qualifier
Aluminum	2930	2990	2%	None
Arsenic	1.06	0.872	19%	None
Barium	12.7	12.9	2%	None
Beryllium	0.0682	0.323 U	NC	None
Calcium	44000	41300	6%	None
Chromium	3.93	3.58	9%	None
Cobalt	0.644	0.598	7%	None
Copper	2.94	1.88	44%	None
Iron	1730	2190	23%	None
Lead	6.60	9.41	35%	None
Magnesium	665	693	4%	None
Manganese	42.1	38.3	9%	None
Mercury	0.0394	0.0195	68%	None
Nickel	2.65	2.63	1%	None
Potassium	184	165	11%	None
Vanadium	5.23	5.19	1%	None
Zinc	16.4	20.4	22%	None

Compound Quantitation - Several analytes were analyzed at a dilution due to high concentrations of target compounds.

ANALYSIS DATA SHEET

MR07-FB111209

Laboratory: Empirical Laboratories, LLC

SDG: UX07_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-01

Sampled: 11/12/09 12:40

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:28
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9K18005	11/23/09 15:11
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 15:11
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9K18005	11/23/09 15:11
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-70-2	Calcium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:11
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:11
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9K18005	11/23/09 15:11
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9K18005	11/23/09 15:11
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9K18005	11/23/09 15:11
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:11
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9K18005	11/23/09 15:11
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 15:11
7440-09-7	Potassium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:11
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:11
7440-23-5	Sodium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:11
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 15:11
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:11
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9K18005	11/23/09 15:11
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K19020	11/20/09 10:40

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ANALYSIS DATA SHEET

MR07-FB111209

2

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 11/12/09 12:40
 % Solids: 0.00

SDG: UX07 003
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911121-02
 Received: 11/13/09 08:15

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:29
7429-90-5	Aluminum (dissolved)		12.5	50.0	1	U	SW6010B	9K18005	11/23/09 15:16
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 15:16
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-39-3	Barium (dissolved)		1.25	10.0	1	U	SW6010B	9K18005	11/23/09 15:16
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-43-9	Cadmium (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-70-2	Calcium (dissolved)		250	1250	1	U	SW6010B	9K18005	11/23/09 15:16
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:16
7440-50-8	Copper (dissolved)		1.25	2.50	1	U	SW6010B	9K18005	11/23/09 15:16
7439-89-6	Iron (dissolved)		7.50	25.0	1	U	SW6010B	9K18005	11/23/09 15:16
7439-92-1	Lead (dissolved)		0.500	0.750	1	U	SW6010B	9K18005	11/23/09 15:16
7439-95-4	Magnesium (dissolved)		250	1250	1	U	SW6010B	9K18005	11/23/09 15:16
7439-96-5	Manganese (dissolved)		0.750	3.75	1	U	SW6010B	9K18005	11/23/09 15:16
7440-02-0	Nickel (dissolved)		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 15:16
7440-09-7	Potassium (dissolved)		250	1250	1	U	SW6010B	9K18005	11/23/09 15:16
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:16
7440-23-5	Sodium (dissolved)		250	1250	1	U	SW6010B	9K18005	11/23/09 15:16
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 15:16
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:16
7440-66-6	Zinc (dissolved)	2.00	1.25	5.00	1	JN	SW6010B	9K18005	11/23/09 15:16

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ANALYSIS DATA SHEET

 MR07-EB111209-SD 3

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0911121-03

 Sampled: 11/12/09 12:45

 Received: 11/13/09 08:15

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:30
7429-90-5	Aluminum		12.5	50.0	1	U N	SW6010B	9K18005	11/23/09 15:46
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 15:46
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:46
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9K18005	11/23/09 15:46
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:46
7440-43-9	Cadmium	0.253	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 15:46
7440-70-2	Calcium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:46
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 15:46
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:46
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9K18005	11/23/09 15:46
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9K18005	11/23/09 15:46
7439-92-1	Lead		0.500	0.750	1	U	SW6010B	9K18005	11/23/09 15:46
7439-95-4	Magnesium		250	1250	1	U N	SW6010B	9K18005	11/23/09 15:46
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9K18005	11/23/09 15:46
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 15:46
7440-09-7	Potassium		250	1250	1	U	SW6010B	9K18005	11/23/09 15:46
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:46
7440-22-4	Silver		0.250	1.25	1	U N	SW6010B	9K18005	11/23/09 15:46
7440-23-5	Sodium	267	250	1250	1	J	SW6010B	9K18005	11/23/09 15:46
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 15:46
7440-62-2	Vanadium		1.25	3.12	1	U N	SW6010B	9K18005	11/23/09 15:46
7440-66-6	Zinc		1.25	5.00	1	U N	SW6010B	9K18005	11/23/09 15:46

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ANALYSIS DATA SHEET

MR07-SW01-09D

4

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0911121-05

 Sampled: 11/12/09 12:15

 Received: 11/13/09 08:15

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:32
7429-90-5	Aluminum <i>MSH</i>	173 <i>J</i>	12.5	50.0	1	U	SW6010B	9K18005	11/23/09 15:51
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 15:51
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:51
7440-39-3	Barium	7.86	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 15:51
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:51
7440-43-9	Cadmium	0.386	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 15:51
7440-70-2	Calcium	20900	250	1250	1		SW6010B	9K18005	11/23/09 15:51
7440-47-3	Chromium	0.662	0.500	1.25	1	J	SW6010B	9K18005	11/23/09 15:51
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:51
7440-50-8	Copper	4.47	1.25	2.50	1		SW6010B	9K18005	11/23/09 15:51
7439-89-6	Iron	69.5	7.50	25.0	1		SW6010B	9K18005	11/23/09 15:51
7439-92-1	Lead	0.724	0.375	0.750	1	J	SW6010B	9K18005	11/23/09 15:51
7439-95-4	Magnesium	822	250	1250	1	J	SW6010B	9K18005	11/23/09 15:51
7439-96-5	Manganese	1.84	0.750	3.75	1	J	SW6010B	9K18005	11/23/09 15:51
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 15:51
7440-09-7	Potassium	1350	250	1250	1		SW6010B	9K18005	11/23/09 15:51
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:51
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:51
7440-23-5	Sodium	1060	250	1250	1	J	SW6010B	9K18005	11/23/09 15:51
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 15:51
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:51
7440-66-6	Zinc	11.1	1.25	5.00	1	U	SW6010B	9K18005	11/23/09 15:51
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K19020	11/20/09 12:07

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 2/21/10

ANALYSIS DATA SHEET

MR07-SW01-09D

Laboratory: Empirical Laboratories, LLCSDG: UX07_003Client: CH2M Hill, Inc.Project: Lejeune CTO014 (UX07)Matrix: WaterLaboratory ID: 0911121-06Sampled: 11/12/09 12:15Received: 11/13/09 08:15% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:34
7429-90-5	Aluminum (dissolved) <i>MSH</i>	40.1 <i>J</i>	12.5	50.0	1	J	SW6010B	9K18005	11/23/09 15:55
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 15:55
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:55
7440-39-3	Barium (dissolved)	6.50	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 15:55
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:55
7440-43-9	Cadmium (dissolved)	0.339	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 15:55
7440-70-2	Calcium (dissolved)	18100	250	1250	1		SW6010B	9K18005	11/23/09 15:55
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 15:55
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:55
7440-50-8	Copper (dissolved)	3.27	1.25	2.50	1		SW6010B	9K18005	11/23/09 15:55
7439-89-6	Iron (dissolved)	13.8	7.50	25.0	1	J	SW6010B	9K18005	11/23/09 15:55
7439-92-1	Lead (dissolved)		0.375	0.750	1	U	SW6010B	9K18005	11/23/09 15:55
7439-95-4	Magnesium (dissolved)	713	250	1250	1	J	SW6010B	9K18005	11/23/09 15:55
7439-96-5	Manganese (dissolved)	0.904	0.750	3.75	1	J	SW6010B	9K18005	11/23/09 15:55
7440-02-0	Nickel (dissolved)		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 15:55
7440-09-7	Potassium (dissolved)	1160	250	1250	1	J	SW6010B	9K18005	11/23/09 15:55
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 15:55
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 15:55
7440-23-5	Sodium (dissolved)	935	250	1250	1	J	SW6010B	9K18005	11/23/09 15:55
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 15:55
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 15:55
7440-66-6	Zinc (dissolved)	6.37	1.25	5.00	1	N	SW6010B	9K18005	11/23/09 15:55

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ANALYSIS DATA SHEET

MR07-SW01D-09D

6

Laboratory: Empirical Laboratories, LLC

SDG: UX07_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-07

Sampled: 11/12/09 12:25

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:35
7429-90-5	Aluminum <i>MSH</i>	181 <i>J</i>	12.5	50.0	1	<i>J</i>	SW6010B	9K18005	11/23/09 16:00
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 16:00
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:00
7440-39-3	Barium	7.96	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 16:00
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:00
7440-43-9	Cadmium	0.388	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 16:00
7440-70-2	Calcium	21200	250	1250	1		SW6010B	9K18005	11/23/09 16:00
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 16:00
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:00
7440-50-8	Copper	4.44	1.25	2.50	1		SW6010B	9K18005	11/23/09 16:00
7439-89-6	Iron	72.4	7.50	25.0	1		SW6010B	9K18005	11/23/09 16:00
7439-92-1	Lead	0.427	0.375	0.750	1	J	SW6010B	9K18005	11/23/09 16:00
7439-95-4	Magnesium	833	250	1250	1	<i>J</i>	SW6010B	9K18005	11/23/09 16:00
7439-96-5	Manganese	1.90	0.750	3.75	1	J	SW6010B	9K18005	11/23/09 16:00
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 16:00
7440-09-7	Potassium	1350	250	1250	1		SW6010B	9K18005	11/23/09 16:00
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:00
7440-22-4	Silver		0.250	1.25	1	<i>U</i>	SW6010B	9K18005	11/23/09 16:00
7440-23-5	Sodium	1050	250	1250	1	J	SW6010B	9K18005	11/23/09 16:00
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 16:00
7440-62-2	Vanadium	1.32	1.25	3.12	1	<i>J</i>	SW6010B	9K18005	11/23/09 16:00
7440-66-6	Zinc	8.52	1.25	5.00	1	<i>J</i>	SW6010B	9K18005	11/23/09 16:00
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K19020	11/20/09 12:08

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2/21/10

ANALYSIS DATA SHEET

MR07-SW01D-09D

7

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0911121-08

 Sampled: 11/12/09 12:25

 Received: 11/13/09 08:15

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:36
7429-90-5	Aluminum (dissolved) <i>MSH</i>	41.2 <i>J</i>	12.5	50.0	1	U	SW6010B	9K18005	11/23/09 16:05
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 16:05
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:05
7440-39-3	Barium (dissolved)	6.63	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 16:05
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:05
7440-43-9	Cadmium (dissolved)	0.356	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 16:05
7440-70-2	Calcium (dissolved)	18800	250	1250	1		SW6010B	9K18005	11/23/09 16:05
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 16:05
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:05
7440-50-8	Copper (dissolved)	3.30	1.25	2.50	1		SW6010B	9K18005	11/23/09 16:05
7439-89-6	Iron (dissolved)	12.0	7.50	25.0	1	J	SW6010B	9K18005	11/23/09 16:05
7439-92-1	Lead (dissolved)		0.375	0.750	1	U	SW6010B	9K18005	11/23/09 16:05
7439-95-4	Magnesium (dissolved)	737	250	1250	1	J	SW6010B	9K18005	11/23/09 16:05
7439-96-5	Manganese (dissolved)	0.927	0.750	3.75	1	J	SW6010B	9K18005	11/23/09 16:05
7440-02-0	Nickel (dissolved)		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 16:05
7440-09-7	Potassium (dissolved)	1180	250	1250	1	J	SW6010B	9K18005	11/23/09 16:05
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:05
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:05
7440-23-5	Sodium (dissolved)	968	250	1250	1	J	SW6010B	9K18005	11/23/09 16:05
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 16:05
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:05
7440-66-6	Zinc (dissolved)	5.69	1.25	5.00	1	N	SW6010B	9K18005	11/23/09 16:05

ANALYSIS DATA SHEET

MR07-SD01-09D

8

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 11/12/09 12:30
 % Solids: 79.33

SDG: UX07 003
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911121-09
 Received: 11/13/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed	
57-12-5	Cyanide		0.158	0.315	1	U	SW9012A	9K19016	11/20/09 12:27	
7439-97-6	Mercury	0.0394	0.0145	0.0367	1		SW7471A	9K20009	11/25/09 15:41	
7429-90-5	Aluminum	2930	6.03	24.1	2	P	SW6010B	9K20003	12/03/09 16:15	
7440-36-0	Antimony	<i>MSL</i>	<i>UJ</i>	0.302	0.905	1	U	SW6010B	9K20003	11/24/09 15:30
7440-38-2	Arsenic	1.06	0.181	0.302	1		SW6010B	9K20003	11/24/09 15:30	
7440-39-3	Barium	12.7	0.302	2.41	1	N	SW6010B	9K20003	11/24/09 15:30	
7440-41-7	Beryllium	0.0682	0.0603	0.302	1	J	SW6010B	9K20003	11/24/09 15:30	
7440-43-9	Cadmium	<i>MBL</i>	<i>U</i>	0.0603	0.302	1		SW6010B	9K20003	11/24/09 15:30
7440-70-2	Calcium	44000	121	603	2	P	SW6010B	9K20003	12/03/09 16:15	
7440-47-3	Chromium	3.93	0.121	0.302	1	N	SW6010B	9K20003	11/24/09 15:30	
7440-48-4	Cobalt	0.644	0.302	0.754	1	J	SW6010B	9K20003	11/24/09 15:30	
7440-50-8	Copper	2.94	0.302	0.603	1		SW6010B	9K20003	11/24/09 15:30	
7439-89-6	Iron	1730	1.81	6.03	1		SW6010B	9K20003	11/24/09 15:30	
7439-92-1	Lead	6.60	0.181	0.362	2	P	SW6010B	9K20003	12/03/09 16:15	
7439-95-4	Magnesium	<i>MSH</i>	<i>J</i>	60.3	302	1	N	SW6010B	9K20003	11/24/09 15:30
7439-96-5	Manganese	42.1	0.181	0.905	1		SW6010B	9K20003	11/24/09 15:30	
7440-02-0	Nickel	2.65	0.302	0.603	1		SW6010B	9K20003	11/24/09 15:30	
7440-09-7	Potassium	184	60.3	302	1	JN	SW6010B	9K20003	11/24/09 15:30	
7782-49-2	Selenium		0.181	0.302	1	U	SW6010B	9K20003	12/08/09 17:26	
7440-22-4	Silver		0.121	0.302	1	U	SW6010B	9K20003	11/24/09 15:30	
7440-23-5	Sodium		60.3	302	1	U	SW6010B	9K20003	11/24/09 15:30	
7440-28-0	Thallium		0.241	0.483	1	U	SW6010B	9K20003	11/24/09 15:30	
7440-62-2	Vanadium	5.23	0.302	0.754	1		SW6010B	9K20003	11/24/09 15:30	
7440-66-6	Zinc	16.4	0.603	2.41	2	P	SW6010B	9K20003	12/03/09 16:15	

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ANALYSIS DATA SHEET

MR07-SD01D-09D

9

 Laboratory: Empirical Laboratories, LLC

 SDG: UXO7 003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UXO7)

 Matrix: Soil

 Laboratory ID: 0911121-10

 Sampled: 11/12/09 12:35

 Received: 11/13/09 08:15

 % Solids: 74.73

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed	
57-12-5	Cyanide		0.167	0.335	1	U	SW9012A	9K19016	11/20/09 12:28	
7439-97-6	Mercury	0.0195	0.0168	0.0427	1	J	SW7471A	9K20009	11/25/09 15:43	
7429-90-5	Aluminum	2990	6.46	25.9	2	P	SW6010B	9K20003	12/03/09 16:20	
7440-36-0	Antimony	<i>MSL</i>	<i>UJ</i>	0.323	0.970	1	U	SW6010B	9K20003	11/24/09 15:35
7440-38-2	Arsenic	0.872	0.194	0.323	1		SW6010B	9K20003	11/24/09 15:35	
7440-39-3	Barium	12.9	0.323	2.59	1	Y	SW6010B	9K20003	11/24/09 15:35	
7440-41-7	Beryllium		0.0646	0.323	1	U	SW6010B	9K20003	11/24/09 15:35	
7440-43-9	Cadmium	<i>MBL</i>	<i>U</i>	0.0646	0.323	1		SW6010B	9K20003	11/24/09 15:35
7440-70-2	Calcium	41300	129	646	2	P	SW6010B	9K20003	12/03/09 16:20	
7440-47-3	Chromium	3.58	0.129	0.323	1	Y	SW6010B	9K20003	11/24/09 15:35	
7440-48-4	Cobalt	0.598	0.323	0.808	1	J	SW6010B	9K20003	11/24/09 15:35	
7440-50-8	Copper	1.88	0.323	0.646	1		SW6010B	9K20003	11/24/09 15:35	
7439-89-6	Iron	2190	1.94	6.46	1		SW6010B	9K20003	11/24/09 15:35	
7439-92-1	Lead	9.14	0.194	0.388	2	P	SW6010B	9K20003	12/03/09 16:20	
7439-95-4	Magnesium	<i>MSH</i>	<i>J</i>	64.6	323	1	Y	SW6010B	9K20003	11/24/09 15:35
7439-96-5	Manganese	38.3	0.194	0.970	1		SW6010B	9K20003	11/24/09 15:35	
7440-02-0	Nickel	2.63	0.323	0.646	1		SW6010B	9K20003	11/24/09 15:35	
7440-09-7	Potassium	165	64.6	323	1	J	SW6010B	9K20003	11/24/09 15:35	
7782-49-2	Selenium		0.194	0.323	1	U	SW6010B	9K20003	12/08/09 17:31	
7440-22-4	Silver		0.129	0.323	1	U	SW6010B	9K20003	11/24/09 15:35	
7440-23-5	Sodium		64.6	323	1	U	SW6010B	9K20003	11/24/09 15:35	
7440-28-0	Thallium		0.259	0.517	1	U	SW6010B	9K20003	11/24/09 15:35	
7440-62-2	Vanadium	5.19	0.323	0.808	1		SW6010B	9K20003	11/24/09 15:35	
7440-66-6	Zinc	20.4	0.646	2.59	2	P	SW6010B	9K20003	12/03/09 16:20	

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2/25/10

ANALYSIS DATA SHEET

MR07-SW02-09D

10

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0911121-11

 Sampled: 11/12/09 11:30

 Received: 11/13/09 08:15

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:37
7429-90-5	Aluminum	MSH 516 J	12.5	50.0	1	J	SW6010B	9K18005	11/23/09 16:10
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 16:10
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:10
7440-39-3	Barium	4.09	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 16:10
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:10
7440-43-9	Cadmium	0.313	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 16:10
7440-70-2	Calcium	10100	250	1250	1		SW6010B	9K18005	11/23/09 16:10
7440-47-3	Chromium	0.768	0.500	1.25	1	J	SW6010B	9K18005	11/23/09 16:10
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:10
7440-50-8	Copper	1.86	1.25	2.50	1	J	SW6010B	9K18005	11/23/09 16:10
7439-89-6	Iron	234	7.50	25.0	1		SW6010B	9K18005	11/23/09 16:10
7439-92-1	Lead	0.487	0.375	0.750	1	J	SW6010B	9K18005	11/23/09 16:10
7439-95-4	Magnesium	468	250	1250	1	J	SW6010B	9K18005	11/23/09 16:10
7439-96-5	Manganese	1.62	0.750	3.75	1	J	SW6010B	9K18005	11/23/09 16:10
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 16:10
7440-09-7	Potassium	668	250	1250	1	J	SW6010B	9K18005	11/23/09 16:10
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:10
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:10
7440-23-5	Sodium	691	250	1250	1	J	SW6010B	9K18005	11/23/09 16:10
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 16:10
7440-62-2	Vanadium	1.61	1.25	3.12	1	J	SW6010B	9K18005	11/23/09 16:10
7440-66-6	Zinc	8.48	1.25	5.00	1	J	SW6010B	9K18005	11/23/09 16:10
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9K19020	11/20/09 12:09

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 2/21/10

ANALYSIS DATA SHEET

MR07-SW02-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-12

Sampled: 11/12/09 11:30

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9K17021	11/18/09 13:40
7429-90-5	Aluminum (dissolved) <i>MSH</i>	30.9 <i>J</i>	12.5	50.0	1	U	SW6010B	9K18005	11/23/09 16:34
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9K18005	11/23/09 16:34
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:34
7440-39-3	Barium (dissolved)	2.76	1.25	10.0	1	J	SW6010B	9K18005	11/23/09 16:34
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:34
7440-43-9	Cadmium (dissolved)	0.318	0.250	1.25	1	J	SW6010B	9K18005	11/23/09 16:34
7440-70-2	Calcium (dissolved)	9330	250	1250	1		SW6010B	9K18005	11/23/09 16:34
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9K18005	11/23/09 16:34
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:34
7440-50-8	Copper (dissolved)		1.25	2.50	1	U	SW6010B	9K18005	11/23/09 16:34
7439-89-6	Iron (dissolved)	11.5	7.50	25.0	1	J	SW6010B	9K18005	11/23/09 16:34
7439-92-1	Lead (dissolved)		0.500	0.750	1	U	SW6010B	9K18005	11/23/09 16:34
7439-95-4	Magnesium (dissolved)	413	250	1250	1	J	SW6010B	9K18005	11/23/09 16:34
7439-96-5	Manganese (dissolved)		0.750	3.75	1	U	SW6010B	9K18005	11/23/09 16:34
7440-02-0	Nickel (dissolved)		0.750	2.50	1	U	SW6010B	9K18005	11/23/09 16:34
7440-09-7	Potassium (dissolved)	574	250	1250	1	J	SW6010B	9K18005	11/23/09 16:34
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9K18005	11/23/09 16:34
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9K18005	11/23/09 16:34
7440-23-5	Sodium (dissolved)	627	250	1250	1	J	SW6010B	9K18005	11/23/09 16:34
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9K18005	11/23/09 16:34
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9K18005	11/23/09 16:34
7440-66-6	Zinc (dissolved) <i>FBL</i>	5 2.75 <i>U</i>	1.25	5.00	1	U	SW6010B	9K18005	11/23/09 16:34

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11/20/10

ANALYSIS DATA SHEET

MR07-SD02-09D

12

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0911121-13

 Sampled: 11/12/09 11:45

 Received: 11/13/09 08:15

 % Solids: 75.90

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.165	0.329	1	U	SW9012A	9K23021	11/24/09 14:23
7439-97-6	Mercury	0.0182	0.0161	0.0408	1	J	SW7471A	9K20009	11/25/09 15:44
7429-90-5	Aluminum	8420	3.28	13.1	1		SW6010B	9K20003	11/24/09 15:40
7440-36-0	Antimony	<i>MSL</i>	<i>UJ</i>	0.328	1	U	SW6010B	9K20003	11/24/09 15:40
7440-38-2	Arsenic	2.16	0.197	0.328	1		SW6010B	9K20003	11/24/09 15:40
7440-39-3	Barium	11.2	0.328	2.62	1	X	SW6010B	9K20003	11/24/09 15:40
7440-41-7	Beryllium	0.0925	0.0655	0.328	1	J	SW6010B	9K20003	11/24/09 15:40
7440-43-9	Cadmium	0.166	0.0655	0.328	1	J	SW6010B	9K20003	11/24/09 15:40
7440-70-2	Calcium	1540	65.5	328	1		SW6010B	9K20003	11/24/09 15:40
7440-47-3	Chromium	12.8	0.131	0.328	1	X	SW6010B	9K20003	11/24/09 15:40
7440-48-4	Cobalt	0.443	0.328	0.819	1	J	SW6010B	9K20003	11/24/09 15:40
7440-50-8	Copper	1.86	0.328	0.655	1		SW6010B	9K20003	11/24/09 15:40
7439-89-6	Iron	6870	1.97	6.55	1		SW6010B	9K20003	11/24/09 15:40
7439-92-1	Lead	6.02	0.0983	0.197	1		SW6010B	9K20003	11/24/09 15:40
7439-95-4	Magnesium	<i>MSH</i>	<i>J</i>	65.5	1	X	SW6010B	9K20003	11/24/09 15:40
7439-96-5	Manganese	7.44	0.197	0.983	1		SW6010B	9K20003	11/24/09 15:40
7440-02-0	Nickel	1.35	0.328	0.655	1		SW6010B	9K20003	11/24/09 15:40
7440-09-7	Potassium	379	65.5	328	1	X	SW6010B	9K20003	11/24/09 15:40
7782-49-2	Selenium	0.397	0.197	0.328	1		SW6010B	9K20003	12/03/09 16:25
7440-22-4	Silver		0.197	0.328	1	U	SW6010B	9K20003	11/24/09 15:40
7440-23-5	Sodium		65.5	328	1	U	SW6010B	9K20003	11/24/09 15:40
7440-28-0	Thallium		0.197	0.524	1	U	SW6010B	9K20003	11/24/09 15:40
7440-62-2	Vanadium	16.4	0.328	0.819	1		SW6010B	9K20003	11/24/09 15:40
7440-66-6	Zinc	9.54	0.328	1.31	1		SW6010B	9K20003	11/24/09 15:40

uw
2/21/10

PERCHLORATE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_003

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 21, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-FB1112-09	0911121-01	Water
2	MR07-EB111209-SD	0911121-03	Water
3	MR07-SW01-09D	0911121-05	Water
4	MR07-SW01D-09D	0911121-07	Water
5	MR07-SD01-09D	0911121-09	Soil
6	MR07-SD01D-09D	0911121-10	Soil
7	MR07-SW02-09D	0911121-11	Water
7MS	MR07-SW02-09DMS	0911121-11MS	Water
7MSD	MR07-SW02-09DMSD	0911121-11MSD	Water
8	MR07-SD02-09D	0911121-13	Soil
8MS	MR07-SD02-09DMS	0911121-13MS	Soil
8MSD	MR07-SD02-09DMSD	0911121-13MSD	Soil

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 28 days for perchlorate.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-FB111209	None - ND	-	-	-	-

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-EB111209-SD	None - ND	-	-	-	-

Matrix Spike/Matrix Spike Duplicate - The matrix spike/duplicates samples exhibited acceptable %R and RPD values.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-SW01-09D ug/L	MR07-SW01D-09D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound	MR07-SD01-09D ug/kg	MR07-SD01D-09D ug/kg	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-FB111209

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-01

Sampled: 11/12/09 12:40

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9K24014	11/25/09 16:24

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Jew
2/21/10

ANALYSIS DATA SHEET

MR07-EB111209-SD

2

Laboratory: Empirical Laboratories, LLC

SDG: UX07_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-03

Sampled: 11/12/09 12:45

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9K24014	11/25/09 17:36

luw
2/21/10

ANALYSIS DATA SHEET

MR07-SW01-09D

3

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0911121-05

Sampled: 11/12/09 12:15

Received: 11/13/09 08:15

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9K24014	11/25/09 19:40

UW
2/21/10

ANALYSIS DATA SHEET

MR07-SW01D-09D
 4

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 11/12/09 12:25
 % Solids: 0.00

SDG: UXO7_003
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0911121-07
 Received: 11/13/09 08:15

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9K24014	11/25/09 20:16

luw
2/21/10

ANALYSIS DATA SHEET

MR07-SD01-09D

5

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911121-09

Sampled: 11/12/09 12:30

Received: 11/13/09 08:15

% Solids: 79.33

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.756	2.52	1	U	SW6850	9L02008	12/02/09 21:20

uw
2/21/10

ANALYSIS DATA SHEET

MR07-SD01D-09D
 6

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911121-10

Sampled: 11/12/09 12:35

Received: 11/13/09 08:15

% Solids: 74.73

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.803	2.68	1	U	SW6850	9L02008	12/02/09 21:56

lew
2/21/10

ANALYSIS DATA SHEET

MR07-SW02-09D

7

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_003

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0911121-11

 Sampled: 11/12/09 11:30

 Received: 11/13/09 08:15

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9K24014	11/25/09 20:52

 lew
2/21/10

ANALYSIS DATA SHEET

MR07-SD02-09D

8

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_003

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0911121-13

Sampled: 11/12/09 11:45

Received: 11/13/09 08:15

% Solids: 75.90

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.791	2.64	1	U	SW6850	9L02008	12/02/09 22:32

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2/2/10

EXPLOSIVES
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_004

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-IS17-16-18-09D	0912031-01	Soil
1MS	MR07-IS17-16-18-09DMS	0912031-01MS	Soil
1MSD	MR07-IS17-16-18-09DMSD	0912031-01MSD	Soil
2	MR07-IS15-16-17-09D	0912031-02	Soil
3	MR07-IS13-16-17-09D	0912031-03	Soil
4	MR07-IS13D-16-17-09D	0912031-04	Soil
5	MR07-IS16-12-13-09D	0912031-05	Soil
6	MR07-IS14-13-14-09D	0912031-06	Soil
7	MR07-IS10-18-19-09D	0912031-07	Soil
8	MR07-IS11-23-24-09D	0912031-08	Soil
9	MR07-IS12-18-19-09D	0912031-09	Soil
10	MR07-IS08-18-19-09D	0912031-10	Soil
11	MR07-IS07-18-19-09D	0912031-11	Soil
12	MR07-IS09-16-17-09D	0912031-12	Soil
13	MR07-IS03-9-10-09D	0912031-13	Soil
14	MR07-IS02-10-11-09D	0912031-14	Soil
15	MR07-IS01-11-12-09D	0912031-15	Soil
16	MR07-IS01D-11-12-09D	0912031-16	Soil
17	MR07-IS04-12-13-09D	0912031-17	Soil
18	MR07-IS05-14-15-09D	0912031-18	Soil
19	MR07-IS06-12-13-09D	0912031-19	Soil

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 14 days for soil samples and analyzed within 40 days except the following.

Sample ID	Date Sampled	Date Extracted	# of Days	Qualifier
1-9	12/01/09	12/17/09	16	J/UJ

Initial Calibration - The initial calibrations exhibited acceptable %RSD and/or correlation coefficient values.

Calibration Verification - The continuing calibrations exhibited acceptable %D values.

Surrogates - Many samples exhibited acceptable surrogate recoveries on the primary column and slightly high recoveries on the confirmation column. No action was taken since the primary column recoveries were within QC limits.

MS/MSD - The MS/MSD samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
1	2,6-Dinitrotoluene	123%/123%/Ok	None - ND

Laboratory Control Sample - The LCS samples exhibited acceptable %R values except the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
9L16024-BLK1	2,6-Dinitrotoluene	126%	None	All ND
9L16028-BLK1	2,6-Dinitrotoluene	122%	None	All ND

Method Blank - The method blanks were free of contamination.

Field and Equipment Blank - Field QC samples were not included in this data package.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-IS13-16-17-09D ug/kg	MR07-IS13D-16-17-09D ug/kg	RPD	Qualifier
None	ND	ND	-	-

Compound	MR07-IS01-11-12-09D ug/kg	MR07-IS01D-11-12-09D ug/kg	RPD	Qualifier
RDX	290	520	57%	None

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - Several samples exhibited results with high %D values between columns and have been flagged (P) by the laboratory and further qualified (J) unless already qualified due to holding times.

FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

MR07-IS17-16-18
-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-01

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 059V5701

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 09:15

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/18/09 19:25

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG		
		MDL	RL	CONC Q
2691-41-0	-----HMX	62	190	HT ↓ U U J ↓
121-82-4	-----RDX	62	190	
98-95-3	-----Nitrobenzene	62	190	
99-65-0	-----1,3-Dinitrobenzene	62	190	
99-35-4	-----1,3,5-Trinitrobenzene	62	190	
121-14-2	-----2,4-Dinitrotoluene	62	190	
606-20-2	-----2,6-Dinitrotoluene	62	190	
118-96-7	-----2,4,6-Trinitrotoluene	62	190	
35572-78-2	-----2-Amino-4,6-dinitrotoluene	62	190	
479-45-8	-----Tetryl	62	190	
19406-51-0	-----4-Amino-2,6-dinitrotoluene	62	190	
88-72-2	-----2-Nitrotoluene	62	190	
99-99-0	-----4-Nitrotoluene	62	190	
99-08-1	-----3-Nitrotoluene	62	190	
55-63-0	-----Nitroglycerin	210	640	
78-11-5	-----PETN	210	640	

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 2

MR07-IS15
-16-17-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-02

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 064V6201

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 10:10

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/18/09 22:09

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190	HT	U UJ
121-82-4-----	RDX	62	190		U
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190		U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. **3**

MR07-IS13
-16-17-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-03

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 065V6301

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 10:20

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/18/09 22:42

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190	HT	U UJ
121-82-4-----	RDX	62	190		U UJ
98-95-3-----	Nitrobenzene	62	190		U UJ
99-65-0-----	1,3-Dinitrobenzene	62	190		U UJ
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U UJ
121-14-2-----	2,4-Dinitrotoluene	62	190		U UJ
606-20-2-----	2,6-Dinitrotoluene	62	190		U UJ
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U UJ
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U UJ
479-45-8-----	Tetryl	62	190		U UJ
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U UJ
88-72-2-----	2-Nitrotoluene	62	190		U UJ
99-99-0-----	4-Nitrotoluene	62	190		U UJ
99-08-1-----	3-Nitrotoluene	62	190		U UJ
55-63-0-----	Nitroglycerin	210	640		U UJ
78-11-5-----	PETN	210	640		U UJ

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 4

MR07-IS13
D-16-17-09

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-04

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 066V6401

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 10:25

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/18/09 23:15

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190		Hr UJ
121-82-4-----	RDX	62	190		
98-95-3-----	Nitrobenzene	62	190		
99-65-0-----	1,3-Dinitrobenzene	62	190		
99-35-4-----	1,3,5-Trinitrobenzene	62	190		
121-14-2-----	2,4-Dinitrotoluene	62	190		
606-20-2-----	2,6-Dinitrotoluene	62	190		
118-96-7-----	2,4,6-Trinitrotoluene	62	190		
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		
479-45-8-----	Tetryl	62	190		
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		
88-72-2-----	2-Nitrotoluene	62	190		
99-99-0-----	4-Nitrotoluene	62	190		
99-08-1-----	3-Nitrotoluene	62	190		
55-63-0-----	Nitroglycerin	210	640		
78-11-5-----	PETN	210	640		

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

5

MR07-IS16
-12-13-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-05

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 067V6501

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 10:55

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/18/09 23:48

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/KG Q
		MDL	(ug/L or ug/Kg) RL CONC	
2691-41-0	-----HMX	62	190	HT
121-82-4	-----RDX	62	190	
98-95-3	-----Nitrobenzene	62	190	
99-65-0	-----1,3-Dinitrobenzene	62	190	
99-35-4	-----1,3,5-Trinitrobenzene	62	190	
121-14-2	-----2,4-Dinitrotoluene	62	190	
606-20-2	-----2,6-Dinitrotoluene	62	190	
118-96-7	-----2,4,6-Trinitrotoluene	62	190	
35572-78-2	----2-Amino-4,6-dinitrotoluene	62	190	
479-45-8	-----Tetryl	62	190	
19406-51-0	----4-Amino-2,6-dinitrotoluene	62	190	
88-72-2	-----2-Nitrotoluene	62	190	
99-99-0	-----4-Nitrotoluene	62	190	
99-08-1	-----3-Nitrotoluene	62	190	
55-63-0	-----Nitroglycerin	210	640	
78-11-5	-----PETN	210	640	

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

MR07-IS14
-13-14-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004
 Matrix: (soil/water) SOIL Lab Sample ID: 0912031-06
 Sample wt/vol: 2.0 (g/mL) G Lab File ID: 068V6601
 % Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 11:45
 Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09
 Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/19/09 00:21
 Injection Volume: 100.0 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190	HT	U UJ
121-82-4-----	RDX	62	190		U
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190		U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

7

MR07-IS10
-18-19-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-07

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 069V6701

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 14:20

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/19/09 00:53

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
MDL RL CONC Q

2691-41-0-----	HMX	62	190	HT 170	U UJ J UJ
121-82-4-----	RDX	62	190		
98-95-3-----	Nitrobenzene	62	190		
99-65-0-----	1,3-Dinitrobenzene	62	190		
99-35-4-----	1,3,5-Trinitrobenzene	62	190		
121-14-2-----	2,4-Dinitrotoluene	62	190		
606-20-2-----	2,6-Dinitrotoluene	62	190		
118-96-7-----	2,4,6-Trinitrotoluene	62	190		
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		
479-45-8-----	Tetryl	62	190		
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		
88-72-2-----	2-Nitrotoluene	62	190		
99-99-0-----	4-Nitrotoluene	62	190		
99-08-1-----	3-Nitrotoluene	62	190		
55-63-0-----	Nitroglycerin	210	640		
78-11-5-----	PETN	210	640		

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FORM 1
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CLIENT SAMPLE NO.

8

MR07-IS11
-23-24-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-08

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 070V6801

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 15:20

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/19/09 01:26

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG		
		MDL	RL	CONC Q
2691-41-0	-----HMX	62	190	HT 150
121-82-4	-----RDX	62	190	
98-95-3	-----Nitrobenzene	62	190	160
99-65-0	-----1,3-Dinitrobenzene	62	190	
99-35-4	-----1,3,5-Trinitrobenzene	62	190	HT 160
121-14-2	-----2,4-Dinitrotoluene	62	190	
606-20-2	-----2,6-Dinitrotoluene	62	190	HT 160
118-96-7	-----2,4,6-Trinitrotoluene	62	190	
35572-78-2	-----2-Amino-4,6-dinitrotoluene	62	190	HT 160
479-45-8	-----Tetryl	62	190	
19406-51-0	-----4-Amino-2,6-dinitrotoluene	62	190	HT 160
88-72-2	-----2-Nitrotoluene	62	190	
99-99-0	-----4-Nitrotoluene	62	190	HT 160
99-08-1	-----3-Nitrotoluene	62	190	
55-63-0	-----Nitroglycerin	210	640	HT 160
78-11-5	-----PETN	210	640	

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FORM 1
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CLIENT SAMPLE NO.

9

MR07-IS12
-18-19-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-09

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 071V6901

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/01/09 15:50

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/17/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/19/09 01:59

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190	HT	U U J
121-82-4-----	RDX	62	190		U U J
98-95-3-----	Nitrobenzene	62	190		U U J
99-65-0-----	1,3-Dinitrobenzene	62	190		U U J
99-35-4-----	1,3,5-Trinitrobenzene	62	190	130	U U J
121-14-2-----	2,4-Dinitrotoluene	62	190		U U J
606-20-2-----	2,6-Dinitrotoluene	62	190		U U J
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U U J
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U U J
479-45-8-----	Tetryl	62	190		U U J
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U U J
88-72-2-----	2-Nitrotoluene	62	190		U U J
99-99-0-----	4-Nitrotoluene	62	190		U U J
99-08-1-----	3-Nitrotoluene	62	190		U U J
55-63-0-----	Nitroglycerin	210	640		U U J
78-11-5-----	PETN	210	640		U U J

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FORM 1
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CLIENT SAMPLE NO. 10

MR07-IS08
-18-19-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-10

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 009V0701

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 08:45

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 15:32

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
MDL RL CONC Q

2691-41-0-----	HMX	62	190		U
121-82-4-----	RDX	62	190	2c 180	J
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190		U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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FORM 1
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CLIENT SAMPLE NO.

MR07-IS07
-18-19-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-11

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 010V0801

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 09:10

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/17/09 16:05

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/KG
		MDL	RL	CONC	
2691-41-0	HMX	62	190		U
121-82-4	RDX	62	190	20 360	J
98-95-3	Nitrobenzene	62	190		U
99-65-0	1,3-Dinitrobenzene	62	190		U
99-35-4	1,3,5-Trinitrobenzene	62	190		U
121-14-2	2,4-Dinitrotoluene	62	190		U
606-20-2	2,6-Dinitrotoluene	62	190		U
118-96-7	2,4,6-Trinitrotoluene	62	190		U
35572-78-2	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	Tetryl	62	190		U
19406-51-0	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	2-Nitrotoluene	62	190		U
99-99-0	4-Nitrotoluene	62	190		U
99-08-1	3-Nitrotoluene	62	190		U
55-63-0	Nitroglycerin	210	640		U
78-11-5	PETN	210	640		U

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CLIENT SAMPLE NO.

