

M67001.AR.005870  
MCB CAMP LEJEUNE  
5090.3a

FINAL SITE-SPECIFIC WORK PLAN FOR LOT 202 ENVIRONMENTAL CONDITION OF  
PROPERTY STUDY PHASE II MCB CAMP LEJEUNE NC  
12/1/2013  
CH2M HILL

Final

**Site-Specific Work Plan  
Lot 202 Environmental Condition of Property Study, Phase II**

**Marine Corps Installations East—Marine Corps Base Camp Lejeune  
North Carolina**

**Contract Task Order WE99**

**December 2013**

Prepared for

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

Under the

**NAVFAC CLEAN 8012 Program  
Contract N62470-11-D-8012**

Prepared by



**CH2MHILL**

**Knoxville, Tennessee**



# Contents

---

<b>Acronyms and Abbreviations .....</b>	<b>v</b>
<b>1 Introduction .....</b>	<b>1-1</b>
1.1 Objective .....	1-1
1.2 Scope of Work.....	1-1
1.3 Site Visit .....	1-2
1.4 Work Plan Organization .....	1-2
<b>2 Site Description and History.....</b>	<b>2-1</b>
2.1 Site Description .....	2-1
2.2 Historical Investigations.....	2-2
2.2.1 Previous Investigations .....	2-2
2.2.2 Test Pits.....	2-2
2.3 Geology and Hydrogeology.....	2-3
<b>3 Project Management Plan .....</b>	<b>3-1</b>
3.1 Project Personnel, Organization, and Schedule.....	3-1
3.1.1 Project Organization .....	3-1
3.1.2 Project Personnel.....	3-1
3.1.3 Project Schedule .....	3-2
3.2 Technical Approach.....	3-2
3.2.1 Project Management .....	3-2
3.2.2 Project Planning.....	3-2
3.2.3 Site Investigation .....	3-2
3.2.4 Reporting .....	3-3
<b>4 Field Investigation Plan.....</b>	<b>4-5</b>
4.1 Field Investigation Approach .....	4-5
4.2 Planning and Preparation .....	4-5
4.3 Mobilization .....	4-5
4.3.1 General Mobilization Activities.....	4-5
4.3.2 Kickoff and Safety Meeting.....	4-6
4.3.3 Anomaly Avoidance .....	4-6
4.4 Surveying.....	4-6
4.4.1 Establish Semi-Permanent or Permanent Benchmark Locations .....	4-6
4.4.2 Establish the Geophysical Area Boundary and Transects.....	4-7
4.4.3 General Site Feature Survey .....	4-7
4.4.4 Monitoring Well and Soil Sampling Locations .....	4-7
4.4.5 Test Pit Locations .....	4-7
4.5 Buried Utility Locating.....	4-7
4.6 Geophysical Investigation .....	4-8
4.7 Environmental Sampling .....	4-8
4.7.1 Soil Sampling.....	4-8
4.7.2 Monitoring Well Installation.....	4-9
4.7.3 Well Development .....	4-10
4.7.4 Well Purging and Sampling .....	4-10
4.7.5 Analytical Requirements and Sample Handling.....	4-11
4.8 Test Pit Excavations .....	4-13
4.8.1 General Test Pit Procedure.....	4-13

4.8.2	Test Pit Sampling .....	4-14
4.9	Health and Safety Plan .....	4-15
4.10	Data Management.....	4-15
4.11	Investigation Derived Waste .....	4-15
4.12	Project File Requirements .....	4-15
4.13	Site Restoration and Demobilization.....	4-15
<b>5</b>	<b>References.....</b>	<b>5-1</b>

**Appendixes**

- A Munitions Response Plan
- B Health and Safety Plan
- C Geophysical Investigation Plan
- D Uniform Federal Policy Quality Assurance Project Plan
- E Standard Operating Procedures
- F Environmental Protection Plan

**Tables**

- 1-1 Suspected Ordnance Net Explosive Weights for Lot 202
- 3-1 Project Personnel Contact Information

**Figures**

- 1-1 Location of Lot 202
- 1-2 Lot 202
- 1-3 Photographs of Lot 202
- 1-4 Area Topographic Map - 1993
- 1-5 Area Topographic Map – 1948
- 1-6 Historical Aerial Photographs of Lot 202
- 1-7 RI Soil Sampling Locations Lot 202
- 1-8 Surficial Aquifer VOCs – 1993
- 1-9 Chlorobenzene in Surficial Aquifer -2012
- 1-10 Site 6 – Supplemental Investigation Volatile Organic Compounds in Groundwater
- 1-11 Historical Test Pit Locations and Munitions Related Results
- 1-12 Surficial Aquifer Potentiometric Surface Map
- 2-1 Lot 202 Schedule
- 4-1 DGM Investigation Area
- 4-2 Proposed Environmental Sampling Locations

# Acronyms and Abbreviations

---

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AAR	After Action Report
Baker	Baker Environmental, Inc.
BEM	Buried Explosion Module
bgs	below ground surface
BIP	blow-in-place
BTEX	benzene, toluene, ethylbenzene, and xylene
BTV	background threshold value
CLEAN	Comprehensive Long-term Environmental Action—Navy
CGI	combustible gas indicator
COC	chain-of-custody
CRREL	Cold Regions Research and Engineering Laboratory
CWM	chemical warfare materiel
DDESB	Department of Defense Explosives Safety Board
DGM	digital geophysical mapping
DoD	Department of Defense
DPT	direct push technology
DRMO	Defense Reutilization and Marketing Office
ECP	Environmental Condition of Property
EM	Environmental Manager
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
ERDC	Engineering Research and Development Center
ESQD	explosives safety quantity distance
ESS	Explosives Safety Submission
EZ	exclusion zone
FID	flame-ionization detector
Ft	feet/foot
gpm	gallons per minute
GPS	global positioning system
H&S	Health and Safety
HC	hexachloroethane
HSP	Health and Safety Plan
IBD	inhabited building distance
ID	identification
IDW	investigation-derived waste
lb(s)	pound(s)
MARCORSYSCOM	Marine Corps Systems Command
MBTA	Migratory Bird Treaty Act
MC	munitions constituent
MCIEAST-MCB CAMLEJ	Marine Corps Installations East-Marine Corps Base Camp Lejeune
MDAS	material documented as safe

MEC	munitions and explosives of concern
MFD-H	maximum fragment distance-horizontal
MGFD	munition with the greatest fragment distance
mm	millimeter
MMRP	Military Munitions Response Program
MPP	Master Project Plan
MPPEH	material potentially presenting an explosive hazard
MR	munitions response
MRP	Munitions Response Program
MS/MSD	matrix spike/matrix spike duplicate
MSD	minimum separation distance
Navy	Department of the Navy
NAVFAC	Naval Facilities Engineering Command
NCDENR	North Carolina Department of Environment and Natural Resources
NOSSA	Naval Ordnance Safety and Security Activity
NTU	Nephelometric Turbidity Unit
ORR	Operational Readiness Review
PAHs	polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PETN	pentaerythritol tetranitrate
PID	photoionization detector
PM	Project Manager
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QCP	Quality Control Plan
Rhea	Rhea Engineers and Consultants, Inc.
RI	Remedial Investigation
RSL	Regional Screening Level
SI	Supplemental Investigation
SOP	standard operating procedure
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TSD	team separation distance
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
UFP-SAP	Uniform Federal Policy-Sampling and Analysis Plan
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
VOC	volatile organic compound

## SECTION 1

# Introduction

---

Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) is conducting a Phase II Environmental Condition of Property (ECP) Study on Lot 202 to support a potential transfer of the property on which the lot is situated. The Phase II ECP is being conducted as a result of known former disposal activities within areas adjoining Lot 202 and a known groundwater contaminant plume within this portion of the Base. The project is being conducted by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, Comprehensive Long-term Environmental Action—Navy (CLEAN) Contract N62470-11-D-8012, Contract Task Order WE99.

## 1.1 Objective

The objectives of the Phase II ECP at Lot 202 are to:

- Identify areas where potential former waste disposal/burial activities may have occurred
- Evaluate whether hazardous substances are present in the soil and/or groundwater, including the potential presence of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH)
- Evaluate potential risks to human health and the environment

The Phase II ECP will be considered complete once the following activities are accomplished:

- Investigations to evaluate the potential presence or absence of contamination, including MEC and MPPEH
- Evaluation of investigation findings
- Acceptance of the Phase II ECP Report

The overall Phase II ECP approach is presented in Section 3.1 of this Work Plan.

## 1.2 Scope of Work

This Work Plan presents the site-specific activities to be performed to accomplish the previously described objectives. The results of this work will be documented in a Phase II ECP Report.

The activities to be conducted at Lot 202 are:

- Collect up to six surface soil samples and six subsurface soil samples in areas where contamination is suspected. Analyze all samples for volatile organic compounds (VOCs, including benzene, toluene, ethylbenzene, and xylene [BTEX]), semi-volatile organic compounds (SVOCs, including polycyclic aromatic hydrocarbons [PAHs]), polychlorinated biphenyls (PCBs), pesticides, metals, and explosives residues.
- Install and collect groundwater samples from up to three surficial aquifer monitoring wells. Analyze the groundwater samples for VOCs (including BTEX), SVOCs (including PAHs), PCBs, pesticides, metals, and explosives residues.
- Conduct digital geophysical mapping (DGM) across 100 percent of the approximately 4.2-acre site to identify areas where former burial or disposal actions may have occurred.
- Excavate up to 10 test pits based on the DGM results to evaluate the nature of any potential buried waste. Sample soil or suspect material found within the test pits.

- Validate the analytical data and screen against human health and ecological risk-based criteria. Complete a human health risk screening on data exceeding criteria.
- Produce a Phase II ECP Report to document the findings associated with the field investigation.

## 1.3 Site Visit

As part of the development of this Work Plan, a site visit was conducted by CH2M HILL in September 2013. The site visit included interviews with key Base personnel and a historical records search. The objectives of this task were to:

- Conduct a review of available Base, county, and/or city historical records to identify areas of concern or potential environmental risks associated with Lot 202.
- Conduct a site walk-over to assess any areas that appear to have soil staining or mounding that may be associated with potential burial or disposal areas.

Pertinent information obtained during this task, along with information obtained from additional research performed for the development of this Work Plan, is summarized in Section 2. A comprehensive summary of the site visit, personnel interviews, and records search information will be provided in the ECP Report.

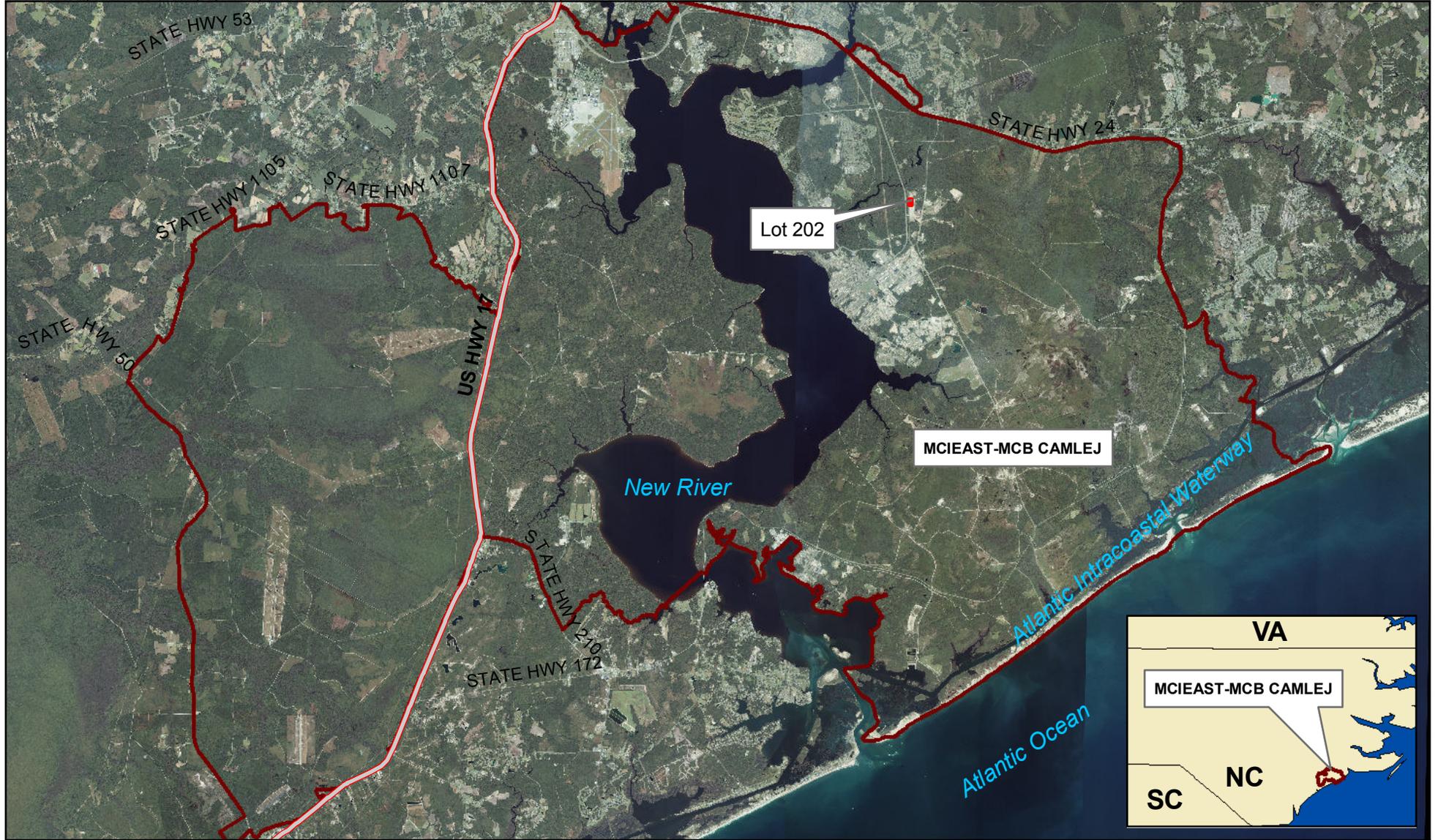
## 1.4 Work Plan Organization

This Work Plan is organized into sections providing information on the project approach, including procedures to be employed during the execution of the Phase II ECP. Supporting documentation that details specific procedures for the execution of the Phase II ECP are provided in the appendixes to this Work Plan.

This Work Plan is organized as follows:

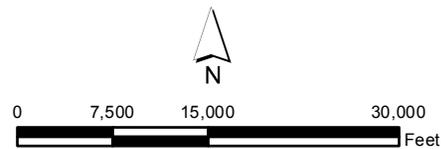
- **Section 1, Introduction**, provides general information about this Work Plan and presents the project objectives and scope of work.
- **Section 2, Site Description and History**, describes Lot 202 and summarizes the historical investigations associated with the site and surrounding area.
- **Section 3, Project Management Plan**, identifies the methods and operational procedures that will be used to execute the Phase II ECP.
- **Section 4, Field Investigation Plan**, identifies the technical approach, methods, and operational procedures that will be used to execute the field investigation activities.
- **Section 5, References**, lists the references cited in the preceding sections.
- **Appendix A, Munitions Response**, identifies the technical approach, methods, and operational procedures that will be used to execute the demilitarization of MEC and MPPEH (if required) and provides details regarding the sampling procedures to be implemented after the completion of detonation activities (if required). The appendix also provides the explosives management plan, explosives siting plan, and the quality control plan.
- **Appendix B, Health and Safety Plan**, provides an interface with CH2M HILL's overall Health and Safety (H&S) program. The HSP also contains the anomaly avoidance procedures that will be used to protect onsite personnel from MEC that may be present at the site.
- **Appendix C, Geophysical Investigation Plan**, details the approach, methods, and operational procedures that will be used in performing the geophysical investigation. Additionally, it includes a Geophysical System Verification Work Plan, which details the activities to be performed for validating DGM systems to be utilized at the site.

- **Appendix D, Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP)**, references the measurement data acquisition, assessment oversight, and data review processes that will be used to carry out tasks associated with this Work Plan.
- **Appendix E, Standard Operating Procedures (SOPs)**, provides the SOPs to be referenced and adhered to during the course of project work.
- **Appendix F, Environmental Protection Plan (EPP)**, describes the approach, methods, and operational procedures to be employed to protect the natural environment during the performance of all tasks.



**Legend**

-  Approximate Boundary of Lot 202
-  Highways
-  Installation Boundary



1 inch = 15,000 feet

Figure 1-1  
Location of Lot 202  
Lot 202 Work Plan  
MCI EAST-MCB CAMLEJ  
North Carolina





**Legend**

- Approximate Boundary of Lot 202
- UXO-22 Boundary
- Site 6 Boundary

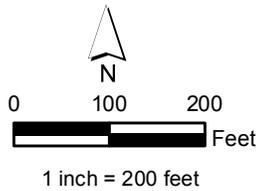


Figure 1-2  
 Lot 202  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina



Lot 202 facing north

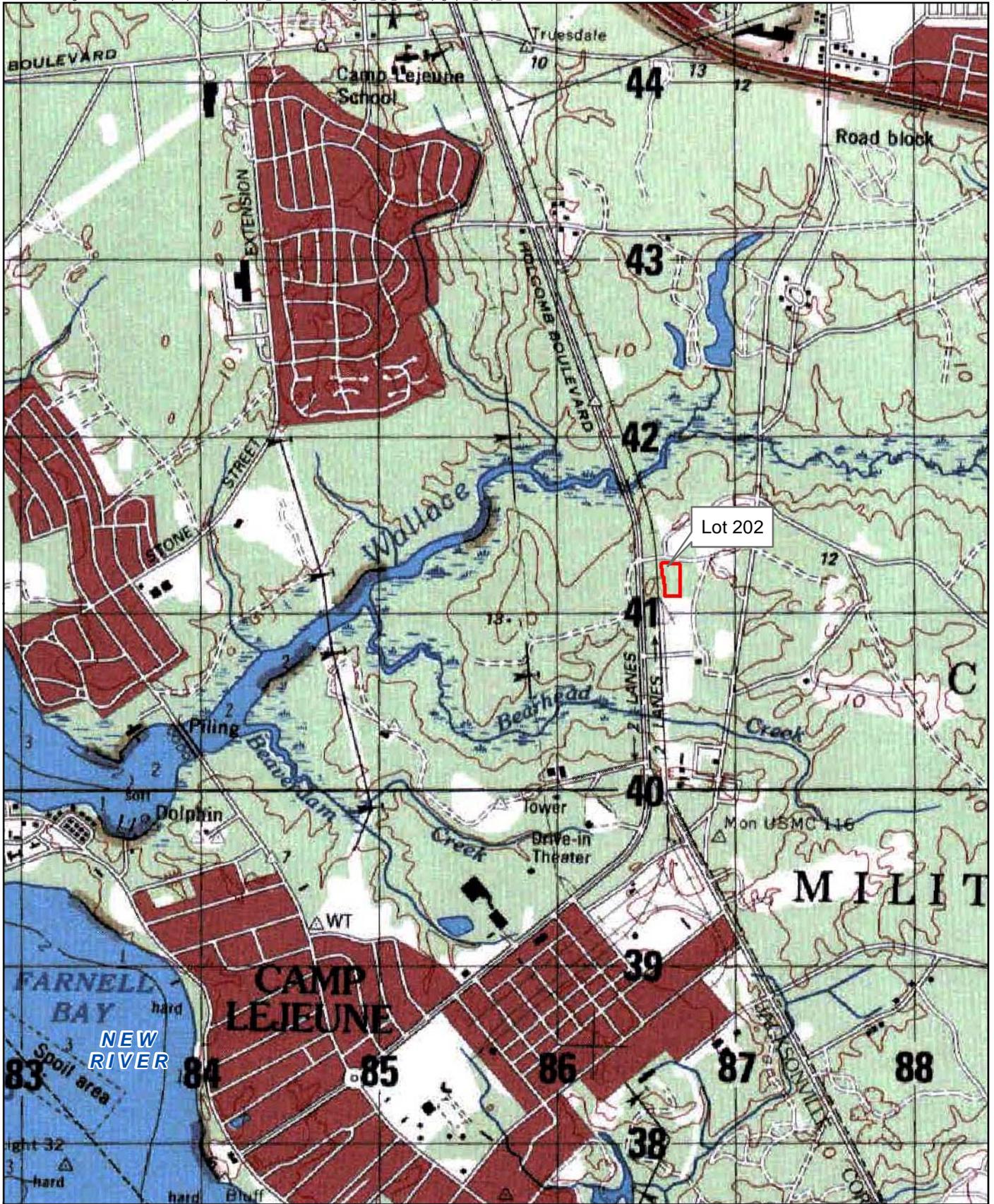


Lot 202 facing south



West side of Lot 202 facing north; shows railroad tracks and perimeter fence-line (under installation - right side of photograph)

Figure 1-3  
Photographs of Lot 202  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina

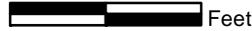


Legend

 Approximate Boundary of Lot 202

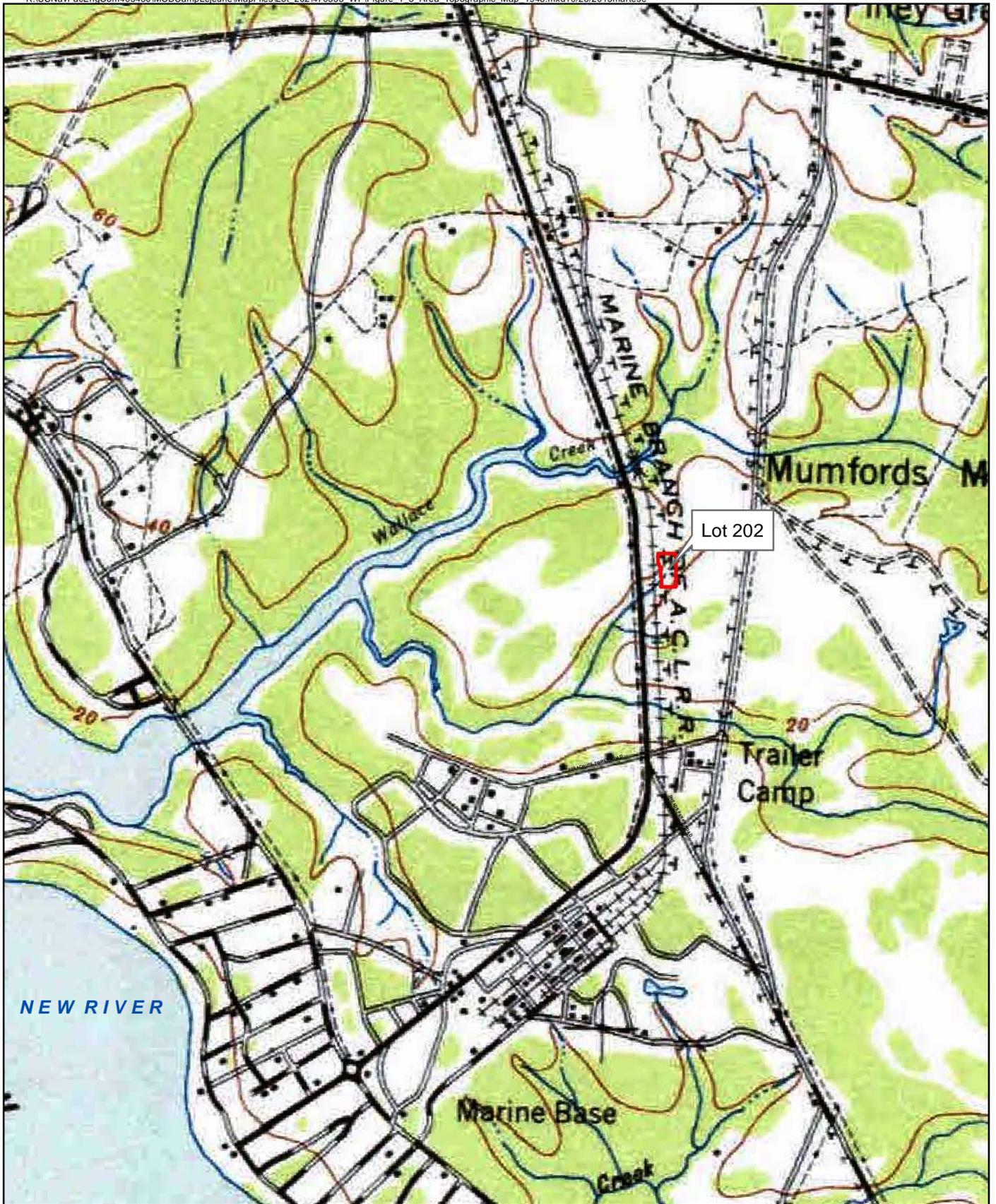


0 1,250 2,500

 Feet

1 inch = 2,500 feet

Figure 1-4  
Area Topographic Map - 1993  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Legend**