12

MR07-IS09
-16-17-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-12

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 011V0901

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 09:50

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 16:38

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0	-----HMX	62	190		U
121-82-4	-----RDX	62	190	20 95	J J
98-95-3	-----Nitrobenzene	62	190		U
99-65-0	-----1,3-Dinitrobenzene	62	190		U
99-35-4	-----1,3,5-Trinitrobenzene	62	190		U
121-14-2	-----2,4-Dinitrotoluene	62	190		U
606-20-2	-----2,6-Dinitrotoluene	62	190		U
118-96-7	-----2,4,6-Trinitrotoluene	62	190		U
35572-78-2	-----2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	-----Tetryl	62	190		U
19406-51-0	-----4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	-----2-Nitrotoluene	62	190		U
99-99-0	-----4-Nitrotoluene	62	190		U
99-08-1	-----3-Nitrotoluene	62	190		U
55-63-0	-----Nitroglycerin	210	640		U
78-11-5	-----PETN	210	640		U

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CLIENT SAMPLE NO.

13

MR07-IS03
-9-10-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-13

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 012V1001

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 10:20

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 17:10

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/KG Q
		MDL	(ug/L or ug/Kg) RL CONC	
2691-41-0-----	HMX	62	190	U
121-82-4-----	RDX	62	190	20 360 U J
98-95-3-----	Nitrobenzene	62	190	U
99-65-0-----	1,3-Dinitrobenzene	62	190	U
99-35-4-----	1,3,5-Trinitrobenzene	62	190	U
121-14-2-----	2,4-Dinitrotoluene	62	190	U
606-20-2-----	2,6-Dinitrotoluene	62	190	U
118-96-7-----	2,4,6-Trinitrotoluene	62	190	U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190	U
479-45-8-----	Tetryl	62	190	U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190	U
88-72-2-----	2-Nitrotoluene	62	190	U
99-99-0-----	4-Nitrotoluene	62	190	U
99-08-1-----	3-Nitrotoluene	62	190	U
55-63-0-----	Nitroglycerin	210	640	U
78-11-5-----	PETN	210	640	U

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CLIENT SAMPLE NO.

14

MR07-IS02
-10-11-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-14

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 013V1101

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 10:50

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/17/09 17:43

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
MDL RL CONC Q

2691-41-0-----HMX	62	190		U
121-82-4-----RDX	62	190	20 390	U J
98-95-3-----Nitrobenzene	62	190		U
99-65-0-----1,3-Dinitrobenzene	62	190		U
99-35-4-----1,3,5-Trinitrobenzene	62	190		U
121-14-2-----2,4-Dinitrotoluene	62	190		U
606-20-2-----2,6-Dinitrotoluene	62	190		U
118-96-7-----2,4,6-Trinitrotoluene	62	190		U
35572-78-2----2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----Tetryl	62	190		U
19406-51-0----4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----2-Nitrotoluene	62	190		U
99-99-0-----4-Nitrotoluene	62	190		U
99-08-1-----3-Nitrotoluene	62	190		U
55-63-0-----Nitroglycerin	210	640		U
78-11-5-----PETN	210	640		U

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CLIENT SAMPLE NO.

15

MR07-IS01 -11-12-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-15

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 014V1201

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 11:10

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/17/09 18:16

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0	-----HMX	62	190		U
121-82-4	-----RDX	62	190	20 290	U J
98-95-3	-----Nitrobenzene	62	190		U
99-65-0	-----1,3-Dinitrobenzene	62	190		U
99-35-4	-----1,3,5-Trinitrobenzene	62	190		U
121-14-2	-----2,4-Dinitrotoluene	62	190		U
606-20-2	-----2,6-Dinitrotoluene	62	190		U
118-96-7	-----2,4,6-Trinitrotoluene	62	190		U
35572-78-2	----2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	-----Tetryl	62	190		U
19406-51-0	----4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	-----2-Nitrotoluene	62	190		U
99-99-0	-----4-Nitrotoluene	62	190		U
99-08-1	-----3-Nitrotoluene	62	190		U
55-63-0	-----Nitroglycerin	210	640		U
78-11-5	-----PETN	210	640		U

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CLIENT SAMPLE NO.

16

MR07-IS01
D-11-12-09

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004
 Matrix: (soil/water) SOIL Lab Sample ID: 0912031-16
 Sample wt/vol: 2.0 (g/mL) G Lab File ID: 015V1301
 % Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 11:15
 Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09
 Concentrated Extract Volume: 20.0 (ml) Date Analyzed: 12/17/09 18:49
 Injection Volume: 100.0 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0-----	HMX	62	190		U
121-82-4-----	RDX	62	190	20 520	U J
98-95-3-----	Nitrobenzene	62	190		U
99-65-0-----	1,3-Dinitrobenzene	62	190		U
99-35-4-----	1,3,5-Trinitrobenzene	62	190		U
121-14-2-----	2,4-Dinitrotoluene	62	190		U
606-20-2-----	2,6-Dinitrotoluene	62	190		U
118-96-7-----	2,4,6-Trinitrotoluene	62	190		U
35572-78-2----	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8-----	Tetryl	62	190		U
19406-51-0----	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2-----	2-Nitrotoluene	62	190		U
99-99-0-----	4-Nitrotoluene	62	190		U
99-08-1-----	3-Nitrotoluene	62	190		U
55-63-0-----	Nitroglycerin	210	640		U
78-11-5-----	PETN	210	640		U

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

17

MR07-IS04
-12-13-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004
 Matrix: (soil/water) SOIL Lab Sample ID: 0912031-17
 Sample wt/vol: 2.0 (g/mL) G Lab File ID: 016V1401
 % Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 11:45
 Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09
 Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 19:22
 Injection Volume: 100.0 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	(ug/L or ug/Kg) RL	CONC	
2691-41-0	-----HMX	62	190		U
121-82-4	-----RDX	62	190	130	J
98-95-3	-----Nitrobenzene	62	190		U
99-65-0	-----1,3-Dinitrobenzene	62	190		U
99-35-4	-----1,3,5-Trinitrobenzene	62	190		U
121-14-2	-----2,4-Dinitrotoluene	62	190		U
606-20-2	-----2,6-Dinitrotoluene	62	190		U
118-96-7	-----2,4,6-Trinitrotoluene	62	190		U
35572-78-2	----2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	-----Tetryl	62	190		U
19406-51-0	----4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	-----2-Nitrotoluene	62	190		U
99-99-0	-----4-Nitrotoluene	62	190		U
99-08-1	-----3-Nitrotoluene	62	190		U
55-63-0	-----Nitroglycerin	210	640		U
78-11-5	-----PETN	210	640		U

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

18

MR07-IS05
-14-15-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-18

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 017V1501

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 12:15

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 19:55

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/KG Q
		MDL	RL	CONC	
2691-41-0	-----HMX	62	190		U
121-82-4	-----RDX	62	190	20 320	J
98-95-3	-----Nitrobenzene	62	190		U
99-65-0	-----1,3-Dinitrobenzene	62	190		U
99-35-4	-----1,3,5-Trinitrobenzene	62	190		U
121-14-2	-----2,4-Dinitrotoluene	62	190		U
606-20-2	-----2,6-Dinitrotoluene	62	190		U
118-96-7	-----2,4,6-Trinitrotoluene	62	190		U
35572-78-2	----2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	-----Tetryl	62	190		U
19406-51-0	----4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	-----2-Nitrotoluene	62	190		U
99-99-0	-----4-Nitrotoluene	62	190		U
99-08-1	-----3-Nitrotoluene	62	190		U
55-63-0	-----Nitroglycerin	210	640		U
78-11-5	-----PETN	210	640		U

FORM I EXPL

Revised 20100106

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

19

MR07-IS06
-12-13-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_004

Matrix: (soil/water) SOIL Lab Sample ID: 0912031-19

Sample wt/vol: 2.0 (g/mL) G Lab File ID: 018V1601

% Moisture: 0 decanted: (Y/N) N Date Sampled: 12/02/09 12:45

Extraction: (SepF/Cont/Sonc/Soxh) SONC Date Extracted: 12/16/09

Concentrated Extract Volume: 20.0 (mL) Date Analyzed: 12/17/09 20:28

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/KG Q
		MDL	RL	CONC	
2691-41-0	HMX	62	190		U
121-82-4	RDX	62	190	20 300	J
98-95-3	Nitrobenzene	62	190		U
99-65-0	1,3-Dinitrobenzene	62	190		U
99-35-4	1,3,5-Trinitrobenzene	62	190	20 140	J J
121-14-2	2,4-Dinitrotoluene	62	190		U
606-20-2	2,6-Dinitrotoluene	62	190		U
118-96-7	2,4,6-Trinitrotoluene	62	190		U
35572-78-2	2-Amino-4,6-dinitrotoluene	62	190		U
479-45-8	Tetryl	62	190		U
19406-51-0	4-Amino-2,6-dinitrotoluene	62	190		U
88-72-2	2-Nitrotoluene	62	190		U
99-99-0	4-Nitrotoluene	62	190		U
99-08-1	3-Nitrotoluene	62	190		U
55-63-0	Nitroglycerin	210	640		U
78-11-5	PETN	210	640		U

FORM I EXPL

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2/23/10

Revised 20100106

METALS & CYANIDE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_004

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-IS17-16-18-09D	0912031-01	Soil
1MS	MR07-IS17-16-18-09DMS	0912031-01MS	Soil
1MSD	MR07-IS17-16-18-09DMSD	0912031-01MSD	Soil
2	MR07-IS15-16-17-09D	0912031-02	Soil
3	MR07-IS13-16-17-09D	0912031-03	Soil
4	MR07-IS13D-16-17-09D	0912031-04	Soil
5	MR07-IS16-12-13-09D	0912031-05	Soil
6	MR07-IS14-13-14-09D	0912031-06	Soil
7	MR07-IS10-18-19-09D	0912031-07	Soil
8	MR07-IS11-23-24-09D	0912031-08	Soil
9	MR07-IS12-18-19-09D	0912031-09	Soil
10	MR07-IS08-18-19-09D	0912031-10	Soil
11	MR07-IS07-18-19-09D	0912031-11	Soil
12	MR07-IS09-16-17-09D	0912031-12	Soil
13	MR07-IS03-9-10-09D	0912031-13	Soil
14	MR07-IS02-10-11-09D	0912031-14	Soil
15	MR07-IS01-11-12-09D	0912031-15	Soil
16	MR07-IS01D-11-12-09D	0912031-16	Soil
17	MR07-IS04-12-13-09D	0912031-17	Soil
18	MR07-IS05-14-15-09D	0912031-18	Soil
19	MR07-IS06-12-13-09D	0912031-19	Soil
20	MR07-FB120209	0912031-20	Water
21	MR07-EB120209-IS	0912031-21	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 14 days for cyanide, 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable except the following.

Compound	%R	Qualifier	Affected Samples
Magnesium	89.1%	None	See MS/MSD
Vanadium	88.6%	J/UJ	11-19

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination.

Blank ID	Compound	Conc. mg/kg	Action Level mg/kg	Qualifier	Affected Samples
9L14011-BLK1	Cadmium	0.0732	0.366	U	1-19

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
MR07-FB120209	None - ND	-	-	-	-
MR07-EB121209-IS	Aluminum	37.1	9.275	None	All >5X
	Iron	40.2	10.05		
	Lead	0.395	0.0988		
	Zinc	4.20	1.05		

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Duplicate - The matrix spike/duplicate samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	%R	Qualifier	Affected Samples
1	Antimony	7.61%/9.37%/Ok	J/UJ*	1-19
	Barium	130%/Ok/Ok	J	1-19
	Chromium	172%/154%/Ok		
	Magnesium	194%/179%/Ok	J	1-11, 13-19
	Potassium	187%/161%/Ok	J	1-11, 13-18
	Sodium	145%/140%/Ok	J	6

* - Although the recovery is <10%, the post-digestion spike recovery was >75% and rejection was not necessary.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-IS13-16-17-09D mg/kg	MR07-IS13D-16-17-09D mg/kg	RPD	Qualifier
Aluminum	13400	12200	9%	None
Arsenic	2.37	3.79	46%	None
Barium	20.2	17.6	14%	None
Beryllium	0.151	0.127	17%	None
Chromium	20.8	18.7	11%	None
Cobalt	0.540	0.531	2%	None
Copper	2.98	2.97	0%	None
Iron	2880	3430	17%	None
Lead	9.69	8.92	8%	None
Magnesium	576	514	11%	None
Manganese	5.23	5.50	5%	None
Nickel	1.38	1.28	8%	None
Potassium	618	564	9%	None
Selenium	0.316	0.291	8%	None
Vanadium	26.3	18.1	37%	None
Zinc	6.07	6.28	3%	None

Compound	MR07-IS01-11-12-09D mg/kg	MR07-IS01D-11-12-09D mg/kg	RPD	Qualifier
Aluminum	9690	12500	25%	None
Arsenic	2.04	15.7	154%	J
Barium	14.0	19.1	31%	None
Beryllium	0.106	0.158	39%	None
Calcium	111	105	6%	None
Chromium	15.2	22.2	37%	None
Cobalt	0.439	0.579	28%	None
Copper	2.00	2.69	29%	None
Iron	4030	16000	120%	J
Lead	6.53	9.21	34%	None
Magnesium	360	471	27%	None
Manganese	4.88	5.48	12%	None
Nickel	1.24	1.32	6%	None
Potassium	502	597	17%	None
Selenium	0.216	1.01	130%	J
Vanadium	14.1	46.4	107%	None - See ICAL
Zinc	3.91	6.47	49%	None

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-IS17-16-18-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-01

Sampled: 12/01/09 09:15

Received: 12/03/09 08:45

% Solids: 75.28

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.166	0.332	1	U	SW9012A	9L07016	12/08/09 09:50
7439-97-6	Mercury		0.0157	0.0399	1	U	SW7471A	9L15010	12/16/09 11:50
7429-90-5	Aluminum	10700	3.26	13.0	1		SW6010B	9L14011	12/15/09 19:59
7440-36-0	Antimony	MSL UJ	0.326	0.977	1	UN	SW6010B	9L14011	12/15/09 19:59
7440-38-2	Arsenic	1.46	0.195	0.326	1		SW6010B	9L14011	12/15/09 19:59
7440-39-3	Barium	MSH 10.4 J	0.326	2.60	1	N	SW6010B	9L14011	12/15/09 19:59
7440-41-7	Beryllium	0.125	0.0651	0.326	1	J	SW6010B	9L14011	12/15/09 19:59
7440-43-9	Cadmium	MSL 0.326-110 U	0.0651	0.326	1	J	SW6010B	9L14011	12/15/09 19:59
7440-70-2	Calcium		65.1	326	1	U	SW6010B	9L14011	12/15/09 19:59
7440-47-3	Chromium	MSH 13.4 J	0.130	0.326	1	N	SW6010B	9L14011	12/15/09 19:59
7440-48-4	Cobalt	0.712	0.326	0.814	1	J	SW6010B	9L14011	12/15/09 19:59
7440-50-8	Copper	1.47	0.326	0.651	1		SW6010B	9L14011	12/15/09 19:59
7439-89-6	Iron	3050	1.95	6.51	1		SW6010B	9L14011	12/15/09 19:59
7439-92-1	Lead	6.43	0.0977	0.195	1		SW6010B	9L14011	12/15/09 19:59
7439-95-4	Magnesium	MSH 437 J	65.1	326	1	N	SW6010B	9L14011	12/15/09 19:59
7439-96-5	Manganese	12.5	0.195	0.977	1		SW6010B	9L14011	12/15/09 19:59
7440-02-0	Nickel	1.21	0.326	0.651	1		SW6010B	9L14011	12/15/09 19:59
7440-09-7	Potassium	MSH 536 J	65.1	326	1	N	SW6010B	9L14011	12/15/09 19:59
7782-49-2	Selenium	0.254	0.195	0.326	1	J	SW6010B	9L14011	12/15/09 19:59
7440-22-4	Silver		0.195	0.326	1	U	SW6010B	9L14011	12/15/09 19:59
7440-23-5	Sodium		65.1	326	1	UN	SW6010B	9L14011	12/15/09 19:59
7440-28-0	Thallium		0.195	0.521	1	U	SW6010B	9L14011	12/15/09 19:59
7440-62-2	Vanadium	16.1	0.326	0.814	1		SW6010B	9L14011	12/15/09 19:59
7440-66-6	Zinc	6.03	0.326	1.30	1	J	SW6010B	9L14011	12/15/09 19:59

ANALYSIS DATA SHEET

MR07-IS15-16-17-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-02

Sampled: 12/01/09 10:10

Received: 12/03/09 08:45

% Solids: 79.72

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.157	0.314	1	U	SW9012A	9L07016	12/08/09 09:53
7439-97-6	Mercury		0.0158	0.0401	1	U	SW7471A	9L15010	12/16/09 11:54
7429-90-5	Aluminum	15300	3.06	12.2	1		SW6010B	9L14011	12/15/09 20:22
7440-36-0	Antimony	MSL UJ	0.306	0.918	1	U	SW6010B	9L14011	12/15/09 20:22
7440-38-2	Arsenic	1.37	0.184	0.306	1		SW6010B	9L14011	12/15/09 20:22
7440-39-3	Barium	MSH 14.9 J	0.306	2.45	1	N	SW6010B	9L14011	12/15/09 20:22
7440-41-7	Beryllium	0.114	0.0612	0.306	1	J	SW6010B	9L14011	12/15/09 20:22
7440-43-9	Cadmium	MBL 0.306 0.082 U	0.0612	0.306	1	N	SW6010B	9L14011	12/15/09 20:22
7440-70-2	Calcium		61.2	306	1	U	SW6010B	9L14011	12/15/09 20:22
7440-47-3	Chromium	MSH 16.1 J	0.122	0.306	1	N	SW6010B	9L14011	12/15/09 20:22
7440-48-4	Cobalt	0.430	0.306	0.765	1	J	SW6010B	9L14011	12/15/09 20:22
7440-50-8	Copper	2.29	0.306	0.612	1		SW6010B	9L14011	12/15/09 20:22
7439-89-6	Iron	2360	1.84	6.12	1		SW6010B	9L14011	12/15/09 20:22
7439-92-1	Lead	7.36	0.0918	0.184	1		SW6010B	9L14011	12/15/09 20:22
7439-95-4	Magnesium	MSH 360 J	61.2	306	1	N	SW6010B	9L14011	12/15/09 20:22
7439-96-5	Manganese	4.45	0.184	0.918	1		SW6010B	9L14011	12/15/09 20:22
7440-02-0	Nickel	1.15	0.306	0.612	1		SW6010B	9L14011	12/15/09 20:22
7440-09-7	Potassium	MSH 478 J	61.2	306	1	N	SW6010B	9L14011	12/15/09 20:22
7782-49-2	Selenium	0.198	0.184	0.306	1	J	SW6010B	9L14011	12/15/09 20:22
7440-22-4	Silver		0.184	0.306	1	U	SW6010B	9L14011	12/15/09 20:22
7440-23-5	Sodium		61.2	306	1	U	SW6010B	9L14011	12/15/09 20:22
7440-28-0	Thallium		0.184	0.490	1	U	SW6010B	9L14011	12/15/09 20:22
7440-62-2	Vanadium	16.8	0.306	0.765	1		SW6010B	9L14011	12/15/09 20:22
7440-66-6	Zinc	4.15	0.306	1.22	1	N	SW6010B	9L14011	12/15/09 20:22

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ANALYSIS DATA SHEET

MR07-IS13-16-17-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-03

Sampled: 12/01/09 10:20

Received: 12/03/09 08:45

% Solids: 73.36

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.170	0.341	1	U	SW9012A	9L07016	12/08/09 09:54
7439-97-6	Mercury		0.0183	0.0465	1	U	SW7471A	9L15010	12/16/09 11:55
7429-90-5	Aluminum	13400	3.32	13.3	1		SW6010B	9L14011	12/15/09 20:27
7440-36-0	Antimony	MSL UJ	0.332	0.997	1	UN*	SW6010B	9L14011	12/15/09 20:27
7440-38-2	Arsenic	2.37	0.199	0.332	1		SW6010B	9L14011	12/15/09 20:27
7440-39-3	Barium	MSH 20.2 J	0.332	2.66	1	X	SW6010B	9L14011	12/15/09 20:27
7440-41-7	Beryllium	0.151	0.0665	0.332	1	J	SW6010B	9L14011	12/15/09 20:27
7440-43-9	Cadmium	MBL 0.332 UJ	0.0665	0.332	1	J	SW6010B	9L14011	12/15/09 20:27
7440-70-2	Calcium		66.5	332	1	U	SW6010B	9L14011	12/15/09 20:27
7440-47-3	Chromium	MSH 20.8 J	0.133	0.332	1	X	SW6010B	9L14011	12/15/09 20:27
7440-48-4	Cobalt	0.540	0.332	0.831	1	J	SW6010B	9L14011	12/15/09 20:27
7440-50-8	Copper	2.98	0.332	0.665	1		SW6010B	9L14011	12/15/09 20:27
7439-89-6	Iron	2880	1.99	6.65	1		SW6010B	9L14011	12/15/09 20:27
7439-92-1	Lead	9.69	0.0997	0.199	1		SW6010B	9L14011	12/15/09 20:27
7439-95-4	Magnesium	MSH 576 J	66.5	332	1	X	SW6010B	9L14011	12/15/09 20:27
7439-96-5	Manganese	5.23	0.199	0.997	1		SW6010B	9L14011	12/15/09 20:27
7440-02-0	Nickel	1.38	0.332	0.665	1		SW6010B	9L14011	12/15/09 20:27
7440-09-7	Potassium	MSH 618 J	66.5	332	1	X	SW6010B	9L14011	12/15/09 20:27
7782-49-2	Selenium	0.316	0.199	0.332	1	J	SW6010B	9L14011	12/15/09 20:27
7440-22-4	Silver		0.332	0.332	1	U	SW6010B	9L14011	12/15/09 20:27
7440-23-5	Sodium		66.5	332	1	UN	SW6010B	9L14011	12/15/09 20:27
7440-28-0	Thallium		0.199	0.532	1	U	SW6010B	9L14011	12/15/09 20:27
7440-62-2	Vanadium	26.3	0.332	0.831	1		SW6010B	9L14011	12/15/09 20:27
7440-66-6	Zinc	6.07	0.332	1.33	1	N	SW6010B	9L14011	12/15/09 20:27

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ANALYSIS DATA SHEET

MR07-IS13D-16-17-09D

4

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-04

Sampled: 12/01/09 10:25

Received: 12/03/09 08:45

% Solids: 77.77

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.161	0.321	1	U	SW9012A	9L07016	12/08/09 09:55
7439-97-6	Mercury		0.0152	0.0386	1	U	SW7471A	9L15010	12/16/09 11:56
7429-90-5	Aluminum	12200	3.12	12.5	1		SW6010B	9L14011	12/15/09 20:31
7440-36-0	Antimony	MSL UJ	0.312	0.936	1	UN*	SW6010B	9L14011	12/15/09 20:31
7440-38-2	Arsenic	3.79	0.187	0.312	1		SW6010B	9L14011	12/15/09 20:31
7440-39-3	Barium	MSH 17.6 J	0.312	2.50	1	X	SW6010B	9L14011	12/15/09 20:31
7440-41-7	Beryllium	0.127	0.0624	0.312	1	J	SW6010B	9L14011	12/15/09 20:31
7440-43-9	Cadmium	MBL 0.312 U	0.0624	0.312	1	X	SW6010B	9L14011	12/15/09 20:31
7440-70-2	Calcium		62.4	312	1	U	SW6010B	9L14011	12/15/09 20:31
7440-47-3	Chromium	MSH 18.7 J	0.125	0.312	1	X	SW6010B	9L14011	12/15/09 20:31
7440-48-4	Cobalt	0.531	0.312	0.780	1	J	SW6010B	9L14011	12/15/09 20:31
7440-50-8	Copper	2.97	0.312	0.624	1		SW6010B	9L14011	12/15/09 20:31
7439-89-6	Iron	3430	1.87	6.24	1		SW6010B	9L14011	12/15/09 20:31
7439-92-1	Lead	8.92	0.0936	0.187	1		SW6010B	9L14011	12/15/09 20:31
7439-95-4	Magnesium	MSH 514 J	62.4	312	1	X	SW6010B	9L14011	12/15/09 20:31
7439-96-5	Manganese	5.50	0.187	0.936	1		SW6010B	9L14011	12/15/09 20:31
7440-02-0	Nickel	1.28	0.312	0.624	1		SW6010B	9L14011	12/15/09 20:31
7440-09-7	Potassium	MSH 564 J	62.4	312	1	X	SW6010B	9L14011	12/15/09 20:31
7782-49-2	Selenium	0.291	0.187	0.312	1	J	SW6010B	9L14011	12/15/09 20:31
7440-22-4	Silver		0.250	0.312	1	U	SW6010B	9L14011	12/15/09 20:31
7440-23-5	Sodium		62.4	312	1	UN	SW6010B	9L14011	12/15/09 20:31
7440-28-0	Thallium		0.187	0.499	1	U	SW6010B	9L14011	12/15/09 20:31
7440-62-2	Vanadium	18.1	0.312	0.780	1		SW6010B	9L14011	12/15/09 20:31
7440-66-6	Zinc	6.28	0.312	1.25	1	N	SW6010B	9L14011	12/15/09 20:31

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ANALYSIS DATA SHEET

MR07-IS16-12-13-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-05

Sampled: 12/01/09 10:55

Received: 12/03/09 08:45

% Solids: 87.77

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed	
57-12-5	Cyanide		0.142	0.285	1	U	SW9012A	9L07016	12/08/09 09:56	
7439-97-6	Mercury		0.0139	0.0353	1	U	SW7471A	9L15010	12/16/09 11:57	
7429-90-5	Aluminum	3590	2.74	11.0	1		SW6010B	9L14011	12/15/09 20:36	
7440-36-0	Antimony	MSL	UJ	0.274	0.822	1	UN*	SW6010B	9L14011	12/15/09 20:36
7440-38-2	Arsenic	0.514	0.164	0.274	1		SW6010B	9L14011	12/15/09 20:36	
7440-39-3	Barium	MSH	5.79 J	0.274	2.19	1	J	SW6010B	9L14011	12/15/09 20:36
7440-41-7	Beryllium		0.0548	0.274	1	U	SW6010B	9L14011	12/15/09 20:36	
7440-43-9	Cadmium	MSL	0.274	0.0548	0.274	1	J	SW6010B	9L14011	12/15/09 20:36
7440-70-2	Calcium	124	54.8	274	1	J	SW6010B	9L14011	12/15/09 20:36	
7440-47-3	Chromium	MSH	2.72 J	0.110	0.274	1	J	SW6010B	9L14011	12/15/09 20:36
7440-48-4	Cobalt	0.568	0.274	0.685	1	J	SW6010B	9L14011	12/15/09 20:36	
7440-50-8	Copper	0.377	0.274	0.548	1	J	SW6010B	9L14011	12/15/09 20:36	
7439-89-6	Iron	896	1.64	5.48	1		SW6010B	9L14011	12/15/09 20:36	
7439-92-1	Lead	2.71	0.0822	0.164	1		SW6010B	9L14011	12/15/09 20:36	
7439-95-4	Magnesium	MSH	82.8 J	54.8	274	1	J	SW6010B	9L14011	12/15/09 20:36
7439-96-5	Manganese	1.12	0.164	0.822	1		SW6010B	9L14011	12/15/09 20:36	
7440-02-0	Nickel	1.81	0.274	0.548	1		SW6010B	9L14011	12/15/09 20:36	
7440-09-7	Potassium	MSH	80.4 J	54.8	274	1	J	SW6010B	9L14011	12/15/09 20:36
7782-49-2	Selenium	0.213	0.164	0.274	1	J	SW6010B	9L14011	12/15/09 20:36	
7440-22-4	Silver		0.0548	0.274	1	U	SW6010B	9L14011	12/15/09 20:36	
7440-23-5	Sodium		54.8	274	1	UN	SW6010B	9L14011	12/15/09 20:36	
7440-28-0	Thallium		0.164	0.438	1	U	SW6010B	9L14011	12/15/09 20:36	
7440-62-2	Vanadium	3.31	0.274	0.685	1		SW6010B	9L14011	12/15/09 20:36	
7440-66-6	Zinc	1.32	0.274	1.10	1	J	SW6010B	9L14011	12/15/09 20:36	

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ANALYSIS DATA SHEET

MR07-IS14-13-14-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-06

Sampled: 12/01/09 11:45

Received: 12/03/09 08:45

% Solids: 80.32

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.156	0.311	1	U	SW9012A	9L07016	12/08/09 09:57
7439-97-6	Mercury		0.0167	0.0425	1	U	SW7471A	9L15010	12/16/09 11:58
7429-90-5	Aluminum	11700	2.96	11.9	1		SW6010B	9L14011	12/15/09 20:40
7440-36-0	Antimony	MSL UJ	0.296	0.889	1	UN	SW6010B	9L14011	12/15/09 20:40
7440-38-2	Arsenic	2.12	0.178	0.296	1		SW6010B	9L14011	12/15/09 20:40
7440-39-3	Barium	MSH 18.6 J	0.296	2.37	1	X	SW6010B	9L14011	12/15/09 20:40
7440-41-7	Beryllium	0.143	0.0593	0.296	1	J	SW6010B	9L14011	12/15/09 20:40
7440-43-9	Cadmium	MSL 0.296 U	0.0593	0.296	1	X	SW6010B	9L14011	12/15/09 20:40
7440-70-2	Calcium	67.8	59.3	296	1	J	SW6010B	9L14011	12/15/09 20:40
7440-47-3	Chromium	MSH 16.6 J	0.119	0.296	1	X	SW6010B	9L14011	12/15/09 20:40
7440-48-4	Cobalt	0.475	0.296	0.741	1	J	SW6010B	9L14011	12/15/09 20:40
7440-50-8	Copper	3.16	0.296	0.593	1		SW6010B	9L14011	12/15/09 20:40
7439-89-6	Iron	2150	1.78	5.93	1		SW6010B	9L14011	12/15/09 20:40
7439-92-1	Lead	8.19	0.0889	0.178	1		SW6010B	9L14011	12/15/09 20:40
7439-95-4	Magnesium	MSH 409 J	59.3	296	1	X	SW6010B	9L14011	12/15/09 20:40
7439-96-5	Manganese	5.50	0.178	0.889	1		SW6010B	9L14011	12/15/09 20:40
7440-02-0	Nickel	1.31	0.296	0.593	1		SW6010B	9L14011	12/15/09 20:40
7440-09-7	Potassium	MSH 622 J	59.3	296	1	X	SW6010B	9L14011	12/15/09 20:40
7782-49-2	Selenium	0.324	0.178	0.296	1		SW6010B	9L14011	12/15/09 20:40
7440-22-4	Silver		0.237	0.296	1	U	SW6010B	9L14011	12/15/09 20:40
7440-23-5	Sodium	MSH 68.0 J	59.3	296	1	X	SW6010B	9L14011	12/15/09 20:40
7440-28-0	Thallium		0.178	0.474	1	U	SW6010B	9L14011	12/15/09 20:40
7440-62-2	Vanadium	17.6	0.296	0.741	1		SW6010B	9L14011	12/15/09 20:40
7440-66-6	Zinc	5.04	0.296	1.19	1	X	SW6010B	9L14011	12/15/09 20:40

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ANALYSIS DATA SHEET

MR07-IS10-18-19-09D

7

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO0 14 (UX07)

Matrix: Soil

Laboratory ID: 0912031-07

Sampled: 12/01/09 14:20

Received: 12/03/09 08:45

% Solids: 77.66

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.161	0.322	1	U	SW9012A	9L07016	12/08/09 09:59
7439-97-6	Mercury		0.0167	0.0425	1	U	SW7471A	9L15010	12/16/09 11:59
7429-90-5	Aluminum	8700	3.17	12.7	1		SW6010B	9L14011	12/15/09 20:45
7440-36-0	Antimony	MSL WJ	0.317	0.952	1	UN	SW6010B	9L14011	12/15/09 20:45
7440-38-2	Arsenic	7.51	0.190	0.317	1		SW6010B	9L14011	12/15/09 20:45
7440-39-3	Barium	MSH J	0.317	2.54	1	X	SW6010B	9L14011	12/15/09 20:45
7440-41-7	Beryllium	0.113	0.0634	0.317	1	J	SW6010B	9L14011	12/15/09 20:45
7440-43-9	Cadmium	MSL 0.317 U	0.0634	0.317	1	X	SW6010B	9L14011	12/15/09 20:45
7440-70-2	Calcium		63.4	317	1	U	SW6010B	9L14011	12/15/09 20:45
7440-47-3	Chromium	MSH J	0.127	0.317	1	X	SW6010B	9L14011	12/15/09 20:45
7440-48-4	Cobalt	0.530	0.317	0.793	1	J	SW6010B	9L14011	12/15/09 20:45
7440-50-8	Copper	2.75	0.317	0.634	1		SW6010B	9L14011	12/15/09 20:45
7439-89-6	Iron	6460	1.90	6.34	1		SW6010B	9L14011	12/15/09 20:45
7439-92-1	Lead	6.29	0.0952	0.190	1		SW6010B	9L14011	12/15/09 20:45
7439-95-4	Magnesium	MSH J	63.4	317	1	X	SW6010B	9L14011	12/15/09 20:45
7439-96-5	Manganese	5.02	0.190	0.952	1		SW6010B	9L14011	12/15/09 20:45
7440-02-0	Nickel	0.863	0.317	0.634	1		SW6010B	9L14011	12/15/09 20:45
7440-09-7	Potassium	MSH J	63.4	317	1	X	SW6010B	9L14011	12/15/09 20:45
7782-49-2	Selenium	0.371	0.190	0.317	1		SW6010B	9L14011	12/15/09 20:45
7440-22-4	Silver		0.127	0.317	1	U	SW6010B	9L14011	12/15/09 20:45
7440-23-5	Sodium		63.4	317	1	U	SW6010B	9L14011	12/15/09 20:45
7440-28-0	Thallium		0.190	0.507	1	U	SW6010B	9L14011	12/15/09 20:45
7440-62-2	Vanadium	12.6	0.317	0.793	1		SW6010B	9L14011	12/15/09 20:45
7440-66-6	Zinc	6.47	0.317	1.27	1	N	SW6010B	9L14011	12/15/09 20:45

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ANALYSIS DATA SHEET

MR07-IS11-23-24-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-08

Sampled: 12/01/09 15:20

Received: 12/03/09 08:45

% Solids: 81.64

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.153	0.306	1	U	SW9012A	9L07016	12/08/09 10:02
7439-97-6	Mercury		0.0154	0.0391	1	U	SW7471A	9L15010	12/16/09 12:00
7429-90-5	Aluminum	7800	2.99	11.9	1		SW6010B	9L14011	12/15/09 20:49
7440-36-0	Antimony	<i>MSL</i> <i>UJ</i>	0.299	0.896	1	U	SW6010B	9L14011	12/15/09 20:49
7440-38-2	Arsenic	4.90	0.179	0.299	1		SW6010B	9L14011	12/15/09 20:49
7440-39-3	Barium	<i>MSH</i> 9.05 <i>J</i>	0.299	2.39	1	X	SW6010B	9L14011	12/15/09 20:49
7440-41-7	Beryllium	0.169	0.0597	0.299	1	J	SW6010B	9L14011	12/15/09 20:49
7440-43-9	Cadmium	<i>MSL</i> 0.299 <i>U</i>	0.0597	0.299	1	X	SW6010B	9L14011	12/15/09 20:49
7440-70-2	Calcium		59.7	299	1	U	SW6010B	9L14011	12/15/09 20:49
7440-47-3	Chromium	<i>MSH</i> 13.7 <i>J</i>	0.119	0.299	1	X	SW6010B	9L14011	12/15/09 20:49
7440-48-4	Cobalt	0.525	0.299	0.747	1	J	SW6010B	9L14011	12/15/09 20:49
7440-50-8	Copper	2.39	0.299	0.597	1		SW6010B	9L14011	12/15/09 20:49
7439-89-6	Iron	5510	1.79	5.97	1		SW6010B	9L14011	12/15/09 20:49
7439-92-1	Lead	6.38	0.0896	0.179	1		SW6010B	9L14011	12/15/09 20:49
7439-95-4	Magnesium	<i>MSH</i> 375 <i>J</i>	59.7	299	1	X	SW6010B	9L14011	12/15/09 20:49
7439-96-5	Manganese	4.41	0.179	0.896	1		SW6010B	9L14011	12/15/09 20:49
7440-02-0	Nickel	0.697	0.299	0.597	1		SW6010B	9L14011	12/15/09 20:49
7440-09-7	Potassium	<i>MSH</i> 434 <i>J</i>	59.7	299	1	X	SW6010B	9L14011	12/15/09 20:49
7782-49-2	Selenium	0.571	0.179	0.299	1		SW6010B	9L14011	12/15/09 20:49
7440-22-4	Silver		0.179	0.299	1	U	SW6010B	9L14011	12/15/09 20:49
7440-23-5	Sodium		59.7	299	1	U	SW6010B	9L14011	12/15/09 20:49
7440-28-0	Thallium		0.179	0.478	1	U	SW6010B	9L14011	12/15/09 20:49
7440-62-2	Vanadium	16.4	0.299	0.747	1		SW6010B	9L14011	12/15/09 20:49
7440-66-6	Zinc	6.99	0.299	1.19	1	X	SW6010B	9L14011	12/15/09 20:49

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ANALYSIS DATA SHEET

MR07-IS12-18-19-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-09

Sampled: 12/01/09 15:50

Received: 12/03/09 08:45

% Solids: 75.90

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.165	0.329	1	U	SW9012A	9L07016	12/08/09 10:03
7439-97-6	Mercury		0.0166	0.0421	1	U	SW7471A	9L15010	12/16/09 12:03
7429-90-5	Aluminum	16000	3.23	12.9	1		SW6010B	9L14011	12/15/09 20:54
7440-36-0	Antimony	MSL uJ	0.323	0.969	1	UN	SW6010B	9L14011	12/15/09 20:54
7440-38-2	Arsenic	1.15	0.194	0.323	1		SW6010B	9L14011	12/15/09 20:54
7440-39-3	Barium	MSH 16.4 J	0.323	2.58	1	X	SW6010B	9L14011	12/15/09 20:54
7440-41-7	Beryllium	0.139	0.0646	0.323	1	J	SW6010B	9L14011	12/15/09 20:54
7440-43-9	Cadmium	MBL 0.303 0.101 U	0.0646	0.323	1	/	SW6010B	9L14011	12/15/09 20:54
7440-70-2	Calcium	84.8	64.6	323	1	J	SW6010B	9L14011	12/15/09 20:54
7440-47-3	Chromium	MSH 12.9 J	0.129	0.323	1	X	SW6010B	9L14011	12/15/09 20:54
7440-48-4	Cobalt	0.679	0.323	0.807	1	J	SW6010B	9L14011	12/15/09 20:54
7440-50-8	Copper	2.45	0.323	0.646	1		SW6010B	9L14011	12/15/09 20:54
7439-89-6	Iron	2500	1.94	6.46	1		SW6010B	9L14011	12/15/09 20:54
7439-92-1	Lead	5.79	0.0969	0.194	1		SW6010B	9L14011	12/15/09 20:54
7439-95-4	Magnesium	MSH 547 J	64.6	323	1	X	SW6010B	9L14011	12/15/09 20:54
7439-96-5	Manganese	6.68	0.194	0.969	1		SW6010B	9L14011	12/15/09 20:54
7440-02-0	Nickel	2.02	0.323	0.646	1		SW6010B	9L14011	12/15/09 20:54
7440-09-7	Potassium	MSH 566 J	64.6	323	1	X	SW6010B	9L14011	12/15/09 20:54
7782-49-2	Selenium	0.305	0.194	0.323	1	J	SW6010B	9L14011	12/15/09 20:54
7440-22-4	Silver		0.194	0.323	1	U	SW6010B	9L14011	12/15/09 20:54
7440-23-5	Sodium		64.6	323	1	UN	SW6010B	9L14011	12/15/09 20:54
7440-28-0	Thallium		0.323	0.517	1	U	SW6010B	9L14011	12/15/09 20:54
7440-62-2	Vanadium	12.9	0.323	0.807	1		SW6010B	9L14011	12/15/09 20:54
7440-66-6	Zinc	5.82	0.323	1.29	1	/	SW6010B	9L14011	12/15/09 20:54


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ANALYSIS DATA SHEET

MR07-IS08-18-19-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-10

Sampled: 12/02/09 08:45

Received: 12/03/09 08:45

% Solids: 74.48

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.168	0.336	1	U	SW9012A	9L09017	12/10/09 14:25
7439-97-6	Mercury		0.0164	0.0415	1	U	SW7471A	9L15011	12/16/09 12:07
7429-90-5	Aluminum	15000	3.24	13.0	1		SW6010B	9L14011	12/15/09 20:58
7440-36-0	Antimony	MSL iJ	0.324	0.973	1	UN	SW6010B	9L14011	12/15/09 20:58
7440-38-2	Arsenic	1.70	0.195	0.324	1		SW6010B	9L14011	12/15/09 20:58
7440-39-3	Barium	MSH 16.3 J	0.324	2.59	1	X	SW6010B	9L14011	12/15/09 20:58
7440-41-7	Beryllium	0.262	0.0649	0.324	1	J	SW6010B	9L14011	12/15/09 20:58
7440-43-9	Cadmium	MSL 0.324-0.990 U	0.0649	0.324	1	J	SW6010B	9L14011	12/15/09 20:58
7440-70-2	Calcium	71.9	64.9	324	1	J	SW6010B	9L14011	12/15/09 20:58
7440-47-3	Chromium	MSH 14.5 J	0.130	0.324	1	X	SW6010B	9L14011	12/15/09 20:58
7440-48-4	Cobalt	0.866	0.324	0.811	1		SW6010B	9L14011	12/15/09 20:58
7440-50-8	Copper	2.31	0.324	0.649	1		SW6010B	9L14011	12/15/09 20:58
7439-89-6	Iron	4780	1.95	6.49	1		SW6010B	9L14011	12/15/09 20:58
7439-92-1	Lead	8.58	0.0973	0.195	1		SW6010B	9L14011	12/15/09 20:58
7439-95-4	Magnesium	MSH 695 J	64.9	324	1	X	SW6010B	9L14011	12/15/09 20:58
7439-96-5	Manganese	8.38	0.195	0.973	1		SW6010B	9L14011	12/15/09 20:58
7440-02-0	Nickel	2.59	0.324	0.649	1		SW6010B	9L14011	12/15/09 20:58
7440-09-7	Potassium	MSH 686 J	64.9	324	1	X	SW6010B	9L14011	12/15/09 20:58
7782-49-2	Selenium	0.372	0.195	0.324	1		SW6010B	9L14011	12/15/09 20:58
7440-22-4	Silver		0.195	0.324	1	U	SW6010B	9L14011	12/15/09 20:58
7440-23-5	Sodium		64.9	324	1	UN	SW6010B	9L14011	12/15/09 20:58
7440-28-0	Thallium		0.195	0.519	1	U	SW6010B	9L14011	12/15/09 20:58
7440-62-2	Vanadium	17.2	0.324	0.811	1		SW6010B	9L14011	12/15/09 20:58
7440-66-6	Zinc	10.3	0.324	1.30	1	X	SW6010B	9L14011	12/15/09 20:58

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ANALYSIS DATA SHEET

MR07-IS07-18-19-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-11

Sampled: 12/02/09 09:10

Received: 12/03/09 08:45

% Solids: 77.01

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.162	0.325	1	U	SW9012A	9L09017	12/10/09 14:28
7439-97-6	Mercury	0.0260	0.0145	0.0367	1	J	SW7471A	9L15011	12/16/09 12:07
7429-90-5	Aluminum	10300	3.26	13.1	1		SW6010B	9L14011	12/15/09 21:16
7440-36-0	Antimony <i>MSL</i>	<i>UJ</i>	0.326	0.979	1	<i>UN</i>	SW6010B	9L14011	12/15/09 21:16
7440-38-2	Arsenic	0.635	0.196	0.326	1		SW6010B	9L14011	12/15/09 21:16
7440-39-3	Barium <i>MSH</i>	18.7 <i>J</i>	0.326	2.61	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16
7440-41-7	Beryllium	0.134	0.0653	0.326	1	J	SW6010B	9L14011	12/15/09 21:16
7440-43-9	Cadmium <i>MSL</i>	<i>0.326 U</i>	0.0653	0.326	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16
7440-70-2	Calcium	1040	65.3	326	1		SW6010B	9L14011	12/15/09 21:16
7440-47-3	Chromium <i>MSH</i>	14.1 <i>J</i>	0.131	0.326	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16
7440-48-4	Cobalt	0.653	0.326	0.816	1	J	SW6010B	9L14011	12/15/09 21:16
7440-50-8	Copper	2.89	0.326	0.653	1		SW6010B	9L14011	12/15/09 21:16
7439-89-6	Iron	1670	1.96	6.53	1		SW6010B	9L14011	12/15/09 21:16
7439-92-1	Lead	7.02	0.0979	0.196	1		SW6010B	9L14011	12/15/09 21:16
7439-95-4	Magnesium <i>MSH</i>	480 <i>J</i>	65.3	326	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16
7439-96-5	Manganese	4.85	0.196	0.979	1		SW6010B	9L14011	12/15/09 21:16
7440-02-0	Nickel	0.987	0.326	0.653	1		SW6010B	9L14011	12/15/09 21:16
7440-09-7	Potassium <i>MSH</i>	589 <i>J</i>	65.3	326	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16
7782-49-2	Selenium	0.330	0.196	0.326	1		SW6010B	9L14011	12/15/09 21:16
7440-22-4	Silver		0.196	0.326	1	U	SW6010B	9L14011	12/15/09 21:16
7440-23-5	Sodium		65.3	326	1	<i>UN</i>	SW6010B	9L14011	12/15/09 21:16
7440-28-0	Thallium		0.196	0.522	1	U	SW6010B	9L14011	12/15/09 21:16
7440-62-2	Vanadium <i>COL</i>	14.4 <i>J</i>	0.326	0.816	1		SW6010B	9L14011	12/15/09 21:16
7440-66-6	Zinc	8.98	0.326	1.31	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:16

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ANALYSIS DATA SHEET

MR07-IS09-16-17-09D

12

 Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/02/09 09:50
 % Solids: 85.40

 SDG: UX07_004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-12
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.146	0.293	1	U	SW9012A	9L09017	12/10/09 14:30
7439-97-6	Mercury		0.0143	0.0362	1	U	SW7471A	9L15011	12/16/09 12:09
7429-90-5	Aluminum	1650	2.94	11.8	1		SW6010B	9L14011	12/15/09 21:20
7440-36-0	Antimony	MSL UJ	0.294	0.883	1	UN	SW6010B	9L14011	12/15/09 21:20
7440-38-2	Arsenic	0.368	0.177	0.294	1		SW6010B	9L14011	12/15/09 21:20
7440-39-3	Barium	MSH 2.69 J	0.294	2.35	1	N	SW6010B	9L14011	12/15/09 21:20
7440-41-7	Beryllium		0.0588	0.294	1	U	SW6010B	9L14011	12/15/09 21:20
7440-43-9	Cadmium	MBL 0.294-1.12 U	0.0588	0.294	1	N	SW6010B	9L14011	12/15/09 21:20
7440-70-2	Calcium		58.8	294	1	U	SW6010B	9L14011	12/15/09 21:20
7440-47-3	Chromium	MSH 1.50 J	0.118	0.294	1	N	SW6010B	9L14011	12/15/09 21:20
7440-48-4	Cobalt		0.294	0.736	1	U	SW6010B	9L14011	12/15/09 21:20
7440-50-8	Copper		0.294	0.588	1	U	SW6010B	9L14011	12/15/09 21:20
7439-89-6	Iron	519	1.77	5.88	1		SW6010B	9L14011	12/15/09 21:20
7439-92-1	Lead	1.59	0.0883	0.177	1		SW6010B	9L14011	12/15/09 21:20
7439-95-4	Magnesium		58.8	294	1	UN	SW6010B	9L14011	12/15/09 21:20
7439-96-5	Manganese	0.903	0.177	0.883	1		SW6010B	9L14011	12/15/09 21:20
7440-02-0	Nickel	0.798	0.294	0.588	1		SW6010B	9L14011	12/15/09 21:20
7440-09-7	Potassium		58.8	294	1	UN	SW6010B	9L14011	12/15/09 21:20
7782-49-2	Selenium	0.184	0.177	0.294	1	J	SW6010B	9L14011	12/15/09 21:20
7440-22-4	Silver		0.0588	0.294	1	U	SW6010B	9L14011	12/15/09 21:20
7440-23-5	Sodium		58.8	294	1	UN	SW6010B	9L14011	12/15/09 21:20
7440-28-0	Thallium		0.177	0.471	1	U	SW6010B	9L14011	12/15/09 21:20
7440-62-2	Vanadium	CEL 2.72 J	0.294	0.736	1		SW6010B	9L14011	12/15/09 21:20
7440-66-6	Zinc	1.32	0.294	1.18	1	N	SW6010B	9L14011	12/15/09 21:20

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Revised 01-06-10

ANALYSIS DATA SHEET

MR07-IS03-9-10-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-13

Sampled: 12/02/09 10:20

Received: 12/03/09 08:45

% Solids: 81.06

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.154	0.308	1	U	SW9012A	9L09017	12/10/09 14:31
7439-97-6	Mercury	0.0271	0.0172	0.0436	1	J	SW7471A	9L15011	12/16/09 12:10
7429-90-5	Aluminum	13900	3.04	12.2	1		SW6010B	9L14011	12/15/09 21:25
7440-36-0	Antimony	MSL UJ	0.304	0.912	1	UN	SW6010B	9L14011	12/15/09 21:25
7440-38-2	Arsenic	3.95	0.182	0.304	1		SW6010B	9L14011	12/15/09 21:25
7440-39-3	Barium	MSH 21.0 J	0.304	2.43	1	N	SW6010B	9L14011	12/15/09 21:25
7440-41-7	Beryllium	0.136	0.0608	0.304	1	J	SW6010B	9L14011	12/15/09 21:25
7440-43-9	Cadmium	MBL 0.306-0.064 u	0.0608	0.304	1	J	SW6010B	9L14011	12/15/09 21:25
7440-70-2	Calcium		60.8	304	1	U	SW6010B	9L14011	12/15/09 21:25
7440-47-3	Chromium	MSH 21.7 J	0.122	0.304	1	N	SW6010B	9L14011	12/15/09 21:25
7440-48-4	Cobalt	0.898	0.304	0.760	1		SW6010B	9L14011	12/15/09 21:25
7440-50-8	Copper	2.90	0.304	0.608	1		SW6010B	9L14011	12/15/09 21:25
7439-89-6	Iron	13600	1.82	6.08	1		SW6010B	9L14011	12/15/09 21:25
7439-92-1	Lead	8.82	0.0912	0.182	1		SW6010B	9L14011	12/15/09 21:25
7439-95-4	Magnesium	MSH 415 J	60.8	304	1	N	SW6010B	9L14011	12/15/09 21:25
7439-96-5	Manganese	4.53	0.182	0.912	1		SW6010B	9L14011	12/15/09 21:25
7440-02-0	Nickel	2.35	0.304	0.608	1		SW6010B	9L14011	12/15/09 21:25
7440-09-7	Potassium	MSH 481 J	60.8	304	1	N	SW6010B	9L14011	12/15/09 21:25
7782-49-2	Selenium	0.550	0.182	0.304	1		SW6010B	9L14011	12/15/09 21:25
7440-22-4	Silver		0.365	0.608	2	U	SW6010B	9L14011	12/17/09 16:03
7440-23-5	Sodium		60.8	304	1	UN	SW6010B	9L14011	12/15/09 21:25
7440-28-0	Thallium		0.182	0.486	1	U	SW6010B	9L14011	12/15/09 21:25
7440-62-2	Vanadium	CCL 31.7 J	0.304	0.760	1		SW6010B	9L14011	12/15/09 21:25
7440-66-6	Zinc	5.17	0.304	1.22	1	N	SW6010B	9L14011	12/15/09 21:25

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ANALYSIS DATA SHEET

MR07-IS02-10-11-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-14

Sampled: 12/02/09 10:50

Received: 12/03/09 08:45

% Solids: 86.10

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.145	0.290	1	U	SW9012A	9L09017	12/10/09 14:32
7439-97-6	Mercury	0.0392	0.0126	0.0330	1		SW7471A	9L15011	12/16/09 12:11
7429-90-5	Aluminum	6610	2.89	11.6	1		SW6010B	9L14011	12/15/09 21:29
7440-36-0	Antimony	MSL UJ	0.289	0.867	1	LN	SW6010B	9L14011	12/15/09 21:29
7440-38-2	Arsenic	2.71	0.173	0.289	1		SW6010B	9L14011	12/15/09 21:29
7440-39-3	Barium	MSH 10.0 J	0.289	2.31	1	J	SW6010B	9L14011	12/15/09 21:29
7440-41-7	Beryllium	0.0680	0.0578	0.289	1	J	SW6010B	9L14011	12/15/09 21:29
7440-43-9	Cadmium	MSL 0.289 0.132 U	0.0578	0.289	1	J	SW6010B	9L14011	12/15/09 21:29
7440-70-2	Calcium	69.3	57.8	289	1	J	SW6010B	9L14011	12/15/09 21:29
7440-47-3	Chromium	MSH 8.92 J	0.116	0.289	1	J	SW6010B	9L14011	12/15/09 21:29
7440-48-4	Cobalt	0.352	0.289	0.722	1	J	SW6010B	9L14011	12/15/09 21:29
7440-50-8	Copper	0.851	0.289	0.578	1		SW6010B	9L14011	12/15/09 21:29
7439-89-6	Iron	5970	1.73	5.78	1		SW6010B	9L14011	12/15/09 21:29
7439-92-1	Lead	4.65	0.0867	0.173	1		SW6010B	9L14011	12/15/09 21:29
7439-95-4	Magnesium	MSH 258 J	57.8	289	1	J	SW6010B	9L14011	12/15/09 21:29
7439-96-5	Manganese	3.26	0.173	0.867	1		SW6010B	9L14011	12/15/09 21:29
7440-02-0	Nickel	0.916	0.289	0.578	1		SW6010B	9L14011	12/15/09 21:29
7440-09-7	Potassium	MSH 281 J	57.8	289	1	J	SW6010B	9L14011	12/15/09 21:29
7782-49-2	Selenium	0.346	0.173	0.289	1		SW6010B	9L14011	12/15/09 21:29
7440-22-4	Silver		0.173	0.289	1	U	SW6010B	9L14011	12/15/09 21:29
7440-23-5	Sodium		57.8	289	1	U	SW6010B	9L14011	12/15/09 21:29
7440-28-0	Thallium		0.173	0.462	1	U	SW6010B	9L14011	12/15/09 21:29
7440-62-2	Vanadium	CCL 12.8 J	0.289	0.722	1		SW6010B	9L14011	12/15/09 21:29
7440-66-6	Zinc	3.46	0.289	1.16	1	J	SW6010B	9L14011	12/15/09 21:29

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ANALYSIS DATA SHEET

MR07-IS01-11-12-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-15

Sampled: 12/02/09 11:10

Received: 12/03/09 08:45

% Solids: 81.88

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed	
57-12-5	Cyanide		0.153	0.305	1	U	SW9012A	9L09017	12/10/09 14:33	
7439-97-6	Mercury		0.0140	0.0356	1	U	SW7471A	9L15011	12/16/09 12:12	
7429-90-5	Aluminum	9690	2.98	11.9	1		SW6010B	9L14011	12/15/09 21:34	
7440-36-0	Antimony	MSL UJ	0.298	0.894	1	UN	SW6010B	9L14011	12/15/09 21:34	
7440-38-2	Arsenic	FD 2.04 J	0.179	0.298	1		SW6010B	9L14011	12/15/09 21:34	
7440-39-3	Barium	MSH 14.0 J	0.298	2.38	1	J	SW6010B	9L14011	12/15/09 21:34	
7440-41-7	Beryllium		0.106	0.0596	0.298	1	J	SW6010B	9L14011	12/15/09 21:34
7440-43-9	Cadmium	MSL 0.298 u	0.0596	0.298	1	J	SW6010B	9L14011	12/15/09 21:34	
7440-70-2	Calcium		111	59.6	298	1	J	SW6010B	9L14011	12/15/09 21:34
7440-47-3	Chromium	MSH 15.2 J	0.119	0.298	1	J	SW6010B	9L14011	12/15/09 21:34	
7440-48-4	Cobalt		0.439	0.298	0.745	1	J	SW6010B	9L14011	12/15/09 21:34
7440-50-8	Copper		2.00	0.298	0.596	1		SW6010B	9L14011	12/15/09 21:34
7439-89-6	Iron	FD 4030 J	1.79	5.96	1		SW6010B	9L14011	12/15/09 21:34	
7439-92-1	Lead		6.53	0.0894	0.179	1		SW6010B	9L14011	12/15/09 21:34
7439-95-4	Magnesium	MSH 360 J	59.6	298	1	J	SW6010B	9L14011	12/15/09 21:34	
7439-96-5	Manganese		4.88	0.179	0.894	1		SW6010B	9L14011	12/15/09 21:34
7440-02-0	Nickel		1.24	0.298	0.596	1		SW6010B	9L14011	12/15/09 21:34
7440-09-7	Potassium	MSH 502 J	59.6	298	1	J	SW6010B	9L14011	12/15/09 21:34	
7782-49-2	Selenium	FD 0.216 J	0.179	0.298	1	J	SW6010B	9L14011	12/15/09 21:34	
7440-22-4	Silver		0.179	0.298	1	U	SW6010B	9L14011	12/15/09 21:34	
7440-23-5	Sodium		59.6	298	1	UN	SW6010B	9L14011	12/15/09 21:34	
7440-28-0	Thallium		0.179	0.477	1	U	SW6010B	9L14011	12/15/09 21:34	
7440-62-2	Vanadium	CC 14.1 J	0.298	0.745	1		SW6010B	9L14011	12/15/09 21:34	
7440-66-6	Zinc		3.91	0.298	1.19	1	J	SW6010B	9L14011	12/15/09 21:34

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ANALYSIS DATA SHEET

MR07-IS01D-11-12-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-16

Sampled: 12/02/09 11:15

Received: 12/03/09 08:45

% Solids: 76.63

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.163	0.326	1	U	SW9012A	9L09017	12/10/09 14:34
7439-97-6	Mercury		0.0164	0.0417	1	U	SW7471A	9L15011	12/16/09 12:13
7429-90-5	Aluminum	12500	3.25	13.0	1		SW6010B	9L14011	12/15/09 21:38
7440-36-0	Antimony	MSL WJ	0.325	0.974	1	UN	SW6010B	9L14011	12/15/09 21:38
7440-38-2	Arsenic	FD 15.7 J	0.195	0.325	1		SW6010B	9L14011	12/15/09 21:38
7440-39-3	Barium	MSH 19.1 J	0.325	2.60	1	N	SW6010B	9L14011	12/15/09 21:38
7440-41-7	Beryllium	0.158	0.0649	0.325	1	J	SW6010B	9L14011	12/15/09 21:38
7440-43-9	Cadmium	MSL 0.325 0.182 U	0.0649	0.325	1	J	SW6010B	9L14011	12/15/09 21:38
7440-70-2	Calcium	105	64.9	325	1	J	SW6010B	9L14011	12/15/09 21:38
7440-47-3	Chromium	MSH 22.2 J	0.130	0.325	1	N	SW6010B	9L14011	12/15/09 21:38
7440-48-4	Cobalt	0.579	0.325	0.812	1	J	SW6010B	9L14011	12/15/09 21:38
7440-50-8	Copper	2.69	0.325	0.649	1		SW6010B	9L14011	12/15/09 21:38
7439-89-6	Iron	FD 16000 J	1.95	6.49	1		SW6010B	9L14011	12/15/09 21:38
7439-92-1	Lead	9.21	0.0974	0.195	1		SW6010B	9L14011	12/15/09 21:38
7439-95-4	Magnesium	MSH 471 J	64.9	325	1	N	SW6010B	9L14011	12/15/09 21:38
7439-96-5	Manganese	5.48	0.195	0.974	1		SW6010B	9L14011	12/15/09 21:38
7440-02-0	Nickel	1.32	0.325	0.649	1		SW6010B	9L14011	12/15/09 21:38
7440-09-7	Potassium	MSH 597 J	64.9	325	1	N	SW6010B	9L14011	12/15/09 21:38
7782-49-2	Selenium	FD 1.01 J	0.195	0.325	1		SW6010B	9L14011	12/15/09 21:38
7440-22-4	Silver		0.519	0.649	2	U	SW6010B	9L14011	12/17/09 16:07
7440-23-5	Sodium		64.9	325	1	UN	SW6010B	9L14011	12/15/09 21:38
7440-28-0	Thallium		0.195	0.519	1	U	SW6010B	9L14011	12/15/09 21:38
7440-62-2	Vanadium	CCL 46.4 J	0.325	0.812	1		SW6010B	9L14011	12/15/09 21:38
7440-66-6	Zinc	6.47	0.325	1.30	1	N	SW6010B	9L14011	12/15/09 21:38

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ANALYSIS DATA SHEET

MR07-IS04-12-13-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-17

Sampled: 12/02/09 11:45

Received: 12/03/09 08:45

% Solids: 93.47

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.134	0.267	1	U	SW9012A	9L09017	12/10/09 14:35
7439-97-6	Mercury		0.0135	0.0342	1	U	SW7471A	9L15011	12/16/09 12:16
7429-90-5	Aluminum	2420	2.66	10.6	1		SW6010B	9L14011	12/15/09 21:43
7440-36-0	Antimony	MSL UJ	0.266	0.798	1	UN	SW6010B	9L14011	12/15/09 21:43
7440-38-2	Arsenic	0.269	0.160	0.266	1		SW6010B	9L14011	12/15/09 21:43
7440-39-3	Barium	MSH 3.91 J	0.266	2.13	1	J	SW6010B	9L14011	12/15/09 21:43
7440-41-7	Beryllium		0.0532	0.266	1	U	SW6010B	9L14011	12/15/09 21:43
7440-43-9	Cadmium	MSL 0.266-102 U	0.0532	0.266	1	J	SW6010B	9L14011	12/15/09 21:43
7440-70-2	Calcium	86.5	53.2	266	1	J	SW6010B	9L14011	12/15/09 21:43
7440-47-3	Chromium	MSH 2.43 J	0.106	0.266	1	J	SW6010B	9L14011	12/15/09 21:43
7440-48-4	Cobalt		0.266	0.665	1	U	SW6010B	9L14011	12/15/09 21:43
7440-50-8	Copper	0.276	0.266	0.532	1	J	SW6010B	9L14011	12/15/09 21:43
7439-89-6	Iron	348	1.60	5.32	1		SW6010B	9L14011	12/15/09 21:43
7439-92-1	Lead	1.64	0.0798	0.160	1		SW6010B	9L14011	12/15/09 21:43
7439-95-4	Magnesium	MSH 57.8 J	53.2	266	1	J	SW6010B	9L14011	12/15/09 21:43
7439-96-5	Manganese	1.91	0.160	0.798	1		SW6010B	9L14011	12/15/09 21:43
7440-02-0	Nickel	0.669	0.266	0.532	1		SW6010B	9L14011	12/15/09 21:43
7440-09-7	Potassium	MSH 81.8 J	53.2	266	1	J	SW6010B	9L14011	12/15/09 21:43
7782-49-2	Selenium		0.160	0.266	1	U	SW6010B	9L14011	12/15/09 21:43
7440-22-4	Silver		0.0532	0.266	1	U	SW6010B	9L14011	12/15/09 21:43
7440-23-5	Sodium		53.2	266	1	U	SW6010B	9L14011	12/15/09 21:43
7440-28-0	Thallium		0.213	0.426	1	U	SW6010B	9L14011	12/15/09 21:43
7440-62-2	Vanadium	CCU 1.94 J	0.266	0.665	1		SW6010B	9L14011	12/15/09 21:43
7440-66-6	Zinc	1.37	0.266	1.06	1	J	SW6010B	9L14011	12/15/09 21:43

led
2/23/10

ANALYSIS DATA SHEET

MR07-IS05-14-15-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-18

Sampled: 12/02/09 12:15

Received: 12/03/09 08:45

% Solids: 83.16

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.150	0.301	1	U	SW9012A	9L09017	12/10/09 14:36
7439-97-6	Mercury	0.0169	0.0120	0.0330	1	J	SW7471A	9L15011	12/16/09 12:17
7429-90-5	Aluminum	7490	2.88	11.5	1		SW6010B	9L14011	12/15/09 21:47
7440-36-0	Antimony	MSL u J	0.288	0.863	1	UN	SW6010B	9L14011	12/15/09 21:47
7440-38-2	Arsenic	0.573	0.173	0.288	1		SW6010B	9L14011	12/15/09 21:47
7440-39-3	Barium	MSH 9.42 J	0.288	2.30	1	N	SW6010B	9L14011	12/15/09 21:47
7440-41-7	Beryllium		0.0575	0.288	1	U	SW6010B	9L14011	12/15/09 21:47
7440-43-9	Cadmium	MSL 0.288 u	0.0575	0.288	1	J	SW6010B	9L14011	12/15/09 21:47
7440-70-2	Calcium	383	57.5	288	1		SW6010B	9L14011	12/15/09 21:47
7440-47-3	Chromium	MSH 6.86 J	0.115	0.288	1	N	SW6010B	9L14011	12/15/09 21:47
7440-48-4	Cobalt	0.361	0.288	0.719	1	J	SW6010B	9L14011	12/15/09 21:47
7440-50-8	Copper	1.35	0.288	0.575	1		SW6010B	9L14011	12/15/09 21:47
7439-89-6	Iron	1560	1.73	5.75	1		SW6010B	9L14011	12/15/09 21:47
7439-92-1	Lead	MSH 4.42	0.0863	0.173	1		SW6010B	9L14011	12/15/09 21:47
7439-95-4	Magnesium	211 J	57.5	288	1	N	SW6010B	9L14011	12/15/09 21:47
7439-96-5	Manganese	3.27	0.173	0.863	1		SW6010B	9L14011	12/15/09 21:47
7440-02-0	Nickel	1.84	0.288	0.575	1		SW6010B	9L14011	12/15/09 21:47
7440-09-7	Potassium	MSH 172 J	57.5	288	1	N	SW6010B	9L14011	12/15/09 21:47
7782-49-2	Selenium	1.02	0.173	0.288	1		SW6010B	9L14011	12/15/09 21:47
7440-22-4	Silver		0.115	0.288	1	U	SW6010B	9L14011	12/15/09 21:47
7440-23-5	Sodium		57.5	288	1	UN	SW6010B	9L14011	12/15/09 21:47
7440-28-0	Thallium		0.230	0.460	1	U	SW6010B	9L14011	12/15/09 21:47
7440-62-2	Vanadium	CC 5.13 J	0.288	0.719	1		SW6010B	9L14011	12/15/09 21:47
7440-66-6	Zinc	2.70	0.288	1.15	1	N	SW6010B	9L14011	12/15/09 21:47

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2/23/10

ANALYSIS DATA SHEET

MR07-IS06-12-13-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-19

Sampled: 12/02/09 12:45

Received: 12/03/09 08:45

% Solids: 87.89

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.142	0.284	1	U	SW9012A	9L09017	12/10/09 14:37
7439-97-6	Mercury		0.0139	0.0352	1	U	SW7471A	9L15011	12/16/09 12:18
7429-90-5	Aluminum	3310	2.79	11.2	1		SW6010B	9L14011	12/15/09 21:52
7440-36-0	Antimony	<i>MSL UJ</i>	0.279	0.837	1	<i>UN*</i>	SW6010B	9L14011	12/15/09 21:52
7440-38-2	Arsenic	0.617	0.167	0.279	1		SW6010B	9L14011	12/15/09 21:52
7440-39-3	Barium	<i>MSH 25.3 J</i>	0.279	2.23	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:52
7440-41-7	Beryllium	0.0786	0.0558	0.279	1	J	SW6010B	9L14011	12/15/09 21:52
7440-43-9	Cadmium	<i>MSL 0.219-110 U</i>	0.0558	0.279	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:52
7440-70-2	Calcium	352	55.8	279	1		SW6010B	9L14011	12/15/09 21:52
7440-47-3	Chromium	<i>MSH 2.36 J</i>	0.112	0.279	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:52
7440-48-4	Cobalt		0.279	0.697	1	U	SW6010B	9L14011	12/15/09 21:52
7440-50-8	Copper	0.602	0.279	0.558	1		SW6010B	9L14011	12/15/09 21:52
7439-89-6	Iron	1420	1.67	5.58	1		SW6010B	9L14011	12/15/09 21:52
7439-92-1	Lead	3.16	0.0837	0.167	1		SW6010B	9L14011	12/15/09 21:52
7439-95-4	Magnesium	<i>MSH 84.5 J</i>	55.8	279	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:52
7439-96-5	Manganese	28.0	0.167	0.837	1		SW6010B	9L14011	12/15/09 21:52
7440-02-0	Nickel	0.676	0.279	0.558	1		SW6010B	9L14011	12/15/09 21:52
7440-09-7	Potassium		55.8	279	1	<i>UN</i>	SW6010B	9L14011	12/15/09 21:52
7782-49-2	Selenium		0.167	0.279	1	U	SW6010B	9L14011	12/15/09 21:52
7440-22-4	Silver		0.112	0.279	1	U	SW6010B	9L14011	12/15/09 21:52
7440-23-5	Sodium		55.8	279	1	<i>UN</i>	SW6010B	9L14011	12/15/09 21:52
7440-28-0	Thallium		0.223	0.446	1	U	SW6010B	9L14011	12/15/09 21:52
7440-62-2	Vanadium	<i>CC 3.14 J</i>	0.279	0.697	1		SW6010B	9L14011	12/15/09 21:52
7440-66-6	Zinc	1.96	0.279	1.12	1	<i>X</i>	SW6010B	9L14011	12/15/09 21:52

ew
2/23/10

ANALYSIS DATA SHEET

MR07-FB120209

Laboratory: Empirical Laboratories, LLC

SDG: UXO7 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0912031-20

Sampled: 12/02/09 12:55

Received: 12/03/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L07002	12/07/09 16:40
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9L15004	12/16/09 12:48
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15004	12/16/09 12:48
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9L15004	12/16/09 12:48
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-70-2	Calcium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:48
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15004	12/16/09 12:48
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15004	12/16/09 12:48
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9L15004	12/16/09 12:48
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15004	12/16/09 12:48
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:48
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9L15004	12/16/09 12:48
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9L15004	12/16/09 12:48
7440-09-7	Potassium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:48
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:48
7440-23-5	Sodium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:48
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15004	12/16/09 12:48
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15004	12/16/09 12:48
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9L15004	12/16/09 12:48
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9L09018	12/10/09 14:50

Revised 20100106 *llw* 2/23/10

ANALYSIS DATA SHEET

21

MR07-EB120209-IS

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0912031-21

Sampled: 12/02/09 13:00

Received: 12/03/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L07002	12/07/09 16:40
7429-90-5	Aluminum	37.1	12.5	50.0	1	J	SW6010B	9L15004	12/16/09 12:52
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15004	12/16/09 12:52
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9L15004	12/16/09 12:52
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-70-2	Calcium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:52
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15004	12/16/09 12:52
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15004	12/16/09 12:52
7439-89-6	Iron	40.2	7.50	25.0	1		SW6010B	9L15004	12/16/09 12:52
7439-92-1	Lead	0.395	0.375	0.750	1	J	SW6010B	9L15004	12/16/09 12:52
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:52
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9L15004	12/16/09 12:52
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9L15004	12/16/09 12:52
7440-09-7	Potassium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:52
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15004	12/16/09 12:52
7440-23-5	Sodium		250	1250	1	U	SW6010B	9L15004	12/16/09 12:52
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15004	12/16/09 12:52
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15004	12/16/09 12:52
7440-66-6	Zinc	4.20	1.25	5.00	1	J	SW6010B	9L15004	12/16/09 12:52
CAS NO.	Analyte	Concentration (mg/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
57-12-5	Cyanide		0.00500	0.0100	1	U	SW9012A	9L09018	12/10/09 14:51

lew
2/23/10

PERCHLORATE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_004

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-IS17-16-18-09D	0912031-01	Soil
1MS	MR07-IS17-16-18-09DMS	0912031-01MS	Soil
1MSD	MR07-IS17-16-18-09DMSD	0912031-01MSD	Soil
2	MR07-IS15-16-17-09D	0912031-02	Soil
3	MR07-IS13-16-17-09D	0912031-03	Soil
4	MR07-IS13D-16-17-09D	0912031-04	Soil
5	MR07-IS16-12-13-09D	0912031-05	Soil
6	MR07-IS14-13-14-09D	0912031-06	Soil
7	MR07-IS10-18-19-09D	0912031-07	Soil
8	MR07-IS11-23-24-09D	0912031-08	Soil
9	MR07-IS12-18-19-09D	0912031-09	Soil
10	MR07-IS08-18-19-09D	0912031-10	Soil
11	MR07-IS07-18-19-09D	0912031-11	Soil
12	MR07-IS09-16-17-09D	0912031-12	Soil
13	MR07-IS03-9-10-09D	0912031-13	Soil
14	MR07-IS02-10-11-09D	0912031-14	Soil
15	MR07-IS01-11-12-09D	0912031-15	Soil
16	MR07-IS01D-11-12-09D	0912031-16	Soil
17	MR07-IS04-12-13-09D	0912031-17	Soil
18	MR07-IS05-14-15-09D	0912031-18	Soil
19	MR07-IS06-12-13-09D	0912031-19	Soil
20	MR07-FB120209	0912031-20	Water
21	MR07-EB120209-IS	0912031-21	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 28 days for perchlorate.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-FB120209	None - ND	-	-	-	-
MR07-EB120209-IS	None - ND	-	-	-	-

Matrix Spike/Matrix Spike Duplicate - The matrix spike/duplicates sample exhibited acceptable %R and RPD values.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-IS13-16-17-09D ug/kg	MR07-IS13D-16-17-09D ug/kg	RPD	Qualifier
None	ND	ND	-	-

Compound	MR07-IS01-11-12-09D ug/kg	MR07-IS01D-11-12-09D ug/kg	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-IS17-16-18-09D

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/01/09 09:15
 % Solids: 75.28

SDG: UX07_004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-01
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.797	2.66	1	U	SW6850	9L07024	12/08/09 20:25

ANALYSIS DATA SHEET

MR07-IS15-16-17-09D 2

Laboratory: Empirical Laboratories, LLC

Client: CH2M Hill, Inc.

Matrix: Soil

Sampled: 12/01/09 10:10

% Solids: 79.72

SDG: UXO7 004

Project: Lejeune CTO014 (UX07)

Laboratory ID: 0912031-02

Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.753	2.51	1	U	SW6850	9L07024	12/08/09 21:18

Handwritten:
2/23/10

ANALYSIS DATA SHEET

MR07-IS13-16-17-09D 3

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-03

Sampled: 12/01/09 10:20

Received: 12/03/09 08:45

% Solids: 73.36

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.818	2.73	1	U	SW6850	9L07024	12/08/09 21:36

uw
2/23/10

ANALYSIS DATA SHEET

MR07-IS13D-16-17-09D

4

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-04

Sampled: 12/01/09 10:25

Received: 12/03/09 08:45

% Solids: 77.77

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.771	2.57	1	U	SW6850	9L07024	12/08/09 21:54

llw
2/23/10

ANALYSIS DATA SHEET

MR07-IS16-12-13-09D

5

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/01/09 10:55
 % Solids: 87.77

SDG: UX07 004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-05
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.684	2.28	1	U	SW6850	9L07024	12/08/09 22:12

luw
2/23/10

ANALYSIS DATA SHEET

MR07-IS14-13-14-09D

6

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-06

Sampled: 12/01/09 11:45

Received: 12/03/09 08:45

% Solids: 80.32

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.747	2.49	1	U	SW6850	9L07024	12/08/09 22:29

uw
2/23/10

ANALYSIS DATA SHEET

MR07-IS10-18-19-09D

7

Laboratory: Empirical Laboratories, LLC

SDG: UX07 004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-07

Sampled: 12/01/09 14:20

Received: 12/03/09 08:45

% Solids: 77.66

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.773	2.58	1	U	SW6850	9L07024	12/08/09 22:47

MS
2/23/10

ANALYSIS DATA SHEET

MR07-IS11-23-24-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-08

Sampled: 12/01/09 15:20

Received: 12/03/09 08:45

% Solids: 81.64

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.735	2.45	1	U	SW6850	9L07024	12/08/09 23:05

Handwritten: 2123110

ANALYSIS DATA SHEET

MR07-IS12-18-19-09D

9

Laboratory: Empirical Laboratories, LLC

SDG: UXO7_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-09

Sampled: 12/01/09 15:50

Received: 12/03/09 08:45

% Solids: 75.90

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.791	2.64	1	U	SW6850	9L07024	12/08/09 23:23

ms
2/23/10

ANALYSIS DATA SHEET

MR07-IS08-18-19-09D

10

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 004

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0912031-10

 Sampled: 12/02/09 08:45

 Received: 12/03/09 08:45

 % Solids: 74.48

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.806	2.69	1	U	SW6850	9L07024	12/09/09 00:52

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 MED
 2/23/10

ANALYSIS DATA SHEET

MR07-IS07-18-19-09D

Laboratory: Empirical Laboratories, LLC

Client: CH2M Hill, Inc.

Matrix: Soil

Sampled: 12/02/09 09:10

% Solids: 77.01

SDG: UX07 004

Project: Lejeune CTO014 (UX07)

Laboratory ID: 0912031-11

Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.779	2.60	1	U	SW6850	9L07024	12/11/09 14:19

New
2/23/10

ANALYSIS DATA SHEET

MR07-IS09-16-17-09D

12

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/02/09 09:50
 % Solids: 85.40

SDG: UX07 004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-12
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.703	2.34	1	U	SW6850	9L07024	12/09/09 01:28

mw
2123110

ANALYSIS DATA SHEET

MR07-IS03-9-10-09D

Laboratory: Empirical Laboratories, LLC

Client: CH2M Hill, Inc.

Matrix: Soil

Sampled: 12/02/09 10:20

% Solids: 81.06

SDG: UX07_004

Project: Lejeune CTO014 (UX07)

Laboratory ID: 0912031-13

Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.740	2.47	1	U	SW6850	9L07024	12/09/09 01:45

mw
2/23/10

ANALYSIS DATA SHEET

 MR07-IS02-10-11-09D 14

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/02/09 10:50
 % Solids: 86.10

SDG: UX07_004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-14
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.697	2.32	1	U	SW6850	9L07024	12/09/09 02:03

ew
2/23/10

ANALYSIS DATA SHEET

MR07-IS01-11-12-09D

15

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/02/09 11:10
 % Solids: 81.88

SDG: UX07_004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-15
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.733	2.44	1	U	SW6850	9L07024	12/09/09 02:21

luw
2123110

ANALYSIS DATA SHEET

MR07-IS01D-11-12-09D

16

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Soil

Laboratory ID: 0912031-16

Sampled: 12/02/09 11:15

Received: 12/03/09 08:45

% Solids: 76.63

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.783	2.61	1	U	SW6850	9L07024	12/09/09 02:39

lew
2/23/10

ANALYSIS DATA SHEET

MR07-IS04-12-13-09D

17

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_004

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0912031-17

 Sampled: 12/02/09 11:45

 Received: 12/03/09 08:45

 % Solids: 93.47

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.642	2.14	1	U	SW6850	9L07024	12/09/09 02:57

lew
2/23/10

ANALYSIS DATA SHEET

MR07-IS05-14-15-09D

18

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_004

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Soil

 Laboratory ID: 0912031-18

 Sampled: 12/02/09 12:15

 Received: 12/03/09 08:45

 % Solids: 83.16

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.721	2.40	1	U	SW6850	9L07024	12/09/09 03:14

lew
 2/23/10

ANALYSIS DATA SHEET

MR07-IS06-12-13-09D

19

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Soil
 Sampled: 12/02/09 12:45
 % Solids: 87.89

SDG: UX07_004
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912031-19
 Received: 12/03/09 08:45

CAS NO.	Analyte	Concentration (ug/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.683	2.28	1	U	SW6850	9L07024	12/09/09 03:32

HW
2/23/10

ANALYSIS DATA SHEET

MR07-FB120209

20

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 004

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Water

 Laboratory ID: 0912031-20

 Sampled: 12/02/09 12:55

 Received: 12/03/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9L09015	12/16/09 21:18

new
212310

ANALYSIS DATA SHEET

MR07-EB120209-IS

21

Laboratory: Empirical Laboratories, LLC

SDG: UX07_004

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Water

Laboratory ID: 0912031-21

Sampled: 12/02/09 13:00

Received: 12/03/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9L09015	12/16/09 21:54

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 2/23/10

EXPLOSIVES
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_005

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-EB120309	0912053-01	Water
2	MR07-TW08-09D	0912053-02	Water
3	MR07-TW17-09D	0912053-03	Water
4	MR07-TW10-09D	0912053-04	Water
5	MR07-TW13-09D	0912053-05	Water
6	MR07-TW13D-09D	0912053-06	Water
7	MR07-TW12-09D	0912053-07	Water
8	MR07-TW03-09D	0912053-08	Water
8MS	MR07-TW03-09DMS	0912053-08MS	Water
8MSD	MR07-TW03-09DMSD	0912053-08MSD	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days except the following.

Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1-8	12/03/09	12/16/09	13	J/UJ

Initial Calibration - The initial calibrations exhibited acceptable %RSD and/or correlation coefficient values.