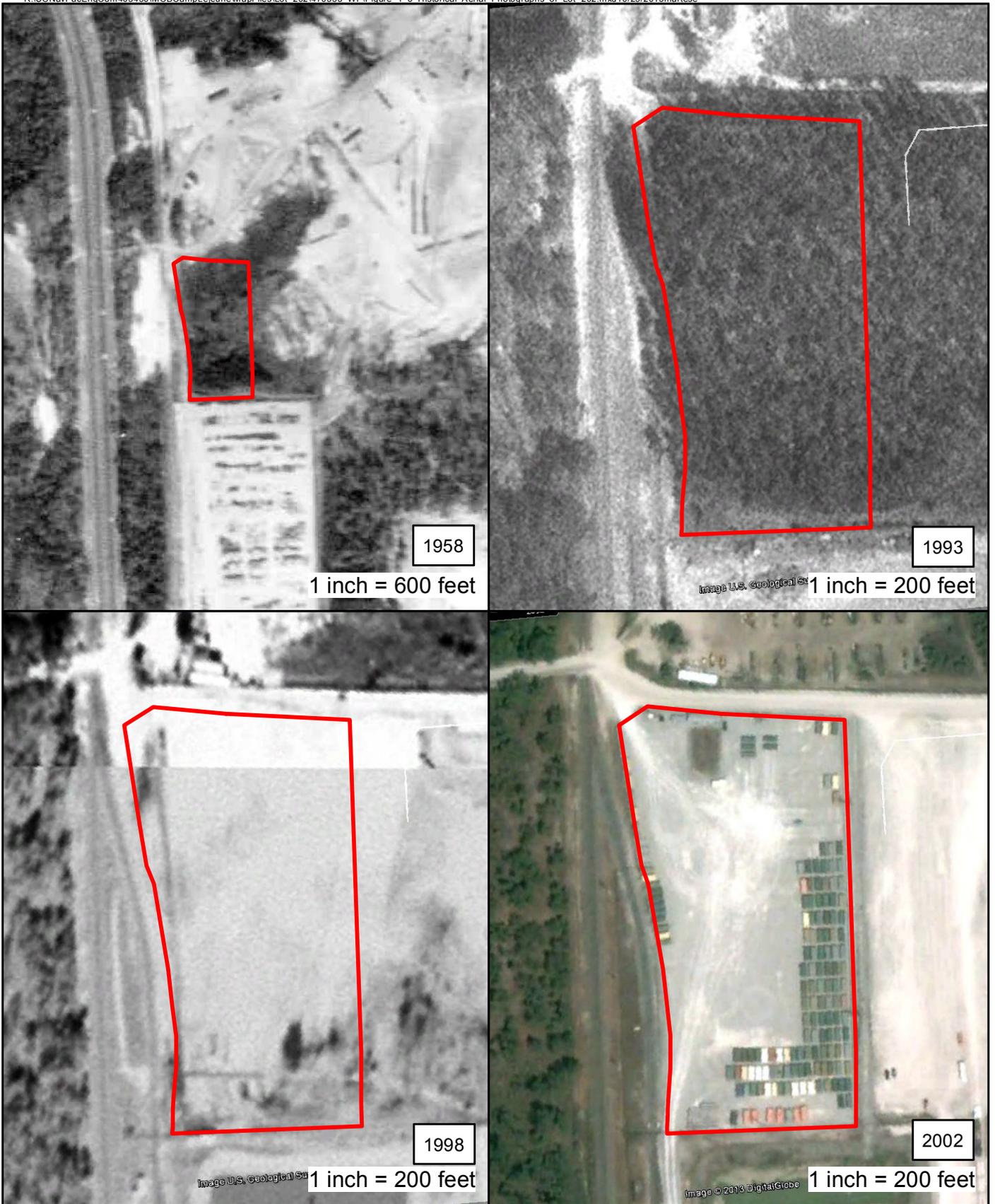
 Approximate Boundary of Lot 202



0 1,250 2,500  
 Feet

1 inch = 2,500 feet

Figure 1-5  
Area Topographic Map - 1948  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Legend**

 Approximate Boundary of Lot 202



Figure 1-6  
Historical Aerial Photographs of Lot 202  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Legend**

- Historical Sample Locations (Baker, 1993)
- Approximate Boundary of Lot 202
- Lots 201 and 203
- Site 6 Boundary

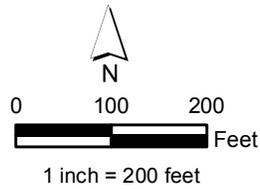


Figure 1-7  
RI Soil Sampling Locations Lot 202  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Legend**

- Historical Shallow Monitoring Well Locations (Baker, 1993)
- Estimated Total VOC Isocontour Line (ug/L) (Baker, 1993)
- Groundwater Flow Direction
- Approximate Boundary of Lot 202
- Lots 201 and 203
- Site 6 Boundary

Note:  
 ND = Not Detected  
 8,591.2 = total VOC concentration (ug/L) (Baker, 1993)

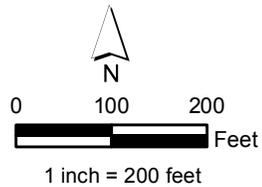


Figure 1-8  
 Surficial Aquifer VOCs - 1993  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina





**Legend**

- Monitoring Well - Surficial Aquifer
- Not Sampled
- Groundwater Flow Direction
- Ephemeral Drainage Feature
- Approximate Boundary of Lot 202
- Site 6 Boundary

**Chlorobenzene (dashed where inferred)**

- > 50 µg/L
- > 500 µg/L

**Notes:**  
 Concentrations shown in micrograms per liter (µg/L)  
 Samples were collected in October 2012  
 ND - not detected  
 Highlighted wells were sampled during previous investigation

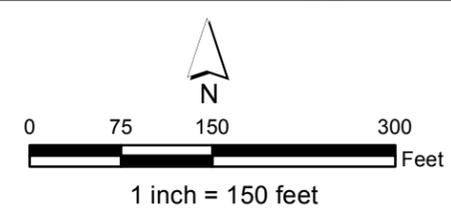


Figure 1-9  
 Chlorobenzene in Surficial Aquifer - 2012  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina



Surficial Aquifer

- Legend**
- Monitoring Well - Surficial Aquifer
  - Not Sampled
  - Groundwater Flow Direction
  - Approximate Boundary of Lot 202
  - Site 6 and 82 Boundaries
- Chlorinated Ethenes**
- > 1 µg/L
  - > 10 µg/L

Concentrations shown in micrograms per liter (µg/L)  
 Data collected in October 2012  
 ND - not detected  
 NS - not sampled  
 Highlighted wells sampled under previous investigation

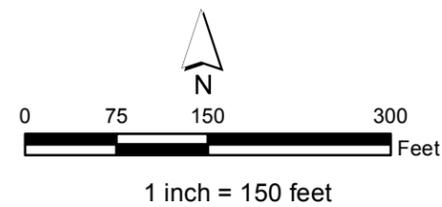


Figure 1-10  
 Site 6 - Supplemental Investigation  
 Volatile Organic Compounds in Groundwater  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina





- Legend**
- Monitoring Well
  - Not gauged
  - Ephemeral Drainage Feature
  - Potentiometric Contours (dashed where inferred)
  - Groundwater Flow
  - Site 6 and 82 Boundaries
  - Approximate Boundary of Lot 202

**Notes:**  
 Potentiometric surface contours have been interpolated between monitoring well locations.  
 Actual conditions may differ from those shown on this figure.  
 Monitoring wells gauged on 10/19/2012  
 Source: CH2M HILL, 2013

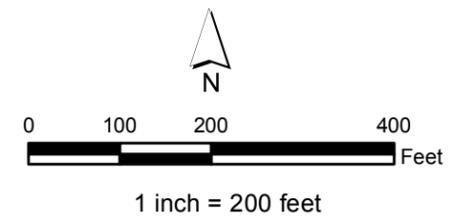


Figure 1-12  
 Surficial Aquifer Potentiometric Surface Map  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina

# Site Description and History

---

## 2.1 Site Description

MCIEAST-MCB CAMLEJ encompasses an area of approximately 236 square miles in Onslow County, North Carolina, adjacent to the southern boundary of the city of Jacksonville. MCIEAST-MCB CAMLEJ is bordered by the Atlantic Ocean to the east, U.S. Route 17 to the west and State Route 24 to the north. It is bisected by the New River, which flows into the Atlantic Ocean in a southeasterly direction (**Figure 1-1**).

Lot 202 is an approximate 4.2-acre container storage area that was historically used to store bulk materials by the II Marine Expeditionary Force (CH2M HILL, 2013d). The lot is located in the northeast portion of MCIEAST-MCB CAMLEJ between Holcomb Boulevard and Piney Green Road (**Figure 1-2**). Lot 202 is surrounded by a locked chain-link fence and consists of relatively level terrain with an elevation of approximately 12 feet (ft) above mean sea level. **Figure 1-3** presents photographs of Lot 202 taken during the September 2013 site visit.

Lot 202 was reportedly used for disposal and storage of waste and supplies, including pesticides, transformers containing PCBs, solvents, electrolytes, and waste oils (Rhea, 2010). At adjoining Site 6, similar wastes were disposed of in trenches throughout the site (CH2M HILL, 2013b), and it is possible that this disposal practice may have also occurred within Lot 202. However, based on the September 2013 interviews with facility personnel and a review of historical aerial photographs and documents, there do not appear to be any instances where hazardous substances were stored, disposed, or released within Lot 202. The lot is currently used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies. No documentation has been identified to indicate that MEC has been used or disposed of within the boundaries of Lot 202; however, MEC and MPPEH items have been encountered in test pits excavated within the adjoining Lot 203 and UXO-22 areas (refer to Section 1.5) and therefore, may be present within Lot 202.

Lot 202 is situated between Bearhead Creek (approximately 0.4 mile south of the site) and Wallace Creek (approximately 0.3 mile north of the site) (**Figure 1-4**). Bearhead Creek discharges to Wallace Creek approximately 1 mile east of Lot 202 and Wallace Creek discharges into the New River approximately 2 miles southeast of Lot 202. No surface water bodies are present on the lot. However, historical topographic mapping dating from the early 1950s shows that a southwest flowing tributary to Bearhead Creek once bisected Lot 202, indicating that the land surface has been reworked (**Figure 1-5**). Based on site topography, storm water runoff from Lot 202 is presumed to flow in a southerly direction toward Bearhead Creek or the storm water retention pond located directly south of Lot 202.

Two unnamed and unpaved roads are located north and south of Lot 202. Lot 202 is bordered by a branch of the Atlantic Coast Line railroad to the west, the former Defense Reutilization and Marketing Office (DRMO) Lot 203 to the north, a stormwater retention pond and Lot 201 to the south, and Site 6 to the east (refer to Figure 1-2). Lots 202 and 203, along with Site 6 and the northeast portion of Lot 201, are part of MCIEAST-MCB CAMLEJ Munitions Response Program (MRP) Site UXO-22 (Former Munitions Disposal Area).

Base sanitary sewer lines were not identified on the lot during the site visit. However, a 6-inch diameter polyvinyl chloride (PVC) pipe present at the north end of the site may have once connected an office trailer, identified on historical aerial images (refer to Figure 1-2), to a septic tank or lateral system. A north-south trending storm ditch is present along the eastern boundary of Lot 202; no other storm ditches were observed in the vicinity of Lot 202 during the site visit. An overhead power line runs to a meter box in the northern portion of the lot and appears to have previously been connected to the trailer once located on the lot (Google Earth, 2012).

Aerial photographs from 1958 and 1993 show that the area containing Lot 202 was covered by forest (**Figure 1-6**). By 1998, the entirety of Lot 202 was cleared of trees and vegetation, and by 2002 the lot was being used for the storage of containers (refer to Figure 1-6). The exact date the lot was cleared of vegetation is uncertain. Currently Lot 202 remains clear of vegetation and the surface is covered by crushed limestone gravel ranging in thickness from an estimated 8 to 18 inches.

## 2.2 Historical Investigations

This section provides a summary of the environmental and MR investigations that have been conducted within and surrounding Lot 202. Although no environmental or MR investigations have been focused on Lot 202 to date, the Base has conducted investigations on adjacent sites, and environmental samples have been collected within the borders of Lot 202 as part of these investigations.

### 2.2.1 Previous Investigations

Surface and subsurface soil samples were collected from two soil borings within the area of Lot 202 as part of the 1992 Remedial Investigation (RI) of Operable Unit No. 2 (OU-2) (**Figure 1-7**) (Baker Environmental, Inc [Baker], 1993). The surface soil samples contained SVOCs [1,671 J micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) total concentration], pesticides (4,4-DDE = 500  $\mu\text{g}/\text{kg}$  and 4,4-DDT = 280 J  $\mu\text{g}/\text{kg}$ ), and PCBs Aroclor1260 (800  $\mu\text{g}/\text{kg}$ ). However, these constituents were not detected in the corresponding subsurface soil samples.

During the RI, a surficial aquifer monitoring well was installed within Lot 202 (Baker, 1993). VOCs, the only organic compounds evaluated, were not detected in the samples collected from this well; however, total VOCs greater than 8,000 micrograms per liter ( $\mu\text{g}/\text{L}$ ) were reported in surficial aquifer samples collected from Site 6, located east of Lot 202, during Phase II of the RI (**Figure 1-8**). Inorganics were not analyzed as part of the Phase II RI sampling event (Baker, 1993).

During the 2012 Site 6 Supplemental Investigation (SI), chlorobenzene was detected in samples collected from surficial aquifer monitoring wells located to the east and northeast of Lot 202, with a maximum chlorobenzene concentration of 3,500  $\mu\text{g}/\text{L}$  reported in the shallow groundwater east of Lot 202 (**Figure 1-9**) (CH2M HILL, 2013c). Chlorinated ethenes (approximately 15  $\mu\text{g}/\text{L}$ ) were also reported in the surficial aquifer east/northeast of Lot 202 during the SI (**Figure 1-10**).

### 2.2.2 Test Pits

Test pit excavations have been performed within areas adjoining Lot 202 as follows:

- OU-2 RI (Site 6) in 1992 (Baker, 1993)
- Lot 203 ECP investigation in 2010 (Rhea Engineers and Consultants, Inc. [Rhea], 2010)
- Site 6 SI in 2011 (CH2M HILL, 2012)

**Figure 1-11** presents the locations of these test pits. The sections below provide a brief summary of the test pit sampling results, the types of debris found, and the MEC and MPPEH items identified during these investigations.

#### 2.2.2.1 Test Pit Sampling Results

VOCs were detected in soil samples collected from the 35 test pits excavated during the Phase I and II OU-2 RI (Baker, 1993). Metals were detected in all of the samples collected from the test pits, but the concentrations were within an order of magnitude of the Base subsurface soil background concentrations. Pesticides and SVOCs were also detected in the test pit samples obtained during the RI. PCBs were not detected (Baker, 1993).

Arsenic, mercury, lead, and cadmium were detected at concentrations above the applicable screening criteria in samples collected from the Lot 203 ECP test pit excavations. Some of these metals may be associated with the discarded batteries found in the test pits (Rhea, 2010). Pesticides were also detected at concentrations above the applicable screening criteria in the Lot 203 test pit excavation samples (Rhea, 2010).

Soil samples were collected from the test pits excavated during the Site 6 SI. Chlorobenzene, SVOCs [benzo(a)pyrene, 2-methylnaphthalene, naphthalene, and pentachlorophenol], pesticides (4,4'-DD, beta-BHC, and dieldrin), and metals (antimony, chromium, hexavalent chromium, cobalt, lead, and manganese) exceeded the screening criteria in these test pit samples (CH2M HILL, 2012).

### 2.2.2.2 Test Pit Debris

Debris found in the test pits excavated within Lot 203 and Site 6 consisted of:

- Solid state batteries or dry cell communication batteries
- Metal debris, including communication wire and metal roofing material
- Wooden debris, including a wooden crate containing an unknown white powder
- Small containers (5-gallon-capacity or less) with unknown contents
- Intact 55-gallon steel drums (contents unknown)

### 2.2.2.3 MEC and MPPEH

There have been no previous studies regarding the presence or extent of MEC and MPPEH within Lot 202. However, MEC and MPPEH items have been found during test pit investigations conducted at adjoining Site UXO-22 (Lot 203 and Site 6) (refer to Figure 1-11), consisting of the following:

#### MEC

- Mk II Grenade
- 81-millimeter (mm) M43A1 (Mortar)
- 60-mm M49A2 (Mortar, without fuze)
- 3.5-inch M28A3 Rocket

#### MPPEH

- 3.5-inch rockets (motors, practice warheads, fuzes)
- 20-, 30-, 40-, 57-, 75-, 90-, 95-, 105-, and 106-mm cartridges
- Small Arms Ammunition
- M-2 Antipersonnel, mine, bounding
- M48 trip flares, practice
- M9 AT, rifle grenades
- MK21 practice hand grenades
- M45 mortar fuze, expended
- Mortar, 60-mm, practice, M50A2
- Propellant canister
- 40-mm practice projectiles
- M27A1 Signal Illuminating Ground Flares
- Mk 13 Grenade Diversionary

## 2.3 Geology and Hydrogeology

The regional geology and hydrogeology at MCIEAST-MCB CAMLEJ are discussed in Sections 1.6 and 1.7 of the MRP MPPs (CH2M HILL, 2008b). Site-specific geologic and hydrogeologic data will be collected during Lot 202 field activities and will be presented in the Phase II ECP Report.

MCIEAST-MCB CAMLEJ is located in the southeastern part of the Coastal Plain physiographic province of North Carolina (USGS, 2008). The Coastal Plain geology consists of interbedded layers of clay, sand, and limestone of Quaternary to Cretaceous age strata. The aquifers of interest underlying MCIEAST-MCB CAMLEJ are the surficial aquifer and the underlying Upper and Lower Castle Hayne aquifers.

The surficial aquifer is an unconfined aquifer composed mostly of fine sands and silty sands. The water table is present at depths ranging from approximately 10 to 15 ft below ground surface (bgs), and the aquifer

extends to an approximate depth of 25 ft bgs in the area. Groundwater flow within the surficial aquifer below Lot 202 is to the northwest, toward Wallace Creek (**Figure 1-12**). The aquifer is the primary source of recharge for the lower aquifers in the region and is the source of base flow for the areas streams and rivers (USGS, 2008). Wells installed within the surficial aquifer at MCIEAST-MCB CAMLEJ typically yield less than 5 gallons per minute (gpm). However, with the exception of irrigation and private supply wells, the surficial aquifer is not used in Onslow County (USGS, 2008).

The Castle Hayne aquifer is a highly productive aquifer composed of limestone and sand, with minor amounts of clay (USGS, 2008). The base of the Castle Hayne aquifer at adjoining Site 6 is at approximately 250 ft bgs. The Castle Hayne aquifer is the predominant groundwater supply for Onslow County and the Base, with wells typically yielding 200 to 500 gallons per minute. The Castle Hayne confining unit overlies the Castle Hayne aquifer throughout most of Onslow County, except in this area of the county and Base where the aquifer is unconfined and in direct contact with the surficial aquifer.