Calibration Verification - The continuing calibrations exhibited acceptable %D values.

Surrogates - Many samples exhibited acceptable surrogate recoveries on the primary column and slightly high recoveries on the confirmation column. No action was taken since the primary column recoveries were within QC limits.

MS/MSD - The MS/MSD samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
8	HMX	79%/Ok/Ok	None - See HT
	RDX	610%/568%/Ok	
	Nitrobenzene	1095%/1484%/Ok	
	2,4-Dinitrotoluene	156%/178%/Ok	
	2,6-Dinitrotoluene	160%/181%/Ok	
	2,4,6-Trinitrotoluene	Ok/177%/Ok	
	Tetryl	191%/246%/Ok	
	4-Amino-2,6-dinitrotoluene	444%/594%/Ok	
	2-Nitrotoluene	552%/464%/Ok	
	4-Nitrotoluene	184%/147%/Ok	
	3-Nitrotoluene	714%/974%/31	

Laboratory Control Sample - The LCS samples exhibited acceptable %R values except the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
9L16023-BLK1	HMX	71%	None	See HT
9L16025-BLK1	HMX	66%	None	See HT

Method Blank - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-EB120309	HMX	0.22	1.1	U	2, 4, 5
	RDX	0.79	3.95	None	All ND
	Nitrobenzene	0.074	0.37	U	4
	1,3-Dinitrobenzene	0.76	3.8	U	7
	1,3,5-Trinitrobenzene	0.17	0.85	U	2-8
	2,4-Dinitrotoluene	0.18	0.90	U	4, 7, 8
	2,6-Dinitrotoluene	0.11	0.55	U	8
	2,4,6-Trinitrotoluene	0.087	0.435	None	All ND
	2-Nitrotoluene	0.21	1.05	U	3, 7
	Nitroglycerin	0.24	1.2	None	All ND
MR07-FB120209	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-TW13-09D ug/L	MR07-TW13D-09D ug/L	RPD	Qualifier
Nitrobenzene	0.56	0.57	2%	None
4-Nitrotoluene	0.14 U	0.063	NC	None
PETN	0.24	0.48 U	NC	None

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - Several samples exhibited results with high %D values between columns and have been flagged (P) by the laboratory and further qualified (J).

FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 2

MR07-TW08-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005
 Matrix: (soil/water) WATER Lab Sample ID: 0912053-02
 Sample wt/vol: 1060 (g/ml) ML Lab File ID: 044V4201
 % Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/03/09 15:50
 Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/16/09
 Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/18/09 11:11
 Injection Volume: 100.0 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
2691-41-0	-----HMX	0.047	0.14	HT 0.28	UJ
121-82-4	-----RDX	0.047	0.14		U
98-95-3	-----Nitrobenzene	0.047	0.14	HT	U
99-65-0	-----1,3-Dinitrobenzene	0.047	0.14		U
99-35-4	-----1,3,5-Trinitrobenzene	0.047	0.14	HT 0.088	U 0.14UJ
121-14-2	-----2,4-Dinitrotoluene	0.047	0.14	HT	U UJ
606-20-2	-----2,6-Dinitrotoluene	0.047	0.14		U
118-96-7	-----2,4,6-Trinitrotoluene	0.047	0.14		U
35572-78-2	-----2-Amino-4,6-dinitrotoluene	0.047	0.14		U
479-45-8	-----Tetryl	0.047	0.14		U
19406-51-0	-----4-Amino-2,6-dinitrotoluene	0.047	0.14		U
88-72-2	-----2-Nitrotoluene	0.047	0.14		U
99-99-0	-----4-Nitrotoluene	0.047	0.14		U
99-08-1	-----3-Nitrotoluene	0.047	0.14		U
55-63-0	-----Nitroglycerin	0.16	0.48	0.079	U UJ
78-11-5	-----PETN	0.16	0.48		U UJ

FORM I EXPL

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2/23/10

FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

3

MR07-TW17-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-03

Sample wt/vol: 1020 (g/ml) ML Lab File ID: 019V1901

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/04/09 08:50

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/17/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/20/09 03:02

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L			Q
		MDL	RL	CONC	
2691-41-0	-----HMX	0.049	0.15	HT	U UJ
121-82-4	-----RDX	0.049	0.15		U J
98-95-3	-----Nitrobenzene	0.049	0.15	0.44	PM J
99-65-0	-----1,3-Dinitrobenzene	0.049	0.15		U UJ
99-35-4	-----1,3,5-Trinitrobenzene	0.049	0.15	EGL HT 100	J 0.15 UJ
121-14-2	-----2,4-Dinitrotoluene	0.049	0.15	HT	U UJ
606-20-2	-----2,6-Dinitrotoluene	0.049	0.15		U UJ
118-96-7	-----2,4,6-Trinitrotoluene	0.049	0.15		U UJ
35572-78-2	----2-Amino-4,6-dinitrotoluene	0.049	0.15		U UJ
479-45-8	-----Tetryl	0.049	0.15		U UJ
19406-51-0	----4-Amino-2,6-dinitrotoluene	0.049	0.15	HT	U UJ
88-72-2	-----2-Nitrotoluene	0.049	0.15	EGL HT 0.31	J UJ
99-99-0	-----4-Nitrotoluene	0.049	0.15	HT 0.16	PM J
99-08-1	-----3-Nitrotoluene	0.049	0.15	HT 0.067	J PM J
55-63-0	-----Nitroglycerin	0.17	0.50		U UJ
78-11-5	-----PETN	0.17	0.50	0.22	J J

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

4

MR07-TW10-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-04

Sample wt/vol: 1040 (g/ml) ML Lab File ID: 045V4301

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/03/09 15:00

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/16/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/18/09 11:44

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L		
		MDL	RL	CONC Q
2691-41-0	HMX	0.048	0.14	EAL HT 0.085 JP 0.14u
121-82-4	RDX	0.048	0.14	HT HT X uJ
98-95-3	Nitrobenzene	0.048	0.14	EAL 0.054 JPM 0.14u
99-65-0	1,3-Dinitrobenzene	0.048	0.14	HT HT X uJ
99-35-4	1,3,5-Trinitrobenzene	0.048	0.14	EAL HT 0.15 uJ
121-14-2	2,4-Dinitrotoluene	0.048	0.14	EAL HT 0.076 J 0.14u
606-20-2	2,6-Dinitrotoluene	0.048	0.14	HT U uJ
118-96-7	2,4,6-Trinitrotoluene	0.048	0.14	HT U uJ
35572-78-2	2-Amino-4,6-dinitrotoluene	0.048	0.14	HT U uJ
479-45-8	Tetryl	0.048	0.14	HT 0.32 J
19406-51-0	4-Amino-2,6-dinitrotoluene	0.048	0.14	HT U uJ
88-72-2	2-Nitrotoluene	0.048	0.14	HT U uJ
99-99-0	4-Nitrotoluene	0.048	0.14	HT 0.20 J
99-08-1	3-Nitrotoluene	0.048	0.14	HT U uJ
55-63-0	Nitroglycerin	0.16	0.49	HT U uJ
78-11-5	PETN	0.16	0.49	HT 8.6 J

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

5

MR07-TW13-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-05

Sample wt/vol: 1040 (g/ml) ML Lab File ID: 046V4401

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/03/09 11:10

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/16/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/18/09 12:17

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L CONC	UG/L Q
		MDL	RL			
2691-41-0	-----HMX	0.048	0.14	HT	0.14	HT
121-82-4	-----RDX	0.048	0.14	HT	0.14	HT
98-95-3	-----Nitrobenzene	0.048	0.14	HT	0.14	HT
99-65-0	-----1,3-Dinitrobenzene	0.048	0.14	HT	0.14	HT
99-35-4	-----1,3,5-Trinitrobenzene	0.048	0.14	HT	0.14	HT
121-14-2	-----2,4-Dinitrotoluene	0.048	0.14	HT	0.14	HT
606-20-2	-----2,6-Dinitrotoluene	0.048	0.14	HT	0.14	HT
118-96-7	-----2,4,6-Trinitrotoluene	0.048	0.14	HT	0.14	HT
35572-78-2	----2-Amino-4,6-dinitrotoluene	0.048	0.14	HT	0.14	HT
479-45-8	-----Tetryl	0.048	0.14	HT	0.14	HT
19406-51-0	----4-Amino-2,6-dinitrotoluene	0.048	0.14	HT	0.14	HT
88-72-2	-----2-Nitrotoluene	0.048	0.14	HT	0.14	HT
99-99-0	-----4-Nitrotoluene	0.048	0.14	HT	0.14	HT
99-08-1	-----3-Nitrotoluene	0.048	0.14	HT	0.14	HT
55-63-0	-----Nitroglycerin	0.16	0.49	HT	0.49	HT
78-11-5	-----PETN	0.16	0.49	HT	0.49	HT

FORM I EXPL

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2/23/10

FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 6

MR07-TW13D-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-06

Sample wt/vol: 1060 (g/ml) ML Lab File ID: 047V4501

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/03/09 11:15

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/16/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/18/09 12:50

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
2691-41-0	-----HMX	0.047	0.14		U UJ
121-82-4	-----RDX	0.047	0.14		U UJ
98-95-3	-----Nitrobenzene	0.047	0.14		U UJ
99-65-0	-----1,3-Dinitrobenzene	0.047	0.14		U UJ
99-35-4	-----1,3,5-Trinitrobenzene	0.047	0.14		U UJ
121-14-2	-----2,4-Dinitrotoluene	0.047	0.14		U UJ
606-20-2	-----2,6-Dinitrotoluene	0.047	0.14		U UJ
118-96-7	-----2,4,6-Trinitrotoluene	0.047	0.14		U UJ
35572-78-2	----2-Amino-4,6-dinitrotoluene	0.047	0.14		U UJ
479-45-8	-----Tetryl	0.047	0.14		U UJ
19406-51-0	----4-Amino-2,6-dinitrotoluene	0.047	0.14		U UJ
88-72-2	-----2-Nitrotoluene	0.047	0.14		U UJ
99-99-0	-----4-Nitrotoluene	0.047	0.14		U UJ
99-08-1	-----3-Nitrotoluene	0.047	0.14		U UJ
55-63-0	-----Nitroglycerin	0.16	0.48		U UJ
78-11-5	-----PETN	0.16	0.48		U UJ

HT
 ↓ 0.57
 EST HT 0.10
 HT
 ↓
 0.063
 JPM
 UJ

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 7

MR07-TW12-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-07

Sample wt/vol: 1000 (g/ml) ML Lab File ID: 048V4601

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/03/09 13:40

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/16/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/18/09 13:23

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L			
		MDL	RL	CONC	
2691-41-0	HMX	0.050	0.15		UJ
121-82-4	RDX	0.050	0.15		UJ
98-95-3	Nitrobenzene	0.050	0.15	HT ↓ EOL 0.79	UJ
99-65-0	1,3-Dinitrobenzene	0.050	0.15	EOL 0.32	UJ
99-35-4	1,3,5-Trinitrobenzene	0.050	0.15	EOL 0.060	UJ
121-14-2	2,4-Dinitrotoluene	0.050	0.15	HT	UJ
606-20-2	2,6-Dinitrotoluene	0.050	0.15		UJ
118-96-7	2,4,6-Trinitrotoluene	0.050	0.15		UJ
35572-78-2	2-Amino-4,6-dinitrotoluene	0.050	0.15		UJ
479-45-8	Tetryl	0.050	0.15		UJ
19406-51-0	4-Amino-2,6-dinitrotoluene	0.050	0.15		UJ
88-72-2	2-Nitrotoluene	0.050	0.15	EOL HT 0.17	UJ
99-99-0	4-Nitrotoluene	0.050	0.15	HT 0.076	JPM
99-08-1	3-Nitrotoluene	0.050	0.15	0.076	JPM
55-63-0	Nitroglycerin	0.17	0.51		UJ
78-11-5	PETN	0.17	0.51		UJ

FORM I EXPL

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FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 8

MR07-TW0
3-09DRE1

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005
 Matrix: (soil/water) WATER Lab Sample ID: 0912053-08RE1
 Sample wt/vol: 1000 (g/ml) ML Lab File ID: 020V2001
 % Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/04/09 10:50
 Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/17/09
 Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 12/20/09 03:35
 Injection Volume: 100.0 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L			Q
		MDL	RL	CONC	
2691-41-0	HMX	0.050	0.15	HT	J UJ
121-82-4	RDX	0.050	0.15		J UJ
98-95-3	Nitrobenzene	0.050	0.15	↓ 1.2	J UJ
99-65-0	1,3-Dinitrobenzene	0.050	0.15		J UJ
99-35-4	1,3,5-Trinitrobenzene	0.050	0.15	HT 0.19	UJ
121-14-2	2,4-Dinitrotoluene	0.050	0.15	↓ 0.054	JPM 0.15
606-20-2	2,6-Dinitrotoluene	0.050	0.15	↓ 0.083	JPM 0.15
118-96-7	2,4,6-Trinitrotoluene	0.050	0.15	HT	J UJ
35572-78-2	2-Amino-4,6-dinitrotoluene	0.050	0.15		J UJ
479-45-8	Tetryl	0.050	0.15		J UJ
19406-51-0	4-Amino-2,6-dinitrotoluene	0.050	0.15		J UJ
88-72-2	2-Nitrotoluene	0.050	0.15		J UJ
99-99-0	4-Nitrotoluene	0.050	0.15	0.099	JPM J
99-08-1	3-Nitrotoluene	0.050	0.15	↓	J UJ

FORM I EXPL

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2/23/10

FORM 1
EXPL ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 8

MR07-TW03-09D

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: Case No.: SAS No.: NA SDG No.: UX07_005

Matrix: (soil/water) WATER Lab Sample ID: 0912053-08

Sample wt/vol: 1000 (g/ml) ML Lab File ID: 018V1801

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 12/04/09 10:50

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 12/09/09

Concentrated Extract Volume: 8.0 (ml) Date Analyzed: 01/03/10 01:02

Injection Volume: 100.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)		UG/L	Q
		MDL	RL		
55-63-0-----	Nitroglycerin	0.17	0.51	U	
78-11-5-----	PETN	0.17	0.51	U	

FORM I EXPL

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2/23/10

METALS
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_005

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-EB120309	0912053-01	Water
2	MR07-TW08-09D	0912053-02	Water
3	MR07-TW17-09D	0912053-03	Water
4	MR07-TW10-09D	0912053-04	Water
5	MR07-TW13-09D	0912053-05	Water
6	MR07-TW13D-09D	0912053-06	Water
7	MR07-TW12-09D	0912053-07	Water
8	MR07-TW03-09D	0912053-08	Water
8MS	MR07-TW03-09DMS	0912053-08MS	Water
8MSD	MR07-TW03-09DMSD	0912053-08MSD	Water
9D	MR07-TW03-09D	0912053-09	Water
10D	MR07-TW17-09D	0912053-10	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 14 days for cyanide, 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks was free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
MR07-EB120309	None - ND	-	-	-	-
MR07-FB120209	None - ND	-	-	-	-

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Duplicate - The matrix spike/duplicate samples exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	%R	Qualifier	Affected Samples
8	Aluminum	143%/Ok//Ok	J	2-10

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-TW13-09D ug/L	MR07-TW13D-09D ug/L	RPD	Qualifier
Aluminum	250	234	7%	None
Barium	24.0	22.6	6%	None
Cadmium	0.338	0.335	1%	None
Calcium	1320	1280	3%	None
Chromium	0.794	0.688	14%	None
Iron	832	794	5%	None
Magnesium	855	797	7%	None
Manganese	19.1	17.7	8%	None
Nickel	2.56	2.37	8%	None
Potassium	1270	1190	7%	None
Sodium	10300	9500	8%	None
Zinc	8.88	8.93	1%	None

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

MR07-EB120309

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 12/03/09 16:40
 % Solids: 0.00

SDG: UX07_005
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912053-01
 Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:33
7429-90-5	Aluminum		12.5	50.0	1	U	SW6010B	9L15006	12/16/09 15:37
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 15:37
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-39-3	Barium		1.25	10.0	1	U	SW6010B	9L15006	12/16/09 15:37
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-70-2	Calcium		250	1250	1	U	SW6010B	9L15006	12/16/09 15:37
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:37
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 15:37
7439-89-6	Iron		7.50	25.0	1	U	SW6010B	9L15006	12/16/09 15:37
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 15:37
7439-95-4	Magnesium		250	1250	1	U	SW6010B	9L15006	12/16/09 15:37
7439-96-5	Manganese		0.750	3.75	1	U	SW6010B	9L15006	12/16/09 15:37
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	9L15006	12/16/09 15:37
7440-09-7	Potassium		250	1250	1	U	SW6010B	9L15006	12/16/09 15:37
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:37
7440-23-5	Sodium		250	1250	1	U	SW6010B	9L15006	12/16/09 15:37
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 15:37
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:37
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9L15006	12/16/09 15:37

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ANALYSIS DATA SHEET

MR07-TW08-09D

2

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_005

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Ground Water

 Laboratory ID: 0912053-02

 Sampled: 12/03/09 15:50

 Received: 12/05/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:34
7429-90-5	Aluminum <i>MSH</i>	241 <i>J</i>	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 15:42
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 15:42
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:42
7440-39-3	Barium	49.5	1.25	10.0	1		SW6010B	9L15006	12/16/09 15:42
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:42
7440-43-9	Cadmium	0.386	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 15:42
7440-70-2	Calcium	2690	250	1250	1	N	SW6010B	9L15006	12/16/09 15:42
7440-47-3	Chromium	0.967	0.500	1.25	1	J	SW6010B	9L15006	12/16/09 15:42
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:42
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 15:42
7439-89-6	Iron	1270	7.50	25.0	1		SW6010B	9L15006	12/16/09 15:42
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 15:42
7439-95-4	Magnesium	2190	250	1250	1		SW6010B	9L15006	12/16/09 15:42
7439-96-5	Manganese	39.4	0.750	3.75	1		SW6010B	9L15006	12/16/09 15:42
7440-02-0	Nickel	2.64	0.750	2.50	1		SW6010B	9L15006	12/16/09 15:42
7440-09-7	Potassium	2530	250	1250	1	N	SW6010B	9L15006	12/16/09 15:42
7782-49-2	Selenium	1.37	0.750	1.25	1		SW6010B	9L15006	12/16/09 15:42
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:42
7440-23-5	Sodium	8440	250	1250	1		SW6010B	9L15006	12/16/09 15:42
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 15:42
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:42
7440-66-6	Zinc	5.84	1.25	5.00	1		SW6010B	9L15006	12/16/09 15:42

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ANALYSIS DATA SHEET

MR07-TW17-09D

3

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 005

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Ground Water

 Laboratory ID: 0912053-03

 Sampled: 12/04/09 08:50

 Received: 12/05/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:35
7429-90-5	Aluminum <i>MSH</i>	695 <i>J</i>	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 15:47
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 15:47
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:47
7440-39-3	Barium	62.9	1.25	10.0	1		SW6010B	9L15006	12/16/09 15:47
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:47
7440-43-9	Cadmium	0.422	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 15:47
7440-70-2	Calcium	1340	250	1250	1	N	SW6010B	9L15006	12/16/09 15:47
7440-47-3	Chromium	1.66	0.500	1.25	1		SW6010B	9L15006	12/16/09 15:47
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:47
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 15:47
7439-89-6	Iron	597	7.50	25.0	1		SW6010B	9L15006	12/16/09 15:47
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 15:47
7439-95-4	Magnesium	1940	250	1250	1		SW6010B	9L15006	12/16/09 15:47
7439-96-5	Manganese	12.4	0.750	3.75	1		SW6010B	9L15006	12/16/09 15:47
7440-02-0	Nickel	1.36	0.750	2.50	1	J	SW6010B	9L15006	12/16/09 15:47
7440-09-7	Potassium	1790	250	1250	1	X	SW6010B	9L15006	12/16/09 15:47
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:47
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:47
7440-23-5	Sodium	25000	250	1250	1		SW6010B	9L15006	12/16/09 15:47
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 15:47
7440-62-2	Vanadium	1.42	1.25	3.12	1	J	SW6010B	9L15006	12/16/09 15:47
7440-66-6	Zinc	3.08	1.25	5.00	1	J	SW6010B	9L15006	12/16/09 15:47

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ANALYSIS DATA SHEET

MR07-TW10-09D 4

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-04

Sampled: 12/03/09 15:00

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:36
7429-90-5	Aluminum <i>MS11</i>	855 <i>J</i>	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 15:51
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 15:51
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:51
7440-39-3	Barium	36.2	1.25	10.0	1		SW6010B	9L15006	12/16/09 15:51
7440-41-7	Beryllium	0.286	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 15:51
7440-43-9	Cadmium	0.701	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 15:51
7440-70-2	Calcium	74800	250	1250	1	N	SW6010B	9L15006	12/16/09 15:51
7440-47-3	Chromium	3.31	0.500	1.25	1		SW6010B	9L15006	12/16/09 15:51
7440-48-4	Cobalt	35.9	1.25	3.12	1		SW6010B	9L15006	12/16/09 15:51
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 15:51
7439-89-6	Iron	942	7.50	25.0	1		SW6010B	9L15006	12/16/09 15:51
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 15:51
7439-95-4	Magnesium	3610	250	1250	1		SW6010B	9L15006	12/16/09 15:51
7439-96-5	Manganese	765	0.750	3.75	1		SW6010B	9L15006	12/16/09 15:51
7440-02-0	Nickel	13.5	0.750	2.50	1		SW6010B	9L15006	12/16/09 15:51
7440-09-7	Potassium	2450	250	1250	1	N	SW6010B	9L15006	12/16/09 15:51
7782-49-2	Selenium	1.62	0.750	1.25	1		SW6010B	9L15006	12/16/09 15:51
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:51
7440-23-5	Sodium	11300	250	1250	1		SW6010B	9L15006	12/16/09 15:51
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 15:51
7440-62-2	Vanadium	2.43	1.25	3.12	1	J	SW6010B	9L15006	12/16/09 15:51
7440-66-6	Zinc	19.3	1.25	5.00	1		SW6010B	9L15006	12/16/09 15:51

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ANALYSIS DATA SHEET

 MR07-TW13-09D 5

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_005

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Ground Water

 Laboratory ID: 0912053-05

 Sampled: 12/03/09 11:10

 Received: 12/05/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:37
7429-90-5	Aluminum MSH	250 J	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 15:56
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 15:56
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:56
7440-39-3	Barium	24.0	1.25	10.0	1		SW6010B	9L15006	12/16/09 15:56
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:56
7440-43-9	Cadmium	0.338	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 15:56
7440-70-2	Calcium	1320	250	1250	1	N	SW6010B	9L15006	12/16/09 15:56
7440-47-3	Chromium	0.794	0.500	1.25	1	J	SW6010B	9L15006	12/16/09 15:56
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:56
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 15:56
7439-89-6	Iron	832	7.50	25.0	1		SW6010B	9L15006	12/16/09 15:56
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 15:56
7439-95-4	Magnesium	855	250	1250	1	J	SW6010B	9L15006	12/16/09 15:56
7439-96-5	Manganese	19.1	0.750	3.75	1		SW6010B	9L15006	12/16/09 15:56
7440-02-0	Nickel	2.56	0.750	2.50	1		SW6010B	9L15006	12/16/09 15:56
7440-09-7	Potassium	1270	250	1250	1	N	SW6010B	9L15006	12/16/09 15:56
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 15:56
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 15:56
7440-23-5	Sodium	10300	250	1250	1		SW6010B	9L15006	12/16/09 15:56
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 15:56
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 15:56
7440-66-6	Zinc	8.88	1.25	5.00	1		SW6010B	9L15006	12/16/09 15:56

lew
 2/23/10

ANALYSIS DATA SHEET

 MR07-TW13D-09D 6

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07 005

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Ground Water

 Laboratory ID: 0912053-06

 Sampled: 12/03/09 11:15

 Received: 12/05/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:38
7429-90-5	Aluminum <i>MSH</i>	234 <i>J</i>	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 16:00
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 16:00
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:00
7440-39-3	Barium	22.6	1.25	10.0	1		SW6010B	9L15006	12/16/09 16:00
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:00
7440-43-9	Cadmium	0.335	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 16:00
7440-70-2	Calcium	1280	250	1250	1	N	SW6010B	9L15006	12/16/09 16:00
7440-47-3	Chromium	0.688	0.500	1.25	1	J	SW6010B	9L15006	12/16/09 16:00
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 16:00
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 16:00
7439-89-6	Iron	794	7.50	25.0	1		SW6010B	9L15006	12/16/09 16:00
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 16:00
7439-95-4	Magnesium	797	250	1250	1	J	SW6010B	9L15006	12/16/09 16:00
7439-96-5	Manganese	17.7	0.750	3.75	1		SW6010B	9L15006	12/16/09 16:00
7440-02-0	Nickel	2.37	0.750	2.50	1	J	SW6010B	9L15006	12/16/09 16:00
7440-09-7	Potassium	1190	250	1250	1	J	SW6010B	9L15006	12/16/09 16:00
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:00
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:00
7440-23-5	Sodium	9500	250	1250	1		SW6010B	9L15006	12/16/09 16:00
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 16:00
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 16:00
7440-66-6	Zinc	8.93	1.25	5.00	1		SW6010B	9L15006	12/16/09 16:00

*lead
2/23/10*

ANALYSIS DATA SHEET

MR07-TW12-09D

7

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-07

Sampled: 12/03/09 13:40

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 08:39
7429-90-5	Aluminum <i>MSH</i>	260 <i>J</i>	12.5	50.0	1	U	SW6010B	9L15006	12/16/09 16:34
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 16:34
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:34
7440-39-3	Barium	43.1	1.25	10.0	1		SW6010B	9L15006	12/16/09 16:34
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:34
7440-43-9	Cadmium	0.329	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 16:34
7440-70-2	Calcium	1200	250	1250	1	<i>JY</i>	SW6010B	9L15006	12/16/09 16:34
7440-47-3	Chromium	1.37	0.500	1.25	1		SW6010B	9L15006	12/16/09 16:34
7440-48-4	Cobalt	1.26	1.25	3.12	1	J	SW6010B	9L15006	12/16/09 16:34
7440-50-8	Copper	1.41	1.25	2.50	1	J	SW6010B	9L15006	12/16/09 16:34
7439-89-6	Iron	838	7.50	25.0	1		SW6010B	9L15006	12/16/09 16:34
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 16:34
7439-95-4	Magnesium	1220	250	1250	1	J	SW6010B	9L15006	12/16/09 16:34
7439-96-5	Manganese	48.2	0.750	3.75	1		SW6010B	9L15006	12/16/09 16:34
7440-02-0	Nickel	2.60	0.750	2.50	1		SW6010B	9L15006	12/16/09 16:34
7440-09-7	Potassium	1800	250	1250	1	<i>J</i>	SW6010B	9L15006	12/16/09 16:34
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:34
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:34
7440-23-5	Sodium	7850	250	1250	1		SW6010B	9L15006	12/16/09 16:34
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 16:34
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 16:34
7440-66-6	Zinc	6.16	1.25	5.00	1		SW6010B	9L15006	12/16/09 16:34

see 2/23/10

ANALYSIS DATA SHEET

MR07-TW03-09D

8

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 12/04/09 10:50
 % Solids: 0.00

SDG: UX07_005
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912053-08
 Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10013	12/14/09 09:24
7429-90-5	Aluminum	MSH 196 J	12.5	50.0	1	N	SW6010B	9L15006	12/16/09 16:39
7440-36-0	Antimony		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 16:39
7440-38-2	Arsenic		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:39
7440-39-3	Barium	23.9	1.25	10.0	1		SW6010B	9L15006	12/16/09 16:39
7440-41-7	Beryllium		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:39
7440-43-9	Cadmium	0.311	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 16:39
7440-70-2	Calcium	4140	250	1250	1	N	SW6010B	9L15006	12/16/09 16:39
7440-47-3	Chromium	0.687	0.500	1.25	1	J	SW6010B	9L15006	12/16/09 16:39
7440-48-4	Cobalt		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 16:39
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 16:39
7439-89-6	Iron	6600	7.50	25.0	1		SW6010B	9L15006	12/16/09 16:39
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 16:39
7439-95-4	Magnesium	1540	250	1250	1		SW6010B	9L15006	12/16/09 16:39
7439-96-5	Manganese	106	0.750	3.75	1		SW6010B	9L15006	12/16/09 16:39
7440-02-0	Nickel	5.72	0.750	2.50	1		SW6010B	9L15006	12/16/09 16:39
7440-09-7	Potassium	1600	250	1250	1	N	SW6010B	9L15006	12/16/09 16:39
7782-49-2	Selenium		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 16:39
7440-22-4	Silver		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 16:39
7440-23-5	Sodium	7490	250	1250	1		SW6010B	9L15006	12/16/09 16:39
7440-28-0	Thallium		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 16:39
7440-62-2	Vanadium		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 16:39
7440-66-6	Zinc	2.83	1.25	5.00	1	J	SW6010B	9L15006	12/16/09 16:39

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ANALYSIS DATA SHEET

MR07-TW03-09D

9

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-09

Sampled: 12/04/09 10:50

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9L15020	12/16/09 15:38
7429-90-5	Aluminum (dissolved) <i>MSH</i>	15.5 <i>J</i>	12.5	50.0	1	U	SW6010B	9L15006	12/16/09 17:02
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 17:02
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 17:02
7440-39-3	Barium (dissolved)	22.9	1.25	10.0	1		SW6010B	9L15006	12/16/09 17:02
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 17:02
7440-43-9	Cadmium (dissolved)	0.340	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 17:02
7440-70-2	Calcium (dissolved)	3920	250	1250	1	U	SW6010B	9L15006	12/16/09 17:02
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9L15006	12/16/09 17:02
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 17:02
7440-50-8	Copper (dissolved)		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 17:02
7439-89-6	Iron (dissolved)	5230	7.50	25.0	1		SW6010B	9L15006	12/16/09 17:02
7439-92-1	Lead (dissolved)		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 17:02
7439-95-4	Magnesium (dissolved)	1520	250	1250	1		SW6010B	9L15006	12/16/09 17:02
7439-96-5	Manganese (dissolved)	90.0	0.750	3.75	1		SW6010B	9L15006	12/16/09 17:02
7440-02-0	Nickel (dissolved)	5.39	0.750	2.50	1		SW6010B	9L15006	12/16/09 17:02
7440-09-7	Potassium (dissolved)	1510	250	1250	1	U	SW6010B	9L15006	12/16/09 17:02
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 17:02
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 17:02
7440-23-5	Sodium (dissolved)	7520	250	1250	1		SW6010B	9L15006	12/16/09 17:02
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 17:02
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 17:02
7440-66-6	Zinc (dissolved)	3.36	1.25	5.00	1	J	SW6010B	9L15006	12/16/09 17:02

lew
2/23/10

ANALYSIS DATA SHEET

MR07-TW17-09D

10

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-10

Sampled: 12/04/09 08:50

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury (dissolved)		0.0800	0.200	1	U	SW7470A	9L15020	12/16/09 15:48
7429-90-5	Aluminum (dissolved) <i>MSH</i>	65.8 <i>J</i>	12.5	50.0	1	U	SW6010B	9L15006	12/16/09 17:25
7440-36-0	Antimony (dissolved)		1.25	3.75	1	U	SW6010B	9L15006	12/16/09 17:25
7440-38-2	Arsenic (dissolved)		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 17:25
7440-39-3	Barium (dissolved)	55.2	1.25	10.0	1		SW6010B	9L15006	12/16/09 17:25
7440-41-7	Beryllium (dissolved)		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 17:25
7440-43-9	Cadmium (dissolved)	0.399	0.250	1.25	1	J	SW6010B	9L15006	12/16/09 17:25
7440-70-2	Calcium (dissolved)	1060	250	1250	1	J	SW6010B	9L15006	12/16/09 17:25
7440-47-3	Chromium (dissolved)		0.500	1.25	1	U	SW6010B	9L15006	12/16/09 17:25
7440-48-4	Cobalt (dissolved)		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 17:25
7440-50-8	Copper (dissolved)		1.25	2.50	1	U	SW6010B	9L15006	12/16/09 17:25
7439-89-6	Iron (dissolved)	330	7.50	25.0	1		SW6010B	9L15006	12/16/09 17:25
7439-92-1	Lead (dissolved)		0.375	0.750	1	U	SW6010B	9L15006	12/16/09 17:25
7439-95-4	Magnesium (dissolved)	1700	250	1250	1		SW6010B	9L15006	12/16/09 17:25
7439-96-5	Manganese (dissolved)	10.7	0.750	3.75	1		SW6010B	9L15006	12/16/09 17:25
7440-02-0	Nickel (dissolved)	1.19	0.750	2.50	1	J	SW6010B	9L15006	12/16/09 17:25
7440-09-7	Potassium (dissolved)	1640	250	1250	1	U	SW6010B	9L15006	12/16/09 17:25
7782-49-2	Selenium (dissolved)		0.750	1.25	1	U	SW6010B	9L15006	12/16/09 17:25
7440-22-4	Silver (dissolved)		0.250	1.25	1	U	SW6010B	9L15006	12/16/09 17:25
7440-23-5	Sodium (dissolved)	23300	250	1250	1		SW6010B	9L15006	12/16/09 17:25
7440-28-0	Thallium (dissolved)		0.750	2.00	1	U	SW6010B	9L15006	12/16/09 17:25
7440-62-2	Vanadium (dissolved)		1.25	3.12	1	U	SW6010B	9L15006	12/16/09 17:25
7440-66-6	Zinc (dissolved)	2.95	1.25	5.00	1	J	SW6010B	9L15006	12/16/09 17:25

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PERCHLORATE
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-014, UXO-07 SDG #: UX07_005

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 23, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	MR07-EB120309	0912053-01	Water
2	MR07-TW08-09D	0912053-02	Water
3	MR07-TW17-09D	0912053-03	Water
4	MR07-TW10-09D	0912053-04	Water
5	MR07-TW13-09D	0912053-05	Water
6	MR07-TW13D-09D	0912053-06	Water
7	MR07-TW12-09D	0912053-07	Water
8	MR07-TW03-09D	0912053-08	Water
8MS	MR07-TW03-09DMS	0912053-08MS	Water
8MSD	MR07-TW03-09DMSD	0912053-08MSD	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 28 days for perchlorate.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
MR07-EB120309	None - ND	-	-	-	-
MR07-FB120209	None - ND	-	-	-	-

Matrix Spike/Matrix Spike Duplicate - The matrix spike/duplicates sample exhibited acceptable %R and RPD values.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate results are summarized below.

Compound	MR07-TW13-09D ug/L	MR07-TW13D-09D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - EDS sample IDs 2 and 3 were analyzed at a dilution due to matrix interference. No action was required.

ANALYSIS DATA SHEET

MR07-EB120309

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 12/03/09 16:40
 % Solids: 0.00

SDG: UX07_005
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912053-01
 Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9L12002	12/13/09 11:28

uw
2/23/10

ANALYSIS DATA SHEET

MR07-TW08-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-02

Sampled: 12/03/09 15:50

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.330	1.00	5	U	SW6850	9L17013	12/17/09 22:47

ANALYSIS DATA SHEET

MR07-TW17-09D

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-03

Sampled: 12/04/09 08:50

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate	9.93	0.330	1.00	5	<input checked="" type="checkbox"/>	SW6850	9L17013	12/17/09 23:22

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ANALYSIS DATA SHEET

MR07-TW10-09D

4

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 12/03/09 15:00
 % Solids: 0.00

SDG: UX07_005
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912053-04
 Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate	0.755	0.0660	0.200	1		SW6850	9L12002	12/13/09 13:15

hw
2123110

ANALYSIS DATA SHEET

MR07-TW13-09D

5

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 12/03/09 11:10
 % Solids: 0.00

SDG: UX07_005
 Project: Lejeune CTO014 (UX07)
 Laboratory ID: 0912053-05
 Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9L12002	12/13/09 13:51

Handwritten:
 2/23/10

ANALYSIS DATA SHEET

 MR07-TW13D-09D 6

 Laboratory: Empirical Laboratories, LLC

 SDG: UX07_005

 Client: CH2M Hill, Inc.

 Project: Lejeune CTO014 (UX07)

 Matrix: Ground Water

 Laboratory ID: 0912053-06

 Sampled: 12/03/09 11:15

 Received: 12/05/09 08:45

 % Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate		0.0660	0.200	1	U	SW6850	9L12002	12/13/09 14:26

luw
2/23/10

ANALYSIS DATA SHEET

MR07-TW12-09D

7

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Ground Water
Sampled: 12/03/09 13:40
% Solids: 0.00

SDG: UX07 005
Project: Lejeune CTO014 (UX07)
Laboratory ID: 0912053-07
Received: 12/05/09 08:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate	0.472	0.0660	0.200	1		SW6850	9L12002	12/13/09 15:02

fw
2123110

ANALYSIS DATA SHEET

MR07-TW03-09D

8

Laboratory: Empirical Laboratories, LLC

SDG: UX07_005

Client: CH2M Hill, Inc.

Project: Lejeune CTO014 (UX07)

Matrix: Ground Water

Laboratory ID: 0912053-08

Sampled: 12/04/09 10:50

Received: 12/05/09 08:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
14797-73-0	Perchlorate	0.0895	0.0660	0.200	1	J	SW6850	9L12002	12/13/09 15:38

llw
2123110

Appendix E
Soil Boring Logs and Well Completion
Diagrams



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS01	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 19.8 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837514.7 N 285545.2 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 13.5 ft bgs at time of drilling START : 12/2/09 11:03 END : 12/2/09 11:14 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0						POORLY GRADED SAND (SP) light tan, dry, loose, little organics.	
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) light brown, dry, loose, trace silt.	
5	5.0			0 ppm		CLAYEY SAND (SC) gray, moist, dense, trace silt.	
		4.0	DP-1	0 ppm		POORLY GRADED SAND (SP) gray with light orange, moist, medium dense, little clay.	
10	10.0			0 ppm			Sample: MR07-IS01-11-12-09D @ 1110
		5.0	DP-2			CLAYEY SAND (SC) gray, moist, dense, trace silt.	Sample: MR07-IS01D-11-12-09D @ 1115
15	15.0					SILTY SAND (SM) very dark brown, wet, loose.	
							Boring terminated at 15'
20							
25							



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS02	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 18.0 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837495.0 N 285603.9 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: --- START : 12/2/09 10:40 END : 12/2/09 11:01 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
5	0.0	5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) light tan, dry, loose, little organics.	
				POORLY GRADED SAND (SP) light brown, dry, loose, trace silt.			
10	5.0	1.5	DP-1	0 ppm		POORLY GRADED SAND (SP) orangeish brown, dry, medium dense, little clay.	
				NR.			
15	10.0	4.5	DP-2	0 ppm		POORLY GRADED SAND (SP) orangeish brown, moist, medium dense, little clay.	Sample: MR07-IS02-10-11-09D @ 1050
				SILTY SAND (SM) light orange with light gray, wet, medium dense.			
20	15.0					SILTY SAND (SM) very dark brown, wet, medium dense.	Boring terminated at 15'
				POORLY GRADED SAND (SP) gray, wet, loose, trace silt.			
25							



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS03	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 18.5 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837475.7 N 285632.6 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 12 ft bgs at time of drilling START : 12/2/09 10:08 END : 12/2/09 10:33 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						POORLY GRADED SAND (SP) light tan, dry, loose, little organics.		0ft: Riser
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish brown, dry, medium dense, little clay.		
				0 ppm				
5	5.0					CLAYEY SAND (SC) light orangeish gray, moist, medium dense, trace silt.		6ft: Bentonite Chips
		5.0	DP-1	0 ppm				8ft: Filter pack
				0 ppm		POORLY GRADED SAND (SP) light gray, moist to wet, loose, little silt.	Sample: MR07-IS03-9-10-09D @ 1020	10ft: Pre-packed, 0.010 in slotted Pre-packed, 0.010 in slotted screen
10	10.0							
		4.6	DP-2					
							orange staining	
15	15.0							
		5.0	DP-3				orange staining	
						POORLY GRADED SAND (SP) light gray with light orange, wet, dense.		
20	20.0							
								Boring terminated at 20'
25								

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS05	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 19.7 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837463.6 N 285571.0 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 15 ft bgs at time of drilling START : 12/2/09 12:03 END : 12/2/09 12:22 LOGGER : S Forker

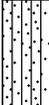
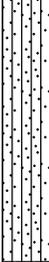
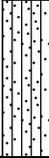
DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0						Asphalt.	
5.0	5.0	5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish tan, dry, dense, little clay.	
				1.3 ppm 0 ppm		SILTY SAND (SM) brownish gray, moist, medium dense.	
		4.5	DP-1	0 ppm		NR. POORLY GRADED SAND (SP) brownish gray, moist, medium dense, little clay.	
10.0	10.0					SILTY SAND (SM) very dark brown, moist, dense.	
		5.0	DP-2	46.9 ppm 5.4 ppm		POORLY GRADED SAND (SP) light gray, moist, medium dense, trace silt.	Sample: MR07-IS05-14-15-09D @ 1215
15.0	15.0						
		5.0	DP-3				
20.0	20.0						Boring terminated at 20'
25.0							

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS06	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 19.0 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837433.6 N 285609.3 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 14 ft bgs at time of drilling START : 12/2/09 12:27 END : 12/2/09 12:44 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0						Asphalt.	
5.0	5.0	5.0	HA-1	0 ppm		CLAYEY SAND (SC) gray with light orange, moist, very dense.	
				859 ppm 187 ppm		SILTY SAND (SM) brownish gray, moist, medium dense.	
10.0		4.0	DP-1	0.5 ppm			
						NR.	
15.0		4.5	DP-2			SILTY SAND (SM) brownish gray, moist to wet, dense.	Sample: MR07-IS06-13-14-06D @ 1245
							Boring terminated at 15'



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS07	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 20.7 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837469.5 N 285513.4 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 19.8 ft bgs at time of drilling START : 12/2/09 09:05 END : 12/2/09 09:14 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	0.0					POORLY GRADED SAND (SP) brown, dry, loose, with organics.	
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) gray with light orange, dry, loose.	
				0 ppm		NR.	
5	5.0					POORLY GRADED SAND (SP) light gray with light orange, dry, loose, trace silt. SILTY SAND (SM) very dark brown, moist, loose.	
		4.2	DP-1	0 ppm			
						POORLY GRADED SAND (SP) light gray with light orange, moist, loose, trace silt.	
10	10.0						
		4.2	DP-2	0 ppm			
						CLAYEY SAND (SC) gray with light orange, moist, dense, trace silt.	
15	15.0						
		5.0	DP-3	0 ppm			Sample: MR07-IS07-18-19-09D @ 0910
20	20.0					POORLY GRADED SAND (SP) gray with light orange, wet, medium dense, trace silt.	Boring terminated at 20'
25							

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS08	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 21.6 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837440.2 N 285552.4 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 20 ft bgs at time of drilling START : 12/2/09 08:33 END : 12/2/09 08:54 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						POORLY GRADED SAND (SP) brown, dry, loose, with organics.	2.5	0ft: Riser
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish brown, moist, dense, little clay.		
				0 ppm		POORLY GRADED SAND (SP) light gray with light orange, moist, loose, trace silt.		
5	5.0					SILTY SAND (SM) very dark brown, moist, loose.		
		4.6	DP-1	0 ppm		POORLY GRADED SAND (SP) gray, moist, loose, little silt.		
						CLAYEY SAND (SC) gray with light orange, moist, dense, trace silt.		
10	10.0					POORLY GRADED SAND (SP) gray with light orange, wet, medium dense, trace silt.		11ft: Bentonite Chips
		4.5	DP-2	0 ppm				13ft: Filter pack
								15ft: Pre-packed, 0.010 in slotted Pre-packed, 0.010 in slotted screen
15	15.0							
		5.0	DP-3	0 ppm				
							Sample: MR07-IS08-18-19-09D @ 0845	
20	20.0							
		5.0	DP-4					
25	25.0							
							Boring terminated at 25'	

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS09	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 20.7 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837402.9 N 285597.4 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 17.5 ft bgs at time of drilling START : 12/2/09 09:27 END : 12/2/2009 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0						POORLY GRADED SAND (SP) brown, dry, loose, with organics.	
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) light grayish tan, dry, loose, trace silt.	
5	5.0			0 ppm		POORLY GRADED SAND (SP) brownish orange, moist, medium dense, little clay.	
		4.5	DP-1	4.2 ppm 0.6 ppm		POORLY GRADED SAND (SP) light gray with light orange, dry, loose, trace silt.	
10	10.0			1.5 ppm 0.2 ppm		SILTY SAND (SM) very dark brown to dark brown, dry, loose.	
		5.0	DP-2	0 ppm		POORLY GRADED SAND (SP) brownish gray, moist to wet, loose, little silt.	
15	15.0			0 ppm			
		5.0	DP-3				Sample: MR07-IS09-16-17-09D @ 0950
20	20.0					POORLY GRADED SAND (SP) gray with light orange, wet, medium dense, some clay.	
							Boring terminated at 20'
25							



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS10	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 21.9 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837422.0 N 285489.2 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 19.5 ft bgs at time of drilling START : 12/1/09 13:51 END : 12/1/09 14:30 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						POORLY GRADED SAND (SP) light grayish tan, dry, loose, with organics.		0ft: Riser
	5.0	5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish tan, moist, dense, some clay, trace silt.		
5	5.0			0 ppm		POORLY GRADED SAND (SP) grayish tan, moist, medium dense, little silt. NR.		
	4.0	4.0	DP-1	0 ppm		POORLY GRADED SAND (SP) light gray, dry, loose.		
10	10.0							
	4.2	4.2	DP-2	0 ppm		POORLY GRADED SAND (SP) light gray with orange, moist, loose, trace silt.		11ft: Bentonite Chips
				0.4 ppm		POORLY GRADED SAND (SP) gray with orange, moist, dense, little clay.		13ft: Filter pack
15	15.0							15ft: Pre-packed, 0.010 in slotted screen
	4.6	4.6	DP-3	0 ppm		CLAYEY SAND (SC) gray with orange, moist, dense, no, Few small gravel pieces <2mm.	Sample: MR07-IS10-18-19-09D @ 1420	
20	20.0							
	5.0	5.0	DP-4			POORLY GRADED SAND (SP) gray with light orange, wet, medium dense.		
25	25.0							
						Boring terminated at 25'		

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS11	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 21.6 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837394.0 N 285526.8 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: --- START : 12/1/09 14:52 END : 12/1/09 15:27 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	0.0					POORLY GRADED SAND (SP) light tan, dry, very loose, with organics.	
		5.0	HA-1	0 ppm			
						POORLY GRADED SAND (SP) orange, dry, dense, some clay.	
5	5.0					NR.	
		1.2	DP-1				
						POORLY GRADED SAND (SP) very light gray, dry, very loose, sugary texture. NR.	
10	10.0						
		4.2	DP-2	0.5 ppm		POORLY GRADED SAND (SP) gray to very light gray, moist, loose, sugary texture.	
						SANDY LEAN CLAY (CL) gray, moist, soft.	
		4.2	DP-3			SANDY LEAN CLAY (CL) black and orange, moist, medium stiff.	
20	20.0					NR.	
		3.0	DP-4			CLAYEY SAND (SC) gray, moist, dense.	Sample: MR07-IS10-23-24-09D @ 1520
25	25.0						Boring terminated at 25'



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS12	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 23.1 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837377.0 N 285560.4 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 20 ft bgs at time of drilling START : 12/1/09 15:41 END : 12/1/09 15:59 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						POORLY GRADED SAND (SP) brown, dry, loose, with organics.		0ft: Riser
5.0	5.0	5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish gray, dry, dense, some clay.		
				0 ppm		NR.		
10.0		3.0	DP-1	0 ppm		POORLY GRADED SAND (SP) dark brown, dry, medium dense, trace silt.		9ft: Bentonite Chips
						POORLY GRADED SAND (SP) light gray, dry to moist, very loose, sugary texture.		11ft: Filter pack
15.0	15.0	5.0	DP-2	0 ppm		NR.		13.5ft: Pre-packed, 0.010 in slotted screen
						POORLY GRADED SAND (SP) gray, very moist, medium dense, little clay.		
20.0	20.0	3.8	DP-3			SANDY LEAN CLAY (CL) gray, very moist, soft.	Sample: MR07-IS12-18-19-09D @1550	
						POORLY GRADED SAND (SP) grayish orange, wet, loose, trace clay.		
25.0	25.0	5.0	DP-4			CLAYEY SAND (SC) dark gray to gray, wet, dense.		23.5ft: Bottom of well
							Boring terminated at 25'	

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS13	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 21.4 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837279.5 N 285376.7 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 20.5 ft bgs at time of drilling START : 11/30/09 12:12 END : 11/30/09 16:12 LOGGER : S Forker

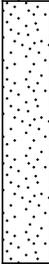
DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						dark brown, dry, loose. POORLY GRADED SAND (SP) light grayish tan, moist, loose, trace silt.		0ft: Riser
5.0	5.0	5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) orangeish tan, moist, medium dense, little clay.		
10.0						No recovery.		
10.0		3.5	DP-1	0 ppm		POORLY GRADED SAND (SP) light gray, dry, loose, Sugary texture.		
15.0						POORLY GRADED SAND (SP) gray, moist, medium dense, and, iron oxide staining. NR.		
15.0		2.8	DP-2	0 ppm		POORLY GRADED SAND (SP) light gray, moist, dense, no clay, Sugary texture.		11ft: Bentonite Chips
15.0						CLAYEY SAND (SC) dark gray, moist, dense.		13ft: Filter pack
20.0		5.0	DP-3	0 ppm		CLAYEY SAND (SC) light gray, moist to wet, dense.	Sample: MR07-IS13-16-17-09D @ 1020, 12-1-09 Sample: MR07-IS13D-16-17-09D@ 1025	15ft: Pre-packed, 0.010 in slotted screen
25.0		5.0	DP-4			POORLY GRADED SAND (SP) orange, wet, medium dense, little clay.		
							Boring terminated at 25'	

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS14	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 19.9 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837275.2 N 285450.0 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: 15 ft bgs at time of drilling START : 12/1/09 11:19 END : 12/1/09 23:45 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	0.0					Asphalt.	
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) light orange, dry, loose.	
5	5.0			0 ppm		POORLY GRADED SAND (SP) light gray with light orange, dry, loose, little silt.	
		4.6	DP-1	0 ppm		POORLY GRADED SAND (SP) light gray with orange, dry, dense, little clay.	
10	10.0			0 ppm		POORLY GRADED SAND (SP) light gray with orange, dry, dense, little clay.	
		4.6	DP-2	0 ppm		CLAYEY SAND (SC) gray, very moist, medium dense.	Sample: MRO7-IS14-13-14-09D @1145
15	15.0						Boring terminated at 15'
20							
25							



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS15	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 21.6 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837261.1 N 285411.9 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: --- START : 11/30/09 12:41 END : 12/1/09 10:00 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0						POORLY GRADED SAND (SP) brown, dry, loose, some organics.	
		5.0	HA-1	0 ppm		POORLY GRADED SAND (SP) light tan, dry, loose, trace silt.	
				0 ppm		CLAYEY SAND (SC) light orange, moist, dense.	
5	5.0					NR.	
		3.2	DP-1	0 ppm		POORLY GRADED SAND (SP) light gray with light orange, moist, loose, trace silt.	
10	10.0			0 ppm		NR.	
		3.0	DP-2	0 ppm		POORLY GRADED SAND (SP) light gray, moist, medium dense.	
				0 ppm		CLAYEY SAND (SC) gray, moist, dense.	
15	15.0			0 ppm		NR.	
		3.0	DP-3	0 ppm		CLAYEY SAND (SC) light gray, moist to wet, medium dense, trace silt.	Sample: MR07-IS15-16-17-09D @ 1010
20	20.0						Water encountered
							Boring terminated at 20'
25							

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS16
SHEET 1 OF 1	
<h2 style="margin: 0;">Soil Boring Log</h2>	

CLIENT: NAVFAC	PROJECT: CTO-14	LOCATION: UXO-07, Camp Lejeune, NC
ELEVATION: 17.0 ft	DRILLING CONTRACTOR: Probe Technologies	
COORDINATES: 3837245.5 N 285351.1 E	DRILLING METHOD AND EQUIPMENT: DPT with Geoprobe 6620DT, Macro-core samplers	
WATER LEVEL: 13.5 ft bgs at time of drilling	START: 12/1/09 10:45	END: 12/1/09 11:08
LOGGER: S Forker		

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	0.0						
		5.0	HA-1	0 ppm	•••••	POORLY GRADED SAND (SP) very dark brown, dry, loose, with organics.	
				0 ppm	•••••	POORLY GRADED SAND (SP) tannish orange, dry, medium dense, little clay.	
5	5.0				•••••	POORLY GRADED SAND (SP) light gray with light orange, dry, loose.	
		4.3	DP-1	0 ppm	•••••	POORLY GRADED SAND (SP) dark brown, moist, loose, trace silt.	
10	10.0				•••••		
		4.2	DP-2	0 ppm	•••••	POORLY GRADED SAND (SP) light gray, moist to wet, medium dense, some clay.	Sample: MR07-IS16-12-13-09D @ 1055
15	15.0				•••••		Water encountered
							Boring terminated at 15'
20							
25							

FID: Flame ionization detector



PROJECT NUMBER: 378849.SI.FK	BORING NUMBER: MR07-IS17	SHEET 1 OF 1
Soil Boring Log		

CLIENT: NAVFAC PROJECT : CTO-14 LOCATION : UXO-07, Camp Lejeune, NC
 ELEVATION : 20.6 ft DRILLING CONTRACTOR : Probe Technologies
 COORDINATES : 3837234.3 N 285450.4 E DRILLING METHOD AND EQUIPMENT : DPT with Geoprobe 6620DT, Macro-core samplers
 WATER LEVEL: --- START : 11/30/09 12:32 END : 12/1/09 09:20 LOGGER : S Forker

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	Sample ID	FID SCREENING LEVELS	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DETAILS
0.0						POORLY GRADED SAND (SP) brown, dry, very loose, some organics. POORLY GRADED SAND (SP) light tan, moist, medium dense, little clay.		0ft: Riser
	5.0	5.0	HA-1	0 ppm		CLAYEY SAND (SC) light orange, moist, dense.		
				0 ppm		NR.		
5	5.0							
		3.0	DP-1	0 ppm		POORLY GRADED SAND (SP) light gray with orange, dry, loose, trace silt. POORLY GRADED SAND (SP) very dark brown, dry, loose, trace silt.		
				0 ppm				
10	10.0							
		4.2	DP-2	0 ppm		POORLY GRADED SAND (SP) light gray with orange, dry, medium dense.		11ft: Bentonite Chips
				0 ppm		CLAYEY SAND (SC) light gray, moist, dense.		13ft: Filter pack
15	15.0							
		4.6	DP-3	0 ppm		SANDY LEAN CLAY (CL) light gray, moist, stiff. CLAYEY SAND (SC) light gray, wet, medium dense, trace silt.	Sample: MR07-IS17-16-18-09D +MS/MSD @ 0915 Water encountered	15ft: Pre-packed, 0.010 in slotted screen
				0 ppm				
20	20.0							
		5.0	DP-4			CLAYEY SAND (SC) light gray, wet, medium dense, little silt.		
25	25.0						Boring terminated at 25'	

FID: Flame ionization detector

Appendix F
Groundwater Sampling Data Sheets

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/4/09
 Weather: 65°

Project Number: 378849.SI.FK
 Well ID: M207-TW03
 Sample ID: M207-TW03-09D
 Sampling Team: O. Seed / ROV

Total Depth: 19.85 FT.(BTOC)
 Depth to water: (+) 11.61 FT.(BTOC)
 Water Column: 8.2 FT.

Measuring Device: YSI 556 #05730
 Date and Time: L-ANNA # 0896Q

Well Volume: (x) 0.041 GAL/FT.
 Total Purge Vol.: 0.33 GAL x 5 = 1.65
4 GAL.

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

Purge Device: Peristaltic Pump

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
0950	12						470	0.4	
1000	18.99								→ pump battery died
1010	12	18.99	0.162	1.92	6.08	-129.6	300		
1020	12	19.53	0.122	1.97	6.58	-101.6	200		
1030	12	19.54	0.122	1.96	6.59	-101.6	75		
1040	12	19.54	0.122	1.96	6.60	-101.7	28		
1050	12	19.54	0.122	1.97	6.60	-101.7	13	4	

SAMPLE DATA

Date: <u>12/4/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>51V</u>	Color / Odor / Comments
Time: <u>1050</u>								
Method: <u>Low Flow</u>	<u>19.54</u>	<u>0.122</u>	<u>1.97</u>	<u>6.60</u>	<u>101.7</u>	<u>13</u>	<u>12</u>	

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

Analysis	Preservative	Container requirements	No. of containers

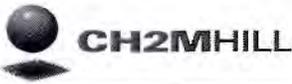
Observations/Notes:

Total Volume Purged: 4 gallons

pump started 0945
 34min purge rate
 turbid intake @ 17 ft bgs

MS/MSD: (YES) NO Duplicate ID No.:

Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/3/09
 Weather: 640

Project Number: 378849.SI.FK
 Well ID: MR07-TW08
 Sample ID: MR07-TW08-09D
 Sampling Team: D.Scott/ROU

Total Depth: 24.80 FT.(BTOC)
 Depth to water: (+) 16.30 FT.(BTOC)
 Water Column: 8.50 FT.
(x) 0.041 GAL/FT.
 Well Volume: 0.34 GAL x 5 = 1.7
 Total Purge Vol.: 1.2 GAL.

Measuring Device: YSI 556 #05730
 Date and Time: HANNA # 09909

Purge Device: Peristaltic Pump

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
1540	16.35	20.92	0.099	0.54	4.73	-155.8	60.00	0.4	
1545	16.35	20.92	0.099	0.55	4.75	-155.8	12.00	0.4	
1550	16.35	20.92	0.094	0.54	4.75	-156.2	6.40	1.2	

1535

SAMPLE DATA

Date: <u>12/3/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>ETW</u>	Color / Odor / Comments
Time: <u>1550</u>								
Method: <u>Low Flow</u>	<u>20.92</u>	<u>0.094</u>	<u>0.54</u>	<u>4.75</u>	<u>-156.2</u>	<u>6.40</u>	<u>16.35</u>	

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

Analysis	Preservative	Container requirements	No. of containers
<u>Explosive Residues</u>			
<u>Perchlorate</u>			
<u>TAL metals</u>			

Observations/Notes:
 Total Volume Purged: 1.2
 Pump start 1530
 Purge rate 0.54/min tubing set @ 22. ft bgs

MS/MSD: YES NO Duplicate ID No.:
 Signature(s):

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/3/09
 Weather: 68°

Project Number: 378849.SI.FK
 Well ID: M207-TW10
 Sample ID: M207-TW10-09D
 Sampling Team: D. Seel / RDU

Total Depth: 25.00 FT.(BTOC)
 Depth to water: (H) 16.70 FT.(BTOC)
 Water Column: 8.30 FT.
(x) 0.0-11 GAL/FT.
 Well Volume: 0.33 GAL. = 1.65
 Total Purge Vol.: 1.6 GAL.

Measuring Device: YSI 556# 05730
 Date and Time: HANNA# 03969

Purge Device: Peristaltic Pump

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
1443	16.85	20.91	0.435	2.40	5.57	-146.2	31	.4	
1450	16.85	20.91	0.438	2.59	5.72	-153.2	27	.8	
1455	16.85	20.91	0.438	2.58	5.73	-154.4	24	1.2	
1500	16.85	20.93	0.438	2.59	5.73	-156.7	22	1.6	

SAMPLE DATA

Date: <u>12/3/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTL</u>	Color / Odor / Comments
Time: <u>1500</u>								
Method: <u>Low flow</u>	<u>20.93</u>	<u>0.438</u>	<u>2.59</u>	<u>5.73</u>	<u>-156.7</u>	<u>22</u>	<u>1.6</u>	

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

Analysis	Preservative	Container requirements	No. of containers
<u>Explosive Residue</u>			
<u>Perchlorate</u>			
<u>TAL metals</u>			

Observations/Notes:

Total Volume Purged: 1.6 gallons
 started pump @ 1440
 purge rate 0.34/min

MS/MSD: YES NO Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/3/09
 Weather: 78°

Project Number: 378849.SI.FK
 Well ID: MR07-TW12
 Sample ID: MR07-TW12
 Sampling Team: D. Seefeldt

Total Depth: 24.85 FT.(BTOC)
 Depth to water: (H) 18.5 FT.(BTOC)
 Water Column: 6.35 FT.
 (X) 0.041 GAL/FT.
 Well Volume: 0.25 GAL. 1.25
 Total Purge Vol.: 3.85 GAL.

Measuring Device: YESSCO #05730
 Date and Time: 12/3/09 08:00

Purge Device: Peristaltic Pump

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
1250	20.6	20.51	0.096	3.99	4.74	-88.5	450	0.35	
1255	21.1	20.51	0.096	3.99	4.74	-89.6	450	0.7	
1300	21.4	20.35	0.084	3.93	4.66	-96.8	500	1.05	
1305	21.45	20.26	0.090	3.58	4.34	-91.2	260	1.4	
1315	21.94	20.24	0.083	3.30	3.97	-71.9	110	2.1	
1325	22.00	20.06	0.078	3.22	4.06	-101	45	2.8	
1335	22.05	19.87	0.076	3.04	3.67	-63.3	24.0	3.5	
1340	22.17	19.84	0.076	3.04	3.93	-109.3	10.8	3.85	

SAMPLE DATA

Date: <u>12/3/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1340</u>								
Method: <u>LC Filter</u>								

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

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Total Volume Purged: 3.84
 Pump started 1245
 Purge rate .25 L/min

MS/MSD: YES NO Duplicate ID No.:

Signature(s): 

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/3/09
 Weather: 74°

Project Number: 378849.SI.FK
 Well ID: ~~MR07-TW13~~ MR07-TW13
 Sample ID: ~~MR07-TW13-090~~ MR07-TW13-090
 Sampling Team: O. Saucedo / EDU

Total Depth: 24.95 FT.(BTOC)
 Depth to water: (H) 17.10 FT.(BTOC)
 Water Column: 7.85 FT.
 Well Volume: (X) 0.041 GAL/FT.
0.31 GAL X 5 = 1.55
 Total Purge Vol.: 8.6 GAL.

Measuring Device: YSI 556 # 05730
 Date and Time: _____
Turbid # 06969

Purge Device: Peristaltic Pump

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
1035	18.00	21.47	0.112	3.07	5.11	-106.7	140		
1040	18.34	21.53	0.077	2.1	4.86	-200.7	80		
1045	18.5	21.59	0.077	2.0	4.96	-200.7	65		
1050	18.5	21.52	0.077	1.40	4.86	-201.1	23		
1055	18.5	21.60	0.077	1.4	4.86	-201.2	16		
1100	18.5	21.25	0.065	0.96	4.89	-216.4	12		
1100	18.5	21.25	0.065	0.96	4.89	-216.5	19.8		
1110	18.5	21.26	0.065	0.94	4.86	-215	9.8	34 min	

SAMPLE DATA

Date: <u>12/3/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTU</u>	Color / Odor / Comments
Time: <u>1110</u>								
Method: <u>Low Flow</u>	<u>21.26</u>	<u>0.065</u>	<u>0.94</u>	<u>4.86</u>	<u>-215</u>	<u>9.8</u>	<u>8.5</u>	

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

Analysis	Preservative	Container requirements	No. of containers
<u>Explosives Residues</u>			
<u>PETN</u>			
<u>Nitrosamine</u>			
<u>Perchlorate</u>			

Observations/Notes:

Total Volume Purged: 8.6 gals

pump started @ 1030
purge rate 34/min

MS/MSD: YES NO Duplicate ID No.: MR07-TW13D-090

Signature(s):



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Mid-Atlantic
 Location: MCB CAMP LEJEUNE
 Event: CTO-014
 Date: 12/4/09
 Weather: 580

Project Number: 378849.SI.FK
 Well ID: MRO7-TW17
 Sample ID: MRO7-TW17-090
 Sampling Team: D. Seal/Kou

Total Depth: 24.85 FT.(BTOC)
 Depth to water: (+) 16.65 FT.(BTOC)
 Water Column: 8.2 FT.
 Well Volume: (x) 2.41 GAL/FT. 0.33 GAL x 7.265
 Total Purge Vol.: 1.74 GAL.

Measuring Device: YSI 556A-05730
 Date and Time: HAWAIIA 089 69

Purge Device: Peristaltic Pump

Well Dia. (inches)	Volume (gallons/foot)
0.75	0.023
1	0.041
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Depth to Water (ft bgs)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Flow Rate (mL/min)	Color / Odor / Comments
Stabilization Criteria		± 10%	± 3%	± 10%	± 0.1	± 10 mV	± 10% or <10		
0825	17.12	17.99	0.191	1.17	6.09	-127.2	37	35	
0830	17.21	18.06	0.189	1.15	6.18	-119.4	32	7	
0835	17.24	18.04	0.189	0.68	6.03	-99	38	2.05	
0840	17.29	18.04	0.187	0.67	6.07	-100.3	25	2.04	
0850	17.32	18.04	0.186	0.67	6.13	-100.6	22	1.74	

SAMPLE DATA

Date: <u>12/4/09</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTL</u>	Color / Odor / Comments
Time: <u>0850</u>								
Method: <u>Low Flow</u>	<u>18.04</u>	<u>0.186</u>	<u>0.67</u>	<u>6.13</u>	<u>-100.6</u>	<u>22</u>	<u>17</u>	

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

Analysis	Preservative	Container requirements	No. of containers
<u>Explosives Residues</u>			
<u>TAL metals</u>			
<u>Dissolved metals</u>			
<u>Perchlorate</u>			

Observations/Notes:

Total Volume Purged: 1.74 2.160 →
0820
25 L/min purge rate
sub. intake @ 22 ft bgs

MS/MSD: YES NO Duplicate ID No.:

Signature(s): [Signature]

Appendix G
Data Tables and Raw Analytical Data

Appendix G
Site UXO-7
Subsurface Soil Raw Analytical Results
March 2011

Station ID	MR07-IS18		MR07-IS19	MR07-IS20	MR07-IS21	MR07-IS22	MR07-IS23
Sample ID	MR07-IS18-4-8-11A	MR07-IS18D-4-8-11A	MR07-IS19-4-8-11A	MR07-IS20-4-8-11A	MR07-IS21-4-8-11A	MR07-IS22-4-8-11A	MR07-IS23-4-8-11A
Sample Date	03/10/11	03/10/11	03/10/11	03/10/11	03/10/11	03/10/11	03/10/11
Chemical Name							
Explosives (µg/kg)							
1,3,5-Trinitrobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
1,3-Dinitrobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trinitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dinitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,6-Dinitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Amino-4,6-dinitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Amino-2,6-dinitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrotoluene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
HMX	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitroglycerin	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Perchlorate	2.33 U	2.69 U	2.79 U	2.32 U	2.19 U	2.24 U	2.34 U
PETN	500 U	500 U	500 U	500 U	500 U	500 U	500 U
RDX	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Tetryl	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Notes:

Shading indicates detections
 U - The material was analyzed for, but not detected
 µg/kg - Micrograms per kilogram

Appendix G
Site UXO - 07
Subsurface Soil Raw Analytical Results
December 2009

Station ID	MR07-IS01		MR07-IS02	MR07-IS03	MR07-IS04	MR07-IS05	MR07-IS06	MR07-IS07	MR07-IS08	MR07-IS09	MR07-IS10
Sample ID	MR07-IS01-11-12-09D	MR07-IS01D-11-12-09D	MR07-IS02-10-11-09D	MR07-IS03-9-10-09D	MR07-IS04-12-13-09D	MR07-IS05-14-15-09D	MR07-IS06-12-13-09D	MR07-IS07-18-19-09D	MR07-IS08-18-19-09D	MR07-IS09-16-17-09D	MR07-IS10-18-19-09D
Sample Date	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/02/09	12/01/09
Chemical Name											
Explosives (µg/kg)											
1,3,5-Trinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	140 J	190 U	190 U	190 U	170 J
1,3-Dinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
2,4,6-Trinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
2,4-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
2,6-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
2-Amino-4,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
2-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
3-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
4-Amino-2,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
4-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
HMX	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
Nitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
Nitroglycerin	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 UJ
Perchlorate	2.44 U	2.61 U	2.32 U	2.47 U	2.14 U	2.4 U	2.28 U	2.6 U	2.69 U	2.34 U	2.58 U
PETN	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 UJ
RDX	290 J	520 J	390 J	360 J	130 J	320 J	300 J	360 J	180 J	95 J	190 UJ
Tetryl	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 UJ
Total Metals (mg/kg)											
Aluminum	9,690	12,500	6,610	13,900	2,420	7,490	3,310	10,300	15,000	1,650	8,700
Antimony	0.894 UJ	0.974 UJ	0.867 UJ	0.912 UJ	0.798 UJ	0.863 UJ	0.837 UJ	0.979 UJ	0.973 UJ	0.883 UJ	0.952 UJ
Arsenic	2.04 J	15.7 J	2.71	3.95	0.269	0.573	0.617	0.635	1.7	0.368	7.51
Barium	14 J	19.1 J	10 J	21 J	3.91 J	9.42 J	25.3 J	18.7 J	16.3 J	2.69 J	9.87 J
Beryllium	0.106 J	0.158 J	0.068 J	0.136 J	0.266 U	0.288 U	0.0786 J	0.134 J	0.262 J	0.294 U	0.113 J
Cadmium	0.298 U	0.325 U	0.289 U	0.304 U	0.266 U	0.288 U	0.279 U	0.326 U	0.324 U	0.294 U	0.317 U
Calcium	111 J	105 J	69.3 J	304 U	86.5 J	383	352	1,040	71.9 J	294 U	317 U
Chromium	15.2 J	22.2 J	8.92 J	21.7 J	2.43 J	6.86 J	2.36 J	14.1 J	14.5 J	1.5 J	12.9 J
Cobalt	0.439 J	0.579 J	0.352 J	0.898	0.665 U	0.361 J	0.697 U	0.653 J	0.866	0.736 U	0.53 J
Copper	2	2.69	0.851	2.9	0.276 J	1.35	0.602	2.89	2.31	0.588 U	2.75
Cyanide	0.305 U	0.326 U	0.29 U	0.308 U	0.267 U	0.301 U	0.284 U	0.325 U	0.336 U	0.293 U	0.322 U
Iron	4,030 J	16,000 J	5,970	13,600	348	1,560	1,420	1,670	4,780	519	6,460
Lead	6.53	9.21	4.65	8.82	1.64	4.42	3.16	7.02	8.58	1.59	6.29
Magnesium	360 J	471 J	258 J	415 J	57.8 J	211 J	84.5 J	480 J	695 J	294 U	407 J
Manganese	4.88	5.48	3.26	4.53	1.91	3.27	28	4.85	8.38	0.903	5.02
Mercury	0.0356 U	0.0417 U	0.0392	0.0271 J	0.0342 U	0.0169 J	0.0352 U	0.026 J	0.0415 U	0.0362 U	0.0425 U
Nickel	1.24	1.32	0.916	2.35	0.669	1.84	0.676	0.987	2.59	0.798	0.863
Potassium	502 J	597 J	281 J	481 J	81.8 J	172 J	279 U	589 J	686 J	294 U	624 J
Selenium	0.216 J	1.01 J	0.346	0.55	0.266 U	1.02	0.279 U	0.33	0.372	0.184 J	0.371
Silver	0.298 U	0.649 U	0.289 U	0.608 U	0.266 U	0.288 U	0.279 U	0.326 U	0.324 U	0.294 U	0.317 U
Sodium	298 U	325 U	289 U	304 U	266 U	288 U	279 U	326 U	324 U	294 U	317 U
Thallium	0.477 U	0.519 U	0.462 U	0.486 U	0.426 U	0.46 U	0.446 U	0.522 U	0.519 U	0.471 U	0.507 U
Vanadium	14.1 J	46.4 J	12.8 J	31.7 J	1.94 J	5.13 J	3.14 J	14.4 J	17.2	2.72 J	12.6
Zinc	3.91	6.47	3.46	5.17	1.37	2.7	1.96	8.98	10.3	1.32	6.47

Notes:

- Shading indicates detections
- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- mg/kg - Milligrams per kilogram
- µg/kg - Micrograms per kilogram

Appendix G
Site UXO - 07
Subsurface Soil Raw Analytical Results
December 2009

Station ID	MR07-IS11	MR07-IS12	MR07-IS13		MR07-IS14	MR07-IS15	MR07-IS16	MR07-IS17
Sample ID	MR07-IS11-23-24-09D	MR07-IS12-18-19-09D	MR07-IS13-16-17-09D	MR07-IS13D-16-17-09D	MR07-IS14-13-14-09D	MR07-IS15-16-17-09D	MR07-IS16-12-13-09D	MR07-IS17-16-18-09D
Sample Date	12/01/09	12/01/09	12/01/09	12/01/09	12/01/09	12/01/09	12/01/09	12/01/09
Chemical Name								
Explosives (µg/kg)								
1,3,5-Trinitrobenzene	160 J	130 J	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
1,3-Dinitrobenzene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
2,4,6-Trinitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
2,4-Dinitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
2,6-Dinitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
2-Amino-4,6-dinitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
2-Nitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
3-Nitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
4-Amino-2,6-dinitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
4-Nitrotoluene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
HMX	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Nitrobenzene	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Nitroglycerin	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ
Perchlorate	2.45 U	2.64 U	2.73 U	2.57 U	2.49 U	2.51 U	2.28 U	2.66 U
PETN	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ	640 UJ
RDX	150 J	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Tetryl	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Total Metals (mg/kg)								
Aluminum	7,800	16,000	13,400	12,200	11,700	15,300	3,590	10,700
Antimony	0.896 UJ	0.969 UJ	0.997 UJ	0.936 UJ	0.889 UJ	0.918 UJ	0.822 UJ	0.977 UJ
Arsenic	4.9	1.15	2.37	3.79	2.12	1.37	0.514	1.46
Barium	9.05 J	16.4 J	20.2 J	17.6 J	18.6 J	14.9 J	5.79 J	10.4 J
Beryllium	0.169 J	0.139 J	0.151 J	0.127 J	0.143 J	0.114 J	0.274 U	0.125 J
Cadmium	0.299 U	0.323 U	0.332 U	0.312 U	0.296 U	0.306 U	0.274 U	0.326 U
Calcium	299 U	84.8 J	332 U	312 U	67.8 J	306 U	124 J	326 U
Chromium	13.7 J	12.9 J	20.8 J	18.7 J	16.6 J	16.1 J	2.72 J	13.4 J
Cobalt	0.525 J	0.679 J	0.54 J	0.531 J	0.475 J	0.43 J	0.568 J	0.712 J
Copper	2.39	2.45	2.98	2.97	3.16	2.29	0.377 J	1.47
Cyanide	0.306 U	0.329 U	0.341 U	0.321 U	0.311 U	0.314 U	0.285 U	0.332 U
Iron	5,510	2,500	2,880	3,430	2,150	2,360	896	3,050
Lead	6.38	5.79	9.69	8.92	8.19	7.36	2.71	6.43
Magnesium	375 J	547 J	576 J	514 J	409 J	360 J	82.8 J	437 J
Manganese	4.41	6.68	5.23	5.5	5.5	4.45	1.12	12.5
Mercury	0.0391 U	0.0421 U	0.0465 U	0.0386 U	0.0425 U	0.0401 U	0.0353 U	0.0399 U
Nickel	0.697	2.02	1.38	1.28	1.31	1.15	1.81	1.21
Potassium	434 J	566 J	618 J	564 J	622 J	478 J	80.4 J	536 J
Selenium	0.571	0.305 J	0.316 J	0.291 J	0.324	0.198 J	0.213 J	0.254 J
Silver	0.299 U	0.323 U	0.332 U	0.312 U	0.296 U	0.306 U	0.274 U	0.326 U
Sodium	299 U	323 U	332 U	312 U	68 J	306 U	274 U	326 U
Thallium	0.478 U	0.517 U	0.532 U	0.499 U	0.474 U	0.49 U	0.438 U	0.521 U
Vanadium	16.4	12.9	26.3	18.1	17.6	16.8	3.31	16.1
Zinc	6.99	5.82	6.07	6.28	5.04	4.15	1.32	6.03

Notes:

Shading indicates detections

- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- mg/kg - Milligrams per kilogram
- µg/kg - Micrograms per kilogram

Appendix G
Site UXO-07
Surface Soil Raw Analytical Results
November 2009

Station ID	MR07-SS01		MR07-SS02	MR07-SS03	MR07-SS04	MR07-SS05	MR07-SS06	MR07-SS07	MR07-SS08	MR07-SS09	MR07-SS10	MR07-SS11		MR07-SS12	MR07-SS13	MR07-SS14	MR07-SS15	MR07-SS16	MR07-SS17	MR07-SS18	MR07-SS19	
Sample ID	MR07-SS01-09D	MR07-SS01D-09D	MR07-SS02-09D	MR07-SS03-09D	MR07-SS04-09D	MR07-SS05-09D	MR07-SS06-09D	MR07-SS07-09D	MR07-SS08-09D	MR07-SS09-09D	MR07-SS10-09D	MR07-SS11-09D	MR07-SS11D-09D	MR07-SS12-09D	MR07-SS13-09D	MR07-SS14-09D	MR07-SS15-09D	MR07-SS16-09D	MR07-SS17-09D	MR07-SS18-09D	MR07-SS19-09D	
Sample Date	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/02/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	
Chemical Name																						
Semivolatile Organic Compounds (µg/kg)																						
2,4-Dinitrotoluene	190 U	190 U	190 U	190 U	76 J	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U							
2,6-Dinitrotoluene	190 U	190 U	120 J	190 U	190 U	140 J	190 U	190 U	190 U	190 U	120 J	120 J	170 J	190 U	190 U							
Nitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
Explosives (µg/kg)																						
1,3,5-Trinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
1,3-Dinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
2,4,6-Trinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	74 J	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
2-Amino-4,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	200 J	190 U
2-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
3-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
4-Amino-2,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
4-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
HMX	190 U	190 U	190 U	70 J	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U								
Nitroglycerin	640 U	640 U	640 U	420 J	640 U	240 J	640 U	640 U	230 J	640 U	640 U											
Perchlorate	2.55 U	2.61 U	2.4 U	2.34 U	2.24 U	2.28 U	2.62 U	2.39 U	2.48 U	2.4 U	2.66 U	2.56 U	2.57 U	2.66 U	2.36 U	2.44 U	2.47 U	2.31 U	2.48 U	2.36 U	2.99 U	2.41 U
PETN	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U
RDX	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	280 J	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
Tetryl	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Total Metals (mg/kg)																						
Aluminum	7,260	7,190	6,950	5,670	6,140	9,240	5,790	8,080	3,850	4,380	5,350	5,330	5,240	4,850	5,780	4,760	6,370	4,810	4,860	7,050	5,020	
Antimony	0.949 UJ	0.979 UJ	0.87 UJ	0.879 UJ	0.824 UJ	0.854 UJ	0.946 UJ	0.862 UJ	0.924 UJ	0.895 UJ	0.377 J	0.43 J	0.525 J	0.876 UJ	0.904 U	0.91 U	0.855 U	0.9 U	0.3 J	1.23	0.435 J	
Arsenic	1.73	1.56	1.57	1.34	1.21	1.18	1.34	1.98	0.967	1.1	2.04	2.22	2	1.12	1.14	1.48	1.89	1.53	2.52	9.58	2.39	
Barium	17.3	17.5	19.6	16.3	13.3	19	16.2	16.1	7.8	12	13.4	14.1	14.2	13.7	14.3 J	13.2 J	13.9 J	11.6 J	13.5 J	24.2 J	12.9	
Beryllium	0.085 J	0.086 J	0.0874 J	0.0864 J	0.089 J	0.0802 J	0.0843 J	0.076 J	0.308 U	0.0765 J	0.0762 J	0.0777 J	0.0762 J	0.0714 J	0.0792 J	0.0743 J	0.08 J	0.0675 J	0.0793 J	0.132 J	0.0743 J	
Cadmium	0.356 U	0.352 U	0.29 U	0.293 U	0.303 U	0.285 U	0.315 U	0.287 U	0.308 U	0.298 U	0.326 U	0.407 U	0.494 U	0.292 U	0.301 U	0.404	0.285 U	0.3 U	0.295 U	0.884	0.296 U	
Calcium	5,520	3,780	2,360	1,250	32,800	8,400	10,200	1,840	1,180	5,530	1,460	3,470	4,280	12,700	7,240	11,200	20,700	2,100	1,770	6,120	1,040 J	
Chromium	8.68 J	8.52 J	7.22 J	5.62 J	7.13 J	8.24 J	7.03 J	8.83 J	4.8 J	5.52 J	6.08 J	6.99 J	7.14 J	5.77 J	6.69	6.37	7.87	6.3	6.39	19.5	6.99	
Cobalt	0.463 J	0.451 J	0.419 J	0.339 J	0.387 J	0.389 J	0.414 J	0.51 J	0.77 U	0.326 J	0.347 J	0.456 J	0.505 J	0.391 J	0.477 J	0.437 J	0.454 J	0.374 J	0.407 J	1.58	0.359 J	
Copper	4.87 J	5.12 J	3.67 J	3.22 J	2.3 J	2.06 J	4.62 J	1.89 J	1.76 J	5.37 J	5.15 J	5.34 J	5.71 J	3.01 J	2.94 U	15.9	3 U	3.35 U	4.97	16.6	3.45 U	
Cyanide	0.196 J	0.326 U	0.16 J	0.293 U	0.28 U	0.285 U	0.328 U	0.299 U	0.309 U	0.3 U	0.332 U	0.32 U	0.322 U	0.295 U	0.304 U	0.546	0.289 U	0.311 U	0.295 U	0.21 J	0.302 U	
Iron	4,190	4,260	4,420	3,440	2,870	2,770	3,240	5,510	2,860	2,790	3,420	3,700	3,670	2,660	3,560	3,970	4,400	3,400	3,200	5,540	3,390	
Lead	41.4	40.3	18.3	19.1	7.79	6.28	19.1	8.12	6.01	16.4	18.8	13.8	14.3	12.9	9.61	12.7	10.5	10.1	14.6	36.9	15.7 J	
Magnesium	446 J	380 J	881 J	320 J	705 J	415 J	542 J	344 J	241 J	276 J	301 J	267 J	276 J	434 J	390	389	629	257 J	231 J	446	222 J	
Manganese	21.4	17.8	21.1	20.7	17.7	11.7	24.1	16.6	11.5	16.1	21.6	26.9	28.8	21.3	19.1	22.1	23.6	18.4	23.1	60.3	15.4	
Mercury	0.0386	0.0447	0.0436	0.0502	0.0297 J	0.0702	0.0296 J	0.0254 J	0.0438 U	0.0276 J	0.0298 J	0.032 J	0.0316 J	0.0247 J	0.0293 J	0.0362 J	0.0277 J	0.0289	0.0335	0.0441	0.0377	
Nickel	2.31 J	2.27 J	1.87 J	1.63 J	1.41 J	1.89 J	2.07 J	4.56 J	1.01 J	1.44 J	1.4 J	3.11 J	3.42 J	1.82 J	2.01	2.65	1.8	1.96	1.82	4.1	1.36	
Potassium	346 J	357 J	247 J	215 J	303 J	330 J	269 J	265 J	212 J	222 J	251 J	222 J	258 J	238 J	297 J	289 J	274 J	339	210 J	585	220 J	
Selenium	0.458	0.487	0.217 J	0.22 J	0.275 U	0.285 U	0.207 J	0.245 J	0.358 J	0.259 J	0.351	0.323 J	0.361	0.292 U	0.487	0.45	0.483	0.433	0.335	0.787	0.449	
Silver	0.316 U	0.326 U	0.29 U	0.293 U	0.275 U	0.285 U	0.315 U	0.287 U	0.308 U	0.298 U	0.326 U	0.315 U	0.322 U	0.292 U	0.301 U	0.303 U	0.285 U	0.3 U	0.295 U	0.364 U	0.296 U	
Sodium	316 U	326 U	290 U	293 U	106 J	285 U	315 U	287 U	308 U	298 U	326 U	315 U	322 U	292 U	301 U	303 U	285 U	300 U	295 U	364 U	296 U	
Thallium	0.506 U	0.522 U	0.464 U	0.469 U	0.439 U	0.455 U	0.505 U	0.46 U	0.493 U	0.477 U	0.521 U	0.504 U	0.514 U	0.467 U	0.482 U	0.485 U	0.456 U	0.48 U	0.472 U	0.583 U	0.473 U	
Vanadium	11.3	11.3	10.7	8.45	8.8	10.3	10	12.6	6.79	7.6	8.58	12.7	13.7	8.11	10.2	10.1	11.3	8.75	8.14	13.5	8	
Zinc	60 J	61.5 J	30.8 J	28.6 J	16.6 J	17.3 J	33.5 J	14.3 J	20.2 J	17.3 J	31 J	56.1 J	79.7 J	29.7 J	25.5	35.2	24.9	30.3	24.3	188	17.1 J	