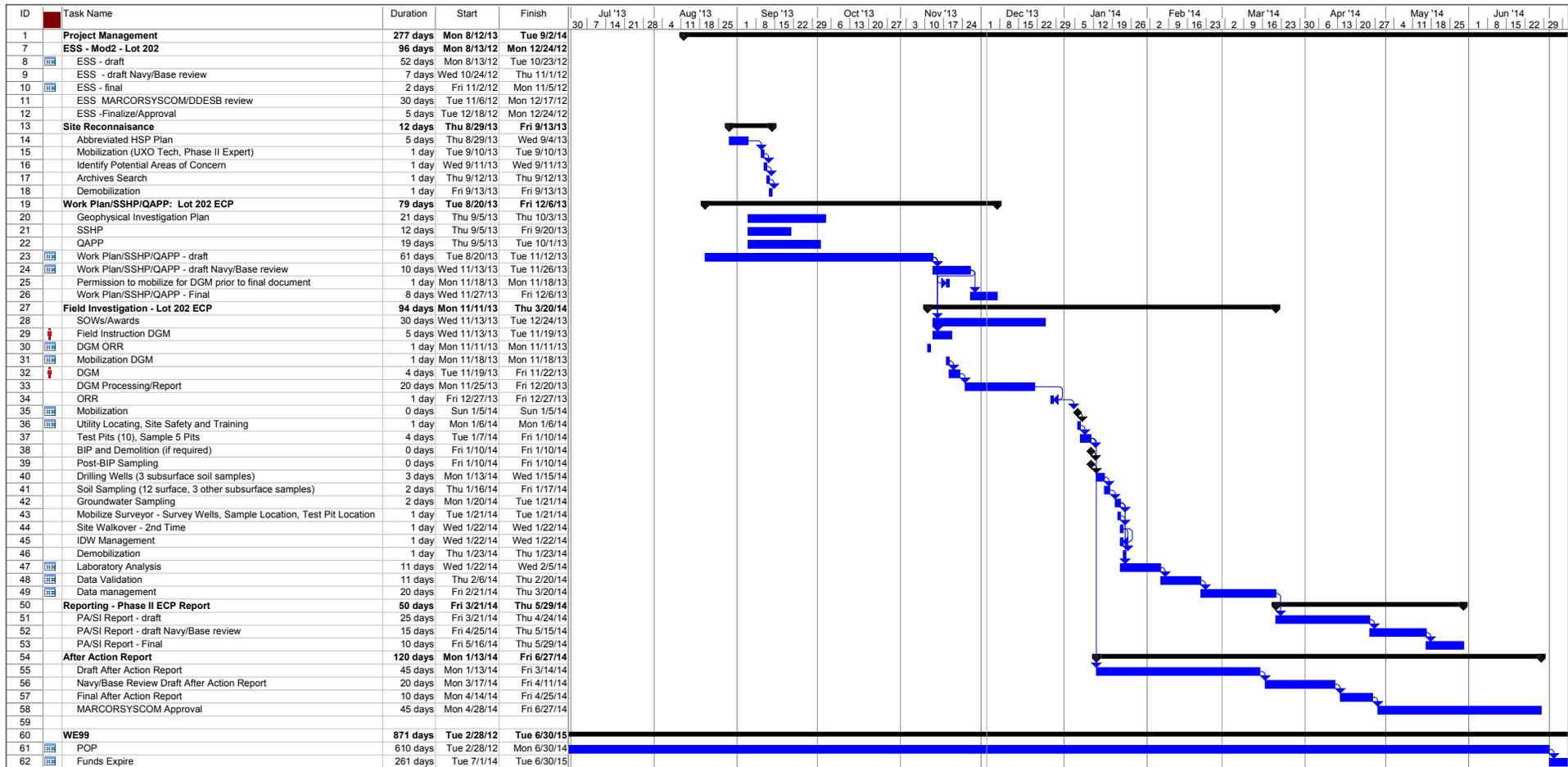


Figure 2-1: Lot 202 Phase II ECP  
MCIEAST-MCB CAMLEJ  
Date: Tue 12/3/13



Figure 2-1  
Schedule  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina

SECTION 3

# Project Management Plan

## 3.1 Project Personnel, Organization, and Schedule

This section describes the project organization and key personnel involved with implementing the work described in the Work Plan.

### 3.1.1 Project Organization

The key organizations involved in this project are NAVFAC, MCIEAST-MCB CAMLEJ, North Carolina Department of Environmental and Natural Resources (NCDENR), the U.S. Environmental Protection Agency (USEPA), and CH2M HILL. Project execution will be conducted by CH2M HILL and its subcontractors. CH2M HILL will issue subcontracts for MEC support, buried utility locating, land surveying, subsurface soil sampling and monitoring well installation, test pit excavating, laboratory analysis, and data validation.

### 3.1.2 Project Personnel

The roles and responsibilities of the project key personnel are discussed in Section 2.4 of the MRP MPP (CH2M HILL, 2008a). Contact information for key project personnel is shown in **Table 3-1**.

TABLE 3-1  
Project Personnel Contact Information  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ

Name/Title/Organization	Mailing Address	Telephone/Fax/E-mail
Bryan Beck, P.E. Remedial Project Manager NAVFAC Mid-Atlantic	6506 Hampton Blvd. Norfolk, VA 23508-1278	757-322-4734 <a href="mailto:bryan.k.beck@navy.mil">bryan.k.beck@navy.mil</a>
Charity (Rychak) Delaney, P.E. Environmental Engineer MCIEAST-MCB CAMLEJ	G-F/EMD/EQB 12 Post Lane Camp Lejeune, NC 28547	910-451-9385 <a href="mailto:charity.rychak@usmc.mil">charity.rychak@usmc.mil</a>
Matt Louth, P.G. Activity Manager CH2M HILL	5701 Cleveland Street Suite 200 Virginia Beach, VA 23462	757-671-6240 (office) <a href="mailto:Matt.Louth@ch2m.com">Matt.Louth@ch2m.com</a>
Keith LaTorre Project Manager (PM) CH2M HILL	2095 Lakeside Centre Way Suite 200 Knoxville, TN 37922	865-769-3204 (office) 865-323-3300 (cell) <a href="mailto:keith.latorre@ch2m.com">keith.latorre@ch2m.com</a>
Thomas M. Roth, P.E. Senior Technical Consultant CH2M HILL	2607 LaVista Road Decatur, GA 30033-1728	404-474-7640 (office) 404-259-6674 (cell) <a href="mailto:Tom.Roth@ch2m.com">Tom.Roth@ch2m.com</a>
Carl Woods, C.I.H. Program H&S Manager CH2M HILL	CH2M HILL 10123 Alliance Road Suite 300 Cincinnati, OH 45242	513-889-5771 (office) <a href="mailto:carl.woods@ch2m.com">carl.woods@ch2m.com</a>
Greg Schaefer, P.G. Task Manager CH2M HILL	2095 Lakeside Centre Way Suite 200 Knoxville, TN 37922	865-560-2984 (office) 865-228-7794 (cell) <a href="mailto:greg.schaefer@ch2m.com">greg.schaefer@ch2m.com</a>
Matt Barner, P.G. Geophysicist CH2M HILL	11301 Carmel Commons Blvd Suite 304 Charlotte, NC 28226	704-543-3273 (office) <a href="mailto:matthew.barner@ch2m.com">matthew.barner@ch2m.com</a>

TABLE 3-1  
 Project Personnel Contact Information  
*Lot 202 Work Plan*  
 MCIEAST-MCB CAMLEJ

Name/Title/Organization	Mailing Address	Telephone/Fax/E-mail
Teg Williams, P.G. Geologist CH2M HILL	11301 Carmel Commons Blvd Suite 304 Charlotte, NC 28226	704-543-3297 (office) 704-236-9602 (cell) <a href="mailto:tegwyn.williams@ch2m.com">tegwyn.williams@ch2m.com</a>
Tim Garretson Senior MR Technical Consultant (Navy CLEAN) CH2M HILL	9428 Baymeadows Road Suite 300 Jacksonville, FL 32256	904- 374-5633 (office) 757- 287-5222 (cell) <a href="mailto:timothy.garretson@ch2m.com">timothy.garretson@ch2m.com</a>
George DeMetropolis, PhD Corporate MR Safety and QC Officer CH2M HILL	CH2M HILL 402 W. Broadway, Suite 1450 San Diego, CA 92101	619-687-0120, Ext. 37239 (office) 619-564-9627 (cell) <a href="mailto:George.DeMetropolis@ch2m.com">George.DeMetropolis@ch2m.com</a>

### 3.1.3 Project Schedule

Figure 2-1 presents a proposed project schedule, including key project milestones.

## 3.2 Technical Approach

### 3.2.1 Project Management

Project management covers all work necessary for controlling the project budget and schedule. This includes monthly status reports and invoicing, as well as all other administrative tasks needed for project performance.

### 3.2.2 Project Planning

This task consists of project management, meetings, Work Plan preparation, and subcontractor procurement.

Meetings are planned throughout the course of this project. The meetings will be held to discuss proposed work, present investigation findings, and discuss project status. The meetings are planned to be held at MCIEAST-MCB CAMLEJ, a CH2M HILL office, or at other locations as necessary.

Up to three versions of this Work Plan will be prepared under this task. A draft document will be submitted electronically for NAVFAC and MCIEAST-MCB CAMLEJ review. A revised draft final Work Plan will be submitted to NAVFAC, MCIEAST-MCB CAMLEJ, EPA, and NCDENR for review upon incorporating comments from NAVFAC and MCIEAST-MCB CAMLEJ. After comments are considered, the Work Plan will be finalized.

### 3.2.3 Site Investigation

Environmental field and intrusive investigation activities will be performed under this task. The scope of the investigation and the technical approach are presented in Section 3. The primary environmental investigation activities are:

- DGM Survey
- Monitoring well installation and sampling
- Surface and subsurface soil sampling

If geophysical anomalies are identified during the DGM survey representing potential burial or disposal areas, test pits will be excavated. The scope of the test pits and the technical approach are presented in Section 3. The primary test pit activities consist of the following:

- Establishing locations of geophysical anomalies
- Excavating test pits
- Sampling soil and any suspect or unidentified material within the test pits
- Disposal of MEC and processing of MPPEH
- Soil sampling for post controlled detonation or blow-in-place (BIP) (if required)

### 3.2.4 Reporting

For Lot 202, a Phase II ECP Report and After Action Report (AAR) will be produced, described as follows.

#### 3.2.4.1 Phase II ECP Report

A draft Phase II ECP Report will be prepared to document the findings of the field investigation. The document will be prepared in accordance with the May 2006 Department of Navy (Navy) Policy for Streamlining the Assessment, Documentation and Disclosure of the Environmental Condition of Property for Non-BRAC Real Estate Actions (Navy, 2006). The report will provide a summary of the site background and history, the records search, interviews and site visit findings, field activities, an evaluation of the geophysical and environmental data, any MEC or MPPEH findings, and will present the Human Health Risk Screening and Ecological Risk Screening results.

As part of the development of the Phase II ECP Report, the environmental media data will be screened using the following criteria:

- **Groundwater:** Analytical results for groundwater will be compared with the more conservative of the North Carolina Groundwater Quality Standards or the EPA's Maximum Contaminant Levels (USEPA, 2009). Groundwater data will also be compared to EPA Regional Screening Levels (RSLs) for tap water (EPA, 2008). Inorganic analytical results will also be compared to the aquifer-specific Base background threshold values (BTVs) (CH2M HILL, 2011a).
- **Surface and Subsurface Soil:** Soil analytical data will be compared to the adjusted USEPA Adjusted Industrial and Residential Soil RSLs. Soil data will also be compared to the North Carolina Soil Screening Levels. For inorganic constituents, the analytical results will also be compared to the surface soil and subsurface soil Base BTVs (CH2M HILL, 2011a).

The draft Phase II ECP Report will be submitted electronically for concurrent review by NAVFAC and MCIEAST-MCB CAMLEJ. A final report will be prepared that will address all comments received on the draft document.

#### 3.2.4.2 After Action Report

An AAR will be prepared to document the results of the investigation in accordance with NOSSA Instruction 8020.15C (NOSSA, 2011). A draft AAR will be provided to NAVFAC, MARCORSYSCOM, and MCIEAST-MCB CAMLEJ. After the review process, the MCIEAST-MCB CAMLEJ will submit the final AAR to MARCORSYSCOM for endorsement to Department of Defense Explosives Safety Board (DDESB).

# Field Investigation Plan

---

## 4.1 Field Investigation Approach

This section summarizes the field activities associated with site preparation, the geophysical investigation, and environmental sampling. Field activities will be conducted in accordance with the SOPs provided in the MCIEAST-MCB CAMLEJ MRP MPP (CH2M HILL, 2008a) and the MPPs (CH2M HILL, 2008b) and will consist of:

- **Surveying:** perform civil surveying to support the geophysical and environmental field efforts
- **Utility Locating:** perform underground utility locating within the proposed investigation area
- **Soil Sampling:** collect up to 6 surface soil and 6 subsurface soil samples from suspected contamination areas
- **Well Installation:** drill, install, and develop up to three shallow (surficial aquifer) groundwater monitoring wells
- **Groundwater Sampling:** collect groundwater samples from the three surficial aquifer monitoring wells to be installed
- **Geophysical Investigation:** perform DGM over 100 percent of the site
- **Test Pit Excavations:** conduct test pit excavations at up to 10 locations selected on the basis of the DGM results

## 4.2 Planning and Preparation

The following actions require advance planning and will be conducted before mobilization to the site:

- Finalize procurement of supplies and services needed during the mobilization
- Hold a pre-mobilization meeting and Operational Readiness Review (ORR) with the project team at least one week before field operations begin
- Coordinate with the NAVFAC PM and Base point of contact on notification of local stakeholders regarding upcoming project activities
- Reconfirm site personnel documentation of required training, certifications, and medical monitoring

## 4.3 Mobilization

Mobilization will involve identifying, briefing, and mobilizing staff, as well as securing and deploying equipment.

### 4.3.1 General Mobilization Activities

General mobilization activities are as follows:

- Identify/procure, package, ship, and inventory project equipment, including geophysical instrumentation, hand tools, and supplies
- Coordinate with local agencies, including MCIEAST-MCB CAMLEJ, Base Range Control, police, hospital, and fire department, as appropriate
- Test and inspect equipment
- Review and approve subcontractor Activity Hazard Analysis forms

- Verify that all forms and project documentation are in order and project team members understand their responsibilities regarding completing project-reporting requirements
- Finalize operating schedules
- Establish MPPEH collection area, in accordance with the ESS (CH2M HILL, 2013a).
- Conduct site-specific training regarding this Work Plan, Project Instructions, ESS (CH2M HILL, 2013a), HSP, and MEC and MPPEH procedures and hazards

### 4.3.2 Kickoff and Safety Meeting

During mobilization, a kickoff and site safety meeting will be conducted and will include a review of this Work Plan, ESS (CH2M HILL, 2013a), and HSP (Appendix B) by all site personnel. Additional meetings will occur as needed, as new personnel, visitors, and/or subcontractors arrive at the site.

### 4.3.3 Anomaly Avoidance

Anomaly avoidance will be practiced during all non-intrusive site activities, including buried utility locating, site surveying, sampling, and the DGM survey. Unexploded Ordnance (UXO) Technicians will escort personnel while onsite, and will practice anomaly avoidance at all locations.

## 4.4 Surveying

Surveying activities will be conducted in accordance with Section 7.4 of the MPPs (CH2M HILL, 2008b) and will be conducted by a Professional Land Surveyor registered in the State of North Carolina. Surveying will be performed to accomplish the following tasks:

- Establish semi-permanent and/or permanent benchmark locations, as needed
- Establish the geophysical survey area boundary and transects
- Conduct a general site feature survey
- Establish the top of casing and adjacent ground surface elevations for the newly installed groundwater monitoring wells
- Establish the soil sampling locations
- Establish the locations of the test pit excavations

The survey data will be correlated with navigational data based upon a local “third-order” (1:5,000) monument or survey marker and will be provided to CH2M HILL on the North American Datum of 1983 Universal Transverse Mercator, Zone 18, meters. Exceptions to this will be survey ties to an acceptable defined Base coordinate system that is provided to CH2M HILL by the surveyor for review and approval before the field surveys begin. Coordinate information will be provided to CH2M HILL within 24 hours of placement of survey stakes.

Workers will be cognizant of ongoing traffic while working in the vicinity of roadways and employ the proper precautions (such as exclusion zones [EZs] and barricades) to avoid vehicle accidents. The Site Manager will oversee the surveying task. The following sections describe the surveying tasks to be performed during the field effort.

### 4.4.1 Establish Semi-Permanent or Permanent Benchmark Locations

If required after reviewing the existing control networks and under the direction of CH2M HILL, the surveyor will establish two semi-permanent benchmark locations and/or one permanent benchmark near the proposed DGM survey area (but not within the footprint) for use during the project. The benchmark locations will be selected at the start of the field effort.

If installed, each semi-permanent benchmark location will be clearly marked using a combination of wooden stakes, flagging tape, and/or iron pins in order to facilitate re-location by others. Stakes will be clearly annotated as survey control points, and the point identification (ID) will be legibly written on each stake using permanent marker. The control point IDs will consist of a number that is easily differentiated from point IDs recorded as part of subsequent tasks.

If installed, the permanent benchmark will consist of a brass plate securely set into a subsurface concrete support or a piece of rebar driven into the ground. The brass plate will be stamped with the applicable survey information (elevation, benchmark number, etc) for that point.

#### 4.4.2 Establish the Geophysical Area Boundary and Transects

The approximate boundary of the proposed DGM survey area will be surveyed for location (elevations are not required). The boundary will be marked using wooden stakes or plastic hubs no more than 0.3 meter (1 foot) high. Metal nails, hubs, or other markers will not be used to identify the corners of the area.

The DGM investigation will be conducted along appropriately spaced individual transect lines (**Appendix C**). Stakes will be placed at the start and end points of alternating transect lines as well as at interior locations (elevations are not required). The stakes will be marked with flagging tape for increased visibility. The transect number and stake number (i.e. point ID) will be legibly written on each stake using permanent marker.

#### 4.4.3 General Site Feature Survey

During the site survey, relevant and permanent site features present within the DGM survey area will be located for position (elevations not required). These features may include metal signs (e.g. road signs), fire hydrants, drop inlets, or other visible metallic features. CH2M HILL will identify and inform the surveyor of the site features requiring surveying.

#### 4.4.4 Monitoring Well and Soil Sampling Locations

A survey will be performed of the newly installed monitoring wells and soil sampling locations to establish vertical and horizontal control. For the monitoring wells, a survey point will be established at the top (north side) of each inner well casing and on the adjacent ground surface. The soil sampling locations will be surveyed adjacent to the identifying pin flag, surface paint, or stake designating the sampling location. The horizontal control will be performed to the nearest 0.1 foot and vertical control will be performed to the nearest 0.01 foot.

#### 4.4.5 Test Pit Locations

The boundary of each test pit excavation will be surveyed for location (elevations are not required). To aid in the survey, the boundaries of the test pits will be marked using paint, wooden stakes or plastic hubs no more than 0.3 meters (1 foot) high.

### 4.5 Buried Utility Locating

Before intrusive activities begin, the proposed intrusive investigation areas (test pits, well installation, soil sampling) will be located/cleared by a licensed and insured third party utility locator. Buried utilities will be recorded using the **Buried Utility Location Tracking Sheet**, part of the project instruction package. The private utility locator will mark utilities within a 20-foot radius of all intrusive activity locations. No intrusive activities will be conducted unless utility mark-out verification has been completed and there are no conflicts with subsurface utilities.

The North Carolina One-Call Center will also be contacted regarding the proposed subsurface site activities. The Site Manager will be the contact for the North Carolina One-Call.

When the proposed intrusive location is expected to be within 5 ft of a marked underground system, the absence of underground utilities at the location will be physically verified by hand digging using wood or

fiberglass-handled tools, air knifing, or some other approved means. Hand clearance will be performed to a depth of approximately 5 ft bgs.

## 4.6 Geophysical Investigation

To identify subsurface anomalies indicative of potential waste disposal/burial areas, a DGM survey will be conducted across Lot 202 (**Figure 4-1**). Storage containers will be removed from the lot by MCIEAST-MCB CAMLEJ prior to starting DGM activities. DGM will be conducted using the Geonics, Ltd. EM31 instrument, or equivalent, which can detect changes in bulk conductivity because of the presence of buried metallic objects or the presence of non-metallic materials that may be present in the subsurface. Positional data will be obtained during DGM using real-time kinematic global positioning system (GPS).

Interpretation of the DGM results will be completed by annotating the final DGM data contour maps to indicate the lateral extent of the suspected disposal areas. Annotations will also be provided depicting inaccessible survey areas (representing data gaps) and suspected or known sources of interference. The results of the DGM survey will be presented as a series of plan-view, color-contoured maps depicting instrument response across Lot 202. The Geophysical Investigation Plan provided in **Appendix C** provides details of the equipment, approach, methods, and operational procedures for the geophysical investigation at Lot 202.

## 4.7 Environmental Sampling

In order to assess the presence and nature of potential contamination associated with historical activities conducted at Lot 202, field activities will include the collection of groundwater, surface soil, and subsurface soil samples from proposed locations shown on **Figure 4-2**. Quality Assurance (QA)/QC samples will be collected as described in the UFP-QAPP (**Appendix D**). During environmental sampling operations, anomaly avoidance techniques will be practiced as described in the HSP (**Appendix B**).

### 4.7.1 Soil Sampling

#### 4.7.1.1 Surface Soil Sampling

To obtain more representative samples within the relatively large area of Lot 202, surface soil samples will be collected using the TR-02-1 sampling method. It is anticipated that composite surface soil samples will be collected from six locations, as shown on Figure 4-2. Discrete samples will be collected from each location for VOC analysis. If applicable, samples will be biased towards areas where staining is observed or odors are noted. The TR-02-1 approach is summarized as follows and is described in U.S. Army Corps of Engineers technical report Engineering Research and Development Center (ERDC)/Cold Regions Research and Engineering Laboratory (CRREL) TR-02-1, *Guide for Characterization of Sites Contaminated with Energetic Materials* (Thiboutot, Ampleman, Hewitt, 2002).

Each surface soil sampling location will consist of an area 1 meter by 1 meter. Coordinates of the sampling locations will be based on the center of the sampling square. Soil samples will be collected from each area by thoroughly mixing a minimum of 30 sample aliquots collected from random locations within the 1 square meter area, in accordance with Appendix C of the MPPs, *Homogenization of Soil and Sediment Samples* (note: soil intended for VOC analysis will not be homogenized) (CH2M HILL, 2008b). The aliquots will be approximately equal in the amount of soil and will be collected from approximately 1 to 2 inches (2.5 to 5 centimeters) bgs (DoD, 2008). Surface soil samples will be analyzed by a fixed base laboratory for the following parameters:

- VOCs, including BTEX (EPA SW-846 8260C)
- SVOCs, PAHs (EPA SW-846 8270C and 8270SIM)
- PCBs (EPA SW-846 8082)
- Pesticides (EPA SW-846 8081)

- Explosives residues (nitroaromatics and nitramines), including pentaerythritol tetranitrate (PETN) and nitroglycerin (EPA SW-846 Method 8330B)
- Perchlorate (EPA SW-846 Method 6850)
- Target analyte list (TAL) metals (EPA SW-846 Method 6010C/6020A/7471A)
- Hexavalent chromium (EPA SW-846 Method 7199)

#### 4.7.1.2 Subsurface Soil Sampling

A hand-auger or direct push technology (DPT) rig will be used to collect subsurface soil samples in accordance with the MPPs (CH2M HILL, 2008b). A total of six subsurface soil samples will be collected at the locations corresponding to the three proposed groundwater monitoring wells (see Section 4.7.2) and three select surface soil sample locations, as shown on Figure 4-2. However, the actual boring locations may change based on the DGM results; for example, a subsurface boring may be relocated to evaluate potential disposal/burial areas identified during DGM.

A subsurface soil sample will be collected within the vertical interval from approximately 1 foot to approximately 6 ft bgs at each proposed location. Continuous soil cores will be collected and screened for the presence of VOCs using a flame-ionization detector (FID) or photo-ionization detector (PID). A discrete VOC subsurface soil sample will be collected from the vertical interval exhibiting the highest FID/PID readings, or, if no FID/PID readings are observed, the sample will be collected from the 1 to 6-foot bgs vertical interval. The soil cores will be inspected by a CH2M HILL geologist and described on a boring log using the Unified Soil Classification System.

Subsurface soil samples will be analyzed by a fixed base laboratory for the same parameters as the surface soil samples:

- VOCs, including BTEX (EPA SW-846 8260C)
- SVOCs, including PAHs (EPA SW-846 8270C and 8270SIM)
- PCBs (EPA SW-846 8082)
- Pesticides (EPA SW-846 8081)
- Explosives residues (nitroaromatics and nitramines), including PETN and nitroglycerin (EPA SW-846 Method 8330B)
- Perchlorate (EPA SW-846 Method 6850)
- TAL metals (EPA SW-846 Method 6010C/6020A/7471A)
- Hexavalent chromium (EPA SW-846 Method 7199)

#### 4.7.2 Monitoring Well Installation

Three surficial aquifer monitoring wells will be installed within Lot 202 (refer to Figure 4-2). The wells are planned for installation within the area of three of the proposed surface soil sampling locations. However, actual well installation locations may vary based on the DGM results and test pit findings (for example, a well may be relocated downgradient of a disposal/burial area). The permanent monitoring wells will be installed in accordance with CLEAN SOPs, CH2M HILL SOPs, and the MRP MPP (CH2M HILL, 2008a).

Boreholes for the shallow monitoring wells will be advanced to an anticipated depth of 25 ft bgs. Subsurface soil samples will be collected at each well location (refer to Section 4.7.1.2). The final placement of the screened interval of each well will be determined on the basis of the lithology and potentiometric data obtained from surficial aquifer wells in the area (example: IR06-MW58). In general, layers having assumed higher permeability than adjacent layers will be preferred for the screen interval. Boring logs and well completion diagrams will be completed for each new monitoring well.

The monitoring wells will be constructed using 2-inch diameter Schedule 40 PVC riser with ten feet of 0.010-inch slotted PVC screens. A 30/40 silica sand filter pack will be placed in the annular space between the well screen and borehole wall, from the bottom of the borehole to approximately 2 feet above the top of the well screen. Bentonite pellets will be placed on top of the filter pack and hydrated for at least 1 hour with potable water to form a seal approximately 2 feet thick. After hydration of the bentonite pellets, the remaining annular space of the borehole will be grouted to within 1 foot of the ground surface. The grout will be allowed to cure a minimum of 24 hours before well completion. A watertight expansion cap will be installed on top of the 2-inch diameter casing and secured with a lock.

Each monitoring well will be completed within a flush-mount, water-tight, steel protective cover installed in the center of a 2-foot by 2-foot by 4-inch concrete pad. Well identification tags will be attached to the inside of the steel protective cover.

All drilling and well installation activities will be conducted by a North Carolina-certified well contractor, in accordance with the North Carolina well construction standards, under the supervision of a CH2M HILL representative.

### 4.7.3 Well Development

Each new monitoring well will be developed in accordance with Navy CLEAN and CH2M HILL SOPs, and will include surging and over-pumping with a submersible pump across the length of the well screen. Adequate well development is normally considered achieved when the development water is free of visible sediment, the groundwater physical parameters (pH, specific conductance, and temperature) have stabilized, and the turbidity values have either stabilized or are below 10 Nephelometric Turbidity Units (NTUs). Stabilization occurs when specific conductance varies no more than 10 percent, pH measurements vary within 0.1 standard unit, and the temperature is constant for three consecutive readings.

### 4.7.4 Well Purging and Sampling

Before any purging and sampling activities begin, depth-to-water measurements will be collected from each newly-installed well and the existing Lot 202 surficial aquifer well (IR06-MW58) using a hand-held electronic water level meter. The depth to water will be referenced to the top of the well casing (north side) and will be recorded to the nearest 0.01-foot.

The new wells will then be purged and sampled using low-flow methods in accordance with CLEAN SOPs, CH2M HILL SOPs, and the (CH2M HILL, 2008a). Samples will be collected once the groundwater pH, specific conductivity, and temperature parameters have stabilized (that is, when pH measurements remain constant within 0.1 standard units, there is no more than 10 percent variance for specific conductance, and temperature is constant for three consecutive readings). Perchlorate sampling will be conducted in accordance with Appendix F of the DoD Perchlorate Handbook (DoD, 2007).

Groundwater samples will be analyzed for the following constituents:

- VOCs, including BTEX (EPA SW-846 8260C)
- SVOCs, including PAHs (EPA SW-846 8270C and 8270SIM)
- PCBs (EPA SW-846 8082)
- Pesticides (EPA SW-846 8081)
- Explosives residues (nitroaromatics and nitramines), including PETN and nitroglycerin (EPA SW-846 Method 8330B)
- Perchlorate (EPA SW-846 Method 6850)
- TAL metals (EPA SW-846 Method 6010C/6020A/7470A)

- Dissolved TAL metals (EPA SW-846 6010C/6020A/7470A )
- Hexavalent chromium (EPA SW-846 Method 7199)

## 4.7.5 Analytical Requirements and Sample Handling

### 4.7.5.1 Sample Preservation and Handling

Sample preservation must occur in the field immediately after collection and will be consistent with the Lot 202 UFP-QAPP (**Appendix D**). The laboratory-supplied containers will contain the appropriate analyte-specific preservative. QA/QC samples will be collected in the same types of preserved containers as the field samples. The preservatives and holding time requirements for analysis are provided in the UFP-QAPP.

### 4.7.5.2 Quality Assurance and Quality Control

QA/QC requirements for environmental sampling, handling, and management are detailed in the MPPs (CH2M HILL, 2008b). Field QC samples (including field blanks, equipment blanks, duplicate samples, and matrix spike/matrix spike duplicate [MS/MSD] samples) will be collected during the investigation and submitted for laboratory analysis. Required QA/QC samples and the required frequency of collection are summarized in Table 2 of the UFP-QAPP (**Appendix D**).

### 4.7.5.3 Sample Collection Frequencies

Table 2 in the UFP-QAPP (**Appendix D**) presents the anticipated number of field samples and their associated QA/QC samples.

### 4.7.5.4 Sample Identification System

The following is a general guide for sample identification; an electronic sample-tracking program will be used to manage the flow of information from the field sampling team to the laboratory and to internal and external data users. The tracking program will manage the entry of sampling-related data, such as station locations and field measurements.

While in the custody of the sampling team, the sample analysis data will be recorded in field log books, along with sample identity information. Labels for samples to be shipped to a fixed-base laboratory will be produced electronically. If they cannot be produced electronically, they must be written legibly in indelible ink.

The following information typically is provided on the sample label:

- Site name or identifier
- Unique sample identification number
- Date and time of sample collection
- Sampler's initials
- Sample matrix or matrix identifier
- Type of analyses to be conducted

Each analytical sample will be assigned a unique number using the following format:

*Site#-Media/Station# or QA/QC-Year/Quarter or Depth Interval*

An explanation of each of these identifiers is given below.

**Site#:** The prefix "L202" will be used to signify the investigation at Lot 202

**Media:** GW = Groundwater  
 TP = Test Pit  
 SS = Surface soil  
 SB = Subsurface soil

**Station#:** Each monitoring well will be identified with a unique identification number. Soil borings will be numbered consecutively.

**QA/QC:** D = Duplicate sample (following sample type/number)  
 FB = Field blank  
 ER = Equipment rinsate

All MS/MSD samples will be entered in the same line as the field sample on the chain-of-custody (COC). The total number of sample containers submitted will be entered on the COC and "MS/MSD" will be indicated in the comments section.

**Year/Quarter#:** Year/Quarter indicators will be used for samples collected from monitoring wells. Each round of sampling will have a distinct identification number:

"14" = year 2014

"B" = Sampling during the second quarter

**Depth Interval:** Depth indicators will be used for subsurface soil samples collected. The number will reference the depth interval (in feet) of the sample: 5-7 = 5 to 7 ft bgs.

Under this sample designation format, "L202-SS01-0-1-14B" would mean the following:

Lot 202 - surface soil sample from location #1 - obtained from 0 to 1 foot bgs – second quarter of 2014

Under this sample designation format, "L202-SB01-5-7-14B" would mean the following:

Lot 202 - subsurface soil sample collected from boring 01 - from 5 to 7 ft bgs – second quarter of 2014

Under this sample designation format, "L202-GW01-14B" would mean the following:

Lot 202 - groundwater sample collected from monitoring well L202-MW01 during the second quarter of 2014.

Under this sample designation format, "L202-TP01-3-4-14B" would mean the following:

Lot 202 – test pit samples collected from test pit 01 - from 3 to 4 ft bgs – second quarter of 2014

This sample designation format will be followed throughout the project. Required deviations to this format in response to field conditions will be documented in the log book.

#### 4.7.5.5 Sample Packaging and Shipping

Samples will be packed in a cooler with bubble wrap packaging material and double-bagged ice. The samples will be either picked up at the site by the analytical laboratory or shipped to the laboratory via overnight courier. The Field Team Leader is responsible for the following activities related to shipment of the samples:

- Verifying that all sample bottles are correctly labeled, sealed, and packaged
- Checking that sample bottles in each cooler correspond to the accompanying COC form
- Affixing a custody seal to each cooler
- Using appropriate labels and forms required for shipment

Custody of the samples will be maintained and documented at all times. COC will begin with the collection of the samples in the field and will continue through the analysis of the sample at the analytical laboratory (sampler's must transfer custody to the person responsible for shipping the samples).

## 4.8 Test Pit Excavations

### 4.8.1 General Test Pit Procedure

This task consists of excavating up to 10 test pits to evaluate the nature of DGM anomalies that may be associated with former waste disposal/burial activities. The test pits will be located based on the DGM results (refer to Section 3.6) and will target areas that exhibit higher geophysical responses and/or indicate the presence of disposal/burial areas. The proposed position of each test pit will be located in the field using GPS and/or civil surveying, and the proposed boundary of the pits will be marked on the ground surface using spray paint and/or pin flags.

A mechanized excavator, such as a track-hoe and bucket, will be used to excavate the test pits. Because there is a potential to encounter MEC, the excavator will be equipped with blast shielding and an extended arm length, in accordance with the ESS. Material will be removed from the excavation in approximate 6- to 12-inch lifts using a controlled lateral scraping method to minimize striking or shocking potential MEC or MPPEH and minimize impacts to potential environmental sources (such as drums or cans). The test pit work environment will continuously be monitored using an FID and/or PID and a combustible gas indicator (CGI). The excavations will be conducted by qualified UXO subcontractors supervised by CH2M HILL UXO personnel. No personnel will enter the excavations.

Each test pit is anticipated to be up to 10 feet long, 3 to 4 feet wide, and to extend to a depth just beneath any identified debris or to a maximum depth of 9 feet bgs (just above the water table, which is estimated to be at 10 ft bgs). Excavations will not extend into the water table. The actual lateral and vertical extent of each excavation will be decided in the field and will be based on the following:

- **Representative Amount of Waste Removed:** If a representative amount of debris or waste has been removed from the anomaly before achieving the proposed excavation dimensions listed above, and the removed material has been characterized, the test pit will be considered complete.
- **Elevated VOCs:** If elevated and sustained VOCs are measured in the work area breathing zone, excavation activities will stop until the source of the VOCs is identified and/or the breathing zone concentrations decrease to a level deemed safe according to the HSP (Appendix B). If the breathing zone concentrations do not decrease, engineering controls and/or personnel protective equipment upgrades will be enacted, and the excavation will be backfilled. The Base will be notified if elevated VOCs readings are encountered.
- **Unidentifiable Drums:** If unidentifiable drums or other types of containers are encountered, excavation work will stop and the Base will be notified. Because this investigation is being conducted for site characterization and is not a removal action, the drums/containers will be left in place in the test pit and the excavation will be backfilled.
- **MEC or MPPEH:** If suspected MEC or MPPEH items are encountered in the test pit, excavation work will stop until the items can be identified in accordance with the ESS (CH2MHILL, 2013a). MEC and MPPEH will be managed according to the ESS.
- **Water Entering the Excavation:** If perched water or the water table (estimated at 10 ft bgs) is encountered and water enters the test pit, excavation work will stop and the pit will be backfilled.
- **Excavation Stability:** An excavation-competent person will continuously evaluate each test pit to maintain safe working conditions in and around the excavation. If unsafe conditions are identified, excavation work will stop.

Debris will be removed from the test pits to an extent that will allow the collection of soil samples (see Section 3.8.2), as needed, from beneath the debris. All material removed from the excavation, with the exception of MEC/MPPEH, will be placed on plastic sheeting adjacent to the excavation for characterization and later backfilling. The surface gravel currently in place will be segregated from other material removed

from the test pits, and will be used as surface cover during backfilling of the pits. Any MEC/MPPEH removed from the test pits will be segregated from other waste and managed according to the ESS (CH2M HILL, 2013a).

Excavations will be backfilled after completion of work each day (no test pit will remain open overnight) and all non-munitions related debris and soil removed from the excavation will be placed back into the test pit. Crushed limestone gravel will be used as final cover and as additional backfill material, where needed. The excavator bucket will be used to compact the backfill material in 1- to 2-foot lifts, as practical based on the type of waste material found.

Information obtained from each excavation will be recorded onto a test pit log and will include the following:

- Project title
- Test pit number and date
- Weather conditions
- General location of the excavation within Lot 202
- Equipment used to excavate the pit
- Description, type, and depth of the material or debris found
- Approximate type and depth of items recovered, including MEC or MPPEH
- Depth and location of each sample collected from the excavation
- Air monitoring (FID/PID and CGI) readings
- Final excavation dimensions (approximate length, width, depth)

Digital photographs will be taken during excavation and sampling activities and will include the following:

- Test pit area before starting excavation activities
- Excavation walls obtained from all sides of the test pit
- Stained soil, debris or other material removed the test pit
- Any MEC or MPPEH item recovered
- Material from which samples are collected
- Excavation area following final backfill/cover of the test pit location

#### 4.8.2 Test Pit Sampling

The material within the anomaly, including soil, may be sampled to evaluate the nature of the material/soil present in Lot 202. Test pit sample locations will be selected in the field and will be based on, but not limited to, the following:

- Suspect or unidentified materials (liquid or solid)
- Locations with elevated FID/PID readings
- Soil staining or burnt material
- Layered material indicating historical backfilling activities

Solid samples will be obtained directly from the excavator bucket or through the use of a hand-auger. Samples should be obtained from the central teeth of the excavator bucket or the material in the center of the bucket where the sample has not likely contacted the sides of the bucket and the origin of the test pit material in the bucket is known. The excavator bucket will be decontaminated between test pits. The hand-auger bucket will be decontaminated following the collection of each sample.

Solid samples obtained from the test pits may be analyzed for the following constituents:

- VOCs, including BTEX (EPA SW-846 8260C)
- SVOCs, including PAHs (EPA SW-846 8270C and 8270SIM)
- PCBs (EPA SW-846 8082)

- Pesticides (EPA SW-846 8081)
- Explosives residues (nitroaromatics and nitramines), including PETN and nitroglycerin (EPA SW-846 Method 8330B)
- Perchlorate (EPA SW-846 Method 6850)
- TAL metals (EPA SW-846 Method 6010C/6020A/7471A)
- Hexavalent chromium (EPA SW-846 Method 7199)

If MEC or MPPEH items are not found in the test pit, the samples will not be analyzed for explosive residues and perchlorate.

Liquids found in the test pits or in open containers in the pits, if sampled, will be collected directly from the excavator bucket into the sample bottles or transferred to the laboratory bottles using a decontaminated glass or plastic container. If required, liquid samples may be obtained using a disposal bailer or peristaltic pump with disposable sample hose. Liquid samples will be analyzed for the same constituents detailed in Section 3.7.4. Unopened containers found in the pit will not be opened or sampled.

## 4.9 Health and Safety Plan

The HSP is provided in **Appendix B**. Because of the potential presence of MEC at this site, anomaly avoidance techniques will be employed throughout the site preparation and environmental sampling. Anomaly avoidance techniques are summarized in the HSP.

## 4.10 Data Management

Documentation and processing of field data, lab data, and investigation results will be completed in accordance with Section 7.2 of the MRP MPPs (CH2M HILL, 2008b).

## 4.11 Investigation Derived Waste

All IDW generated during the field effort will be managed in accordance with MCIEAST-MCB CAMLEJ Investigation and Remediation Waste Management Plan (CH2M HILL, 2013e). IDW may consist of soil cuttings, liquid waste (such as decontamination fluids or purge water), and used personal protective equipment.

## 4.12 Project File Requirements

This project will require the administration of a central project file. Project data and records will be managed in accordance with Section 7.3 of the MPPs (CH2M HILL, 2008b).

## 4.13 Site Restoration and Demobilization

Full demobilization will occur when the investigation is completed. Damage caused by site activities will be repaired to the extent possible and as necessary to prevent erosion. Personnel who are no longer needed during the course of field operations may be demobilized before the final project completion date.

The following activities will occur before demobilization begins:

- All areas to be investigated will be verified as completed.
- Restoration of the site to an appropriate level will be verified.
- All equipment will be inspected, packaged, and shipped to the appropriate location.
- All required environmental samples have been confirmed as collected and shipped for analysis.

- All facilities-support infrastructures will be dismantled and shipped to the appropriate location, and the field site will be returned to the condition existing before mobilization.
- All handling of IDW is confirmed as complete.



**Legend**

- Site 6 Boundary
- Lot 202 DGM Study Area

**Note:**

Portable trailer at north end of site has been removed.  
All storage containers will be removed prior to DGM Study.

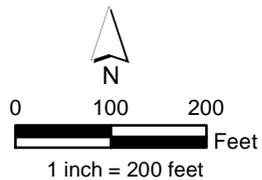


Figure 4-1  
DGM Investigation Area  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Legend**

- ⊕ Proposed Groundwater Monitoring Well, Surface Soil, and Subsurface Soil Sampling Location
- ⊕ Proposed Surface Soil and Subsurface Soil Sampling Location
- Monitoring Well - Surficial Aquifer Well Location
- Approximate Boundary of Lot 202

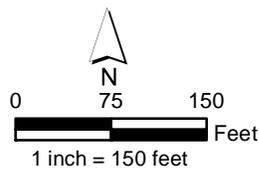


Figure 4-2  
 Proposed Environmental Sampling Locations  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina



## SECTION 5

# References

---

- Baker Environmental, Inc. (Baker). 1993. *Remedial Investigation Report for Operable Unit No. 2 (Sites 6, 9, and 82)*, Marine Corps Base Camp Lejeune, North Carolina. August.
- CH2M HILL. 2008a. *MCB CamLej Munitions Response Program Master Project Plan, Marine Corps Base Camp Lejeune, North Carolina*. May.
- CH2M HILL. 2008b. *Master Project Plans, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*. June.
- CH2M HILL. 2011a. *Draft Expanded Groundwater Background Study Report, Marine Corps Base Camp Lejeune, North Carolina*. September.
- CH2M HILL. 2011c. *Final Expanded Soil Background Study Report, Marine Corps Base Camp Lejeune, North Carolina*. September.
- CH2M HILL. 2012. *Site 6 Supplemental Investigation Technical Memorandum – Interim Results*. Prepared for Marine Corp Installations East – Marine Corp Base Camp Lejeune. February.
- CH2M HILL. 2013a. *Explosives Safety Submission Munitions Response Activities Gun Position Owl (ESS-136), Marine Corps Installations East-Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*. October.
- CH2M HILL. 2013b. *Preliminary Assessment/Site Inspection Report, Site UXO-22 Former Munitions Disposal Area*. Prepared for Marine Corp Installations East – Marine Corp Base Camp Lejeune. April.
- CH2M HILL. 2013c. *Supplemental Investigation Report Sites 6 and 82, Operable Unit No. 2*. Prepared for Marine Corp Installations East – Marine Corp Base Camp Lejeune. September. Draft
- CH2M HILL. 2013d. Information obtained during site visit and personnel interviews. September.
- CH2M HILL. 20113e. *Investigation and Remediation Waste Management Plan, Marine Corps Base Camp Lejeune, North Carolina*. September.
- Department of Defense (DoD). 2007. *DoD Perchlorate Handbook*. May.
- Department of Defense (DoD). 2008. *DoD Environmental Data Quality Workgroup, Guide for Implementing EPA SW-846 Method 8330B*. July.
- Department of the Navy (Navy). 2006. *Streamlining the Assessment, Documentation and Disclosure of the Environmental Condition of Property for Non-BRAC Real Estate Actions*. DON Policy Memorandum 06-06. May.
- Google earth. 2012. Aerial Imagery date: 11/24/12.
- Naval Ordnance Safety and Security Activity (NOSSA). 2011. Instruction 8020.15C. *Explosives Safety Review, Oversight, and Verification of Munitions Responses*. February.
- Rhea Engineers and Consultants, Inc (Rhea). 2010. *Final. Environmental Condition of Property (ECP) Report, Phase II Lot 203 ECP for Property Real Estate DRMO Area, Marine Corps Base Camp Lejeune, North Carolina*. March.
- Thiboutot, S., G. Ampleman, and A.D. Hewitt. 2002. *Guide for Characterization of Sites Contaminated with Energetic Materials*. Technical Report Engineering Research and Development Center/ Cold Regions Research and Engineering Laboratory TR-02-1, United States Army Corps of Engineers, Engineer Research and Development Center.
- United States Environmental Protection Agency (EPA). 2008. *Regional Screening Levels*. September.

United States Environmental Protection Agency (EPA). 2009. *National Primary Drinking Water Standards*. June.

United States Geological Survey (USGS). 2008. *Hydrogeologic Framework of Onslow County, North Carolina*. Scientific Investigations Map 3055.

**Appendix A**  
**Munitions Response Plan**

---

# Munitions Response Plan – Lot 202

---

This munitions response plan for Lot 202 identifies the technical approach, methods, and operational procedures that will be used to execute the disposal of MEC and processing of MPPEH, and provides details regarding the sampling procedures to be implemented after the completion of detonation activities (if required). The appendix also provides the explosives management plan, explosives siting plan, and the quality control plan.

This munitions response plan was developed in accordance with the following applicable documents:

- MCB Camp Lejeune Munitions Response Program Master Project Plan, Marine Corps Base Camp Lejeune, North Carolina (hereinafter referred to as the MRP MPP) (CH2M HILL, 2008a)
- Master Project Plans, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina (herein referred to as the MPPs) (CH2M HILL, 2008b)

In conjunction with this Work Plan, a ***Health and Safety Plan (HSP)*** and an ***Explosives Safety Submission (ESS) (ESS-136)*** (CH2M HILL, 2013a) have been developed to guide the safe performance of this work. The HSP is provided in **Appendix B** of the Work Plan. Because of the potential presence of MEC at this site, the ESS will be submitted to Marine Corps Systems Command (MARCORSYSCOM) and the Department of Defense Explosives Safety Board (DDESB) under separate cover for review and approval. Approval of the ESS must be obtained before any activities involving intentional contact with MEC begins on the site. If activities not involving intentional contact with MEC are conducted prior to ESS approval, MARCORSYSCOM must make a determination that an ESS is not required for these activities and an ESS Determination Request will be submitted for this purpose. Anomaly avoidance techniques provided in the HSP and ESS will be employed during the non-intrusive field investigation activities.