Notes:
 Shading indicates detections
 NA - Not analyzed
 J - Analyte present, value may or may not be accurate or precise
 U - The material was analyzed for, but not detected
 UJ - Analyte not detected, quantitation limit may be inaccurate
 mg/kg - Milligrams per kilogram
 µg/kg - Micrograms per kilogram

Appendix G
Site UXO-07
Surface Soil Raw Analytical Results
November 2009

Station ID	MR07-SS20	MR07-SS21			MR07-SS22	MR07-SS23	MR07-SS24	MR07-SS25	MR07-SS26	MR07-SS27	MR07-SS28	MR07-SS29	MR07-SS30	MR07-SS31		MR07-SS32	MR07-SS33	MR07-SS34	MR07-SS35	MR07-SS36	MR07-SS37	MR07-SS38
Sample ID	MR07-SS20-09D	MR07-SS21-09D	MR07-SS21D-09D	MR07-SS22-09D	MR07-SS23-09D	MR07-SS24-09D	MR07-SS25-09D	MR07-SS26-09D	MR07-SS27-09D	MR07-SS28-09D	MR07-SS29-09D	MR07-SS30-09D	MR07-SS31-09D	MR07-SS31D-09D	MR07-SS32-09D	MR07-SS33-09D	MR07-SS33-09D	MR07-SS34-09D	MR07-SS35-09D	MR07-SS36-09D	MR07-SS37-09D	MR07-SS38-09D
Sample Date	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09
Chemical Name																						
Semivolatile Organic Compounds (µg/kg)																						
2,4-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
2,6-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	120 J	190 U	190 U	190 U	190 U
Nitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
Explosives (µg/kg)																						
1,3,5-Trinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
1,3-Dinitrobenzene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
2,4,6-Trinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
2-Amino-4,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	220 J	190 U	190 U	190 U	190 U
2-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
3-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
4-Amino-2,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
4-Nitrotoluene	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
HMX	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
Nitroglycerin	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U
Perchlorate	2.51 U	2.26 U	2.25 U	2.47 U	2.38 U	2.83 U	2.37 U	2.61 U	3.12 U	2.52 U	3.03 U	2.32 U	2.27 U	2.26 U	2.33 U	2.63 U	2.47 U	2.25 U	2.42 U	2.24 U	2.42 U	2.27 U
PETN	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U	640 U
RDX	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U	190 U
Tetryl	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ	190 UJ
Total Metals (mg/kg)																						
Aluminum	4,560	3,890	3,710	5,300	4,220	6,500	4,680	8,560	5,090	4,240	6,060	5,100	6,010	7,710	6,440	4,890	4,910	5,870	5,220	5,160	10,600	
Antimony	0.429 J	0.337 J	0.448 J	0.376 J	0.864 UJ	1.07 UJ	0.455 J	0.938 UJ	1.15 U	0.408 J	1.13 U	0.465 J	0.546 J	0.322 J	0.832 UJ	0.53 J	0.428 J	0.289 J	0.818 UJ	0.531 J	0.823 UJ	
Arsenic	1.83	1.6	1.63	1.81	1.01	2.39	2.25	2.92	1.41	2.86	1.5	2.14	2.1	2.15	2.01	2.4	1.91	1.8	1.15	2.7	1.84	
Barium	11.7 J	15.8	12.1	13.4	14.4	13.3	10.7	21.6	14.4 J	12.2	14.6 J	14.1	13.8 J	16.5 J	12.7	16 J	14.2 J	13.5	10.9	14.3	18.8	
Beryllium	0.071 J	0.0626 J	0.0704 J	0.0628 J	0.0631 J	0.0845 J	0.0707 J	0.134 J	0.385 U	0.07 J	0.0827 J	0.0789 J	0.0795 J	0.0799 J	0.0731 J	0.076 J	0.0799 J	0.0679 J	0.0582 J	0.0737 J	0.0865 J	
Cadmium	0.308 U	0.348 U	0.394	0.308 U	0.378 U	0.355 U	0.293 U	0.313 U	0.385 U	0.303 U	0.376 U	0.289 U	0.275 U	0.27 U	0.277 U	0.352	0.3 U	0.271 U	0.273 U	0.318 U	0.274 U	
Calcium	1,820	11,900 J	18,200 J	1,270 J	11,900 J	1,180 J	527 J	2,530 J	1,100	5,170 J	10,400	1,660 J	1,100	1,270	1,350 J	1,920	1,450	1,250 J	12,500 J	2,030 J	22,100 J	
Chromium	5.5	5.28	5.41	6.81	6.02	7.72	6.06	11.7	5.23	6.51	7.35	6.6	6.27	8.38	7.35	6.42	6	6.86	6.85	6.43	11.4	
Cobalt	0.318 J	0.384 J	0.412 J	0.382 J	0.502 J	0.432 J	0.318 J	0.724 J	0.962 U	0.359 J	0.402 J	0.368 J	0.374 J	0.46 J	0.42 J	0.357 J	0.367 J	0.387 J	0.442 J	0.368 J	0.829	
Copper	3.42 U	3.42 U	3.81 U	3.08 U	5.28	2.31 U	3.45 U	6.54	2.83 U	3.82 U	3.04 U	3.23 U	2.41 U	2.84 U	3.14 U	7.02	4.25 U	3.07 U	4.31 U	6.28	1.47 U	
Cyanide	0.314 U	0.283 U	0.282 U	0.308 U	0.298 U	0.353 U	0.296 U	0.327 U	0.391 U	0.314 U	0.378 U	0.291 U	0.283 U	0.282 U	0.291 U	0.241 J	0.309 U	0.282 U	0.28 U	0.303 U	0.284 U	
Iron	3,250	2,500	2,380	3,700	2,490	3,790	3,000	6,440	3,310	2,890	3,330	3,360	3,790	5,610	4,410	3,260	3,250	4,510	3,350	3,240	6,730	
Lead	11.2	13.7 J	13.9 J	11.9 J	11.8 J	14.7 J	13.1 J	13.9 J	11	12.3 J	12.2	15.8 J	11.6	11.1	9.97 J	14.5	13.3	10.9 J	15.2 J	13 J	6.89 J	
Magnesium	232 J	366	460	256 J	401	289 J	204 J	413	229 J	286 J	421	239 J	245 J	314	253 J	231 J	275 J	254 J	375	264 J	611	
Manganese	17.7	22	28.4	13.8	28.4	11.3	9.05	17.2	15.2	18.1	17.1	18.7	13.2	14.4	12.6	23.7	21	14.8	16.7	15.3	15.6	
Mercury	0.0278 J	0.0175 J	0.023 J	0.0229 J	0.0208 J	0.0291 J	0.0431	0.0295 J	0.0427	0.0237	0.0229 J	0.0316 J	0.0302 J	0.0366	0.0229 J	0.0286 J	0.0324 J	0.116	0.0295 J	0.0627	0.0271 J	
Nickel	1.66	1.61	1.66	1.76	2.17	1.78	1.43	2.96	1.52	1.48	1.7	1.67	1.71	2	1.84	1.77	1.55	1.41	1.59	1.46	2.75	
Potassium	239 J	234 J	240 J	253 J	270 J	334 J	239 J	416 J	225 J	268 J	233 J	217 J	256 J	289 J	251 J	214 J	238 J	294 J	252 J	252 J	352 J	
Selenium	0.426	0.309	0.225 J	0.307 J	0.487	0.514	0.367	0.642	0.383 J	0.372	0.361 J	0.422	0.379	0.363	0.291	0.376	0.464	0.364	0.383	0.449	0.535	
Silver	0.308 U	0.272 U	0.277 U	0.308 U	0.288 U	0.355 U	0.293 U	0.313 U	0.385 U	0.299 U	0.376 U	0.289 U	0.275 U	0.27 U	0.277 U	0.328 U	0.3 U	0.271 U	0.273 U	0.295 U	0.274 U	
Sodium	308 U	272 U	277 U	308 U	288 U	355 U	293 U	313 U	385 U	299 U	376 U	289 U	275 U	270 U	277 U	328 U	300 U	271 U	273 U	295 U	75.7 J	
Thallium	0.492 U	0.435 U	0.444 U	0.493 U	0.461 U	0.568 U	0.469 U	0.5 U	0.616 U	0.479 U	0.602 U	0.463 U	0.44 U	0.432 U	0.444 U	0.525 U	0.48 U	0.433 U	0.437 U	0.473 U	0.439 U	
Vanadium	7.79	6.87	6.95	8.68	7.48	10.1	7.41	14.8	7.99	6.99	9.96	8.05	9	12.3	10.4	7.98	7.9	10.4	8.21	8.77	15.5	
Zinc	22.7	30.1 J	33 J	40.6 J	45.8 J	21.5 J	23.7 J	44.4 J	17.9	26 J	21.1	24 J	18.3	19.1	31 J	52.4	26.4	16.1 J	19.1 J	26 J	7.13 J	

Notes:
 Shading indicates detections
 NA - Not analyzed
 J - Analyte present, value may or may not be accurate or precise
 U - The material was analyzed for, but not detected
 UJ - Analyte not detected, quantitation limit may be inaccurate
 mg/kg - Milligrams per kilogram
 µg/kg - Micrograms per kilogram

Appendix G
Site UXO-07
Surface Soil Raw Analytical Results
November 2009

Station ID	MR07-SS39	MR07-SS40	MR07-SS41		MR07-SS42
Sample ID	MR07-SS39-09D	MR07-SS40-09D	MR07-SS41-09D	MR07-SS41D-09D	MR07-SS42-09D
Sample Date	11/03/09	11/03/09	11/03/09	11/03/09	11/03/09
Chemical Name					
Semivolatile Organic Compounds (µg/kg)					
2,4-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U
2,6-Dinitrotoluene	190 U	190 U	190 U	190 U	190 U
Nitrobenzene	190 U	190 U	190 U	190 U	190 U
Explosives (µg/kg)					
1,3,5-Trinitrobenzene	190 U	190 U	190 U	87 J	190 U
1,3-Dinitrobenzene	190 U	190 U	190 U	190 U	190 U
2,4,6-Trinitrotoluene	190 U	190 U	190 U	190 U	190 U
2-Amino-4,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U
2-Nitrotoluene	190 U	190 U	190 U	190 U	190 U
3-Nitrotoluene	190 U	190 U	120 J	190 U	190 U
4-Amino-2,6-dinitrotoluene	190 U	190 U	190 U	190 U	190 U
4-Nitrotoluene	190 U	190 U	190 U	190 U	190 U
HMX	190 U	190 U	190 U	190 U	190 U
Nitroglycerin	640 U	260 J	330 J	640 U	640 U
Perchlorate	2.32 U	2.39 U	2.38 U	2.41 U	2.43 U
PETN	640 U	640 U	640 U	640 U	640 U
RDX	190 U	190 U	190 U	74 J	190 U
Tetryl	190 UJ	190 UJ	190 UJ	320 J	190 UJ
Total Metals (mg/kg)					
Aluminum	2,700	6,110	4,150	3,940	4,970
Antimony	0.867 UJ	0.884 UJ	0.881 UJ	0.874 UJ	0.894 UJ
Arsenic	0.901	1.34	1.06	1.03	1.25
Barium	9.8	15.3	14.4	14.1	27.5
Beryllium	0.0642 J	0.0897 J	0.0834 J	0.0832 J	0.0846 J
Cadmium	0.359 U	0.329 U	0.294 U	0.291 U	0.298 U
Calcium	42,000 J	8,530 J	1,880 J	1,450 J	7,070 J
Chromium	5.25	9.06	5.04	4.91	6.51
Cobalt	0.304 J	0.402 J	0.327 J	0.317 J	0.382 J
Copper	2.73 U	3.48 U	3.26 U	2.8 U	2.8 U
Cyanide	0.29 U	0.299 U	0.298 U	0.301 U	0.162 J
Iron	1,790	3,390	2,320	2,290	2,870
Lead	12.1 J	32 J	22.5 J	22.2 J	20.9 J
Magnesium	749	349	230 J	230 J	375
Manganese	16.9	18.2	16.9	15.7	18.9
Mercury	0.0189 J	0.0285 J	0.033 J	0.0353 J	0.0282 J
Nickel	0.953	1.94	1.55	1.48	1.65
Potassium	193 J	219 J	156 J	148 J	200 J
Selenium	0.188 J	0.417	0.274 J	0.394	0.432
Silver	0.289 U	0.295 U	0.294 U	0.291 U	0.298 U
Sodium	92 J	295 U	294 U	291 U	298 U
Thallium	0.462 U	0.471 U	0.47 U	0.466 U	0.477 U
Vanadium	5.45	9.42	6.64	6.42	8.14
Zinc	20.3 J	30.9 J	17.3 J	18 J	24.3 J

Notes:

- Shading indicates detections
- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- mg/kg - Milligrams per kilogram
- µg/kg - Micrograms per kilogram

Appendix G
Site UXO - 07
Groundwater Raw Analytical Results
December 2009

Station ID	MR07-IS03	MR07-IS08	MR07-IS10	MR07-IS12	MR07-IS13		MR07-IS17
Sample ID	MR07-TW03-09D	MR07-TW08-09D	MR07-TW10-09D	MR07-TW12-09D	MR07-TW13-09D	MR07-TW14-09D	MR07-TW17-09D
Sample Date	12/04/09	12/03/09	12/03/09	12/03/09	12/03/09	12/03/09	12/04/09
Chemical Name							
Explosives (µg/l)							
1,3,5-Trinitrobenzene	0.19 UJ	0.14 UJ	0.15 UJ	0.32 UJ	0.14 UJ	0.14 UJ	0.15 UJ
1,3-Dinitrobenzene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
2,4,6-Trinitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
2,4-Dinitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
2,6-Dinitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
2-Amino-4,6-dinitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
2-Nitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.17 UJ	0.14 UJ	0.14 UJ	0.31 UJ
3-Nitrotoluene	0.15 UJ	0.079 J	0.14 UJ	0.076 J	0.14 UJ	0.14 UJ	0.067 J
4-Amino-2,6-dinitrotoluene	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
4-Nitrotoluene	0.099 J	0.14 UJ	0.2 J	0.076 J	0.14 UJ	0.063 J	0.16 J
HMX	0.15 UJ	0.28 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
Nitrobenzene	1.2 J	0.14 UJ	0.14 UJ	0.79 UJ	0.56 J	0.57 J	0.44 J
Nitroglycerin	0.51 U	0.48 UJ	0.49 UJ	0.51 UJ	0.49 UJ	0.48 UJ	0.5 UJ
Perchlorate	0.0895 J	1 U	0.755	0.472	0.2 U	0.2 U	9.93
PETN	0.51 U	0.48 UJ	8.6 J	0.51 UJ	0.24 J	0.48 UJ	0.22 J
RDX	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
Tetryl	0.15 UJ	0.14 UJ	0.32 J	0.15 UJ	0.14 UJ	0.14 UJ	0.15 UJ
Total Metals (µg/l)							
Aluminum	196 J	241 J	855 J	260 J	250 J	234 J	695 J
Antimony	3.75 U						
Arsenic	1.25 U						
Barium	23.9	49.5	36.2	43.1	24	22.6	62.9
Beryllium	1.25 U	1.25 U	0.286 J	1.25 U	1.25 U	1.25 U	1.25 U
Cadmium	0.311 J	0.386 J	0.701 J	0.329 J	0.338 J	0.335 J	0.422 J
Calcium	4,140	2,690	74,800	1,200 J	1,320	1,280	1,340
Chromium	0.687 J	0.967 J	3.31	1.37	0.794 J	0.688 J	1.66
Cobalt	3.12 U	3.12 U	35.9	1.26 J	3.12 U	3.12 U	3.12 U
Copper	2.5 U	2.5 U	2.5 U	1.41 J	2.5 U	2.5 U	2.5 U
Iron	6,600	1,270	942	838	832	794	597
Lead	0.75 U						
Magnesium	1,540	2,190	3,610	1,220 J	855 J	797 J	1,940
Manganese	106	39.4	765	48.2	19.1	17.7	12.4
Mercury	0.2 U						
Nickel	5.72	2.64	13.5	2.6	2.56	2.37 J	1.36 J
Potassium	1,600	2,530	2,450	1,800	1,270	1,190 J	1,790
Selenium	1.25 U	1.37	1.62	1.25 U	1.25 U	1.25 U	1.25 U
Silver	1.25 U						
Sodium	7,490	8,440	11,300	7,850	10,300	9,500	25,000
Thallium	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	3.12 U	3.12 U	2.43 J	3.12 U	3.12 U	3.12 U	1.42 J
Zinc	2.83 J	5.84	19.3	6.16	8.88	8.93	3.08 J
Dissolved Metals (µg/l)							
Aluminum, Dissolved	15.5 J	NA	NA	NA	NA	NA	65.8 J
Antimony, Dissolved	3.75 U	NA	NA	NA	NA	NA	3.75 U
Arsenic, Dissolved	1.25 U	NA	NA	NA	NA	NA	1.25 U
Barium, Dissolved	22.9	NA	NA	NA	NA	NA	55.2
Beryllium, Dissolved	1.25 U	NA	NA	NA	NA	NA	1.25 U
Cadmium, Dissolved	0.34 J	NA	NA	NA	NA	NA	0.399 J
Calcium, Dissolved	3,920	NA	NA	NA	NA	NA	1,060 J
Chromium, Dissolved	1.25 U	NA	NA	NA	NA	NA	1.25 U
Cobalt, Dissolved	3.12 U	NA	NA	NA	NA	NA	3.12 U
Copper, Dissolved	2.5 U	NA	NA	NA	NA	NA	2.5 U
Iron, Dissolved	5,230	NA	NA	NA	NA	NA	330
Lead, Dissolved	0.75 U	NA	NA	NA	NA	NA	0.75 U
Magnesium, Dissolved	1,520	NA	NA	NA	NA	NA	1,700
Manganese, Dissolved	90	NA	NA	NA	NA	NA	10.7
Mercury, Dissolved	0.2 U	NA	NA	NA	NA	NA	0.2 U
Nickel, Dissolved	5.39	NA	NA	NA	NA	NA	1.19 J
Potassium, Dissolved	1,510	NA	NA	NA	NA	NA	1,640
Selenium, Dissolved	1.25 U	NA	NA	NA	NA	NA	1.25 U
Silver, Dissolved	1.25 U	NA	NA	NA	NA	NA	1.25 U
Sodium, Dissolved	7,520	NA	NA	NA	NA	NA	23,300
Thallium, Dissolved	2 U	NA	NA	NA	NA	NA	2 U
Vanadium, Dissolved	3.12 U	NA	NA	NA	NA	NA	3.12 U
Zinc, Dissolved	3.36 J	NA	NA	NA	NA	NA	2.95 J

Notes:

- Shading indicates detections
- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- µg/l - Micrograms per liter

Appendix G
Site UXO - 07
Surface Water Raw Analytical Results
December 2009

Station ID	MR07-SW/SD01		MR07-SW/SD02
Sample ID	MR07-SW01-09D	MR07-SW01D-09D	MR07-SW02-09D
Sample Date	11/12/09	11/12/09	11/12/09
Chemical Name			
Explosives (µg/l)			
1,3,5-Trinitrobenzene	0.14 UJ	0.14 UJ	0.14 UJ
1,3-Dinitrobenzene	0.14 U	0.14 U	0.14 U
2,4,6-Trinitrotoluene	0.14 U	0.14 U	0.14 U
2,4-Dinitrotoluene	0.14 U	0.14 U	0.14 U
2,6-Dinitrotoluene	0.14 U	0.14 U	0.14 U
2-Amino-4,6-dinitrotoluene	0.14 U	0.14 U	0.14 U
2-Nitrotoluene	0.14 U	0.14 U	0.14 U
3-Nitrotoluene	0.15 U	0.14 U	0.14 U
4-Amino-2,6-dinitrotoluene	0.083 J	0.064 J	0.061 J
4-Nitrotoluene	0.14 U	0.14 U	0.14 U
HMX	0.14 UJ	0.14 UJ	0.14 UJ
Nitrobenzene	0.14 U	0.14 U	0.14 U
Nitroglycerin	0.49 UJ	0.49 UJ	0.48 UJ
Perchlorate	0.2 U	0.2 U	0.2 U
PETN	0.49 U	0.49 U	0.48 U
RDX	0.14 U	0.14 U	0.14 U
Tetryl	0.14 UJ	0.14 UJ	0.14 UJ
Total Metals (µg/l)			
Aluminum	173 J	181 J	516 J
Antimony	3.75 U	3.75 U	3.75 U
Arsenic	1.25 U	1.25 U	1.25 U
Barium	7.86 J	7.96 J	4.09 J
Beryllium	1.25 U	1.25 U	1.25 U
Cadmium	0.386 J	0.388 J	0.313 J
Calcium	20,900	21,200	10,100
Chromium	0.662 J	1.25 U	0.768 J
Cobalt	3.12 U	3.12 U	3.12 U
Copper	4.47	4.44	1.86 J
Cyanide	10 U	10 U	10 U
Iron	69.5	72.4	234
Lead	0.724 J	0.427 J	0.487 J
Magnesium	822 J	833 J	468 J
Manganese	1.84 J	1.9 J	1.62 J
Mercury	0.2 U	0.2 U	0.2 U
Nickel	2.5 U	2.5 U	2.5 U
Potassium	1,350	1,350	668 J
Selenium	1.25 U	1.25 U	1.25 U
Silver	1.25 U	1.25 U	1.25 U
Sodium	1,060 J	1,050 J	691 J
Thallium	2 U	2 U	2 U
Vanadium	3.12 U	1.32 J	1.61 J
Zinc	11.1	8.52	8.48
Dissolved Metals (µg/l)			
Aluminum, Dissolved	40.1 J	41.2 J	30.9 J
Antimony, Dissolved	3.75 U	3.75 U	3.75 U
Arsenic, Dissolved	1.25 U	1.25 U	1.25 U
Barium, Dissolved	6.5 J	6.63 J	2.76
Beryllium, Dissolved	1.25 U	1.25 U	1.25 U
Cadmium, Dissolved	0.339 J	0.356 J	0.318 J
Calcium, Dissolved	18,100	18,800	9,330
Chromium, Dissolved	1.25 U	1.25 U	1.25 U
Cobalt, Dissolved	3.12 U	3.12 U	3.12 U
Copper, Dissolved	3.27	3.3	2.5 U
Iron, Dissolved	13.8 J	12 J	11.5 J
Lead, Dissolved	0.75 U	0.75 U	0.75 U
Magnesium, Dissolved	713 J	737 J	413 J
Manganese, Dissolved	0.904 J	0.927 J	3.75 U

Appendix G
 Site UXO - 07
 Surface Water Raw Analytical Results
 December 2009

Station ID	MR07-SW/SD01		MR07-SW/SD02
Sample ID	MR07-SW01-09D	MR07-SW01D-09D	MR07-SW02-09D
Sample Date	11/12/09	11/12/09	11/12/09
Chemical Name			
Mercury, Dissolved	0.2 U	0.2 U	0.2 U
Nickel, Dissolved	2.5 U	2.5 U	2.5 U
Potassium, Dissolved	1,160 J	1,180 J	574 J
Selenium, Dissolved	1.25 U	1.25 U	1.25 U
Silver, Dissolved	1.25 U	1.25 U	1.25 U
Sodium, Dissolved	935 J	968 J	627 J
Thallium, Dissolved	2 U	2 U	2 U
Vanadium, Dissolved	3.12 U	3.12 U	3.12 U
Zinc, Dissolved	6.37	5.69	5 U

Notes:

Shading indicates detections

- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- µg/l - Micrograms per liter

Appendix G
Site UXO - 07
Sediment Raw Analytical Results
December 2009

Station ID	MR07-SW/SD01		MR07-SW/SD02
Sample ID	MR07-SD01-09D	MR07-SD01D-09D	MR07-SD02-09D
Sample Date	11/12/09	11/12/09	11/12/09
Chemical Name			
Explosives (µg/kg)			
1,3,5-Trinitrobenzene	190 U	190 U	190 UJ
1,3-Dinitrobenzene	190 U	190 U	190 U
2,4,6-Trinitrotoluene	190 U	190 U	190 U
2,4-Dinitrotoluene	190 U	190 U	190 U
2,6-Dinitrotoluene	190 U	190 U	190 U
2-Amino-4,6-dinitrotoluene	190 U	190 U	190 U
2-Nitrotoluene	190 U	190 U	190 U
3-Nitrotoluene	190 U	190 U	190 U
4-Amino-2,6-dinitrotoluene	190 U	190 U	190 U
4-Nitrotoluene	190 U	190 U	190 U
HMX	190 U	190 U	190 U
Nitrobenzene	190 U	190 U	190 U
Nitroglycerin	640 U	640 U	640 U
Perchlorate	2.52 U	2.68 U	2.64 U
PETN	640 U	640 U	640 U
RDX	190 U	190 U	190 U
Tetryl	190 UJ	190 UJ	190 UJ
Total Metals (mg/kg)			
Aluminum	2,930	2,990	8,420
Antimony	0.905 UJ	0.97 UJ	0.983 UJ
Arsenic	1.06	0.872	2.16
Barium	12.7	12.9	11.2
Beryllium	0.0682 J	0.323 U	0.0925 J
Cadmium	0.334 U	0.348 U	0.166 J
Calcium	44,000	41,300	1,540
Chromium	3.93	3.58	12.8
Cobalt	0.644 J	0.598 J	0.443 J
Copper	2.94	1.88	1.86
Cyanide	0.315 U	0.335 U	0.329 U
Iron	1,730	2,190	6,870
Lead	6.6	9.14	6.02
Magnesium	665 J	693 J	334 J
Manganese	42.1	38.3	7.44
Mercury	0.0394	0.0195 J	0.0182 J
Nickel	2.65	2.63	1.35
Potassium	184 J	165 J	379
Selenium	0.302 U	0.323 U	0.397
Silver	0.302 U	0.323 U	0.328 U
Sodium	302 U	323 U	328 U
Thallium	0.483 U	0.517 U	0.524 U
Vanadium	5.23	5.19	16.4
Zinc	16.4	20.4	9.54

Notes:

Shading indicates detections

- NA - Not analyzed
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- UJ - Analyte not detected, quantitation limit may be inaccurate
- mg/kg - Milligrams per kilogram
- µg/kg - Micrograms per kilogram

Appendix H
Human Health Risk Screening Tables

TABLE 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil	121-14-2	2,4-Dinitrotoluene	7.6E-02 J	7.6E-02 J	MG/KG	MR07-SS04-09D	1/42	0.19 - 0.19	7.6E-02	N/A	1.6E+00 C*			NO	BSL
	606-20-2	2,6-Dinitrotoluene	1.2E-01 J	1.7E-01 J	MG/KG	MR07-SS11-09D	6/42	0.19 - 0.19	1.7E-01	N/A	6.1E+00 N			NO	BSL
	98-95-3	Nitrobenzene	ND	ND	MG/KG		0/42	0.19 - 0.19	1.9E-01	N/A	4.8E+00 C*			NO	DLBSL
	99-35-4	1,3,5-Trinitrobenzene	8.7E-02 J	8.7E-02 J	MG/KG	MR07-SS41D-09D	1/42	0.19 - 0.19	8.7E-02	N/A	2.2E+02 N			NO	BSL
	99-65-0	1,3-Dinitrobenzene	ND	ND	MG/KG		0/42	0.19 - 0.19	1.9E-01	N/A	6.1E-01 N			NO	DLBSL
	118-96-7	2,4,6-Trinitrotoluene	7.4E-02 J	7.4E-02 J	MG/KG	MR07-SS10-09D	1/42	0.19 - 0.19	7.4E-02	N/A	3.6E+00 C**			NO	BSL
	35572-78-2	2-Amino-4,6-dinitrotoluene	2.0E-01 J	2.2E-01 J	MG/KG	MR07-SS34-09D	2/42	0.19 - 0.19	2.2E-01	N/A	1.5E+01 N			NO	BSL
	88-72-2	2-Nitrotoluene	ND	ND	MG/KG		0/42	0.19 - 0.19	1.9E-01	N/A	2.9E+00 C*			NO	DLBSL
	99-08-1	3-Nitrotoluene	1.2E-01 J	1.2E-01 J	MG/KG	MR07-SS41-09D	1/42	0.19 - 0.19	1.2E-01	N/A	6.1E-01 N			NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	ND	ND	MG/KG		0/42	0.19 - 0.19	1.9E-01	N/A	1.5E+01 N			NO	DLBSL
	99-99-0	4-Nitrotoluene	ND	ND	MG/KG		0/42	0.19 - 0.19	1.9E-01	N/A	2.4E+01 C**			NO	DLBSL
	2691-41-0	HMX	7.0E-02 J	7.0E-02 J	MG/KG	MR07-SS03-09D	1/42	0.19 - 0.19	7.0E-02	N/A	3.8E+02 N			NO	BSL
	55-63-0	Nitroglycerin	2.3E-01 J	4.2E-01 J	MG/KG	MR07-SS03-09D	7/42	0.64 - 0.64	4.2E-01	N/A	6.1E-01 N			NO	BSL
	14797-73-0	Perchlorate	ND	ND	MG/KG		0/42	0.00224 - 0.00312	3.1E-03	N/A	5.5E+00 N			NO	DLBSL
	78-11-5	PETN	ND	ND	MG/KG		0/42	0.64 - 0.64	6.4E-01	N/A	N/A			NO	NTX
	121-82-4	RDX	7.4E-02 J	2.8E-01 J	MG/KG	MR07-SS10-09D	2/42	0.19 - 0.19	2.8E-01	N/A	5.5E+00 C*			NO	BSL
	479-45-8	Tetryl	3.2E-01 J	3.2E-01 J	MG/KG	MR07-SS41D-09D	1/42	0.19 - 0.19	3.2E-01	N/A	2.4E+01 N			NO	BSL
	7429-90-5	Aluminum	2.7E+03	1.1E+04	MG/KG	MR07-SS38-09D	42/42	10.8 - 23.1	1.1E+04	5.5E+03	7.7E+03 N			YES	ASL
	7440-36-0	Antimony	2.9E-01 J	1.2E+00	MG/KG	MR07-SS18-09D	16/42	0.81 - 1.15	1.2E+00	4.5E-01	3.1E+00 N			NO	BSL
	7440-38-2	Arsenic	9.0E-01	9.6E+00	MG/KG	MR07-SS18-09D	42/42	0.27 - 0.385	9.6E+00	6.3E-01	3.9E-01 C*	5.8E+00	NCSSL	YES	ASL
	7440-39-3	Barium	7.8E+00	2.8E+01	MG/KG	MR07-SS42-09D	42/42	2.16 - 3.08	2.8E+01	1.5E+01	1.5E+03 N	5.8E+02	NCSSL	NO	BSL
	7440-41-7	Beryllium	5.8E-02 J	1.3E-01 J	MG/KG	MR07-SS26-09D	40/42	0.27 - 0.385	1.3E-01	1.0E-01	1.6E+01 N			NO	BSL
	7440-43-9	Cadmium	3.5E-01	8.8E-01	MG/KG	MR07-SS18-09D	4/42	0.27 - 0.385	8.8E-01	3.3E-02	7.0E+00 N	3.0E+00	NCSSL	NO	BSL
	7440-70-2	Calcium	5.3E+02 J	4.2E+04 J	MG/KG	MR07-SS39-09D	42/42	270 - 578	4.2E+04	6.4E+03	N/A			NO	NUT
	7440-47-3	Chromium	4.8E+00 J	2.0E+01	MG/KG	MR07-SS18-09D	42/42	0.27 - 0.385	2.0E+01	6.1E+00	2.9E-01 C	3.8E+00	NCSSL	YES	ASL
	7440-48-4	Cobalt	3.0E-01 J	1.6E+00	MG/KG	MR07-SS18-09D	40/42	0.675 - 0.962	1.6E+00	2.9E-01	2.3E+00 N			NO	BSL
	7440-50-8	Copper	1.8E+00 J	1.7E+01	MG/KG	MR07-SS18-09D	19/42	0.54 - 0.77	1.7E+01	4.8E+00	3.1E+02 N	7.0E+02	NCSSL	NO	BSL
	57-12-5	Cyanide	1.6E-01 J	5.5E-01	MG/KG	MR07-SS14-09D	6/42	0.28 - 0.391	5.5E-01	N/A	1.6E+02 N	2.8E-01	NCSSL	NO	BSL
	7439-89-6	Iron	1.8E+03	6.7E+03	MG/KG	MR07-SS38-09D	42/42	5.4 - 7.7	6.7E+03	3.2E+03	5.5E+03 N	1.5E+02	NCSSL	YES	ASL
	7439-92-1	Lead	6.0E+00	4.1E+01	MG/KG	MR07-SS01-09D	42/42	0.162 - 0.347	4.1E+01	1.2E+01	4.0E+02 NL	2.7E+02	NCSSL	NO	BSL
	7439-95-4	Magnesium	2.0E+02 J	8.8E+02 J	MG/KG	MR07-SS02-09D	42/42	270 - 385	8.8E+02	2.4E+02	N/A			NO	NUT
	7439-96-5	Manganese	9.1E+00	6.0E+01	MG/KG	MR07-SS18-09D	42/42	0.81 - 1.15	6.0E+01	1.4E+01	1.8E+02 N	6.5E+01	NCSSL	NO	BSL
	7439-97-6	Mercury	1.9E-02 J	1.2E-01	MG/KG	MR07-SS35-09D	41/42	0.033 - 0.0535	1.2E-01	8.1E-02	2.3E+00 N	1.0E+00	NCSSL	NO	BSL
	7440-02-0	Nickel	9.5E-01	4.6E+00 J	MG/KG	MR07-SS07-09D	42/42	0.54 - 0.77	4.6E+00	1.2E+00	1.5E+02 N	1.3E+02	NCSSL	NO	BSL

TABLE 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7440-09-7	Potassium	1.6E+02 J	5.9E+02	MG/KG	MR07-SS18-09D	42/42	270 - 385	5.9E+02	1.2E+02	N/A			NO	NUT
	7782-49-2	Selenium	1.9E-01 J	7.9E-01	MG/KG	MR07-SS18-09D	39/42	0.27 - 0.385	7.9E-01	5.6E-01	3.9E+01 N	2.1E+00	NCSSL	NO	BSL
	7440-22-4	Silver	ND	ND	MG/KG		0/42	0.27 - 0.385	3.9E-01	1.4E-01	3.9E+01 N	3.4E+00	NCSSL	NO	DLBSL
	7440-23-5	Sodium	7.6E+01 J	1.1E+02 J	MG/KG	MR07-SS04-09D	3/42	270 - 385	1.1E+02	8.1E+01	N/A			NO	NUT
	7440-28-0	Thallium	ND	ND	MG/KG		0/42	0.432 - 0.616	6.2E-01	3.6E-01	N/A			NO	NTX
	7440-62-2	Vanadium	5.5E+00	1.6E+01	MG/KG	MR07-SS38-09D	42/42	0.675 - 0.962	1.6E+01	8.9E+00	3.9E+01 N			NO	BSL
	7440-66-6	Zinc	7.1E+00 J	1.9E+02	MG/KG	MR07-SS18-09D	42/42	1.08 - 2.31	1.9E+02	1.1E+01	2.3E+03 N	1.2E+03	NCSSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are two times the arithmetic mean basewide background surface soil concentrations. Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina*, Baker Environmental, April 25, 2001.

[4] Oak Ridge National Laboratory (ORNL), November, 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Residential soil RSLs. RSLs based on noncarcinogenic effects divided by 10 to account for exposure to more than one constituent that affects the same target organ. The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994. RSL value for chromium VI used for chromium.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
 Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)
 Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
 To Be Considered

NCSSL = North Carolina Preliminary Soil Remediation Goal, January, 2010
 J = Estimated Value

C* = N screening level < 100x C screening level, therefore
 N screening value/10 used as screening level

C** = N screening level < 10x C screening level, therefore
 N screening value/10 used as screening level

N = Noncarcinogenic

N/A = Not available

ND = Non-detect

NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.

TABLE 2.1a

Risk Ratio Screening for Surface Soil, Maximum Detected Concentration

Site UXO-07 D-6 Practice Hand Grenade Course

MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Residential Soil RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ
Metals (mg/kg)								
Aluminum	42 / 42	1.1E+04	MR07-SS38-09D	7.7E+04	1	0.1	NA	Neurological, Developmental
Arsenic	42 / 42	9.6E+00	MR07-SS18-09D	3.9E-01	1E-06	NA	2E-05	NA
Chromium	42 / 42	2.0E+01	MR07-SS18-09D	2.9E-01	1E-06	NA	7E-05	NA
Iron	42 / 42	6.7E+03	MR07-SS38-09D	5.5E+04	1	0.1	NA	Gastrointestinal
Cumulative Corresponding Hazard Index^c						0.3		
Cumulative Corresponding Cancer Risk^d							9E-05	
							Total Developmental HI =	0.1
							Total Gastrointestinal HI =	0.1
							Total Neurological HI =	0.1

Notes:

a Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

b Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

mg/kg = micrograms per kilogram

NA = Not available/not applicable.