The MR field activities will be conducted in accordance with the guidance documents, regulations, and polices described in Section 2.1 of the MRP MPP (CH2M HILL, 2008a). Based on the history of DoD activities at the site, it is anticipated that if MEC is discovered during field activities, it can be destroyed onsite. Therefore, alternatives to onsite disposal are not identified in this Work Plan. If MEC items are discovered that cannot be identified, MEC contingency procedures will be conducted in accordance with Section 2.2 of the MRP MPP (CH2M HILL, 2008a). Based on the history of DoD activities at the site, it is not anticipated that chemical warfare materiel (CWM) will be discovered. However, if CWM is encountered, all work will immediately cease and CWM contingency procedures will be conducted in accordance with Section 2.3 of the MRP MPP (CH2M HILL, 2008a).

## 1.1 MEC/MPPEH Investigation and Removal Plan

Test pit excavations at Lot 202 will be conducted on select DGM response areas. If MEC or MPPEH is encountered within the test pit excavations, the items will be managed according to this appendix of the Work Plan and the ESS (CH2M HILL, 2013a).

## 1.2 MEC Investigation and Removal Operations

During test pit excavating, MEC or MPPEH may be encountered in the excavation. Any items removed from the excavation will be evaluated by the UXO investigation team according to the ESS (CH2M HILL, 2013a). The UXO teams performing this work will be composed of at least one UXO Technician II and a Technician III.

The following technique will be applied during the test pit excavations:

When a suspected MEC or MPPEH item is uncovered by the excavator, work will immediately stop. Until identified otherwise, the item is assumed to be MEC.

If the suspected MEC or MPPEH item is accessible without entering the excavation, the item will be evaluated in place by the UXO technicians. If the item was removed by the excavator bucket, the item will be evaluated while in the bucket or on the spoils pile.

The UXO team will determine whether the item is MEC, MPPEH, or other non-munitions related debris.

- If the item is MEC, a positive identification will be documented and confirmed by another UXO Technician. If confirmed, the MEC item will be disposed of by BIP methods, or, if the item is safe to move (as confirmed by the Senior UXO Supervisor [SUXOS] and UXO Safety Officer [UXOSO]), the item may be moved for controlled detonation and/or consolidation. For MEC, including suspect munitions items, the SUXOS and UXOSO must conclude that the risk associated with movement is acceptable and that the movement is necessary for the efficiency of the activities being conducted or the protection of people, property, or critical assets. In such cases, the responsible SUXOS and UXOSO must agree with the risk determination and document this decision in writing before moving the MEC or suspect munitions item. UXO qualified personnel may conclude that MPPEH is safe for onsite movement. Written documentation and concurrence of the UXOSO is not required.
- If the item is considered to be other non-munitions related debris, it will be returned to the excavation during backfilling.
- If the item is considered to be MPPEH, the procedures presented below will be followed.

### **1.3 MEC and MPPEH Disposal**

This section discusses the procedures for reporting and disposing of MEC and MPPEH items encountered during the project, including the responsibilities of personnel, overall safety precautions, transportation, safe holding areas, operations in populated or sensitive areas, demolition operations, and required engineering controls and EZs for any intentional detonations.

### **1.4 MEC and MPPEH Disposition**

The MEC and MPPEH disposition process is described in the ESS (CH2M HILL, 2013a).

#### **Controlled Detonation**

MEC will be disposed by controlled detonations, as required, and as outlined in the ESS (CH2M HILL, 2013a).

#### **Overall Demolition Safety Precautions**

The overall safety precautions described in Section 2.5.1 of the MRP MPPs (CH2M HILL, 2008b) will be adhered to during demolition operations. The general responsibilities of project personnel are described in Section 2.4 of the MRP MPP (CH2M HILL, 2008a).

If an item is deemed unsafe to move, it will be blown-in-place. Each required BIP action will be assigned a unique identification number (such as, L202-BIP-1), and the location of the action (latitude and longitude) will be recorded using a GPS unit. The amount and type of charge used during the BIP will be recorded, along with the number and type of items destroyed during each BIP operation.

Demolition operations will be performed by a demolition team consisting of one UXO Technician III as the Demolition Supervisor and two UXO Technician II personnel, with the SUXOS responsible for the operation. UXO personnel involved in the storage and handling of demolitions will be certified in accordance with Marine Corps Order 8023.3B.

If an item is deemed safe to move, as confirmed by the SUXOS and UXOSO, it may be relocated for consolidation. Qualified UXO personnel will dispose of all MEC items using explosives demolition procedures by countercharging these items with an explosive donor charge and detonating the donor charge.

## 1.5 Operations near Populated and Sensitive Areas

Operations will not be conducted in populated areas. Exclusion zones (EZs), which include the team separation distance (TSD) for personnel conducting intrusive operations within the site, the minimum separation distance (MSD) for non-essential personnel, the public transportation route distance, and the inhabited building distance for bare explosives and MPPEH under specified scenarios, are provided in the ESS (CH2M HILL, 2013a).

Explosives safety quantity distance (ESQD) arcs (primary and contingency) were developed based on the munitions with the greatest fragment distance (MGFD) calculations for intentional and unintentional detonations, as shown on **Figures A-1 and A-2**, respectively. The maximum fragment distances-horizontal (MFDs-H) are summarized in **Table A-1**.

TABLE A-1  
Primary and Contingency MGFD for Lot 202

MGFD Type	Munitions Item	MFD-H (ft)
Primary MGFD <sup>1</sup>	MK II Grenade	521
Contingency MGFD <sup>1,2</sup>	3.5 in M28A2 Rocket	1,080

Notes:

<sup>1</sup>From the Fragment Data Review Form updated 16 April 2013 (CH2M HILL, 2013).

<sup>2</sup>The MFD-H for the 3.5 in M28A2 Rocket is 772 ft; however, the distance for the 3.5 in M29 Practice Rocket of 1,080 ft will be utilized for the contingency MGFD.

For controlled detonation operations, engineering controls, including the Buried Explosion Module (BEM) and sandbag mitigation, where authorized, will be utilized in accordance with the ESS. If fragmenting MEC is found with a larger MFD-H than the primary MGFD, usage of the primary MGFD will be discontinued and the ESQD arcs for the contingency MGFD will be used. If the contingency MGFD ESQD arcs are implemented, MARCORSYSCOM will be notified. If the new item's MGFD is larger than the contingency MGFD, work at the site will stop and an ESS amendment will be submitted.

MEC operations will be conducted in accordance with the EPP (**Appendix F**) to be protective of any sensitive areas and all threatened and endangered species. Sensitive areas are not present within Lot 202.

## 1.6 MPPEH Disposal

The MPPEH will be visually inspected and independently re-inspected for explosives hazards in accordance with the requirements of Department of Defense Instruction 4140.62 (DoD, 2008), DoD 4160.21-M, Chapter 4, Paragraph B (DoD, 1997), and Ordnance Pamphlet-5 Volume 1, Chapters 13–15 (Naval Sea Systems Command, 2011). Only UXO-qualified personnel will perform these inspections. A UXO Technician III will perform the 100-percent inspection and document that the MPPEH is free of explosive hazards. In accordance with Ordnance Pamphlet -5, Section 13-15.7.2 (Naval Sea Systems Command, 2011) and/or Department of Defense Instruction 4140.62 (DoD, 2008), the UXO Quality Control Specialist (UXOQCS) will conduct the re-inspection and document that the MPPEH is free of explosive hazards. Upon documentation of these two visual inspections, the MPPEH becomes MDAS.

If the MPPEH cannot be documented as MDAS, then demolition operations will be conducted on the MPPEH. The SUXOS may choose to store such MPPEH for consolidated demolition operations in accordance with the requirements in the ESS. If necessary, demilitarization of the MDAS intended for off-site disposal will be conducted. DD Form 1348-1 (series) will be used as 100 percent inspection and 100 percent re-inspection documentation. All DD 1348-1 (series) forms will clearly show the following information in typed or printed letters:

- Name of SUXOS
- Organization
- Two signatures not in the same chain of command (for example, a UXO Technician III and the UXOQCS)
- The two signatures will be authorized by letter from the contractor to the Commanding Officer Engineering Command, Mid-Atlantic, and via the NAVFAC Mid-Atlantic PM
- Contractor's office
- Field office phone number(s) of the persons certifying and verifying the MDAS
- Basic material content (type of metal - for example, steel or mixed)
- Estimated weight
- Unique identification of each sealed container
- Location where MDAS was obtained
- Seal identification, if different from the unique identification of the sealed container

As part of the transfer of MDAS to an off-Base facility for final disposition, the following statement will be entered on each DD Form 1348-1 (series) and will be signed by the SUXOS and the UXOQCS:

*The material listed on this form has been inspected or processed by DDESB-approved means, as required by DOD policy, and to the best of my knowledge and belief does not pose an explosive hazard.*

## 1.7 Post-Detonation Soil Sampling

The use of explosives during a controlled detonation could potentially affect the surrounding soils. Therefore, soil samples will be collected at locations where controlled detonations are conducted. Composite surface soil samples will be collected from both inside and outside of the detonation crater, using the TR-02-1 sampling method inside the resulting crater, and the incremental sampling method outside of the crater, described as follows. QA/QC samples will be collected in accordance with the UFP-QAPP (**Appendix D**). The Site Manager will coordinate with the task manager, PM, and project chemist to obtain the necessary sampling equipment and laboratory bottles.

### 1.7.1 TR-02-1 Surface Soil Sampling – Inside Crater

Surface soil samples from inside the controlled detonation crater will be collected using the TR-02-1 approach (refer to Section 3.7.1.1). This surface soil sampling will follow the SOPs provided in **Appendix E**.

### 1.7.2 Incremental Surface Soil Sampling – Outside Crater

The use of explosives could also affect the soils ejected from the controlled detonation crater. Therefore, surface soil samples will be collected outside the crater using the incremental sampling method. These surface soil samples will be obtained following the SOPs provided in **Appendix E**. One duplicate sample will be taken from the composited sample collected outside the detonation crater.

### 1.7.3 Sample Analysis

Samples from both inside and outside the detonation crater will be analyzed by a fixed-base laboratory for the following parameters (see **Appendix D**):

- Explosives residues, including PETN and nitroglycerin (SW-846 EPA Method 8330B)
- Perchlorate (SW-846 EPA Method 6850)
- TAL metals including mercury (SW-846 EPA Methods 6010C and 7471B)

Post-detonation soil sampling requirements and handling will follow Section 3.7.5 of this Work Plan.

## 1.8 Explosives Management Plan

Commercial explosives, if needed, will be managed in accordance with Section 3 of the MRP MPP (CH2M HILL, 2008a). Authorization for demolition operations will be obtained from MCIEAST-MCB CAMLEJ Range Control, and notifications will be made to other local agencies and stakeholders, as necessary.

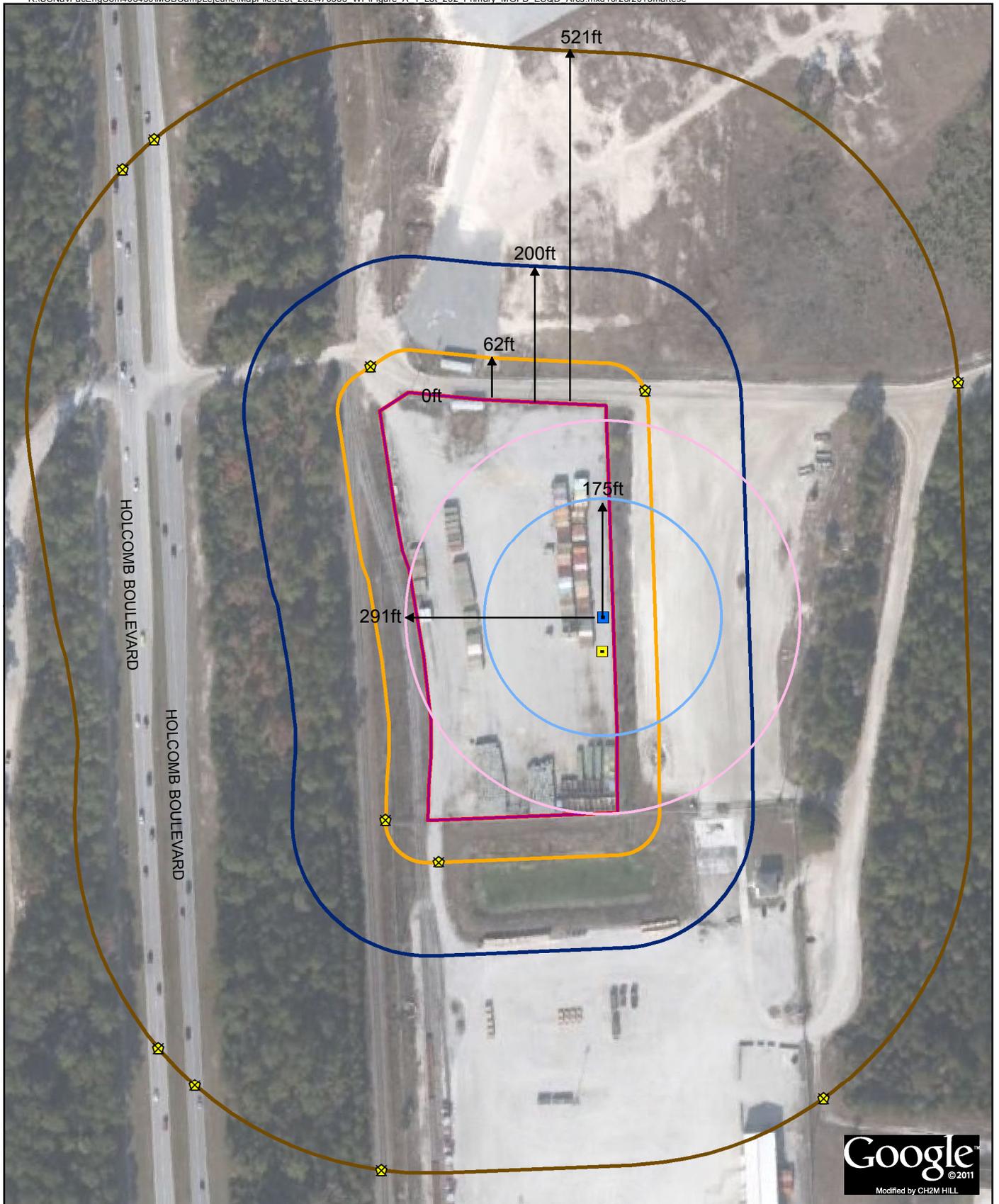
## 1.9 Explosives Siting Plan

Explosives safety criteria for planning and siting explosives operations for the MEC intentional detonation operations at Lot 202 are provided in Section 4 of the MRP MPPs (CH2M HILL, 2008b). There are no planned or established MEC detonation areas. In accordance with the approved ESS, if applicable, MEC and MPPEH items will be BIP where found, or, if the item is safe to move, it may be relocated for controlled demolition (refer to Section 4).

## 1.10 Quality Control Plan

All applicable work conducted by CH2M HILL and its subcontractors at the subject site will be performed in accordance with the Definable Features of Work auditing procedures in Section 7 of the ESS (CH2M HILL, 2013a). QC forms and checklists are also provided in Section 8 of the MRP MPPs (CH2M HILL, 2008b). The QCP is divided into two parts:

- **Section 8.1** addresses environmental investigation activities
- **Section 8.2** addresses MEC-related QA objectives



**Legend**

-  Entry Control Points
-  MPPEH Collection Point
-  MDAS Collection Point
-  MPPEH Collection Point PTR = 175 ft
-  MPPEH Collection Point IBD = 291 ft
-  Intentional Detonation EZ, using BEM, All Personnel = 0 ft
-  Intentional Detonation EZ, Public and Non Essential Personnel = 62 ft
-  Intentional Detonation EZ, using Sandbag Mitigation, All Personnel = 200 ft
-  Intentional Detonation EZ, No Engineering Controls, All Personnel = 521 ft

 Approximate Boundary of Lot 202

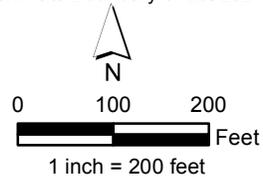
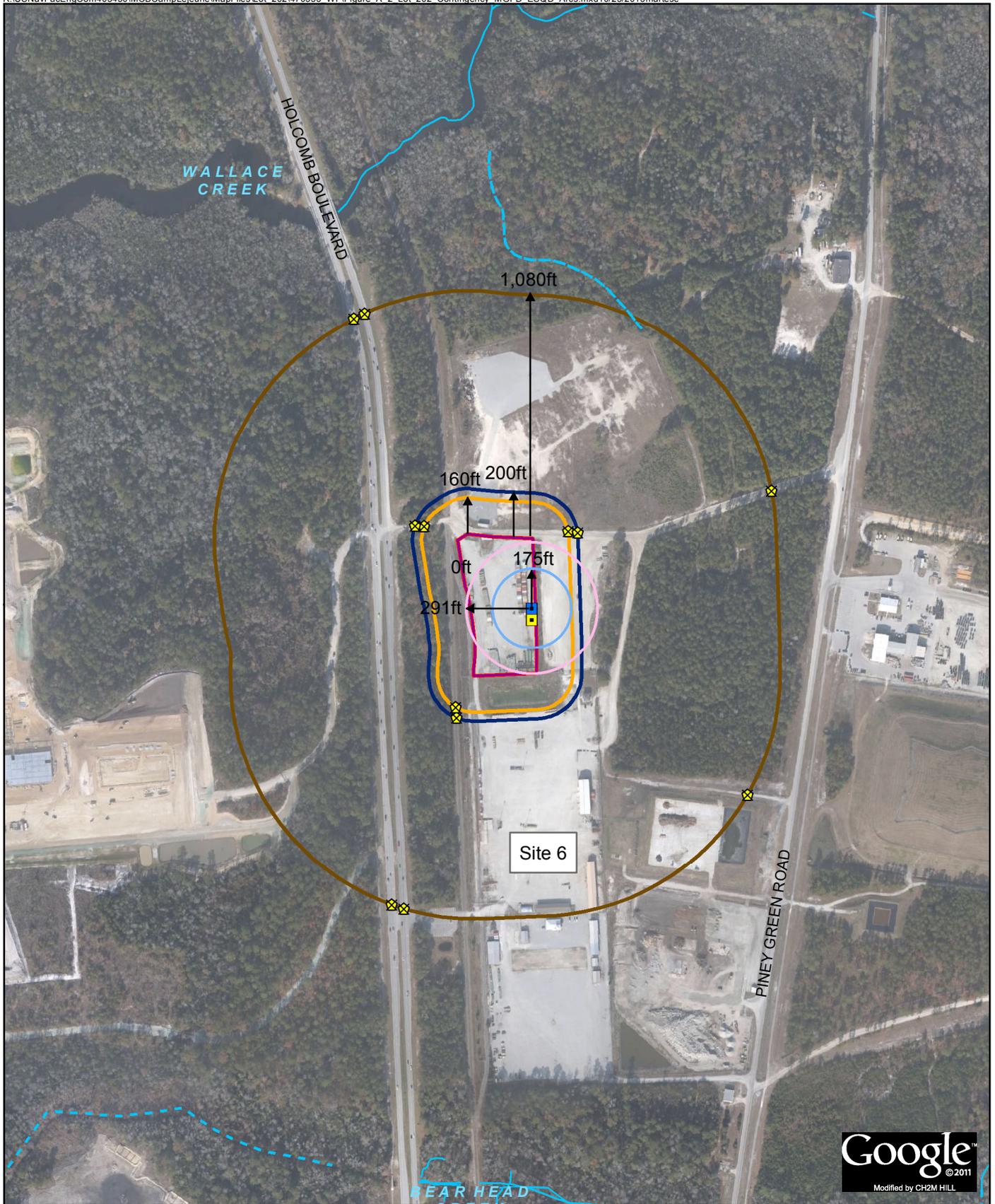


Figure A-1  
 Primary MGF D ESQD Arcs  
 Lot 202 Work Plan  
 MCIEAST-MCB CAMLEJ  
 North Carolina





**Legend**

- ◆ Entry Control Points
- MPPEH Collection Point
- MDAS Collection Point
- MPPEH Collection Point PTR = 175 ft
- MPPEH Collection Point IBD = 291 ft
- Intentional Detonation EZ, using BEM, All Personnel = 0 ft
- Intentional Detonation EZ, Public and Non Essential Personnel = 160 ft
- Intentional Detonation EZ, using Sandbag Mitigation, All Personnel = 200 ft
- Intentional Detonation EZ, No Engineering Controls, All Personnel = 1,080 ft

■ Lot 202

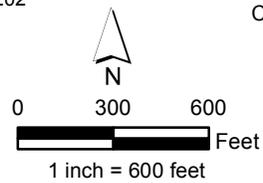


Figure A-2  
Contingency MGF D ESQD Arcs  
Lot 202 Work Plan  
MCIEAST-MCB CAMLEJ  
North Carolina



**Appendix B**  
**Health and Safety Plan**

---

**Environmental Condition of Property Study, Phase II  
Lot 202**

**Maine Corps Installations East-Marine Corps Base Camp Lejeune  
North Carolina**

**Contract Task Order WE99**

**September 2013**

Prepared for

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

Under the

**NAVFAC CLEAN 8012 Program  
Contract No. N62470-11-D-8012**

Prepared by



**Knoxville, Tennessee**

# Contents

---

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1-1</b>
1.1	CH2M HILL POLICY AND COMMITMENT .....	1-2
1.1.1	<i>Safe Work Policy</i> .....	1-2
1.1.2	<i>Health and Safety Commitment</i> .....	1-2
1.1.3	<i>Project-Specific Health, Safety, and the Environment Goals</i> .....	1-2
<b>2.0</b>	<b>APPLICABILITY .....</b>	<b>2-1</b>
<b>3.0</b>	<b>GENERAL PROJECT INFORMATION .....</b>	<b>3-1</b>
3.1	PROJECT INFORMATION AND BACKGROUND .....	3-1
3.2	SITE BACKGROUND AND SETTING .....	3-1
3.3	DESCRIPTION OF TASKS .....	3-2
3.3.1	<i>HAZWOPER-Regulated Tasks</i> .....	3-2
3.3.2	<i>Non-HAZWOPER-Regulated Tasks</i> .....	3-2
<b>4.0</b>	<b>PROJECT ORGANIZATION AND RESPONSIBILITIES .....</b>	<b>4-2</b>
4.1	CLIENT .....	4-2
4.2	CH2M HILL .....	4-2
4.2.1	<i>Project Manager</i> .....	4-2
4.2.2	<i>CH2M HILL Responsible Health and Safety Manager</i> .....	4-3
4.2.3	<i>CH2M HILL Project Environmental Manager</i> .....	4-3
4.2.4	<i>CH2M HILL Safety Coordinator</i> .....	4-4
4.2.5	<i>UXO Safety Officer /UXO Quality Control Specialist</i> .....	4-5
4.3	CH2M HILL SUBCONTRACTORS .....	4-6
4.4	EMPLOYEE RESPONSIBILITIES .....	4-7
4.4.1	<i>Employee Authority</i> .....	4-7
4.5	CLIENT CONTRACTORS .....	4-8
<b>5.0</b>	<b>STANDARDS OF CONDUCT .....</b>	<b>5-1</b>
5.1	STANDARDS OF CONDUCT VIOLATIONS .....	5-1
5.2	DISCIPLINARY ACTIONS .....	5-1
5.3	SUBCONTRACTOR SAFETY PERFORMANCE .....	5-1
5.3.1	<i>Observed Hazard Form</i> .....	5-2
5.3.2	<i>Stop Work Order</i> .....	5-2
5.4	INCENTIVE PROGRAM .....	5-2
5.5	REPORTING UNSAFE CONDITIONS/PRACTICES .....	5-3
<b>6.0</b>	<b>SAFETY PLANNING AND CHANGE MANAGEMENT .....</b>	<b>6-1</b>
6.1	DAILY SAFETY MEETINGS AND PRE-TASK SAFETY PLANS .....	6-1
6.2	CHANGE MANAGEMENT .....	6-1
6.3	AGENCY INSPECTION GUIDANCE .....	6-1
<b>7.0</b>	<b>PROJECT HAZARD ANALYSIS .....</b>	<b>7-2</b>
7.1	ACTIVITY HAZARD ANALYSIS .....	7-2
7.2	SUBCONTRACTOR ACTIVITY HAZARD ANALYSIS .....	7-2
<b>8.0</b>	<b>GENERAL HAZARDS AND CONTROLS .....</b>	<b>8-1</b>
8.1	BLOODBORNE PATHOGENS .....	8-1
8.2	CHEMICAL STORAGE .....	8-1
8.2.1	<i>Storage of Flammable/Combustible Liquids</i> .....	8-1
8.2.2	<i>Indoor Storage of Flammable/Combustible Liquids</i> .....	8-2
8.2.3	<i>Outside Storage of Flammable/Combustible Liquids</i> .....	8-2

8.2.4	Storage of Hazardous Waste .....	8-2
8.2.5	Storage of Chemical Injection Chemicals/Materials.....	8-2
8.3	DRIVING SAFETY.....	8-3
8.4	ELECTRICAL SAFETY .....	8-4
8.5	FIELD VEHICLES.....	8-4
8.6	FIRE PREVENTION .....	8-5
8.6.1	Fire Extinguishers and General Fire Prevention Practices .....	8-5
8.6.2	Dispensing of Flammable/Combustible Liquids.....	8-6
8.7	GENERAL PRACTICES AND HOUSEKEEPING.....	8-6
8.8	HAZARD COMMUNICATION .....	8-7
8.9	KNIFE USE .....	8-7
8.10	LIGHTING .....	8-8
8.11	MANUAL LIFTING.....	8-8
8.12	PERSONAL HYGIENE .....	8-8
8.13	PERSONAL SECURITY .....	8-8
8.14	SHIPPING AND TRANSPORTATION OF HAZARDOUS MATERIALS .....	8-11
8.15	SUBSTANCE ABUSE.....	8-12
<b>9.0</b>	<b>PROJECT-SPECIFIC HAZARD CONTROLS .....</b>	<b>9-1</b>
9.1	CHAINSaws .....	9-1
9.1.1	Equipment.....	9-1
9.1.2	PPE Requirements.....	9-1
9.1.3	Safe Operation.....	9-2
9.1.4	Refueling the Engine.....	9-2
9.2	COMPRESSED GAS CYLINDERS .....	9-3
9.3	CRYSTALLINE SILICA .....	9-3
9.4	DRILLING SAFETY .....	9-4
9.5	DRUM AND PORTABLE TANK HANDLING .....	9-5
9.6	DRUM SAMPLING SAFETY .....	9-6
9.7	EARTHMOVING EQUIPMENT.....	9-6
9.8	EXCAVATION ACTIVITIES .....	9-7
9.9	FORKLIFT OPERATIONS .....	9-8
9.10	GROUNDWATER SAMPLING/WATER LEVEL MEASUREMENTS .....	9-9
9.11	HAND AND POWER TOOLS .....	9-10
9.12	HAUL TRUCKS .....	9-11
9.13	MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) AND/OR MATERIALS POTENTIALLY POSING AN EXPLOSIVES HAZARD (MPPEH).....	9-11
9.13.1	Hazard Identification.....	9-11
9.13.2	Hazard Mitigation/Prevention.....	9-12
9.13.3	MEC Avoidance Procedures.....	9-13
9.14	PORTABLE GENERATOR HAZARDS.....	9-13
9.15	POWDER-ACTUATED TOOLS .....	9-14
9.16	PRESSURE LINE/VESSEL SYSTEMS .....	9-14
9.17	PRESSURE WASHING OPERATIONS.....	9-15
9.18	SLIPS, TRIPS AND FALLS.....	9-15
9.19	TRAFFIC CONTROL.....	9-16
9.20	UNKNOWN OR SUSPECT OBJECTS/MATERIALS.....	9-17
9.21	UTILITIES (UNDERGROUND) .....	9-17
9.22	UTILITIES (OVERHEAD) .....	9-20
9.23	WORKING AROUND MATERIAL HANDLING EQUIPMENT.....	9-20
<b>10.0</b>	<b>PHYSICAL HAZARDS AND CONTROLS .....</b>	<b>10-1</b>
10.1	NOISE.....	10-1
10.2	ULTRAVIOLET RADIATION (SUN EXPOSURE) .....	10-1
10.3	TEMPERATURE EXTREMES.....	10-2
10.3.1	Heat .....	10-3
10.3.2	Cold .....	10-8
10.4	RADIOLOGICAL HAZARDS .....	10-9
<b>11.0</b>	<b>BIOLOGICAL HAZARDS AND CONTROLS.....</b>	<b>11-1</b>

11.1	BEES AND OTHER STINGING INSECTS .....	11-1
11.2	BIRD DROPPINGS .....	11-2
11.3	FERAL DOGS .....	11-2
11.4	MOSQUITO BITES .....	11-2
11.5	POISON IVY, POISON OAK, AND POISON SUMAC .....	11-3
11.6	SNAKES .....	11-4
11.7	SPIDERS - BROWN RECLUSE AND WIDOW .....	11-5
11.8	TICKS.....	11-6
11.8.1	<i>Navy Clean Clothing Options</i> .....	11-7
11.8.2	<i>Skin Treatment</i> .....	11-7
11.8.3	<i>Required Protective Actions</i> .....	11-8
11.8.4	<i>Tick Checks</i> .....	11-9
11.8.5	<i>Tick Bite and Removal</i> .....	11-9
<b>12.0</b>	<b>CONTAMINANTS OF CONCERN .....</b>	<b>12-1</b>
<b>13.0</b>	<b>SITE MONITORING .....</b>	<b>13-1</b>
13.1	DIRECT READING MONITORING SPECIFICATIONS .....	13-1
13.2	CALIBRATION SPECIFICATIONS.....	13-2
<b>14.0</b>	<b>PERSONAL PROTECTIVE EQUIPMENT.....</b>	<b>14-1</b>
14.1	REQUIRED PERSONAL PROTECTIVE EQUIPMENT .....	14-1
14.2	RESPIRATORY PROTECTION .....	14-3
<b>15.0</b>	<b>WORKER TRAINING AND QUALIFICATION.....</b>	<b>15-1</b>
15.1	CH2M HILL WORKER TRAINING.....	15-1
15.1.1	<i>Hazardous Waste Operations Training</i> .....	15-1
15.1.2	<i>First Aid/Cardiopulmonary Resuscitation</i> .....	15-2
15.1.3	<i>Safety Coordinator Training</i> .....	15-2
15.1.4	<i>Site-Specific Training</i> .....	15-2
15.1.5	<i>Project-Specific Training Requirements</i> .....	15-2
<b>16.0</b>	<b>MEDICAL SURVEILLANCE AND QUALIFICATION.....</b>	<b>16-1</b>
16.1	HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE .....	16-1
16.2	JOB OR SITE-SPECIFIC MEDICAL SURVEILLANCE .....	16-1
16.3	RESPIRATOR USER QUALIFICATION.....	16-1
16.4	HEARING CONSERVATION.....	16-1
<b>17.0</b>	<b>SITE-CONTROL PLAN.....</b>	<b>17-1</b>
17.1	SITE-CONTROL PROCEDURES.....	17-1
17.2	REMEDATION WORK AREA ZONES .....	17-1
17.2.1	<i>Support Zone</i> .....	17-1
17.2.2	<i>Contamination Reduction Zone</i> .....	17-1
17.2.3	<i>Exclusion Zone</i> .....	17-2
17.2.4	<i>Other Controlled Areas</i> .....	17-2
<b>18.0</b>	<b>DECONTAMINATION.....</b>	<b>18-1</b>
18.1	CONTAMINATION PREVENTION .....	18-1
18.2	PERSONNEL AND EQUIPMENT DECONTAMINATION .....	18-1
18.3	DECONTAMINATION DURING MEDICAL EMERGENCIES .....	18-2
18.4	WASTE COLLECTION AND DISPOSAL.....	18-2
18.5	DIAGRAM OF PERSONNEL-DECONTAMINATION LINE .....	18-2
<b>19.0</b>	<b>EMERGENCY RESPONSE PLAN.....</b>	<b>19-1</b>
19.1	PRE-EMERGENCY PLANNING .....	19-1
19.2	EMERGENCY EQUIPMENT AND SUPPLIES.....	19-1
19.3	INCIDENT RESPONSE .....	19-2
19.4	EMERGENCY MEDICAL TREATMENT.....	19-2
19.5	EVACUATION .....	19-2

19.6	EVACUATION SIGNALS .....	19-3
19.7	INCLEMENT WEATHER.....	19-3
19.7.1	<i>Tornado Safety</i> .....	19-4
<b>20.0</b>	<b>SPILL CONTAINMENT PROCEDURES.....</b>	<b>20-1</b>
<b>21.0</b>	<b>INSPECTIONS .....</b>	<b>21-1</b>
21.1	MANAGEMENT HEALTH, SAFETY, SECURITY, AND ENVIRONMENT INSPECTIONS .....	21-1
21.2	PROJECT ACTIVITY SELF-ASSESSMENT CHECKLISTS .....	21-1
21.3	SAFE BEHAVIOR OBSERVATIONS .....	21-1
<b>22.0</b>	<b>INCIDENT NOTIFICATION, REPORTING, AND INVESTIGATION .....</b>	<b>22-1</b>
22.1	GENERAL INFORMATION .....	22-1
22.2	SECTION DEFINITIONS .....	22-1
22.3	REPORTING REQUIREMENTS .....	22-2
22.4	HITS SYSTEM AND INCIDENT REPORT FORM .....	22-2
22.5	INJURY MANAGEMENT/RETURN-TO-WORK (FOR US/PUERTO RICO BASED CH2M HILL STAFF ONLY) .....	22-2
22.5.1	<i>Background</i> .....	22-2
22.5.2	<i>The Injury Management/Return-to-Work Notification Process:</i> .....	22-3
22.6	SERIOUS INCIDENT REPORTING REQUIREMENTS .....	22-3
22.6.1	<i>Serious Incident Determination</i> .....	22-3
22.6.2	<i>Serious Incident Reporting</i> .....	22-4
22.7	INCIDENT ROOT CAUSE ANALYSIS .....	22-6
22.7.1	<i>Corrective Actions</i> .....	22-7
<b>23.0</b>	<b>RECORDS AND REPORTS .....</b>	<b>23-1</b>

## ATTACHMENTS

- Attachment 1 Employee Signoff Form – Health and Safety Plan
- Attachment 2 Chemical Inventory/Register Form
- Attachment 3 Chemical-Specific Training Form
- Attachment 4 Project Activity Self-Assessment Checklists/Forms/Permits
- Attachment 5 Key Target Zero Program Elements
- Attachment 6 Fact Sheets
- Attachment 7 Observed Hazard Form
- Attachment 8 Stop Work Order Form
- Attachment 9 Agency Inspection Target Zero Bulletin
- Attachment 10 Completed CH2M HILL AHAs
  - Mobilization/Site Set-up
  - Soil and Groundwater Sampling
  - IDW Handling/Management
  - Demobilization/Cleanup
  - Vegetation Removal
  - Loading Material for Off-Site Disposal
  - MEC Demolition
  - Demobilization
- Attachment 11 Material Safety Data Sheets

# Acronyms and Abbreviations

---

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AHA	Activity Hazard Analysis
ASR	Archival Search Report
Base	Marine Corps Base Camp Lejeune
BDU	bomb dummy unit
CFR	Code of Federal Regulations
CO	carbon monoxide
COC(s)	contaminant(s) of concern
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
CWM	chemical warfare material
dBA	decibels, A-weighted
DDESB	Department of Defense Explosives Safety Board
DEET	N,N-diethyl-meta-toluamide
DOT	U.S. Department of Transportation
EM	environmental manager
EPA	U.S. Environmental Protection Agency
ERC	emergency response coordinator
ESBG	Environmental Services Business Group
ESI	Expanded Site Investigation
ESQD	explosives safety quantity-distance
ESS(s)	Explosives Safety Submission(s)
EZ	Exclusion Zone
FID	flame ionization detector
GFCI(s)	ground fault circuit interrupter(s)
HAZWOPER	hazardous waste operations and emergency response
HEPA	high-efficiency particulate air (filter)
HITS	Hours and Incident Tracking System
HSE	health, safety, and the environment
HSSE	Health, Safety, Security, & Environment
IDW	investigation-derived waste
IRF	Incident Report Form
JATO	jet-assisted take off
kV	kilovolt(s)
LO/TO	lockout/tagout
lpm	liters per minute
lx	lux
MC	munitions constituents
MCB CamLej	Marine Corps Base Camp Lejeune
MEC	munitions and explosives of concern
MGFD(s)	munition(s) with the greatest fragmentation distance
mm	millimeter(s)
MPPEH	material potentially presenting an explosive hazard

MR	munitions response
MRS	Munitions Response Site
MSDS(s)	Material Safety Data Sheet(s)
OSHA	Occupational Safety and Health Administration
PA/SI	Preliminary Assessment/Site Inspection
PEL	permissible exposure limit
PID	photoionization detector
PIM	potentially infectious material
PM	project manager
PPE	personal protective equipment
ppm	parts per million
PTSP(s)	Pre-Task Safety Plan(s)
RCA(s)	Root Cause Analysis (Analyses)
RHSM	Responsible Health and Safety Manager
RMSF	Rocky Mountain spotted fever
SBO(s)	Safe Behavior Observation(s)
SC	safety coordinator
SCBA	self-contained breathing apparatus
SOP(s)	standard operating procedure(s)
HSP	Site Health and Safety Plan
SZ	Support Zone
USACE	U.S. Army Corps of Engineers
UV	ultraviolet
UXO	unexploded ordnance
UXOSO/UXOQCS	UXO safety officer/UXO quality control specialist
VO	Virtual Office (CH2M HILL intranet system)
WP	Work Plan

# 1.0 Approval

---

This site-specific Health and Safety Plan (HSP) has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions and identified scope(s) of work and must be amended if those conditions or scope(s) of work change.

By approving this HSP, the Responsible Health and Safety Manager (RHSM) certifies that the personal protective equipment has been selected based on the project-specific hazard assessment.

## Original Plan

**RHSM Approval:** Carl Woods

**Date:** 9/18/13

---

**Project Manager or  
Field Operations Manager Approval:**

**Date:**

---

## Revisions

**Revisions Made By:**

**Date:**

**Description of Revisions to Plan:**

**Revisions Approved By:**

**Date:**

---

# 1.0 Introduction



## Health, Safety, and Environment Policy Commitment

Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance.

CH2M HILL deploys an integrated, enterprise-wide behavior based HSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for their fellow employees to prevent injuries, illnesses, and adverse environmental impacts, and create a safe, healthy, and environmentally-responsible workplace.
- We provide value to clients by tailoring HSE processes to customer needs and requiring CH2M HILL employees and subcontractors to deliver projects that identify HSE requirements and commit to compliance with applicable HSE laws and regulations, company standards, and external requirements.
- We are committed to pollution prevention in conjunction with our Sustainability Policy and by offering our clients sustainable solutions.
- We aspire to continually improve our performance and influence others to redefine world-class HSE excellence.
- We evaluate our design engineering and physical work environment to verify safe work conditions and practices are established, followed, and corrected as needed.
- We assess and continually improve our HSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely evaluating our program.
- We expect all employees to embrace our Target Zero culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and “walk the talk” on and off the job.

The undersigned pledge our leadership, commitment, and accountability for making this Policy a reality at CH2M HILL.

Dated the 2nd of October, 2012

Lee McIntire  
Chief Executive Officer

Mike Lucki  
Chief Financial Officer

John Madia  
Chief Human Resources Officer

Margaret McLean  
Chief Legal Officer

Mike McKelvy  
President, Government, Environment, and Infrastructure Division

Mike Szomjassy  
President, Energy, Water and Facilities Division

Jacqueline Rast  
President, International Division

Gene Lupia  
President, Government Facilities and Infrastructure Business Group  
Enterprise Delivery Excellence

## 1.1 CH2M HILL Policy and Commitment

### 1.1.1 Safe Work Policy

It is the policy of CH2M HILL to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and we are dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner;
- Stop work immediately to correct any unsafe condition that is encountered; and
- Take corrective actions so that work may proceed in a safe manner.

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into quality control, cost reduction, and job performance, and are crucial to our success.

### 1.1.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for health and safety excellence. The primary driving force behind this commitment to health and safety is simple: employees are CH2M HILL's most significant asset and CH2M HILL management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. CH2M HILL's safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. The ultimate success of CH2M HILL's safety program depends on the full cooperation and participation of each employee.

CH2M HILL management extends its full commitment to health and safety excellence.

### 1.1.3 Project-Specific Health, Safety, and the Environment Goals

All management and employees are to strive to meet the project-specific Health, Safety, and the Environment (HSE) goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The Project has established eleven specific goals and objectives:

- Create an injury-free environment;
- Have zero injuries or incidents;

- Provide management leadership for HSE by communicating performance expectations, reviewing and tracking performance, and leading by example;
- Ensure effective implementation of the HSP through education, delegation, and team work;
- Ensure 100 percent participation in HSE compliance;
- Continuously improve our safety performance;
- Maintain free and open lines of communication;
- Make a personal commitment to safety as a value;
- Focus safety improvements on high-risk groups;
- Continue strong employee involvement initiatives; and
- Achieve health and safety excellence.

## 2.0 Applicability

This HSP applies to:

- All CH2M HILL staff, including subcontractors and tiered subcontractors of CH2M HILL working on the site; and
- All visitors to the construction site in the custody of CH2M HILL (including visitors from the Client, the Government, the public, and other staff of any CH2M HILL company).

This HSP does not apply to the third-party contractors, their workers, their subcontractors, their visitors, or any other persons not under the direct control or custody of CH2M HILL.

This HSP defines the procedures and requirements for the health and safety of CH2M HILL staff and visitors when they are physically on the work site. The work site includes the project area (as defined by the contract documents) and the project offices, trailers, and facilities thereon.

This HSP will be kept onsite during field activities and will be reviewed as necessary. The HSP will be amended or revised as project activities or conditions change or when supplemental information becomes available. The HSP adopts, by reference, the Enterprise-wide Core Standards and Standard Operating Procedures (SOPs), as appropriate. In addition, the HSP may adopt procedures from the project Work Plan and any governing regulations. If there is a contradiction between this HSP and any

All CH2M HILL staff and subcontractors must sign the employee sign-off form included in this document as Attachment 1 to acknowledge review of this document. Copies of the signature page will be maintained onsite by the Safety Coordinator (SC).

## 3.0 General Project Information

### 3.1 Project Information and Background

**Project Number:** 470553

**CLIENT:** NAVFAC Atlantic

**PROJECT/SITE NAME:** NAVFAC CLEAN 8012, CTO-WE99 Environmental Condition of Property Study, Phase II, Lot 202 Munitions Response Site (MRS), Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ)

**SITE ADDRESS:** East of Holcomb Blvd and east of Piney Green Rd, Camp Lejeune, North Carolina

**CH2M HILL PROJECT MANAGER:** Keith LaTorre/KNV

**CH2M HILL OFFICE:** Knoxville, Tennessee

**DATE HSP Prepared:** September 2013

**Date(s) of Site Work:** Estimated January 2014

### 3.2 Site Background and Setting

Lot 202 is an approximate 5 acre Container Storage area located between Holcomb Boulevard and Piney Green Road within the northern portion of MCIEAST-MCB CAMLEJ. The site consists of relatively flat terrain that is situated north of Bearhead Creek and south of Wallace Creek (**Figure 1-1**). A railroad line borders the western edge of the property and Defense Utilization and Materials Office (DRMO) Lot 203 borders the site to the north. The surface of Lot 201 is currently covered by an estimated 18-inch thick layer of crushed gravel.

MCIEAST-MCB CAMLEJ storage Lot 201 is considered part of Operable Unit 02 (OU2). The lot was historically used for disposal and storage of waste and supplies, including pesticides, transformers containing polychlorinated biphenyls (PCBs), solvents, electrolytes, and waste oils.

Lot 201 is currently used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies (**Figure 2**).

### 3.3 Description of Tasks

All CH2M HILL and Subcontractor employees engaging in hazardous waste operations (HAZWOPER) or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65 (or if required by Subcontract). Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities. See the following tasks that fall under HAZWOPER requirements.

*Lot 202 has the potential to contain MEC, material potentially presenting an explosive hazard (MPPEH) and/or environmental contamination with MC. Because of the historical activities that may have occurred within this site, investigation work is being conducted to accomplish the following:*

- Perform a site visit/walk-over to assess any areas where potential spills or burial/disposal actions may have occurred.
- Perform underground utility locating within the proposed work area.
- Perform civil surveying to establish the proposed geophysical investigation areas and the proposed sampling locations.
- Conduct digital geophysical mapping (DGM) within the site to assess potential burial or waste disposal areas.
- Excavate test pits within the site to evaluate the presence of buried/disposed waste. Collect environmental samples from the test pits.
- Install groundwater monitoring wells.
- Collect soil samples (surface and subsurface) and groundwater samples for laboratory analysis.
- Manage any material potentially presenting an explosive hazard (MPPEH) or munitions and explosives of concern (MEC) found within the work area. MEC will be managed via demolition and disposal. Also manage material documented as safe (MDAS), and any investigation-derived waste (IDW), as required.

#### 3.3.1 HAZWOPER-Regulated Tasks

- Test pit excavating and sampling
- MEC management, demolition and disposal (blasting operations)
- Monitoring well installation
- Soil and groundwater sampling
- IDW management

#### 3.3.2 Non-HAZWOPER-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. The following tasks do not involve exposure to safety or health hazards associated with the hazardous waste operations. Hazwoper training or medical requirements do not apply for the tasks listed below.

**TASKS**

- Mobilization/ Demobilization
- Site visit
- Surveying
- Utility locating
- DGM survey

**CONTROLS**

- Brief on hazards, limits of access, and emergency procedures.
- Post areas of contamination as appropriate.
- Perform air sampling/ monitoring as specified in this HSP.