TABLE 2.1b

Risk Ratio Screening for Surface Soil, 95% UCL Concentration
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	95% UCL	95% UCL Rationale	Residential Soil RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ
Metals (mg/kg)								
Arsenic	42 / 42	2.3E+00 4	95% Stud-t	3.9E-01	1E-06	NA	6E-06	NA
Chromium	42 / 42	7.8E+00 4	95% Stud-t	2.9E-01	1E-06	NA	3E-05	NA
Cumulative Corresponding Hazard Index^c						NA		
Cumulative Corresponding Cancer Risk^d							3E-05	

Notes:

a Corresponding Hazard Index equals 95% UCL concentration divided by the RSL divided by the acceptable risk level.

b Corresponding Cancer Risk equals 95% UCL concentration divided by the RSL divided by the acceptable risk level

c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05.

Constituents selected as COPCs are indicated by shading.

mg/kg = micrograms per kilogram

HI = Hazard Index

NA = Not available/not applicable.

ProUCL, Version 4.00.04 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA, February 2009, ProUCL, Version 4.0. Prepared by Lockheed Martin Environmental Services).
 Options: 95% Student's-t UCL (95% Stud-t)

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive
- (5) Max value used because 95% UCL greater than max.

TABLE 2.2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Water	121-14-2	2,4-Dinitrotoluene	ND	ND	UG/L	MR07-SW01-09D	0/2	0.14 - 0.14	1.4E-01	NA	1.1E-01 NR	2.2E-01	R	YES	DLASL
	606-20-2	2,6-Dinitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		3.7E+00 R	NO	DLBSL		
	98-95-3	Nitrobenzene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		1.7E+01 NR	1.2E-01	R	NO	DLBSL
	99-35-4	1,3,5-Trinitrobenzene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		1.1E+02 R	NO	DLBSL		
	99-65-0	1,3-Dinitrobenzene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		3.7E-01 R	NO	DLBSL		
	118-96-7	2,4,6-Trinitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		1.8E+00 R	NO	DLBSL		
	35572-78-2	2-Amino-4,6-dinitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		7.3E+00 R	NO	DLBSL		
	88-72-2	2-Nitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		3.1E-01 R	NO	DLBSL		
	99-08-1	3-Nitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		3.7E-01 R	NO	DLBSL		
	19406-51-0	4-Amino-2,6-dinitrotoluene	6.1E-02 J	8.3E-02 J	UG/L		2/2	0.14 - 0.14	8.3E-02		7.3E+00 R	NO	BSL		
	99-99-0	4-Nitrotoluene	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		4.2E+00 R	NO	DLBSL		
	2691-41-0	HMX	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		1.8E+02 R	NO	DLBSL		
	55-63-0	Nitroglycerin	ND	ND	UG/L		0/2	0.48 - 0.49	4.9E-01		3.7E-01 R	YES	DLASL		
	14797-73-0	Perchlorate	ND	ND	UG/L		0/2	0.2 - 0.2	2.0E-01		2.6E+00 R	NO	DLBSL		
	78-11-5	PETN	ND	ND	UG/L		0/2	0.48 - 0.49	4.9E-01		N/A	NO	NTX		
	121-82-4	RDX	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		6.1E-01 R	NO	DLBSL		
	479-45-8	Tetryl	ND	ND	UG/L		0/2	0.14 - 0.14	1.4E-01		1.5E+01 R	NO	DLBSL		
	7429-90-5	Aluminum	1.8E+02 J	5.2E+02 J	UG/L		2/2	50 - 50	5.2E+02		3.7E+03 R	NO	BSL		
	7440-36-0	Antimony	ND	ND	UG/L		0/2	3.75 - 3.75	3.8E+00		5.6E+00 NR	1.5E+00	R	NO	DLBSL
	7440-38-2	Arsenic	ND	ND	UG/L		0/2	1.25 - 1.25	1.3E+00		1.0E+01 NC	1.8E-02	NR	NO	DLBSL
	7440-39-3	Barium	4.1E+00 J	8.0E+00 J	UG/L		2/2	10 - 10	8.0E+00		1.0E+03 NC,NR	7.3E+02	R	NO	BSL
	7440-41-7	Beryllium	ND	ND	UG/L		0/2	1.25 - 1.25	1.3E+00		4.0E+00 NR, M	7.3E+00	R	NO	DLBSL
	7440-43-9	Cadmium	3.1E-01 J	3.9E-01 J	UG/L		2/2	1.25 - 1.25	3.9E-01		5.0E+00 NR, M	1.8E+00	R	NO	BSL
	7440-70-2	Calcium	1.0E+04	2.1E+04	UG/L		2/2	1250 - 1250	2.1E+04		N/A	NO	NUT		
	7440-47-3	Chromium	6.6E-01 J	7.7E-01 J	UG/L		2/2	1.25 - 1.25	7.7E-01		1.0E+02 NR, M	4.3E-02	R	NO	BSL
	7440-48-4	Cobalt	ND	ND	UG/L		0/2	3.12 - 3.12	3.1E+00		1.1E+00 R	YES	DLASL		
	7440-50-8	Copper	1.9E+00 J	4.5E+00	UG/L		2/2	2.5 - 2.5	4.5E+00		1.3E+03 NR	1.5E+02	R	NO	BSL
	57-12-5	Cyanide	ND	ND	UG/L		0/2	10 - 10	1.0E+01		1.4E+02 NR	7.3E+01	R	NO	DLBSL
	7439-89-6	Iron	7.2E+01	2.3E+02	UG/L		2/2	25 - 25	2.3E+02		3.0E+02 NR	2.6E+03	R	NO	BSL
	7439-92-1	Lead	4.9E-01 J	7.2E-01 J	UG/L		2/2	0.75 - 0.75	7.2E-01		1.5E+01 AL	NO	BSL		
	7439-95-4	Magnesium	4.7E+02 J	8.3E+02 J	UG/L		2/2	1250 - 1250	8.3E+02		N/A	NO	NUT		
	7439-96-5	Manganese	1.6E+00 J	1.9E+00 J	UG/L		2/2	3.75 - 3.75	1.9E+00		2.0E+02 NC	5.0E+01	NR	NO	BSL
	7439-97-6	Mercury	ND	ND	UG/L		0/2	0.2 - 0.2	2.0E-01		3.0E-01 NR	3.7E-01	R	NO	DLBSL
7440-02-0	Nickel	ND	ND	UG/L	0/2	2.5 - 2.5	2.5E+00	2.5E+01 NC	6.1E+02	NR	NO	DLBSL			

TABLE 2.2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7440-09-7	Potassium	6.7E+02 J	1.4E+03	UG/L	MR07-SW01D-09D, MR07-SW01-09D	2/2	1250 - 1250	1.4E+03		N/A			NO	NUT
	7782-49-2	Selenium	ND	ND	UG/L		0/2	1.25 - 1.25	1.3E+00		1.7E+02 NR	1.8E+01	R	NO	DLBSL
	7440-22-4	Silver	ND	ND	UG/L		0/2	1.25 - 1.25	1.3E+00		1.8E+01 R			NO	DLBSL
	7440-23-5	Sodium	6.9E+02 J	1.1E+03 J	UG/L	MR07-SW01-09D	2/2	1250 - 1250	1.1E+03		N/A			NO	NUT
	7440-28-0	Thallium	ND	ND	UG/L		0/2	2 - 2	2.0E+00		2.4E-01 NR			YES	DLASL
	7440-62-2	Vanadium	1.3E+00 J	1.6E+00 J	UG/L	MR07-SW02-09D	2/2	3.12 - 3.12	1.6E+00		1.8E+01 R			NO	BSL
	7440-66-6	Zinc	8.5E+00	1.1E+01	UG/L	MR07-SW01-09D	2/2	5 - 5	1.1E+01		7.4E+03 NR	1.1E+03	R	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Used North Carolina WQS for Human Health followed by Water Supply or Federal Ambient Water Quality Criteria, Consumption of Water and Organisms. Where North Carolina WQS or Federal Ambient Water Quality Criteria are not available, used the Tap Water RSL, Nov. 2010, (based on 1×10^{-6} for carcinogens and noncarcinogens adjusted by dividing by 10).

For mercury, used values for methyl mercury since methylated form of mercury likely to be present in surface water.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
 Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA but discussed in uncertainty assessment

Deletion Reason: Below Screening Level (BSL)
 Detection Limit Below Screening Level (DLBSL)
 No Toxicity Information (NTX)
 Essential Nutrient (NUT)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
 To Be Considered

J = Estimated Value

NC = North Carolina WQS for Human Health and Water Supply, 2010.

NR = National Recommended Water Quality Criteria, Consumption of Water and Organisms, 2009.

M = Safe Drinking Water Act Maximum Contaminant Level (MCL), since NR refers to the MCL, value is the MCL.

R = RSL, tap water RSL from Regional Screening Level Table, November 2010, if based on noncarcinogenic effects, RSL is divided by 10.

AL = Action Level from Safe Drinking Water Act.

ND = Not detected

UG/L = micrograms per liter

TABLE 2.3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Sediment	121-14-2	2,4-Dinitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	1.6E+00 C*	N/A		NO	DLBSL
	606-20-2	2,6-Dinitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	6.1E+00 N	N/A		NO	DLBSL
	98-95-3	Nitrobenzene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	4.8E+00 C*	N/A		NO	DLBSL
	99-35-4	1,3,5-Trinitrobenzene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	2.2E+02 N	N/A		NO	DLBSL
	99-65-0	1,3-Dinitrobenzene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	6.1E-01 N	N/A		NO	DLBSL
	118-96-7	2,4,6-Trinitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	3.6E+00 C**	N/A		NO	DLBSL
	35572-78-2	2-Amino-4,6-dinitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	1.5E+01 N	N/A		NO	DLBSL
	88-72-2	2-Nitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	2.9E+00 C*	N/A		NO	DLBSL
	99-08-1	3-Nitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	6.1E-01 N	N/A		NO	DLBSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	1.5E+01 N	N/A		NO	DLBSL
	99-99-0	4-Nitrotoluene	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	2.4E+01 C**	N/A		NO	DLBSL
	2691-41-0	HMX	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	3.8E+02 N	N/A		NO	DLBSL
	55-63-0	Nitroglycerin	ND	ND	MG/KG		0/2	0.64 - 0.64	6.4E-01	N/A	6.1E-01 N	N/A		YES	DLASL
	14797-73-0	Perchlorate	ND	ND	MG/KG		0/2	0.00252 - 0.00268	2.7E-03	N/A	5.5E+00 N	N/A		NO	DLBSL
	78-11-5	PETN	ND	ND	MG/KG		0/2	0.64 - 0.64	6.4E-01	N/A	N/A 0	N/A		NO	NTX
	121-82-4	RDX	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	5.5E+00 C*	N/A		NO	DLBSL
	479-45-8	Tetryl	ND	ND	MG/KG		0/2	0.19 - 0.19	1.9E-01	N/A	2.4E+01 N	N/A		NO	DLBSL
	7429-90-5	Aluminum	3.0E+03	8.4E+03	MG/KG	MR07-SD02-09D	2/2	13.1 - 25.9	8.4E+03	N/A	7.7E+03 N	N/A	YES	ASL	
	7440-36-0	Antimony	ND	ND	MG/KG		0/2	0.905 - 0.983	9.8E-01	N/A	3.1E+00 N	N/A		NO	DLBSL
	7440-38-2	Arsenic	1.1E+00	2.2E+00	MG/KG	MR07-SD02-09D	2/2	0.302 - 0.328	2.2E+00	N/A	3.9E-01 C*	N/A	YES	ASL	
	7440-39-3	Barium	1.1E+01	1.3E+01	MG/KG	MR07-SD01D-09D	2/2	2.41 - 2.62	1.3E+01	N/A	1.5E+03 N	N/A		NO	BSL
	7440-41-7	Beryllium	6.8E-02 J	9.3E-02 J	MG/KG	MR07-SD02-09D	2/2	0.302 - 0.328	9.3E-02	N/A	1.6E+01 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.7E-01 J	1.7E-01 J	MG/KG	MR07-SD02-09D	1/2	0.302 - 0.328	1.7E-01	N/A	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.5E+03	4.4E+04	MG/KG	MR07-SD01-09D	2/2	328 - 646	4.4E+04	N/A	N/A 0	N/A		NO	NUT
	7440-47-3	Chromium	3.9E+00	1.3E+01	MG/KG	MR07-SD02-09D	2/2	0.302 - 0.328	1.3E+01	N/A	2.9E-01 C	N/A	YES	ASL	
	7440-48-4	Cobalt	4.4E-01 J	6.4E-01 J	MG/KG	MR07-SD01-09D	2/2	0.754 - 0.819	6.4E-01	N/A	2.3E+00 N	N/A		NO	BSL
	7440-50-8	Copper	1.9E+00	2.9E+00	MG/KG	MR07-SD01-09D	2/2	0.603 - 0.655	2.9E+00	N/A	3.1E+02 N	N/A		NO	BSL
	57-12-5	Cyanide	ND	ND	MG/KG		0/2	0.315 - 0.335	3.4E-01	N/A	1.6E+02 N	N/A		NO	DLBSL
	7439-89-6	Iron	2.2E+03	6.9E+03	MG/KG	MR07-SD02-09D	2/2	6.03 - 6.55	6.9E+03	N/A	5.5E+03 N	N/A	YES	ASL	
	7439-92-1	Lead	6.0E+00	9.1E+00	MG/KG	MR07-SD01D-09D	2/2	0.197 - 0.388	9.1E+00	N/A	4.0E+02 NL	N/A		NO	BSL
	7439-95-4	Magnesium	3.3E+02 J	6.9E+02 J	MG/KG	MR07-SD01D-09D	2/2	302 - 328	6.9E+02	N/A	N/A 0	N/A		NO	NUT
	7439-96-5	Manganese	7.4E+00	4.2E+01	MG/KG	MR07-SD01-09D	2/2	0.905 - 0.983	4.2E+01	N/A	1.8E+02 N	N/A		NO	BSL
	7439-97-6	Mercury	1.8E-02 J	3.9E-02	MG/KG	MR07-SD01-09D	2/2	0.0367 - 0.0427	3.9E-02	N/A	2.3E+00 N	N/A		NO	BSL

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7440-02-0	Nickel	1.4E+00	2.7E+00	MG/KG	MR07-SD01-09D	2/2	0.603 - 0.655	2.7E+00	N/A	1.5E+02 N	N/A		NO	BSL
	7440-09-7	Potassium	1.8E+02 J	3.8E+02	MG/KG	MR07-SD02-09D	2/2	302 - 328	3.8E+02	N/A	N/A 0	N/A		NO	NUT
	7782-49-2	Selenium	4.0E-01	4.0E-01	MG/KG	MR07-SD02-09D	1/2	0.302 - 0.328	4.0E-01	N/A	3.9E+01 N	N/A		NO	BSL
	7440-22-4	Silver	ND	ND	MG/KG		0/2	0.302 - 0.328	3.3E-01	N/A	3.9E+01 N	N/A		NO	DLBSL
	7440-23-5	Sodium	ND	ND	MG/KG		0/2	302 - 328	3.3E+02	N/A	N/A 0	N/A		NO	NUT
	7440-28-0	Thallium	ND	ND	MG/KG		0/2	0.483 - 0.524	5.2E-01	N/A	N/A 0	N/A		NO	NTX
	7440-62-2	Vanadium	5.2E+00	1.6E+01	MG/KG	MR07-SD02-09D	2/2	0.754 - 0.819	1.6E+01	N/A	3.9E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	9.5E+00	2.0E+01	MG/KG	MR07-SD01D-09D	2/2	1.31 - 2.59	2.0E+01	N/A	2.3E+03 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL), Nov 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm.

Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.

The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action

Facilities, USEPA, July 14, 1994.

RSL value for chromium VI used for chromium.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
 Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA but discussed in uncertainty assessment

Deletion Reason: Below Screening Level (BSL)
 Detection Limit Below Screening Level (DLBSL)
 No Toxicity Information (NTX)
 Essential Nutrient (NUT)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
 To Be Considered

J = Estimated Value

C* = N screening level < 100x C screening level, therefore

N screening value/10 used as screening level

C** = N screening level < 10x C screening level, therefore

N screening value/10 used as screening level

N = Noncarcinogenic

N/A = Not available

ND = Not detected

NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.

TABLE 2.3a

Risk Ratio Screening for Sediment, Maximum Detected Concentration

Site UXO-08 Former Lejeune Cantonment Bazooka Range, Base CS Chamber, and NBC Training Trail

MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample	Screening Level	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Index ^b	Target Organ
METAL (mg/kg)								
Aluminum	2 / 2	8.4E+03	MR07-SD02-09D	7.7E+04	1	0.1		Neurological, Developmental
Arsenic	2 / 2	2.2E+00	MR07-SD02-09D	3.9E-01	1E-06		6E-06	NA
Chromium	2 / 2	1.3E+01	MR07-SD02-09D	2.9E-01	1E-06		4E-05	NA
Iron	2 / 2	6.9E+03	MR07-SD02-09D	5.5E+04	1	0.1		Gastrointestinal
Cumulative Corresponding Hazard Index^c						0.2		
Cumulative Corresponding Cancer Risk^d							5E-05	
						Total Developmental HI =		0.1
						Total Gastrointestinal HI =		0.1
						Total Neurological HI =		0.1

Notes:^a Corresponding Hazard Index equals maximum detected concentration divided by the SL divided by the acceptable risk level.^b Corresponding Cancer Risk equals maximum detected concentration divided by the SL divided by the acceptable risk level.^c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.^d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable.

TABLE 2.4

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Future
 Medium: Groundwater
 Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Groundwater	121-14-2	2,4-Dinitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	2.2E-01 C	N/A		NO	DLBSL
	606-20-2	2,6-Dinitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	3.7E+00 N	N/A		NO	DLBSL
	98-95-3	Nitrobenzene	4.4E-01 J	1.2E+00 J	UG/L	MR07-TW03-09D	3/6	0.14 - 0.15	1.2E+00	N/A	1.2E-01 C	N/A		YES	ASL
	99-35-4	1,3,5-Trinitrobenzene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	1.1E+02 N	N/A		NO	DLBSL
	99-65-0	1,3-Dinitrobenzene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	3.7E-01 N	N/A		NO	DLBSL
	118-96-7	2,4,6-Trinitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	1.8E+00 C**	N/A		NO	DLBSL
	35572-78-2	2-Amino-4,6-dinitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	7.3E+00 N	N/A		NO	DLBSL
	88-72-2	2-Nitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	3.1E-01 C	N/A		NO	DLBSL
	99-08-1	3-Nitrotoluene	6.7E-02 J	7.9E-02 J	UG/L	MR07-TW08-09D	3/6	0.14 - 0.15	7.9E-02	N/A	3.7E-01 N	N/A		NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	7.3E+00 N	N/A		NO	DLBSL
	99-99-0	4-Nitrotoluene	6.3E-02 J	2.0E-01 J	UG/L	MR07-TW10-09D	5/6	0.14 - 0.15	2.0E-01	N/A	4.2E+00 C*	N/A		NO	BSL
	2691-41-0	HMX	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	1.8E+02 N	N/A		NO	DLBSL
	55-63-0	Nitroglycerin	ND	ND	UG/L		0/6	0.48 - 0.51	5.1E-01	N/A	3.7E-01 N	N/A		YES	DLASL
	14797-73-0	Perchlorate	9.0E-02 J	9.9E+00	UG/L	MR07-TW17-09D	4/6	0.2 - 1	9.9E+00	N/A	2.6E+00 N	N/A		YES	ASL
	78-11-5	PETN	2.2E-01 J	8.6E+00 J	UG/L	MR07-TW10-09D	3/6	0.48 - 0.51	8.6E+00	N/A	N/A	N/A		NO	NTX
	121-82-4	RDX	ND	ND	UG/L		0/6	0.14 - 0.15	1.5E-01	N/A	6.1E-01 C	N/A		NO	DLBSL
	479-45-8	Tetryl	3.2E-01 J	3.2E-01 J	UG/L	MR07-TW10-09D	1/6	0.14 - 0.15	3.2E-01	N/A	1.5E+01 N	N/A		NO	BSL
	7429-90-5	Aluminum	2.0E+02 J	8.6E+02 J	UG/L	MR07-TW10-09D	6/6	50 - 50	8.6E+02	1.9E+03	3.7E+03 N	50 - 200	SMCL	NO	BSL
	7440-36-0	Antimony	ND	ND	UG/L		0/6	3.75 - 3.75	3.8E+00	3.3E+00	1.5E+00 N	6.0E+00	MCL	YES	DLASL
	7440-38-2	Arsenic	ND	ND	UG/L		0/6	1.25 - 1.25	1.3E+00	5.8E+00	4.5E-02 C	1.0E+01	MCL, NC2LGW	YES	DLASL
	7440-39-3	Barium	2.4E+01	6.3E+01	UG/L	MR07-TW17-09D	6/6	10 - 10	6.3E+01	8.6E+01	7.3E+02 N	2.0E+03	MCL	NO	BSL
												7.0E+02	NC2LGW		
	7440-41-7	Beryllium	2.9E-01 J	2.9E-01 J	UG/L	MR07-TW10-09D	1/6	1.25 - 1.25	2.9E-01	3.1E-01	7.3E+00 N	4.0E+00	MCL	NO	BSL
	7440-43-9	Cadmium	3.1E-01 J	7.0E-01 J	UG/L	MR07-TW10-09D	6/6	1.25 - 1.25	7.0E-01	3.6E-01	1.8E+00 N	5.0E+00	MCL	NO	BSL
												2.0E+00	NC2LGW		
	7440-70-2	Calcium	1.2E+03 J	7.5E+04	UG/L	MR07-TW10-09D	6/6	1250 - 1250	7.5E+04		N/A	N/A		NO	NUT
	7440-47-3	Chromium	6.9E-01 J	3.3E+00	UG/L	MR07-TW10-09D	6/6	1.25 - 1.25	3.3E+00	3.1E+00	4.3E-02 C	1.0E+02	MCL	YES	ASL
												1.0E+01	NC2LGW		
	7440-48-4	Cobalt	1.3E+00 J	3.6E+01	UG/L	MR07-TW10-09D	2/6	3.12 - 3.12	3.6E+01	3.4E+00	1.1E+00 N	N/A		YES	ASL
	7440-50-8	Copper	1.4E+00 J	1.4E+00 J	UG/L	MR07-TW12-09D	1/6	2.5 - 2.5	1.4E+00	2.8E+00	1.5E+02 N	1.3E+03	MCL	NO	BSL
											1.0E+03	NC2LGW			
7439-89-6	Iron	6.0E+02	6.6E+03	UG/L	MR07-TW03-09D	6/6	25 - 25	6.6E+03	6.0E+03	2.6E+03 N	3.0E+02	SMCL, NC2LGW	YES	ASL	
7439-92-1	Lead	ND	ND	UG/L		0/6	0.75 - 0.75	7.5E-01	2.8E+00	N/A	1.5E+01	MCL, NC2LGW	NO	DLBSL	
7439-95-4	Magnesium	8.6E+02 J	3.6E+03	UG/L	MR07-TW10-09D	6/6	1250 - 1250	3.6E+03	6.4E+03	N/A	N/A		NO	NUT	

TABLE 2.4

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7439-96-5	Manganese	1.2E+01	7.7E+02	UG/L	MR07-TW10-09D	6/6	3.75 - 3.75	7.7E+02	2.1E+02	8.8E+01 N	5.0E+01	NC2LGW	YES	ASL
	7439-97-6	Mercury	ND	ND	UG/L		0/6	0.2 - 0.2	2.0E-01	1.0E-01	1.1E+00 N	2.0E+00	MCL	NO	DLBSL
	7440-02-0	Nickel	1.4E+00 J	1.4E+01	UG/L	MR07-TW10-09D	6/6	2.5 - 2.5	1.4E+01	8.0E+00	7.3E+01 N	1.0E+02	NC2LGW	NO	BSL
	7440-09-7	Potassium	1.3E+03	2.5E+03	UG/L	MR07-TW08-09D	6/6	1250 - 1250	2.5E+03	3.3E+03	N/A	N/A		NO	NUT
	7782-49-2	Selenium	1.4E+00	1.6E+00	UG/L	MR07-TW10-09D	2/6	1.25 - 1.25	1.6E+00	3.1E+00	1.8E+01 N	5.0E+01	MCL	NO	BSL
	7440-22-4	Silver	ND	ND	UG/L		0/6	1.25 - 1.25	1.3E+00	7.7E-01	1.8E+01 N	2.0E+01	NC2LGW	NO	DLBSL
	7440-23-5	Sodium	7.5E+03	2.5E+04	UG/L	MR07-TW17-09D	6/6	1250 - 1250	2.5E+04	2.3E+04	N/A	N/A	SMCL	NO	NUT
	7440-28-0	Thallium	ND	ND	UG/L		0/6	2 - 2	2.0E+00	3.8E+00	N/A	2.0E+00	MCL	NO	NTX
	7440-62-2	Vanadium	1.4E+00 J	2.4E+00 J	UG/L	MR07-TW10-09D	2/6	3.12 - 3.12	2.4E+00	4.7E+00	1.8E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	2.8E+00 J	1.9E+01	UG/L	MR07-TW10-09D	6/6	5 - 5	1.9E+01	4.2E+01	1.1E+03 N	1.0E+03	NC2LGW	NO	BSL
											5.0E+03	5.0E+03	SMCL		

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are two times the arithmetic mean basewide background shallow groundwater concentrations. Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina*, Baker Environmental, April 25, 2001.

[4] Oak Ridge National Laboratory (ORNL), November, 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
 Tap water RSLs. RSLs based on noncarcinogenic effects divided by 10 to account for exposure to more than on constituent that effects the same target organ.
 RSL value for chromium VI used for chromium.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
 Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)
 Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
 To Be Considered

MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards

SMCL = Secondary Maximum Contaminant Level

NC2LGW = North Carolina Classifications and Groundwater Quality Standards,
 January, 2010.

J = Estimated Value

C* = N screening level < 100x C screening level, therefore

N screening value/10 used as screening level

C** = N screening level < 10x C screening level, therefore

N screening value/10 used as screening level

N = Noncarcinogenic

N/A = Not available

ND = Not detected

UG/L = micrograms per liter

TABLE 2.4a

Risk Ratio Screening for Groundwater, Maximum Detected Concentration
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Tap Water RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ	
Explosives (ug/L)									
Nitrobenzene	3 / 6	1.2E+00 J	MR07-TW03-09D	1.2E-01	1E-06	NA	1E-05	NA	
Perchlorate	4 / 6	9.9E+00	MR07-TW17-09D	2.6E+01	1	0.4	NA	Thyroid	
Metals (ug/L)									
Chromium	6 / 6	3.3E+00	MR07-TW10-09D	4.3E-02	1E-06	NA	8E-05	NA	
Cobalt	2 / 6	3.6E+01	MR07-TW10-09D	1.1E+01	1	3.3	NA	Thyroid	
Iron	6 / 6	6.6E+03	MR07-TW03-09D	2.6E+04	1	0.3	NA	Gastrointestinal	
Manganese	6 / 6	7.7E+02	MR07-TW10-09D	8.8E+02	1	0.9	NA	CNS	
Cumulative Corresponding Hazard Index^c						4.8			
Cumulative Corresponding Cancer Risk^d							9E-05		
								Total CNS HI =	0.9
								Total Gastrointestinal HI =	0.3
								Total Thyroid HI =	3.6

Notes:

- ^a Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.
 - ^b Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.
 - ^c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.
 - ^d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.
- Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.
- Constituents selected as COPCs are indicated by shading.
- CNS = Central Nervous System
- COPC = Constituent of Potential Concern
- HI = Hazard Index
- J = Estimated Value
- µg/L = micrograms per liter
- NA = Not available/not applicable.

TABLE 2.4b

Risk Ratio Screening for Groundwater, 95% UCL Concentration

Site UXO-07 D-6 Practice Hand Grenade Course

MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Tap Water RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ
Explosives (ug/L)									
Nitrobenzene	3 / 6	8.7E-01	95% KM-t	1, 2	1.2E-01	1E-06	NA	7E-06	NA
Perchlorate	4 / 6	5.3E+00	95% KM-BCA	1, 3	2.6E+01	1	0.2	NA	Thyroid
Metals (ug/L)									
Chromium	6 / 6	2.3E+00	95% Stud-t	1, 2, 3	4.3E-02	1E-06	NA	5E-05	NA
Cobalt	2 / 6	3.6E+01	Max	4, 5	1.1E+01	1	3.3	NA	Thyroid
Manganese	6 / 6	7.4E+02	95% App-G	1, 3	8.8E+02	1	0.8	NA	CNS
Cumulative Corresponding Hazard Index ^c							4.1		
Cumulative Corresponding Cancer Risk ^d								6E-05	
									Total CNS HI =
									0.8
									Total Thyroid HI =
									3.5

Notes:

^a Corresponding Hazard Index equals 95% UCL concentration divided by the RSL divided by the acceptable risk level.

^b Corresponding Cancer Risk equals 95% UCL concentration divided by the RSL divided by the acceptable risk level

^c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

^d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05.

Constituents selected as COPCs are indicated by shading

CNS = Central Nervous System

HI = Hazard Index

NA = Not available/not applicable.

µg/L = micrograms per liter

ProUCL, Version 4.00.02 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide.

Statistics: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Kaplan-Meier (BCA) UCL (95% KM-BCA); 95% Student's-t UCL (95% Stud-t); 95% Approximate Gamma UCL (95% App-G);

Maximum Detected Concentration (Max)

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive
- (5) Max value used because 95% UCL greater than max.

TABLE 2.5

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Future Medium: Subsurface Soil Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Subsurface Soil	121-14-2	2,4-Dinitrotoluene	ND	ND	MG/KG	MR07-IS10-18-19-09D	0/17	0.19 - 0.19	1.9E-01	N/A	1.6E+00 C*	N/A		NO	DLBSL
	606-20-2	2,6-Dinitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	6.1E+00 N	N/A		NO	DLBSL
	98-95-3	Nitrobenzene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	4.8E+00 C*	N/A		NO	DLBSL
	99-35-4	1,3,5-Trinitrobenzene	1.3E-01 J	1.7E-01 J	MG/KG		4/17	0.19 - 0.19	1.7E-01	N/A	2.2E+02 N	N/A		NO	BSL
	99-65-0	1,3-Dinitrobenzene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	6.1E-01 N	N/A		NO	DLBSL
	118-96-7	2,4,6-Trinitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	3.6E+00 C**	N/A		NO	DLBSL
	35572-78-2	2-Amino-4,6-dinitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	1.5E+01 N	N/A		NO	DLBSL
	88-72-2	2-Nitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	2.9E+00 C*	N/A		NO	DLBSL
	99-08-1	3-Nitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	6.1E-01 N	N/A		NO	DLBSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	1.5E+01 N	N/A		NO	DLBSL
	99-99-0	4-Nitrotoluene	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	2.4E+01 C**	N/A		NO	DLBSL
	2691-41-0	HMX	ND	ND	MG/KG		0/17	0.19 - 0.19	1.9E-01	N/A	3.8E+02 N	N/A		NO	DLBSL
	55-63-0	Nitroglycerin	ND	ND	MG/KG		0/17	0.64 - 0.64	6.4E-01	N/A	6.1E-01 N	N/A		YES	DLASL
	14797-73-0	Perchlorate	ND	ND	MG/KG		0/17	0.00214 - 0.00273	2.7E-03	N/A	5.5E+00 N	N/A		NO	DLBSL
	78-11-5	PETN	ND	ND	MG/KG		0/17	0.64 - 0.64	6.4E-01	N/A	N/A	N/A		NO	NTX
	121-82-4	RDX	9.5E-02 J	5.2E-01 J	MG/KG	MR07-IS01D-11-12-09D	10/17	0.19 - 0.19	5.2E-01	N/A	5.5E+00 C*	N/A		NO	BSL
	479-45-8	Tetryl	ND	ND	MG/KG	0/17	0.19 - 0.19	1.9E-01	N/A	2.4E+01 N	N/A		NO	DLBSL	
	7429-90-5	Aluminum	1.7E+03	1.6E+04	MG/KG	MR07-IS12-18-19-09D	17/17	10.6 - 13.3	1.6E+04	1.0E+04	7.7E+03 N	N/A		YES	ASL
	7440-36-0	Antimony	ND	ND	MG/KG	0/17	0.798 - 0.997	1.0E+00	3.6E-01	3.1E+00 N	N/A		NO	DLBSL	
	7440-38-2	Arsenic	2.7E-01	1.6E+01 J	MG/KG	MR07-IS01D-11-12-09D	17/17	0.266 - 0.332	1.6E+01	2.1E+00	3.9E-01 C*	5.8E+00	NCSSL	YES	ASL
	7440-39-3	Barium	2.7E+00 J	2.5E+01 J	MG/KG	MR07-IS06-12-13-09D	17/17	2.13 - 2.66	2.5E+01	1.7E+01	1.5E+03 N	5.8E+02	NCSSL	NO	BSL
	7440-41-7	Beryllium	6.8E-02 J	2.6E-01 J	MG/KG	MR07-IS08-18-19-09D	13/17	0.266 - 0.332	2.6E-01	1.7E-01	1.6E+01 N			NO	BSL
	7440-43-9	Cadmium	ND	ND	MG/KG	0/17	0.266 - 0.332	3.3E-01	2.3E-02	7.0E+00 N	3.0E+00	NCSSL	NO	DLBSL	
	7440-70-2	Calcium	6.8E+01 J	1.0E+03	MG/KG	MR07-IS07-18-19-09D	10/17	266 - 332	1.0E+03	4.4E+02	N/A 0			NO	NUT
	7440-47-3	Chromium	1.5E+00 J	2.2E+01 J	MG/KG	MR07-IS01D-11-12-09D	17/17	0.266 - 0.332	2.2E+01	1.5E+01	2.9E-01 C	3.8E+00	NCSSL	YES	ASL
	7440-48-4	Cobalt	3.5E-01 J	9.0E-01	MG/KG	MR07-IS03-9-10-09D	14/17	0.665 - 0.831	9.0E-01	8.2E-01	2.3E+00 N			NO	BSL
	7440-50-8	Copper	2.8E-01 J	3.2E+00	MG/KG	MR07-IS14-13-14-09D	16/17	0.532 - 0.665	3.2E+00	2.6E+00	3.1E+02 N	7.0E+02	NCSSL	NO	BSL
	57-12-5	Cyanide	ND	ND	MG/KG	0/17	0.267 - 0.341	3.4E-01	N/A	1.6E+02 N	2.8E-01	NCSSL	NO	DLBSL	
	7439-89-6	Iron	3.5E+02	1.6E+04 J	MG/KG	MR07-IS01D-11-12-09D	17/17	5.32 - 6.65	1.6E+04	5.4E+03	5.5E+03 N	1.5E+02	NCSSL	YES	ASL
	7439-92-1	Lead	1.6E+00	9.7E+00	MG/KG	MR07-IS13-16-17-09D	17/17	0.16 - 0.199	9.7E+00	8.5E+00	4.0E+02 NL	2.7E+02	NCSSL	NO	BSL
	7439-95-4	Magnesium	5.8E+01 J	7.0E+02 J	MG/KG	MR07-IS08-18-19-09D	16/17	266 - 332	7.0E+02	3.6E+02	N/A			NO	NUT
	7439-96-5	Manganese	9.0E-01	2.8E+01	MG/KG	MR07-IS06-12-13-09D	17/17	0.798 - 0.997	2.8E+01	9.3E+00	1.8E+02 N	6.5E+01	NCSSL	NO	BSL
	7439-97-6	Mercury	1.7E-02 J	3.9E-02	MG/KG	MR07-IS02-10-11-09D	4/17	0.033 - 0.0465	3.9E-02	7.1E-02	2.3E+00 N	1.0E+00	NCSSL	NO	BSL
7440-02-0	Nickel	6.7E-01	2.6E+00	MG/KG	MR07-IS08-18-19-09D	17/17	0.532 - 0.665	2.6E+00	2.3E+00	1.5E+02 N	1.3E+02	NCSSL	NO	BSL	

TABLE 2.5

Occurrence, Distribution, and Selection of Chemicals of Potential Concern
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Scenario Timeframe: Future Medium: Subsurface Soil Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7440-09-7	Potassium	8.0E+01 J	6.9E+02 J	MG/KG	MR07-IS08-18-19-09D	15/17	266 - 332	6.9E+02	3.6E+02	N/A			NO	NUT
	7782-49-2	Selenium	1.8E-01 J	1.0E+00	MG/KG	MR07-IS05-14-15-09D	15/17	0.266 - 0.332	1.0E+00	5.1E-01	3.9E+01 N	2.1E+00	NCSSL	NO	BSL
	7440-22-4	Silver	ND	ND	MG/KG		0/17	0.266 - 0.649	6.5E-01	1.3E-01	3.9E+01 N	3.4E+00	NCSSL	NO	DLBSL
	7440-23-5	Sodium	6.8E+01 J	6.8E+01 J	MG/KG	MR07-IS14-13-14-09D	1/17	266 - 332	6.8E+01	6.8E+01	N/A			NO	NUT
	7440-28-0	Thallium	ND	ND	MG/KG		0/17	0.426 - 0.532	5.3E-01	3.8E-01	N/A			NO	NTX
	7440-62-2	Vanadium	1.9E+00 J	4.6E+01 J	MG/KG	MR07-IS01D-11-12-09D	17/17	0.665 - 0.831	4.6E+01	1.7E+01	3.9E+01 N			YES	ASL
	7440-66-6	Zinc	1.3E+00	1.0E+01	MG/KG	MR07-IS08-18-19-09D	17/17	1.06 - 1.33	1.0E+01	6.6E+00	2.3E+03 N	1.2E+03	NCSSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are two times the arithmetic mean basewide background subsurface soil concentrations. Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina*, Baker Environmental, April 25, 2001.

[4] Oak Ridge National Laboratory (ORNL), November, 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Residential soil RSLs. RSLs based on noncarcinogenic effects divided by 10 to account for exposure to more than one constituent that affects the same target organ. The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994. RSL value for chromium VI used for chromium.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
 Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)
 Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
 To Be Considered

NCSSL = North Carolina Preliminary Soil Remediation Goal, January, 2010

J = Estimated Value

C* = N screening level < 100x C screening level, therefore
 N screening value/10 used as screening level

C** = N screening level < 10x C screening level, therefore
 N screening value/10 used as screening level

N = Noncarcinogenic

N/A = Not available

TABLE 2.5a

Risk Ratio Screening for Subsurface Soil, Maximum Detected Concentration

Site UXO-07 D-6 Practice Hand Grenade Course

MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Residential Soil RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ
Metals (mg/kg)								
Aluminum	17 / 17	1.6E+04	MR07-IS12-18-19-09D	7.7E+04	1	0.2	NA	Neurological, Developmental
Arsenic	17 / 17	1.6E+01 J	MR07-IS01D-11-12-09D	3.9E-01	1E-06	NA	4E-05	NA
Chromium	17 / 17	2.2E+01	MR07-IS01D-11-12-09D	2.9E-01	1E-06	NA	8E-05	NA
Iron	17 / 17	1.6E+04 J	MR07-IS01D-11-12-09D	5.5E+04	1	0.3	NA	Gastrointestinal
Vanadium	17 / 17	4.6E+01 J	MR07-IS01D-11-12-09D	3.9E+02	1	0.1	NA	Hair
Cumulative Corresponding Hazard Index^c						0.6		
Cumulative Corresponding Cancer Risk^d							1E-04	
						Total Developmental HI =		0.2
						Total Gastrointestinal HI =		0.3
						Total Hair HI =		0.1
						Total Neurological HI =		0.2

Notes:

a Corresponding Hazard Index equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

b Corresponding Cancer Risk equals maximum detected concentration divided by the RSL divided by the acceptable risk level.

c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

mg/kg = micrograms per kilogram

TABLE 2.5b

Risk Ratio Screening for Subsurface Soil, 95% UCL Concentration
 Site UXO-07 D-6 Practice Hand Grenade Course
 MCB Camp Lejeune, North Carolina

Analyte	Detection Frequency	95% UCL	95% UCL Rationale	Residential Soil RSL	Acceptable Risk Level	Corresponding Hazard Index ^a	Corresponding Cancer Risk ^b	Target Organ	
Metals (mg/kg)									
Arsenic	17 / 17	4.8E+00	1, 3	95% App-G	3.9E-01	1E-06	NA	1E-05	NA
Chromium	17 / 17	1.5E+01	1	95% Stud-t	2.9E-01	1E-06	NA	5E-05	NA
Cumulative Corresponding Hazard Index^c						NA			
Cumulative Corresponding Cancer Risk^d							6E-05		

Notes:

a Corresponding Hazard Index equals 95% UCL concentration divided by the RSL divided by the acceptable risk level.

b Corresponding Cancer Risk equals 95% UCL concentration divided by the RSL divided by the acceptable risk level

c Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

d Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = micrograms per kilogram

HI = Hazard Index

NA = Not available/not applicable.

ProUCL, Version 4.00.04 used to determine distribution of data and calculate 95% UCL, following recommendations

in users guide (USEPA, February 2009, ProUCL, Version 4.0. Prepared by Lockheed Martin Environmental Services).

Options: 95% Student's-t UCL (95% Stud-t); 95% Approximate Gamma UCL (95% App-G)

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive
- (5) Max value used because 95% UCL greater than max.

Generated by: Roni Warren/WDC Checked by: Geanine Howard-Peebles/DAY

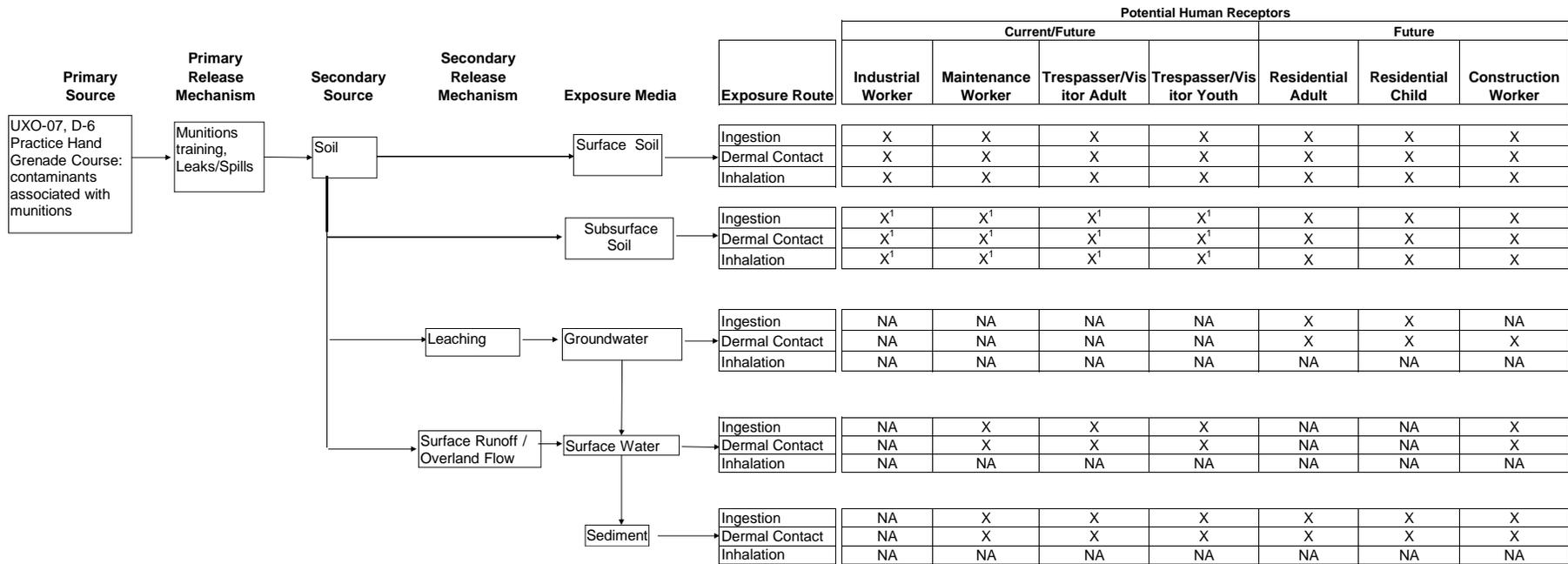


FIGURE 5-1
 Conceptual Site Model for HHRA
 Site UXO-07, D-6 Former Practice Hand Grenade Course
 MCB CamLej
 North Carolina

¹Current receptor populations may be exposed to surface soil. Future receptor populations may be exposed to surface and subsurface soil.

NA - Not Applicable or pathway is incomplete

X - Potentially complete exposure pathways

Appendix I
Ecological Risk Screening Tables

Table 1
ERS Surface Soil screen for CTO-14 UXO-7
MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance ¹	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	2 x Mean Background	Maximum Exceeds 2 x Mean Background?	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value Maximum HQ	Retain?	Rationale
Semivolatile Organic Compounds (UG/KG)																
2,4-Dinitrotoluene	190 - 190	1 / 42	76.0	MR07-SS04-09D	NSV	-- / --	NSV	94.5	NSV	--	--	1,280	EPA, 2003	0.059	No	Supplemental HQ less than one
2,6-Dinitrotoluene	190 - 190	6 / 42	170	MR07-SS11-09D	NSV	-- / --	NSV	100	NSV	--	--	328	EPA, 2003	0.52	No	Supplemental HQ less than one
Nitrobenzene	190 - 190	0 / 42	--	--	40,000	-- / --	0.0048	95.0	0.002	--	--	--	--	--	No	HQ less than one, not detected
Explosives (UG/KG)																
1,3,5-Trinitrobenzene	190 - 190	1 / 42	87.0	MR07-SS41-09D	NSV	-- / --	NSV	94.8	NSV	--	--	4,000	Kuperman et al., 2006	0.02	No	Supplemental HQ less than one
1,3-Dinitrobenzene	190 - 190	0 / 42	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	--	--	No	Not detected
2,4,6-Trinitrotoluene	190 - 190	1 / 42	74.0	MR07-SS10-09D	NSV	-- / --	NSV	94.5	NSV	--	--	100	NRCC, 2008	0.74	No	Supplemental HQ less than one
2-Amino-4,6-dinitrotoluene	190 - 190	2 / 42	220	MR07-SS34-09D	NSV	-- / --	NSV	100	NSV	--	--	200	NRCC, 2008	1.10	No	Low frequency and magnitude of exceedance
2-Nitrotoluene	190 - 190	0 / 42	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	--	--	No	Not detected
3-Nitrotoluene	190 - 190	1 / 42	120	MR07-SS41-09D	NSV	-- / --	NSV	95.6	NSV	--	--	--	--	--	No	Uncertainty, no screening value
4-Amino-2,6-dinitrotoluene	190 - 190	0 / 42	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	--	--	No	Not detected
4-Nitrotoluene	190 - 190	0 / 42	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	--	--	No	Not detected
HMX	190 - 190	1 / 42	70.0	MR07-SS03-09D	NSV	-- / --	NSV	94.4	NSV	--	--	1,500	NRCC, 2008	0.05	No	Supplemental HQ less than one
Nitroglycerin	640 - 640	7 / 42	420	MR07-SS03-09D	NSV	-- / --	NSV	316	NSV	--	--	2,400	NRCC, 2008	0.18	No	Supplemental HQ less than one
Perchlorate	2.24 - 3.12	0 / 42	--	--	NSV	-- / --	NSV	1.23	NSV	--	--	--	--	--	No	Not detected
PETN	640 - 640	0 / 42	--	--	NSV	-- / --	NSV	320	NSV	--	--	--	--	--	No	Not detected
RDX	190 - 190	2 / 42	280	MR07-SS10-09D	NSV	-- / --	NSV	98.9	NSV	--	--	400	NRCC, 2008	0.70	No	Supplemental HQ less than one
Tetryl	190 - 190	1 / 42	320	MR07-SS41-09D	NSV	-- / --	NSV	100	NSV	--	--	25,000	Talmage et al., 1999	0.01	No	Supplemental HQ less than one
Inorganics (MG/KG)																
Aluminum	-- --	42 / 42	10,600	MR07-SS38-09D	50.0	42 / 42	212	5,678	114	5487	Yes	--	--	--	No	Within range of background
Antimony	0.82 - 1.15	16 / 42	1.23	MR07-SS18-09D	0.27	16 / 42	4.56	0.47	1.73	0.447	Yes	--	--	--	No	Only the maximum detection exceeded the maximum background value (0.9 mg/kg)
Arsenic	-- --	42 / 42	9.58	MR07-SS18-09D	18.0	0 / 42	0.53	1.92	0.107	0.626	Yes	--	--	--	No	HQ less than one, detected
Barium	-- --	42 / 42	27.5	MR07-SS42-09D	330	0 / 42	0.083	14.8	0.045	14.5	Yes	--	--	--	No	HQ less than one, detected
Beryllium	0.31 - 0.39	40 / 42	0.13	MR07-SS26-09D	21.0	0 / 42	0.0064	0.084	0.004	0.103	Yes	--	--	--	No	HQ less than one, detected
Cadmium	0.27 - 0.49	4 / 42	0.88	MR07-SS18-09D	0.36	3 / 42	2.46	0.19	0.53	0.033	Yes	--	--	--	No	HQ based on mean is less than one, low frequency and magnitude of exceedance
Calcium ²	-- --	42 / 42	42,000	MR07-SS39-09D	NSV	-- / --	NSV	7,067	NSV	6360	Yes	--	--	--	No	Macronutrient
Chromium	-- --	42 / 42	19.5	MR07-SS18-09D	26.0	0 / 42	0.75	7.21	0.277	6.05	Yes	--	--	--	No	HQ less than one, detected
Cobalt	0.77 - 0.96	40 / 42	1.58	MR07-SS18-09D	13.0	0 / 42	0.12	0.45	0.034	0.294	Yes	--	--	--	No	HQ less than one, detected
Copper	1.47 - 4.31	19 / 42	16.6	MR07-SS18-09D	28.0	0 / 42	0.59	3.41	0.12	4.83	No	--	--	--	No	HQ less than one, detected
Cyanide	0.28 - 0.39	6 / 42	0.55	MR07-SS14-09D	0.9	0 / 42	0.61	0.17	0.19	--	--	--	--	--	No	HQ less than one, detected
Iron	-- --	42 / 42	6,730	MR07-SS38-09D	200	42 / 42	33.7	3,624	18.1	3245	Yes	--	--	--	No	Within range of background
Lead	-- --	42 / 42	41.4	MR07-SS01-09D	11.0	32 / 42	3.76	14.8	1.35	12.3	Yes	50	EPA, 2001	0.83	No	Supplemental HQ less than one. Supplemental ESV based on Region IV value.
Magnesium ²	-- --	42 / 42	881	MR07-SS02-09D	NSV	-- / --	NSV	368	NSV	238	Yes	--	--	--	No	Macronutrient
Manganese	-- --	42 / 42	60.3	MR07-SS18-09D	220	0 / 42	0.27	19.4	0.088	13.7	Yes	--	--	--	No	HQ less than one, detected
Mercury	0.044 - 0.044	41 / 42	0.12	MR07-SS35-09D	0.10	1 / 42	1.16	0.035	0.345	0.081	No	--	--	--	No	Consistent with background
Nickel	-- --	42 / 42	4.56	MR07-SS07-09D	38.0	0 / 42	0.12	1.92	0.051	1.21	Yes	--	--	--	No	HQ less than one, detected
Potassium ²	-- --	42 / 42	585	MR07-SS18-09D	NSV	-- / --	NSV	268	NSV	116	Yes	--	--	--	No	Macronutrient
Selenium	0.28 - 0.29	39 / 42	0.79	MR07-SS18-09D	0.52	3 / 42	1.51	0.38	0.724	0.563	No	--	--	--	No	Consistent with background
Silver	0.27 - 0.39	0 / 42	--	--	4.20	-- / --	0.092	0.15	0.036	0.14	--	--	--	--	No	HQ less than one, not detected
Sodium ²	271 - 385	3 / 42	106	MR07-SS04-09D	NSV	-- / --	NSV	148	NSV	80.9	Yes	--	--	--	No	Macronutrient
Thallium	0.43 - 0.62	0 / 42	--	--	1.00	-- / --	0.62	0.24	0.242	0.36	--	--	--	--	No	HQ less than one, not detected
Vanadium	-- --	42 / 42	15.5	MR07-SS38-09D	7.80	33 / 42	1.99	9.39	1.20	8.9	Yes	--	--	--	No	Within range of background
Zinc	-- --	42 / 42	188	MR07-SS18-09D	46.0	4 / 42	4.09	31.8	0.692	10.8	Yes	--	--	--	No	HQ based on mean is less than one, low frequency of exceedance

NOTES

- 1 - Count of detected samples exceeding or equaling Screening Value
- 2 - Macronutrient - Not considered to be a COPC
- HQ - Hazard Quotient
- NSV - No Screening Value
- MG/KG - Milligrams per kilogram
- UG/KG - Micrograms per kilogram
- Generated by: Sara Kent
- Checked by: Kelly Taylor

Table 2

ERS Groundwater screen for CTO-14 UXO-7
 MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value ¹	Frequency of Exceedance ²	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	2 x Mean Background	Maximum Exceeds 2 x Mean Background?	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value Maximum HQ	Retain?	Rationale
Semivolatile Organic Compounds (UG/L)																
2,4-Dinitrotoluene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
2,6-Dinitrotoluene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
Nitrobenzene	0.14 - 0.79	3 / 6	1.20	MR07-TW03-09D	66.8	0 / 6	0.018	0.46	0.007	--	--	--	--	--	No	HQ less than one, detected
Explosives (UG/L)																
1,3,5-Trinitrobenzene	0.14 - 0.32	0 / 6	--	--	NSV	-- / --	NSV	0.091	NSV	--	--	--	--	--	No	Not detected
1,3-Dinitrobenzene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
2,4,6-Trinitrotoluene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
2-Amino-4,6-dinitrotoluene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
2-Nitrotoluene	0.14 - 0.31	0 / 6	--	--	NSV	-- / --	NSV	0.088	NSV	--	--	--	--	--	No	Not detected
3-Nitrotoluene	0.14 - 0.15	3 / 6	0.079	MR07-TW08-09D	NSV	-- / --	NSV	0.073	NSV	--	--	375	TCEQ, 2006	2.11E-04	No	Supplemental HQ less than one
4-Amino-2,6-dinitrotoluene	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
4-Nitrotoluene	0.14 - 0.14	5 / 6	0.20	MR07-TW10-09D	NSV	-- / --	NSV	0.11	NSV	--	--	950	TCEQ, 2006	2.11E-04	No	Supplemental HQ less than one
HMX	0.14 - 0.28	0 / 6	--	--	NSV	-- / --	NSV	0.084	NSV	--	--	--	--	--	No	Not detected
Nitroglycerin	0.48 - 0.51	0 / 6	--	--	NSV	-- / --	NSV	0.25	NSV	--	--	--	--	--	No	Not detected
Perchlorate	0.20 - 1.00	4 / 6	9.93	MR07-TW17-09D	NSV	-- / --	NSV	1.97	NSV	--	--	9,300	Dean et al., 2004	1.07E-03	No	Supplemental HQ less than one
PETN	0.48 - 0.51	3 / 6	8.60	MR07-TW10-09D	NSV	-- / --	NSV	1.64	NSV	--	--	425,000	TCEQ, 2006	2.02E-05	No	Supplemental HQ less than one
RDX	0.14 - 0.15	0 / 6	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	--	--	No	Not detected
Tetryl	0.14 - 0.15	1 / 6	0.32	MR07-TW10-09D	NSV	-- / --	NSV	0.11	NSV	--	--	13	Nipper et al., 2001	2.46E-02	No	Supplemental HQ less than one
Inorganics (UG/L)																
Aluminum	-- --	6 / 6	855	MR07-TW10-09D	87.0	6 / 6	9.83	416	4.784	1886.00	No	--	--	--	No	Consistent with background
Antimony	3.75 - 3.75	0 / 6	--	--	160	-- / --	0.023	1.88	0.012	3.28	Yes	--	--	--	No	HQ less than one, not detected
Arsenic	1.25 - 1.25	0 / 6	--	--	36.0	-- / --	0.035	0.63	0.017	5.77	Yes	--	--	--	No	HQ less than one, not detected
Barium	-- --	6 / 6	62.9	MR07-TW17-09D	NSV	-- / --	NSV	39.9	NSV	86.20	No	16,000	TCEQ, 2006	3.93E-03	No	Supplemental HQ less than one, consistent with background
Beryllium	1.25 - 1.25	1 / 6	0.29	MR07-TW10-09D	0.53	0 / 6	0.54	0.57	1.073	0.31	No	--	--	--	No	HQ less than one, detected
Cadmium	-- --	6 / 6	0.70	MR07-TW10-09D	0.25	6 / 6	2.80	0.41	1.658	0.36	Yes	--	--	--	No	Low magnitude of exceedance
Calcium ³	-- --	6 / 6	74,800	MR07-TW10-09D	NSV	-- / --	NSV	14,248	NSV	69078	Yes	--	--	--	No	Macronutrient
Chromium	-- --	6 / 6	3.31	MR07-TW10-09D	50.0	0 / 6	0.066	1.46	0.029	3.13	Yes	--	--	--	No	HQ less than one, detected
Cobalt	3.12 - 3.12	2 / 6	35.9	MR07-TW10-09D	NSV	-- / --	NSV	7.23	NSV	3.40	Yes	1,500	TCEQ, 2006	2.39E-02	No	Supplemental HQ less than one
Copper	2.50 - 2.50	1 / 6	1.41	MR07-TW12-09D	3.10	0 / 6	0.45	1.28	0.412	2.76	No	--	--	--	No	HQ less than one, detected
Iron	-- --	6 / 6	6,600	MR07-TW03-09D	1,000	2 / 6	6.60	1,847	1.847	5999	Yes	--	--	--	No	Within range of background
Lead	0.75 - 0.75	0 / 6	--	--	8.10	-- / --	0.093	0.38	0.046	2.80	Yes	--	--	--	No	HQ less than one, not detected
Magnesium ³	-- --	6 / 6	3,610	MR07-TW10-09D	NSV	-- / --	NSV	1,893	NSV	6363	No	--	--	--	No	Macronutrient
Manganese	-- --	6 / 6	765	MR07-TW10-09D	NSV	-- / --	NSV	165	NSV	214	Yes	120	Suter and Tsao, 1996	6.38	No	Supplemental HQ less than one
Mercury	0.20 - 0.20	0 / 6	--	--	0.77	-- / --	0.26	0.10	0.130	0.10	Yes	--	--	--	No	HQ less than one, not detected
Nickel	-- --	6 / 6	13.5	MR07-TW10-09D	8.20	1 / 6	1.65	4.73	0.577	7.97	Yes	--	--	--	No	Within range of background
Potassium ³	-- --	6 / 6	2,530	MR07-TW08-09D	NSV	-- / --	NSV	1,907	NSV	3277	No	--	--	--	No	Macronutrient
Selenium	1.25 - 1.25	2 / 6	1.62	MR07-TW10-09D	5.00	0 / 6	0.32	0.92	0.183	3.14	No	--	--	--	No	HQ less than one, detected
Silver	1.25 - 1.25	0 / 6	--	--	0.012	-- / --	104	0.63	52.083	0.77	Yes	--	--	--	No	Not detected
Sodium ³	-- --	6 / 6	25,000	MR07-TW17-09D	NSV	-- / --	NSV	11,730	NSV	22508	Yes	--	--	--	No	Macronutrient
Thallium	2.00 - 2.00	0 / 6	--	--	4.00	-- / --	0.50	1.00	0.250	3.78	Yes	--	--	--	No	HQ less than one, not detected
Vanadium	3.12 - 3.12	2 / 6	2.43	MR07-TW10-09D	NSV	-- / --	NSV	1.68	NSV	4.72	No	20	Suter and Tsao, 1996	1.22E-01	No	Supplemental HQ less than one, consistent with background
Zinc	-- --	6 / 6	19.3	MR07-TW10-09D	81.0	0 / 6	0.24	7.69	0.095	42.10	No	--	--	--	No	HQ less than one, detected
Dissolved Metals (UG/L)																
Aluminum, Dissolved	-- --	2 / 2	65.8	MR07-TW17-09D	87.0	0 / 2	0.76	40.7	0.467	1886	No	--	--	--	No	HQ less than one, detected
Antimony, Dissolved	3.75 - 3.75	0 / 2	--	--	160	-- / --	0.023	1.88	0.012	3.28	Yes	--	--	--	No	HQ less than one, not detected

Table 2

ERS Groundwater screen for CTO-14 UXO-7
 MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value ¹	Frequency of Exceedance ²	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	2 x Mean Background	Maximum Exceeds 2 x Mean Background?	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value Maximum HQ	Retain?	Rationale
Arsenic, Dissolved	1.25 - 1.25	0 / 2	--	--	36.0	-- / --	0.035	0.63	0.017	5.77	Yes	--	--	--	No	HQ less than one, not detected
Barium, Dissolved	-- - --	2 / 2	55.2	MR07-TW17-09D	NSV	-- / --	NSV	39.1	NSV	86.20	No	16,000	TCEQ, 2006	3.45E-03	No	Supplemental HQ less than one, consistent with background
Beryllium, Dissolved	1.25 - 1.25	0 / 2	--	--	0.53	-- / --	2.36	0.63	1.179	0.31	Yes	--	--	--	No	Not detected
Cadmium, Dissolved	-- - --	2 / 2	0.40	MR07-TW17-09D	0.25	2 / 2	1.60	0.37	1.478	0.36	Yes	--	--	--	No	Low magnitude of exceedance
Calcium, Dissolved ³	-- - --	2 / 2	3,920	MR07-TW03-09D	NSV	-- / --	NSV	2,490	NSV	69078	No	--	--	--	No	Macronutrient
Chromium, Dissolved	1.25 - 1.25	0 / 2	--	--	50.0	-- / --	0.025	0.63	0.013	3.13	Yes	--	--	--	No	HQ less than one, not detected
Cobalt, Dissolved	3.12 - 3.12	0 / 2	--	--	NSV	-- / --	NSV	1.56	NSV	3.40	Yes	--	--	--	No	Not detected
Copper, Dissolved	2.50 - 2.50	0 / 2	--	--	3.10	-- / --	0.81	1.25	0.403	2.76	Yes	--	--	--	No	HQ less than one, not detected
Iron, Dissolved	-- - --	2 / 2	5,230	MR07-TW03-09D	1,000	-- / --	5.23	2,780	2.780	5999	No	--	--	--	No	Consistent with background
Lead, Dissolved	0.75 - 0.75	0 / 2	--	--	8.10	-- / --	0.093	0.38	0.046	2.80	Yes	--	--	--	No	HQ less than one, not detected
Magnesium, Dissolved ³	-- - --	2 / 2	1,700	MR07-TW17-09D	NSV	-- / --	NSV	1,610	NSV	6363	No	--	--	--	No	Macronutrient
Manganese, Dissolved	-- - --	2 / 2	90.0	MR07-TW03-09D	NSV	-- / --	NSV	50.4	NSV	214.00	No	120	Suter and Tsao, 1996	0.75	No	Supplemental HQ less than one, consistent with background
Mercury, Dissolved	0.20 - 0.20	0 / 2	--	--	0.77	-- / --	0.26	0.10	0.130	0.10	Yes	--	--	--	No	HQ less than one, not detected
Nickel, Dissolved	-- - --	2 / 2	5.39	MR07-TW03-09D	52.0	0 / 2	0.10	3.29	0.063	7.97	No	--	--	--	No	HQ less than one, detected
Potassium, Dissolved ³	-- - --	2 / 2	1,640	MR07-TW17-09D	NSV	-- / --	NSV	1,575	NSV	3277	No	--	--	--	No	Macronutrient
Selenium, Dissolved	1.25 - 1.25	0 / 2	--	--	5.00	-- / --	0.25	0.63	0.125	3.14	Yes	--	--	--	No	HQ less than one, not detected
Silver, Dissolved	1.25 - 1.25	0 / 2	--	--	0.012	-- / --	104	0.63	52.083	0.77	Yes	--	--	--	No	Not detected
Sodium, Dissolved ³	-- - --	2 / 2	23,300	MR07-TW17-09D	NSV	-- / --	NSV	15,410	NSV	22508	Yes	--	--	--	No	Macronutrient
Thallium, Dissolved	2.00 - 2.00	0 / 2	--	--	4.00	-- / --	0.50	1.00	0.250	3.78	Yes	--	--	--	No	HQ less than one, not detected
Vanadium, Dissolved	3.12 - 3.12	0 / 2	--	--	NSV	-- / --	NSV	1.56	NSV	4.72	Yes	--	--	--	No	Not detected
Zinc, Dissolved	-- - --	2 / 2	3.36	MR07-TW03-09D	120	0 / 2	0.028	3.16	0.026	42.10	No	--	--	--	No	HQ less than one, detected

NOTES

- 1 - The lowest of the marine and fresh water screening value
 - 2 - Count of detected samples exceeding or equaling Screening Value
 - 3 - Macronutrient - Not considered to be a contaminant of potential concern (COPC)
- HQ - Hazard Quotient
 NSV - No Screening Value
 UG/L - Micrograms per liter
 Generated by: Sara Kent
 Checked by: Kelly Taylor

Table 3

ERS Surface Water screen for CTO-14 UXO-7
 MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value ¹	Frequency of Exceedance ²	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value HQ	Retain?	Rationale
Semivolatile Organic Compounds (UG/L)														
2,4-Dinitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
2,6-Dinitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
Nitrobenzene	0.14 - 0.14	0 / 2	--	--	270	-- / --	5.19E-04	0.070	2.593E-04	--	--	--	No	HQ less than one, not detected
Explosives (UG/L)														
1,3,5-Trinitrobenzene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
1,3-Dinitrobenzene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
2,4,6-Trinitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
2-Amino-4,6-dinitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
2-Nitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
3-Nitrotoluene	0.14 - 0.15	0 / 2	--	--	NSV	-- / --	NSV	0.073	NSV	--	--	--	No	Not detected
4-Amino-2,6-dinitrotoluene	-- - --	2 / 2	0.083	MR07-SW01-09D	NSV	-- / --	NSV	0.072	NSV	100	NRCC, 2008	8.30E-04	No	Supplemental HQ less than one
4-Nitrotoluene	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
HMX	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
Nitroglycerin	0.48 - 0.49	0 / 2	--	--	NSV	-- / --	NSV	0.24	NSV	--	--	--	No	Not detected
Perchlorate	0.20 - 0.20	0 / 2	--	--	NSV	-- / --	NSV	0.10	NSV	--	--	--	No	Not detected
PETN	0.48 - 0.49	0 / 2	--	--	NSV	-- / --	NSV	0.24	NSV	--	--	--	No	Not detected
RDX	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
Tetryl	0.14 - 0.14	0 / 2	--	--	NSV	-- / --	NSV	0.070	NSV	--	--	--	No	Not detected
Inorganics (UG/L)														
Aluminum	-- - --	2 / 2	516	MR07-SW02-09D	87.0	2 / 2	5.93	349	4.006	--	--	--	No	See text for discussion
Antimony	3.75 - 3.75	0 / 2	--	--	160	-- / --	0.023	1.88	0.012	--	--	--	No	HQ less than one, not detected
Arsenic	1.25 - 1.25	0 / 2	--	--	150	-- / --	0.0083	0.63	0.004	--	--	--	No	HQ less than one, not detected
Barium	-- - --	2 / 2	7.96	MR07-SW01-09D	NSV	-- / --	NSV	6.03	NSV	16,000	TCEQ, 2006	4.98E-04	No	Supplemental HQ less than one
Beryllium	1.25 - 1.25	0 / 2	--	--	0.53	-- / --	2.36	0.63	1.179	--	--	--	No	Not detected
Cadmium	-- - --	2 / 2	0.39	MR07-SW01-09D	0.25	2 / 2	1.55	0.35	1.402	--	--	--	No	Low magnitude of exceedances
Calcium ³	-- - --	2 / 2	21,200	MR07-SW01-09D	NSV	-- / --	NSV	15,650	NSV	--	--	--	No	Macronutrient
Chromium	-- - --	2 / 2	0.77	MR07-SW02-09D	117	0 / 2	0.0065	0.72	0.006	--	--	--	No	HQ less than one, detected
Cobalt	3.12 - 3.12	0 / 2	--	--	NSV	-- / --	NSV	1.56	NSV	--	--	--	No	Not detected
Copper	-- - --	2 / 2	4.47	MR07-SW01-09D	9.00	0 / 2	0.50	3.17	0.352	--	--	--	No	HQ less than one, detected
Cyanide	10.0 - 10.0	0 / 2	--	--	NSV	-- / --	NSV	5.00	NSV	--	--	--	No	Not detected
Iron	-- - --	2 / 2	234	MR07-SW02-09D	1,000	0 / 2	0.23	153	0.153	--	--	--	No	HQ less than one, detected
Lead	-- - --	2 / 2	0.72	MR07-SW01-09D	25.0	0 / 2	0.029	0.61	0.024	--	--	--	No	HQ less than one, detected
Magnesium ³	-- - --	2 / 2	833	MR07-SW01-09D	NSV	-- / --	NSV	651	NSV	--	--	--	No	Macronutrient
Manganese	-- - --	2 / 2	1.90	MR07-SW01-09D	NSV	-- / --	NSV	1.76	NSV	120	Suter and Tsao, 1996	1.58E-02	No	Supplemental HQ less than one
Mercury	0.20 - 0.20	0 / 2	--	--	0.77	-- / --	0.26	0.10	0.130	--	--	--	No	HQ less than one, not detected
Nickel	2.50 - 2.50	0 / 2	--	--	52.0	-- / --	0.048	1.25	0.024	--	--	--	No	HQ less than one, not detected
Potassium ³	-- - --	2 / 2	1,350	MR07-SW01-09D	NSV	-- / --	NSV	1,009	NSV	--	--	--	No	Macronutrient
Selenium	1.25 - 1.25	0 / 2	--	--	5.00	-- / --	0.25	0.63	0.125	--	--	--	No	HQ less than one, not detected
Silver	1.25 - 1.25	0 / 2	--	--	0.012	-- / --	104	0.63	52.083	--	--	--	No	Not detected
Sodium ³	-- - --	2 / 2	1,060	MR07-SW01-09D	NSV	-- / --	NSV	876	NSV	--	--	--	No	Macronutrient
Thallium	2.00 - 2.00	0 / 2	--	--	4.00	-- / --	0.50	1.00	0.250	--	--	--	No	HQ less than one, not detected
Vanadium	-- - --	2 / 2	1.61	MR07-SW02-09D	NSV	-- / --	NSV	1.47	NSV	20	Suter and Tsao, 1996	8.05E-02	No	Supplemental HQ less than one
Zinc	-- - --	2 / 2	11.1	MR07-SW01-09D	120	0 / 2	0.093	9.79	0.082	--	--	--	No	HQ less than one, detected
Dissolved Metals (UG/L)														
Aluminum, Dissolved	-- - --	2 / 2	41.2	MR07-SW01-09D	87.0	0 / 2	0.47	36.1	0.414	--	--	--	No	HQ less than one, detected
Antimony, Dissolved	3.75 - 3.75	0 / 2	--	--	160	-- / --	0.023	1.88	0.012	--	--	--	No	HQ less than one, not detected
Arsenic, Dissolved	1.25 - 1.25	0 / 2	--	--	150	-- / --	0.0083	0.63	0.004	--	--	--	No	HQ less than one, not detected
Barium, Dissolved	-- - --	2 / 2	6.63	MR07-SW01-09D	NSV	-- / --	NSV	4.70	NSV	16,000	TCEQ, 2006	4.14E-04	No	Supplemental HQ less than one
Beryllium, Dissolved	1.25 - 1.25	0 / 2	--	--	0.53	-- / --	2.36	0.63	1.179	--	--	--	No	Not detected

Table 3

ERS Surface Water screen for CTO-14 UXO-7

MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value ¹	Frequency of Exceedance ²	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value HQ	Retain?	Rationale
Cadmium, Dissolved	-- - --	2 / 2	0.36	MR07-SW01-09D	0.25	2 / 2	1.42	0.34	1.348	--	--	--	No	Low magnitude of exceedances
Calcium, Dissolved ³	-- - --	2 / 2	18,800	MR07-SW01-09D	NSV	-- / --	NSV	14,065	NSV	--	--	--	No	Macronutrient
Chromium, Dissolved	1.25 - 1.25	0 / 2	--	--	117	-- / --	0.011	0.63	0.005	--	--	--	No	HQ less than one, not detected
Cobalt, Dissolved	3.12 - 3.12	0 / 2	--	--	NSV	-- / --	NSV	1.56	NSV	--	--	--	No	Not detected
Copper, Dissolved	2.50 - 2.50	1 / 2	3.30	MR07-SW01-09D	9.00	0 / 2	0.37	2.28	0.253	--	--	--	No	HQ less than one, detected
Iron, Dissolved	-- - --	2 / 2	13.8	MR07-SW01-09D	1,000	-- / --	0.01	12.7	NSV	--	--	--	No	HQ less than one, detected
Lead, Dissolved	0.75 - 0.75	0 / 2	--	--	25.0	-- / --	0.030	0.38	0.015	--	--	--	No	HQ less than one, not detected
Magnesium, Dissolved ³	-- - --	2 / 2	737	MR07-SW01-09D	NSV	-- / --	NSV	575	NSV	--	--	--	No	Macronutrient
Manganese, Dissolved	3.75 - 3.75	1 / 2	0.93	MR07-SW01-09D	NSV	-- / --	NSV	1.40	NSV	120	Suter and Tsao, 1996	7.73E-03	No	Supplemental HQ less than one
Mercury, Dissolved	0.20 - 0.20	0 / 2	--	--	0.77	-- / --	0.26	0.10	0.130	--	--	--	No	HQ less than one, not detected
Nickel, Dissolved	2.50 - 2.50	0 / 2	--	--	52.0	-- / --	0.048	1.25	0.024	--	--	--	No	HQ less than one, not detected
Potassium, Dissolved ³	-- - --	2 / 2	1,180	MR07-SW01-09D	NSV	-- / --	NSV	877	NSV	--	--	--	No	Macronutrient
Selenium, Dissolved	1.25 - 1.25	0 / 2	--	--	5.00	-- / --	0.25	0.63	0.125	--	--	--	No	HQ less than one, not detected
Silver, Dissolved	1.25 - 1.25	0 / 2	--	--	0.012	-- / --	104	0.63	52.083	--	--	--	No	Not detected
Sodium, Dissolved ³	-- - --	2 / 2	968	MR07-SW01-09D	NSV	-- / --	NSV	798	NSV	--	--	--	No	Macronutrient
Thallium, Dissolved	2.00 - 2.00	0 / 2	--	--	4.00	-- / --	0.50	1.00	0.250	--	--	--	No	HQ less than one, not detected
Vanadium, Dissolved	3.12 - 3.12	0 / 2	--	--	NSV	-- / --	NSV	1.56	NSV	--	--	--	No	Not detected
Zinc, Dissolved	5.00 - 5.00	1 / 2	6.37	MR07-SW01-09D	120	0 / 2	0.053	4.44	0.037	--	--	--	No	HQ less than one, detected

NOTES

1 - FW Screening Values

2 - Count of detected samples exceeding or equaling Screening Value

3 - Macronutrient - Not considered to be a contaminant of potential concern (COPC)

HQ - Hazard Quotient

NSV - No Screening Value

UG/L - Micrograms per liter

Generated by: Sara Kent

Checked by: Kelly Taylor

Table 4

ERS Sediment screen for CTO-14 UXO-7
MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance ¹	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value Maximum HQ	Retain?	Rationale
Semivolatile Organic Compounds (UG/KG)														
2,4-Dinitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
2,6-Dinitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
Nitrobenzene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
Explosives (UG/KG)														
1,3,5-Trinitrobenzene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
1,3-Dinitrobenzene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
2,4,6-Trinitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
2-Amino-4,6-dinitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
2-Nitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
3-Nitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
4-Amino-2,6-dinitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
4-Nitrotoluene	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
HMX	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
Nitroglycerin	640 - 640	0 / 2	--	--	NSV	-- / --	NSV	320	NSV	--	--	--	No	Not detected
Perchlorate	2.64 - 2.68	0 / 2	--	--	NSV	-- / --	NSV	1.33	NSV	--	--	--	No	Not detected
PETN	640 - 640	0 / 2	--	--	NSV	-- / --	NSV	320	NSV	--	--	--	No	Not detected
RDX	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
Tetryl	190 - 190	0 / 2	--	--	NSV	-- / --	NSV	95.0	NSV	--	--	--	No	Not detected
Inorganics (MG/KG)														
Aluminum	-- --	2 / 2	8,420	MR07-SD02-09D	NSV	-- / --	NSV	5,705	NSV	25,500	Ingersoll et al., 1996	0.330	No	Supplemental HQ less than one
Antimony	0.97 - 0.98	0 / 2	--	--	2.00	-- / --	0.49	0.49	0.24	--	--	--	No	HQ less than one, not detected
Arsenic	-- --	2 / 2	2.16	MR07-SD02-09D	7.24	0 / 2	0.30	1.61	0.22	--	--	--	No	HQ less than one, detected
Barium	-- --	2 / 2	12.9	MR07-SD01-09D	NSV	-- / --	NSV	12.1	NSV	--	--	--	No	Within range of Surface Soil background, see text for discussion
Beryllium	-- --	2 / 2	0.093	MR07-SD02-09D	NSV	-- / --	NSV	0.080	NSV	--	--	--	No	Within range of Surface Soil background, see text for discussion
Cadmium	0.35 - 0.35	1 / 2	0.17	MR07-SD02-09D	0.68	0 / 2	0.25	0.17	0.25	--	--	--	No	HQ less than one, detected
Calcium ²	-- --	2 / 2	44,000	MR07-SD01-09D	NSV	-- / --	NSV	22,770	NSV	--	--	--	No	Macronutrient
Chromium	-- --	2 / 2	12.8	MR07-SD02-09D	52.3	0 / 2	0.24	8.37	0.16	--	--	--	No	HQ less than one, detected
Cobalt	-- --	2 / 2	0.64	MR07-SD01-09D	NSV	-- / --	NSV	0.54	NSV	50	Buchman, 2008	0.013	No	Supplemental HQ less than one
Copper	-- --	2 / 2	2.94	MR07-SD01-09D	18.7	0 / 2	0.16	2.40	0.13	--	--	--	No	HQ less than one, detected
Cyanide	0.33 - 0.34	0 / 2	--	--	NSV	-- / --	NSV	0.17	NSV	--	--	--	No	Not detected
Iron	-- --	2 / 2	6,870	MR07-SD02-09D	NSV	-- / --	NSV	4,530	NSV	20,000	Persaud et al., 1993	0.344	No	Supplemental HQ less than one
Lead	-- --	2 / 2	9.14	MR07-SD01-09D	30.2	0 / 2	0.30	7.58	0.25	--	--	--	No	HQ less than one, detected
Magnesium ²	-- --	2 / 2	693	MR07-SD01-09D	NSV	-- / --	NSV	514	NSV	--	--	--	No	Macronutrient
Manganese	-- --	2 / 2	42.1	MR07-SD01-09D	NSV	-- / --	NSV	24.8	NSV	460	Persaud et al., 1993	0.092	No	Supplemental HQ less than one
Mercury	-- --	2 / 2	0.039	MR07-SD01-09D	0.13	0 / 2	0.30	0.029	0.22	--	--	--	No	HQ less than one, detected
Nickel	-- --	2 / 2	2.65	MR07-SD01-09D	15.9	0 / 2	0.17	2.00	0.13	--	--	--	No	HQ less than one, detected
Potassium ²	-- --	2 / 2	379	MR07-SD02-09D	NSV	-- / --	NSV	282	NSV	--	--	--	No	Macronutrient
Selenium	0.32 - 0.32	1 / 2	0.40	MR07-SD02-09D	NSV	-- / --	NSV	0.28	NSV	--	--	--	No	Within range of Surface Soil background, see text for discussion
Silver	0.32 - 0.33	0 / 2	--	--	0.73	-- / --	0.45	0.16	0.22	--	--	--	No	HQ less than one, not detected
Sodium ²	323 - 328	0 / 2	--	--	NSV	-- / --	NSV	163	NSV	--	--	--	No	Not detected
Thallium	0.52 - 0.52	0 / 2	--	--	NSV	-- / --	NSV	0.26	NSV	--	--	--	No	Not detected

Table 4

ERS Sediment screen for CTO-14 UXO-7

MCB Camp Lejeune, North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance ¹	Maximum HQ	Arithmetic Mean Concentration	Mean HQ	Supplemental Screening Value	Supplemental Screening Value Source	Supplemental Screening Value Maximum HQ	Retain?	Rationale
Vanadium	-- - --	2 / 2	16.4	MR07-SD02-09D	NSV	-- / --	NSV	10.8	NSV	--	--	--	No	Within range of Surface Soil background, see text for discussion
Zinc	-- - --	2 / 2	20.4	MR07-SD01-09D	124	0 / 2	0.16	15.0	0.12	--	--	--	No	HQ less than one, detected

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

HQ - Hazard Quotient

NSV - No Screening Value

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

Generated by: Sara Kent

Checked by: Kelly Taylor