# Site Maps

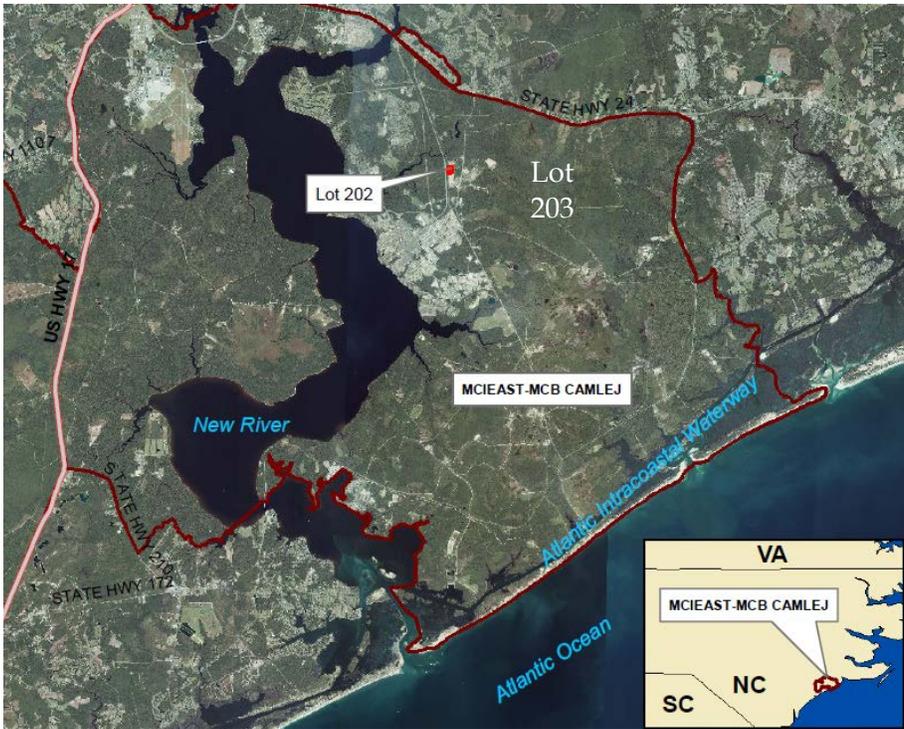


Figure 1. Location of Lot 202



Figure 2. Lot 202

## 4.0 Project Organization and Responsibilities

### 4.1 Client

#### Client Contact

Bryan Beck, P.E.  
CIV NAVFAC Mid-Atlantic  
NC IPT, EV Business Line  
6506 Hampton Blvd  
Norfolk, Virginia 23508-1278

#### Base Contact

Charity (Rychak) Delaney, P. E.  
GF/EMD/EQB  
Building 12  
Camp Lejeune, NC 28542-0004  
Direct (910) 451-9385  
Fax: (910) 451-5997  
[charity.rychak@usmc.mil](mailto:charity.rychak@usmc.mil)

### 4.2 CH2M HILL

#### 4.2.1 Project Manager

Name: Keith LaTorre  
CH2M HILL Office: KNV  
Telephone Number: (865) 769-3204  
Cellular Number: (865)323-3300

The project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
  - Choosing potential subcontractors based on technical ability and HSE performance;
  - Implementing the subcontractor prequalification process;
  - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award; and
  - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization.
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices per the site-specific safety plans and procedures.
- Manage the site and interfacing with 3<sup>rd</sup> parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.

- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Promptly report all work-related HSE incidents or near misses.
- Wear any required personal protective equipment.
- Ensure CH2M HILL employees complete required HSE training within established timelines.
- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes and training.

#### 4.2.2 CH2M HILL Responsible Health and Safety Manager

Name: Carl Woods CH2M HILL Office: CIN Telephone Number: (513) 889-5771 Cellular Number: (513) 319-5771
--

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process;
- Approve HSP and its revisions as well as Activity Hazard Analyses (AHA);
- Review and evaluate subcontractor site-specific safety procedures for adequacy prior to start of subcontractor’s field operations;
- Support the oversight (or SC’s direct oversight) of subcontractor and tiered subcontractor HSE practices;
- Permit upgrades and downgrades in respiratory protection after reviewing analytical data;
- Conduct audits as determined by project schedule and coordination with PM; and
- Participate in incident investigations, lessons learned, loss and near loss reporting.

#### 4.2.3 CH2M HILL Project Environmental Manager

EM Name: Hope Wilson CH2M HILL Office: ATL Telephone Number: 678-530-4226 Cellular Number: 678-656-5411
--

The Project EM is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan;
- Review and evaluate qualifications for subcontractors with a history of environmental non-compliance and for waste transportation and disposal subcontractors;

- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements; and
- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

#### 4.2.4 CH2M HILL Safety Coordinator

SC Name: TBD CH2M HILL Office: Telephone Number: Cellular Number:
--

The SC is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify this HSP is current and amended when project activities or conditions change;
- Verify CH2M HILL site personnel and subcontractor personnel read the HSP and sign the Employee Sign-Off Form, prior to commencing field activities;
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, among others) and medical surveillance as identified in this HSP;
- Verify that project files include copies of subcontractor training and medical monitoring records, and accepted site-specific safety procedures prior to start of subcontractor’s field operations;
- Act as the project “Hazard Communication Coordinator” and perform the responsibilities outlined in the HSP;
- Act as the project “Emergency Response Coordinator” and perform the responsibilities outlined in the HSP;
- Post the Occupational Safety and Health Administration (OSHA) job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. If you work in a state with an OSHA State Plan, make sure the State Plan poster is posted, if required;
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change);
- Verify that project health and safety forms and permits are being used as outlined this HSP;
- Perform oversight and assessments of subcontractor HSE practices per the site-specific safety plan and verify that project activity self-assessment checklists are being used as outlined this HSP;
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and 3<sup>rd</sup> party interfaces;
- Verify appropriate personal protective equipment (PPE) use, availability, and training;
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented;
- Conduct accident investigations including root cause analysis;
- Calibrate and conduct air monitoring in accordance with the HSP; maintain all air monitoring records in project file;
- Maintain HSE records and documentation;
- Facilitate OSHA or other government agency inspections including accompanying inspector and providing all necessary documentation and follow-up;

- Deliver field HSE training as needed based on project-specific hazards and activities;
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites;
- Wear any required personal protective equipment;
- Conduct, cooperate, or assist with HSE incident investigations;
- Contact the PM and RHSM when standards of conduct or CH2M HILL Policy 203 has been violated by a CH2M HILL employee;
- Contact the RHSM and PM in the event of an incident;
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required;
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate; and
- Document all verbal health and safety-related communications in project field logbook, daily reports, or other records.

#### 4.2.5 UXO Safety Officer /UXO Quality Control Specialist

Name: TBD CH2M HILL Office: Telephone Number: Cellular Number:
---

The UXO safety officer/UXO quality control specialist (UXOSO/UXOQCS) for this project will report directly to the PM on issues pertaining to the MEC operations at the sites. The UXOSO/UXOQCS will have the following safety and health-related responsibilities:

- Report directly to the CH2M HILL PM
- Manage the funding, manpower, and equipment necessary to safely conduct site operations
- Review and become familiar with the project WP and this HSP
- Provide copies of the WP and HSP to site personnel
- Review the scope of work and ensure that the required safety and health elements are addressed in this HSP and/or WP
- Coordinate the assignment of personnel and ensure that the personnel and equipment provided meet the requirements of the WP and this HSP
- Ensure that project quality, safety and health procedures area implemented
- Conduct early detection and identification of potential problem areas, including safety and health matters, and institute corrective measures
- Interface directly with the PM and advise him of safety and health matters related to conduct of the site operations
- Act as the On-Scene Incident Commander in a MEC emergency, notifying and coordinating with offsite emergency and medical response agencies.

### 4.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts and Subcontracts*)

Test Pit Excavation and UXO : USAE  
Contact: Matt Tucker  
Telephone: 813-343-6400

IDW Disposal : TBD  
Contact:  
Telephone:

Laboratory : TBD  
Contact: TBD  
Telephone: TBD

Surveying: TBD  
Contact: TBD  
Telephone: TBD

Utility Locating: TBD  
Contact Name: TBD  
Telephone: TBD

Drilling and Well Installation: TBD  
Contact Name: TBD  
Telephone: TBD

Data Validation: TBD  
Contact Name: TBD  
Telephone: TBD

Subcontractors must comply with the following activities, and are responsible to:

- Comply with all local, state, and federal safety standards;
- Comply with project and owner safety requirements;
- Actively participate in the project safety program and either hold or attend and participate in all required safety meetings;
- Provide a qualified safety representative to interface with CH2M HILL;
- Maintain safety equipment and PPE for their employees;
- Maintain and replace safety protection systems damaged or removed by the subcontractor's operations;
- Notify the SC of any accident, injury, or incident (including spills or releases) immediately and submit reports to CH2M HILL within 24 hours;
- Install contractually required general conditions for safety (for example, handrail, fencing, fall protection systems, floor opening covers);
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas;
- Conduct site-specific and job-specific training for all subcontractor employees, including review of the CH2M HILL HSP, subcontractor HSPs, and subcontractor AHAs and sign appropriate sign-off forms; and
- Determine and implement necessary controls and corrective actions to correct unsafe conditions.

The subcontractors listed above may be required to submit their own site-specific HSP and other plans such as lead or asbestos abatement compliance plans. Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit their plans to CH2M HILL for review and acceptance before the start of field work.

Subcontractors are also required to prepare AHAs before beginning each activity posing hazards to their personnel. The AHA shall identify the principle steps of the activity, potential health and safety hazards for each step and recommended control measures for each identified hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements, and training requirements for the safe operation of the equipment listed must be identified.

## 4.4 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

Each employee is responsible for the following performance objectives:

- Understanding and abiding by CH2M HILL and client HSE programs, rules, procedures, processes, and training, including any that are project-specific;
- Completing all required HSE training made available and accessible within established timelines;
- Always wearing any required personal protective equipment;
- Intervening or stopping work for you or other CH2M HILL employees when an unsafe condition or behavior is encountered or observed, and/or when an environmentally compromising condition exists;
- Promptly notifying a supervisor, PM, SC, or RHSM when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition exists;
- Promptly reporting a supervisor, PM, SC, or RHSM all work-related health, safety , and environmental incidents or near misses;
- Attending required project HSE pre-task briefings and meeting prior to performing work; and
- Cooperating or assisting with HSE incident investigations.

### 4.4.1 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work and during employee orientation, each employee will be informed of their authority to do so.

## 4.5 Client Contractors

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts and HSE Management Practices*)

Contractor: N/A Contact Name: Telephone: Contractor Task(s):
---

This HSP does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (such as advising on health and safety issues). In addition to these instructions, CH2M HILL team members should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Self-assessment checklists are to be used by the SC and CH2M HILL team members to review the contractor's performance only as it pertains to evaluating CH2M HILL exposure and safety. The RHSM is the only person who is authorized to comment on or approve contractor safety procedures.

Health and safety-related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL team members on the precautions related to the contractor's work;
- When an apparent contractor non-compliance or unsafe condition or practice poses a risk to CH2M HILL team members:
  - Notify the contractor safety representative;
  - Request that the contractor determine and implement corrective actions;
  - If necessary, stop affected CH2M HILL work until contractor corrects the condition or practice; and
  - Notify the client, PM, and RHSM as appropriate.

If apparent contractor non-compliance or unsafe conditions or practices are observed, inform the contractor safety representative (CH2M HILL's obligation is limited strictly to informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative (CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

All verbal health and safety-related communications will be documented in project field logbook, daily reports, or other records.

## 5.0 Standards of Conduct

All individuals associated with this project must work injury-free and drug-free and must comply with the following standards of conduct, the HSP, and the safety requirements of CH2M HILL. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts.

### 5.1 Standards of Conduct Violations

All individuals associated with this project are expected to behave in a professional manner. Violations of the standards of conduct would include, but not be limited to:

- Failure to perform work;
- Inefficient performance, incompetence, or neglect of work;
- Willful refusal to perform work as directed (insubordination);
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions;
- Unexcused or excessive absence or tardiness;
- Unwillingness or inability to work in harmony with others;
- Discourtesy, irritation, friction, or other conduct that creates disharmony;
- Harassment or discrimination against another individual;
- Failure to be prepared for work by wearing the appropriate construction clothing or bringing the necessary tools; or
- Violation of any other commonly accepted reasonable rule of responsible personal conduct.

### 5.2 Disciplinary Actions

The Environmental Services (ES) business group employees, employees working on ES business group projects, and subcontractor employees are subject to disciplinary action for not following HSE rules and requirements. Potential disciplinary action is equally applicable to all employees including management and supervision. Disciplinary action may include denial of access to the worksite, warnings, reprimands, and other actions up to and including termination depending on the specific circumstances.

### 5.3 Subcontractor Safety Performance

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their plans and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

### 5.3.1 Observed Hazard Form

When apparent non-compliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor or safety representative verbally, and document using the Observed Hazard Form, included as an attachment to this HSP, and require corrective action.

If necessary, stop subcontractor's work using the Stop Work Order Form until corrective actions is implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document corrective actions have been taken. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.

### 5.3.2 Stop Work Order

CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work in the event any CH2M HILL employee observes unsafe conditions or failure of the subcontractor to adhere to its safe-work practices, or observes a condition or practice that may result in a release or violation of an environmental requirement. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor staff from the danger, notify the subcontractor's supervisor or safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, Contract Administrator (KA) and RHSM.

When repeated non-compliance or unsafe conditions are observed, notify the subcontractor's supervisor or safety representative and stop affected work by completing and delivering the Stop Work Order Form (attached to this HSP) until adequate corrective measures are implemented. Consult the KA to determine what the contract dictates for actions to pursue in event of subcontractor non-compliance including work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, or termination of subcontractor for cause.

## 5.4 Incentive Program

Each project is encouraged to implement a safety incentive program that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, or stopping a crew member from doing something unsafe. The program will operate throughout the project, covering all workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

## 5.5 Reporting Unsafe Conditions/Practices

Responsibility for effective health and safety management extends to all levels of the project and requires good communication between employees, supervisors, and management. Accident prevention requires a pro-active policy on near misses, close calls, unsafe conditions, and unsafe practices. All personnel must report any situation, practice, or condition which might jeopardize the safety of our projects. All unsafe conditions or unsafe practices will be corrected immediately. CH2M HILL has zero tolerance of unsafe conditions or unsafe practices.

No employee or supervisor will be disciplined for reporting unsafe conditions or practices. Individuals involved in reporting the unsafe conditions or practices will remain anonymous.

The following reporting procedures will be followed by all project employees:

- Upon detection of any unsafe condition or practice, the responsible employee will attempt to safely correct the condition;
- The unsafe condition or practice will be brought to the attention of the worker's direct supervisor, unless the unsafe condition or practice involves the employee's direct supervisor. If so, the SC needs to be notified at once by the responsible employee;
- Either the responsible employee or responsible employee's direct supervisor is responsible for immediately reporting the unsafe condition or practice to the SC;
- The SC will act promptly to correct the unsafe condition or practice; and
- Details of the incident or situation will be recorded by the SC in the field logbook or use the Observed Hazard Form if subcontractor was involved.

## 6.0 Safety Planning and Change Management

### 6.1 Daily Safety Meetings and Pre-Task Safety Plans

Daily safety meetings are to be held with all project personnel in attendance to review the hazards posed and required HSE procedures and AHAs that apply for each day's project activities. The Pre-Task Safety Plans (PTSPs) serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews.

At the start of each day's activities, the crew supervisor completes the PTSP, provided as an attachment to this HSP, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required HSE procedures, as identified in the HSP and AHA. The use of PTSPs promotes worker participation in the hazard recognition and control process while reinforcing the task-specific hazard and required HSE procedures with the crew each day.

### 6.2 Change Management

This HSP addresses all known activities and associated hazards. As work progresses, if significant changes are identified which could affect health and safety at the site, coordinate with the RHSM to determine whether a HSP update is necessary.

The following are examples of changes that may require a revision to the plan:

- Change in CH2M HILL staff;
- New subcontractor to perform work;
- New chemicals brought to site for use;
- Change in scope or addition of new tasks;
- Change in contaminants of concern (COCs) or change in concentrations of COCs; and
- New hazards or hazards not previously identified that are not addressed in this HSP.

### 6.3 Agency Inspection Guidance

(Reference CH2M HILL SOP HSE-201, *Agency Inspections and Communications*)

Agency inspections (e.g., OSHA, EPA, other regulatory agencies) are on the rise. CH2M HILL implements safety and environmental programs in order to ensure safety to workers, the public, and the environment. This plan addresses things like labeling containers, completing the hazard communication training using the attachments to this HSP, listing training requirements and PPE requirements, and addressing project-specific hazards. Field personnel need to contact the RHSM to update this plan if hazards are encountered that are not addressed.

[SOP HSE-201](#) addresses agency inspections in detail, and the attached **Target Zero Bulletin on Agency Inspections** provides a good summary of the inspection process and what to do if an agency such as OSHA or EPA shows up at the site. It is critical to make immediate notification to the RHSM if an inspector arrives (and EM if it is environmental-related); they can help facilitate and make additional notifications.

Review the Target Zero Bulletin and keep it with your Health and Safety Plan/Environmental Plan. Make it a topic at a safety meeting and keep it readily available in the event of an inspection.

## 7.0 Project Hazard Analysis

A health and safety risk analysis (Table 1) has been performed for each task. In the order listed below, the RHSM considers the various methods for mitigating the hazards. Employees are trained on this hierarchy of controls during their hazardous waste training and reminded of them throughout the execution of projects:

- Elimination of the hazards (use remote sampling methodology to avoid going into a confined space);
- Substitution (reduce exposure to vapors by using of a geoprobe instead of test pitting);
- Engineering controls (ventilate a confined space to improve air quality);
- Warnings (establish exclusion zones to keep untrained people away from hazardous waste work);
- Administrative controls (implement a work-rest schedule to reduce chance of heat stress); or
- Use of PPE (use of respirators when action levels are exceeded).

The hazard controls and safe work practices are summarized in the following sections of this HSP:

- General hazards and controls;
- Project-specific hazards and controls;
- Physical hazards and controls;
- Biological hazards and controls; and
- Contaminants of concern.

### 7.1 Activity Hazard Analysis

An AHA must be developed for each CH2M HILL job activity. The AHA shall define the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements to be performed and training requirements for the safe operation of the equipment listed must be identified. Workers are briefed on the AHA before performing the work and their input is solicited prior, during, and after the performance of work to further identify the hazards posed and control measures required. The AHA shall identify the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard.

The following hazard controls and applicable CH2M HILL core standards and SOPs should be used as a basis for preparing AHAs.

AHAs prepared for CH2M HILL activities are included as an attachment to this HSP.

### 7.2 Subcontractor Activity Hazard Analysis

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their scope of work, along with their project-specific safety plan and procedures. Additions or changes in field activities, equipment, tools, or material used to perform work or hazards not addressed in existing AHAs requires either a new AHA to be prepared or an existing AHA to be revised.

Table 1 – General Activity Hazard Analysis

Potential Hazard	Mobilization/ Demobilization	Surveying and Utility Location	MEC Demolition and Disposal	Test Pit Excavating	Drilling, Soil and Groundwater Sampling	IDW Management
Biological Hazards	X	X	X	X	X	X
Chain Saw/Brush Cutter						
Chemical Hazard	X		X	X	X	X
Drum Handling/Sampling	X		X	X	X	X
Electrical Safety		X		X	X	
Excavations			X	X		X
Explosives Usage or Munitions Response (MR)			X	X		
Field Vehicles	X	X	X	X	X	X
Fire Prevention	X	X	X	X	X	X
Forklifts			X			X
Hand & Power Tools	X	X	X	X	X	X
Knife Use	X				X	
Manual Lifting	X	X	X	X	X	X
MEC/MPPEH	X	X	X	X	X	X
Noise			X	X	X	
Temperature Extremes	X	X	X	X	X	X
Traffic Control	X	X	X	X	X	X
Ultraviolet Light exposure (sunburn)	X	X	X	X	X	X
Utilities (underground/overhead)		X	X	X	X	
Working around Material Handling Equipment	X	X	X	X	X	X

## 8.0 General Hazards and Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. It is a summarized list of requirements. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented.

### 8.1 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne pathogens computer-based training module annually. When performing first-aid/CPR the following shall apply:

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials;
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes; and
- If necessary, decontaminate all potentially contaminated equipment and surfaces with chlorine bleach as soon as possible. Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. This examination includes the following procedures:

- Documenting the exposure;
- Testing the exposed employee's and the source individual's blood (with consent); and
- Administering post-exposure prophylaxis.

### 8.2 Chemical Storage

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases;
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals);
- Keep flammables and corrosives in appropriate storage cabinets;
- Do not store paper or other combustibles near flammables;
- Use secondary containment and lipped shelving that is secured; and
- Have a fire suppression system available.

#### 8.2.1 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (19 liters) or less. Do not use plastic gas cans.
- For quantities of 1 gallon (3.78 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

### 8.2.2 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (95 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (95 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (228 liters) of flammable or 120 gallons (456 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

### 8.2.3 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [228 liters] each) shall not exceed 1,100 gallons (4180 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas may not be located near a storm drain. Overflow and spills must be diverted away from storm drains or surface waters.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

### 8.2.4 Storage of Hazardous Waste

- All facilities storing ignitable and combustible liquids and hazardous wastes must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any release of hazardous constituents.
- Flammable wastes should be stored more than 50 feet from the property line.

### 8.2.5 Storage of Chemical Injection Chemicals/Materials

When chemical injection remediation technologies are being used at a site, the following storage guidelines must be followed:

- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or National Fire Codes. Verify that appropriate storage provisions are in place prior to starting work.

**NOTE:** Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals such as potassium permanganate and hydrogen peroxide may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security – the applicability depends on the chemical, quantity/concentration, and type of facility.

Please contact the project Environmental Manager to determine whether chemicals are subject to these standards.

- Injection chemicals must be stored in a designated, secured area with spill prevention capabilities. Review MSDS or other information to determine potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

### 8.3 Driving Safety

(Reference CH2M HILL HSE Policy 205, Distracted Driving – Wireless Devices, Vehicle Safety Core Standard)

All CH2M HILL employees are prohibited from using Wireless Devices while operating a Motor Vehicle when conducting company business regardless of the location or vehicle ownership and whether or not during regular working hours.

All CH2M HILL contractors and subcontractors are prohibited from using Wireless Devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented Motor Vehicle, or while operating any other Motor Vehicle on the project site.

- Prohibited use includes the following:
  - Dialing or speed dialing
  - Using a hands-free or voice recognition (blue tooth) device to dial or speed dial
  - Engaging in conversation or listening to a conversation using a Wireless Device
  - Checking emails or surfing the internet using a Wireless Device
  - Texting or e-mailing (reading, sending, or screening) with a Wireless Device
  - Programming or entering coordinates into a global positioning system (GPS) device (following directions by a GPS is permitted)
  - Using a Wireless Device for voice recording or dictation
- Employees, contractors, and subcontractors who need to use a wireless device must pull off the road to a safe location, with the vehicle securely stopped and emergency flashers on, or wait until they reach their destination.
- Avoid distractions from mobile phones, smartphones, voice recognition systems, PDAs, notebook, tablets (or similar devices), or laptops, by turning off or silencing the wireless devices before operating a motor vehicle.

Follow the guidelines below when operating a vehicle:

- Obey speed limits; be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you;
- Do not drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep;
- Maintain focus on driving. Eating, drinking, smoking, adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving; and
- Ensure vehicle drivers are familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles.

## 8.4 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed:

- Only qualified personnel are permitted to work on unprotected energized electrical systems;
- Only authorized personnel are permitted to enter high-voltage areas;
- CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office;
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented;
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service;
- CH2M HILL has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock;
  - GFCIs shall be used on all 120-volt, single phase 15 and 20-ampere receptacle outlets which are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
  - GFCIs cannot be utilized;
  - Client requires such a program to be implemented; or
  - Business group decides to implement program in addition to GFCI protection.
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire;
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory (UL) approved;
- Operate and maintain electric power tools and equipment according to manufacturers' instructions;
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet (3 meters) from overhead power lines for voltages of 50 kV or less, and 10 feet (3 meters) plus 0.4 inches (1.0 cm) for every 1 kV over 50 kV;
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage; and
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

## 8.5 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.

- Maintain a first aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.
- Familiarize yourself with rental vehicle features prior to operating the vehicle:
  - Vision Fields and Blind Spots
  - Vehicle Size
  - Mirror adjustments
  - Seat adjustments
  - Cruise control features, if offered
  - Pre-program radio stations and Global Positioning System (GPS), if equipped
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See the Vehicle Accident Guidance attached to this HSP, if a vehicle incident is experienced in a rental or fleet vehicle.

## 8.6 Fire Prevention

(Reference CH2M HILL SOP HSE-403, *Hazardous Material Handling*)

Follow the fire prevention and control procedures listed below.

### 8.6.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters).  
Extinguishers must:
  - be maintained in a fully charged and operable condition;
  - be visually inspected each month; and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.

- Keep areas neat. Housekeeping is important.

### 8.6.2 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) (shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage away from storm drains or surface waters or other means of containment shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

### 8.7 General Practices and Housekeeping

The following are general requirements applicable to all portions of the work:

- Site work should be performed during daylight hours whenever possible;
- Good housekeeping must be maintained at all times in all project work areas;
- Common paths of travel should be established and kept free from the accumulation of materials;
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions;
- Provide slip-resistant surfaces, ropes, or other devices to be used;
- Specific areas should be designated for the proper storage of materials;
- Tools, equipment, materials, and supplies shall be stored in an orderly manner;
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area;
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals;
- All spills shall be quickly cleaned up; oil and grease shall be cleaned from walking and working surfaces;
- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others;
- Familiarize yourself with, understand, and follow jobsite emergency procedures;
- Do not fight or horseplay while conducting the firm's business;
- Do not use or possess firearms or other weapons while conducting the firm's business;
- Report unsafe conditions or unsafe acts to your supervisor immediately;
- Report emergencies, occupational illnesses, injuries, vehicle accidents, and near misses immediately;
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment;

- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor;
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion;
- Do not run in the workplace;
- When ascending or descending stairways, use the handrail and take one step at a time;
- Do not apply compressed air to any person or clothing;
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location;
- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery;
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations;
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible; and
- Check the work area to determine what problems or hazards may exist.

## 8.8 Hazard Communication

(Reference CH2M HILL SOPs HSE-107, *Hazard Communication* and HSE-403, *Hazardous Material Handling*)

The hazard communication coordinator is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using the chemical inventory form included as an attachment to this HSP;
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available;
- Request or confirm locations of material safety data sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed;
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical and include on the chemical inventory sheet (attached to this HSP) and add the MSDS to the MSDS attachment section of this HSP;
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly;
- Give employees required chemical-specific HAZCOM training using the chemical-specific training form included as an attachment to this HSP; and
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

## 8.9 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job;
- An approved Activity Hazard Analysis (AHA) or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training); and

- Knife users have been trained and follow the AHA.

## 8.10 Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (e.g., work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed:

- While work is in progress outside construction areas shall have at least 33 lux (lx);
- Construction work conducted inside buildings should be provided with at least 55 lux light;
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb will not leave any area in total darkness.

## 8.11 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

Back injuries are the leading cause of disabling work and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards;
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112;
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys;
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities;
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices; and
- All CH2M HILL workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the VO.

## 8.12 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work;
- Keep areas of broken skin (chapped, burned, etc.) covered; and
- Wash hands with soap and water prior to eating, smoking, or applying cosmetics.

## 8.13 Personal Security

Follow the guidelines below for personal security measures. The RHSM and Firm-Wide Security Office can be contacted if additional, specific measures are needed (e.g., such as evaluating the needs for security service).

## General Safety and Security Guidelines

CH2M Hill Corporate Security Department recommends the following guidelines for workers in the United States:

- Stay alert and be aware of your surroundings. Avoid pre-occupations with mobile devices, while in an unfamiliar area.
- Whenever possible use the buddy system with another employee or client or subcontractor employee.
- Trust your intuition; if a situation appears strange or wrong, it probably is.
- Be confident in your walk or stride; do not give the appearance you are new in town.
- Avoid carrying and displaying large sums of cash.
- If you sense or see dangerous situations along your route, change your route and depart the area quickly. If you feel that you are being followed, go to the nearest police station or safe location and file a complaint with the police. Provide a description of the person, their vehicle, license plate number and any other useful information.
- Only walk short distances that are safe and secure while visiting an unfamiliar city or location.
- Take host approved transportation for long distances.
- “Fight or Flight?” Leaving the possible or dangerous area is always better than staying to fight.
- Always report suspicious activity to the nearest local law enforcement agency.
- Locate emergency exits in your hotel or where you are staying to ensure you know where to go in case of a fire or a natural or man-made disaster.
- Secure your electronic devices when left in your room or take them with you if you are not able to secure them properly.
- If you feel your life is in danger, call 911. Be sure to speak clearly, concisely and give the dispatcher a good description of where you are physically located.

## Operating or Riding in Vehicles

- When waiting for public transportation or a taxi, remain in a store or restaurant as long as possible before catching your ride and never wait by yourself in an isolated area.
- Approach your vehicle with keys firmly in your hand and ready to unlock the car.
- Quickly check your car before entering it to determine damage or presence of an intruder.
- Vulnerable times can be stopping to find your keys to enter your vehicle or stepping out of your vehicle in an isolated area. Be aware of your surroundings before you perform these activities.
- Always keep your doors locked during transit and when the vehicle is parked.
- Never leave your vehicle unlocked, even when performing a quick task such as checking in a hotel, getting gas or going picking up food.
- If confronted by an individual inside a vehicle pointing a weapon at you, run the opposite way from where the vehicle is facing and scream as loud as you can. This evasive action will probably cause the individual to drive away.

- If an individual in a passing car points at your tires or engine to indicate a malfunction, only pull over in a well-lit and populated gas or rest stop. Never pull over in an isolated or dimly lit area. You may have a malfunction or the passing motorist may be attempting to rob you.
- Always park your vehicle in a well-lit and secure area. If your vehicle is parked in a dimly lit or isolated area in a parking garage; ask an attendant or friend to accompany you to your vehicle.
- Secure your valuables in the trunk, or place them out of sight or cover them with a blanket or coat if there is no secure storage area in the vehicle. The would-be-perpetrator likes to see what to steal and not knowing what you have concealed will normally prevent a break in.

### Riding in a Taxi

- Have your host or a designated travel agent suggest or reserve a reputable taxi service for you during your stay.
- Only use a taxi service that was vetted for safety and reliability.
- If possible, place luggage, laptop and personal belongings inside the taxi.
- When you first enter the taxi, check the driver photo identification card, normally located on the driver's visor with the driver to ensure they match.

### Walking

- If you experience automotive trouble, remain inside the locked vehicle and call for assistance.
- If you can't reach assistance via a mobile phone, only walk for help in a safe area facing the traffic.
- If while walking, you are shadowed or followed by a vehicle, run back in the direction of your vehicle and enter the vehicle if possible. File a police report on the incident as soon as practicable.
- Be aware of your surroundings and those around you while walking and do not be distracted by using electronic devices.
- Regularly change your route if you are walking to and from meetings or conferences and choose only well-lit areas to walk in at night.
- If walking long distances, identify a "safe house, shop, store or restaurant" to duck into if confronted by a perpetrator.

### Jogging or Running

- Always jog or run in an area that is safe, secure, and used for exercising.
- Avoid running along busy roads or highways.
- If you chose to venture out on a jog or run, check the route by vehicle prior to beginning to exercise.
- Let the host or a friend know when you leave, when you plan to return, and the route you will take during exercising.
- Take a photo identification and mobile phone with you for emergencies.
- Avoid physically over-extending yourself since reflexes and decision-making ability can be impaired.

### Clothing and Jewelry

- Dress to blend in with locals, maintain a low profile and avoid drawing attention to yourself.

- Travel with inexpensive clothing and jewelry.
- Avoid wearing CH2M HILL distinctive clothing or using CH2M HILL logos on luggage or laptops.

### Emergency Numbers and Information

- Leave your itinerary and emergency contact numbers where you can be reached with family members and only those that have a need to know.
- Pre-program emergency numbers in the mobile device you are traveling with.
- Carry a list of current medications and specific doses in your purse or wallet.
- Record medical emergency information on a document that can be readily available if you are unable to speak or unconscious.
- Have a photo copy of your driver's license, passport, and credit card information separately in case your wallet or purse is stolen.

## 8.14 Shipping and Transportation of Hazardous Materials

(Reference CH2M HILL SOP HSE-417, *Hazardous Materials Transportation*)

The U.S. Department of Transportation (DOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods). Chemicals brought to the site might be defined as hazardous materials by the U.S DOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by U.S. DOT. Other wastes may also be U.S. DOT hazardous materials. To confirm whether a material or a waste is a U.S. DOT hazardous material, check with the ESG Waste Coordinator (Lisa Schwan/ATL), the project EM, or the CH2M HILL Dangerous Goods Shipping Coordinators (John Blasco/BAO or Rob Strehlow/MKW).

All staff who affect shipment of hazardous materials, including receiving hazardous materials, preparing profiles or manifests, packaging hazardous wastes, labeling, or transporting hazardous materials by road, are called HazMat employees (note CH2M HILL cannot transport hazardous wastes by public road). HazMat employees must receive CH2M HILL online training in shipping dangerous goods. CH2M HILL's online Dangerous Goods Shipping course can be found on the CH2M HILL HSSE website.

All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (e.g., calibration gas), use the HazMat ShipRight tool on the CH2M HILL virtual office (under Company Resources - Online Shipping). Contact the Dangerous Goods Shipping coordinators, the ESG Waste Coordinator or the project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in CH2M HILL's Hazardous Materials SOP (HSE-403). The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous materials;
- All transporters of hazardous materials must be prequalified by a Contracts Administrator who evaluate the carrier's safety rating, security measures, and employee screening procedures;
- When shipping hazardous materials, check driver credentials and ask about shipping details;

- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver; and
- If there is suspicious or unusual behavior (e.g., driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the project manager or the RHSM.

Employees responsible for shipping hazard materials must also review the CH2M HILL Transportation Security Plan (HSE-417 Appendix A).

## 8.15 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace*)

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing CH2M HILL work;
- Abuse of prescription or nonprescription drugs;
- Use or possession of illegal drugs or drugs obtained illegally;
- Sale, purchase, or transfer of legal, illegal or illegally obtained drugs; and
- Arrival at work under the influence of legal or illegal drugs or alcohol.

Drug and/or alcohol testing is applicable under CH2M HILL Constructors, Inc. and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, this testing is performed in accordance with SOP HSE-105, *Drug-Free Workplace*. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the CH2M HILL Virtual Office (VO).

## 9.0 Project-Specific Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

### 9.1 Chainsaws

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when working around or operating chainsaws. Ensure the requirements in the referenced SOP are followed.

#### 9.1.1 Equipment

Only chainsaws equipped with a spark arrestor and fully functioning chain brake or “safety chain” shall be used. The following safety equipment shall be readily available while operating a chainsaw:

- Chainsaw operator’s manual;
- Fully stocked first aid kit;
- Multipurpose fire extinguisher;
- Grounded extension cord approved for outdoor use and ground fault circuit interrupter (GFCI) for electrical-powered chainsaws;
- Approved safety gasoline container and funnel or flexible nozzle for refueling gasoline-powered chainsaws; and
- Sledge hammer and non-metallic wedges when necessary to prevent pinching of the chain.

#### 9.1.2 PPE Requirements

The following personal protective equipment shall be worn while operating chainsaws:

- Safety glasses with side shields and face shield to prevent injury from wood chips, sawdust, or other flying objects;
- Hard hat with properly fitted suspension to prevent head injury from falling debris;
- Steel-toed safety shoes or boots to prevent foot injury from falling objects and accidental contact with the moving chain;
- Hearing protection to prevent permanent damage to hearing. Ear muffs or plugs will have a decibel noise reduction rating (NRR) assigned to them. The higher the rating, the greater the protection offered;
- Non-leather, fabric work gloves to prevent hand injury from abrasions, splinters and cuts;
- Clothing that is well-fitted and free of loose edges that could become entangled in the saw; and
- Protective chaps or leggings that cover the area from the groin to about 2 inches (5.08 cm) above the ankles should be used. These chaps are made from synthetic fabrics that are designed to prevent the running saw chain from coming in contact with your legs.

### 9.1.3 Safe Operation

The following safe operation guidelines shall be followed regardless of the purpose for using a chainsaw:

- Inspect the chainsaw prior to use;
- Chainsaws shall be held firmly with both hands, with thumbs and fingers encircling both chain saw handles;
- Stand slightly to the left side of the saw, out of the plane of the cutting chain and guide bar to reduce the risk of injury in the event of a kickback;
- Position saw so that it is between the waist and mid-chest level. Overreaching or cutting above the mid-chest height shall be avoided;
- Maintain a full throttle setting while cutting. Chainsaws are designed to be run at full speed;
- Always be aware of what is in the saw's downward path after the cut;
- Do not attempt to cut material that is larger than the guide bar of the saw;
- Avoid cuts that will cause the chainsaw to jam. Always cut into the compression wood first until the cut starts to close; then cut from the other side toward the compression cut;
- Use a non-metallic wedge to prevent the compression cut jamming on the blade;
- Chainsaws are designed to feed themselves into the wood and require only light pressure to cut efficiently. If extra force is required to keep cutting, the chain requires sharpening. Additional signs of a dull chain include a saw that is cutting crooked, results in fine sawdust instead of chips, or the smell of burnt wood. Do not use a dull chain;
- Bystanders and helpers shall be kept at a safe distance from operation;
- Do not operate a chainsaw when fatigued; take frequent breaks;
- Work slowly; don't rush; and
- A fire extinguisher shall be present at all times when operating the chainsaw in forest or brushy areas.

### 9.1.4 Refueling the Engine

The fuel for gasoline-powered chainsaws shall be mixed in accordance with the manufacturer's recommendations as outlined in the chainsaw operator's manual. Fuel shall be stored and transported in an approved safety container. The following precautions should also be followed:

- The engine shall be shut off and allowed to cool before refueling; never refuel a hot engine;
- A fire extinguisher shall be present during fueling and refueling;
- Smoking around fueling or refueling operations shall be prohibited; and
- A funnel or a flexible nozzle shall be used to avoid spilling fuel on the engine.

## 9.2 Compressed Gas Cylinders

(Reference CH2M HILL SOP HSE-403, *Hazardous Materials Handling*)

Below are the hazard controls and safe work practices to follow when working around or using compressed gas cylinders. Ensure the requirements in the referenced SOP are followed.

- Cylinders and pressure-controlling apparatus shall be inspected for defects and leakage prior to use. Damaged or defective items shall not be used. If a cylinder is found to be defective, the gas distributor shall be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.
- Cylinders shall be labeled with the identity of the contents. Cylinders not labeled shall be sent back to the cylinder distributor. The color of the cylinder shall not be used exclusively to identify cylinder contents.
- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinders must be secured in an upright position at all times.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.
- Eye protection (safety glasses or goggles) shall be worn when using cylinders.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders inside buildings shall be stored in dry, well-ventilated locations at least 20 feet (6.1 meters) from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas shall be located where cylinders will not be knocked over or damaged.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour.
- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinders.
- Complete the self-assessment checklist for compressed gas cylinders are being used.

## 9.3 Crystalline Silica

(Reference CH2M HILL SOP HSE-511, *Crystalline Silica*)

CH2M HILL subcontractors shall control employee exposure to crystalline silica when exposures are at or above the ACGIH TLV of 0.025 mg/m<sup>3</sup> by submitting for review and approval a crystalline silica exposure monitoring plan. The elements of an exposure monitoring plan include, but are not limited to the following:

- A bulk sample representative of the material to be demolished must be sent with the air monitoring sample media for analysis;
- Initial monitoring and personal air sampling must be conducted to determine the potential worker exposure to respirable crystalline silica;

- Real-time particulate monitors with a 10 micron respirable size fraction attachment may be used as part of the initial and ongoing monitoring plan to evaluate the potential worker exposure. This must include an action level established by their corporate or site health and safety professional and include actions required (e.g., implement engineering, administrative controls, respiratory protection);

Other exposure control measures include:

- Maintaining surfaces as clean as practicable to minimize accumulation of crystalline silica containing particulate material;
- Clean surfaces with a HEPA-filter vacuum or equivalent method;
- Implement dust suppression during demolition;
- Restricting access to the work area where crystalline silica exposure may exist to only those authorized to perform work or enter the area;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in these areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and

CH2M HILL personnel shall review the fact sheet included as an attachment to this HSP.

## 9.4 Drilling Safety

(Reference CH2M HILL SOP HSE-204, *Drilling*)

Below are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. Maintain a minimum distance of 10 feet (3 meters) between mast and overhead lines (<50 kV) and an additional 0.4 inches for every 1 kV over 50kV. Verify the voltage of nearby overhead power lines to determine the minimum distance.
- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.

- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this HSP to evaluate drilling operations.

## 9.5 Drum and Portable Tank Handling

Below are the hazard controls and safe work practices to follow when overseeing the movement of drums or when handling drums:

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries;
- Ensure drum or tank bungs and lids are secured and are labeled prior to moving;
- Ensure that drums and tanks remain covered except when removing or adding material or waste. Covers and/or lids will be properly secured at the end of each workday;
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling;
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface;
- Ensure there are appropriately designed Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials;
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency;
- Supply operators with appropriate respiratory protective equipment when needed;
- Ensure that drums are secure and are not in the operator's view of the roadway;
- Prior to handling, all personnel should be warned about hazards of handling;
- Before moving anything, determine the most appropriate sequence in which the various drums, portable tanks, and other containers should be moved (e.g. small containers may have to be removed first to permit heavy equipment to enter and move the drums);
- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur;

- Use containers or overpacks that are compatible with the waste or materials;
- Drums containing liquids or hazardous waste will be provided with secondary containment and may not be located near a storm water inlet or conveyance;
- Allow enough aisle space between drum pallets and between drums and other equipment that the drums can be easily accessed (at least 2 to 3 feet) by fire control equipment and similar equipment.; and
- Make sure that a spill kit is available in drum or tank storage areas (or where liquids are transferred from one vessel to another).

## 9.6 Drum Sampling Safety

Personnel are permitted to handle and/or sample drums containing certain types of waste (drilling waste, investigation-derived waste, and waste from known sources) only. Handling or sampling drums with unknown contents requires a plan revision or amendment approved by the RHSM. The following control measures will be taken when sampling drums:

- Minimize transportation of drums;
- Sample only labeled drums or drums from a known waste stream;
- Do not sample bulging or swollen drums. Contact the RHSM;
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open;
- Use the proper tools to open and seal drums;
- Reseal bung holes or plugs whenever possible;
- Avoid mixing incompatible drum contents;
- Sample drums without leaning over the drum opening;
- Transfer/sample the content of drums using a method that minimizes contact with material;
- Use the PPE and perform air monitoring as specified in the PPE and Site Monitoring sections of this HSP;
- Take precautions to prevent contaminated media from contacting the floor or ground, such as having plastic under the sampling area, having a spill kit accessible during sampling activities; and
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

## 9.7 Earthmoving Equipment

(Reference CH2M HILL, SOP HSE-306, *Earthmoving Equipment*)

Below are the hazard controls and safe work practices to follow when working around or operating heavy equipment. Ensure the requirements in the referenced SOP are followed.

- CH2M HILL authorizes only those employees qualified by training or previous experience to operate material handling equipment.
- CH2M HILL employees must be evaluated prior to operating earthmoving equipment by a CH2M HILL earthmoving equipment operator evaluation designated person. This evaluation will be documented according to SOP HSE-306, Earthmoving Equipment.

- Heavy equipment operators are prohibited from using any wireless device while operating equipment. Equipment must be stopped before using devices such as two way radios or cell phones.
- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include: service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts and operating controls. All defects shall be corrected before the equipment is placed in service. Documentation of this inspection must be maintained onsite at all times (use the Earthmoving Equipment Inspection form if operated by CH2M HILL).
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls shall be in a neutral position, with the motors stopped and brakes set.
- Equipment which is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operators view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 feet (3 meters) from the power lines less than 50 kilovolts (kV). Provide an additional 4 feet (1.2 meters) for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered to be an energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- Underground utility lines must be located before excavation begins; refer to the Utilities (underground) section.
- Operators loading and unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake shall be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When not in operation, the blade or bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades or buckets landed and shift lever in neutral.

## 9.8 Excavation Activities

(Reference CH2M HILL SOP HSE-307, *Excavation and Trenching Safety*)

The requirements in this section shall be followed whenever excavation is being performed. Refer to the Earthmoving Equipment section and SOP for additional requirements applicable to operating/oversight of earthmoving equipment. Below are the hazard controls and safe work practices to follow when working around or performing excavation. Ensure the requirements in the referenced SOP are followed.

- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated

soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).

- Do not enter the excavations unless completely necessary, and only after the excavation competent person has completed their daily inspection and has authorized entry. An inspection shall be conducted by the competent person prior to the start of work, as needed throughout the shift, after every rainstorm, and after any hazard increasing occurrence. Documentation of the inspection must be maintained onsite at all times.
- Follow all excavation entry requirements established by the excavation competent person and any excavation permit being used.
- Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet deep (1.5 meters) and there is no indication of possible cave-in, as determined by the excavation competent person. Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.
- Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).
- The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.
- Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.
- Excavations shall not be entered when:
  - Protective systems are damaged or unstable;
  - Objects or structures above the work location may become unstable and fall into the excavation;
  - The potential for a hazardous atmosphere exists, unless the air has been tested and found to be at safe levels; or
  - Accumulated water exists in the excavation, unless precautions have been taken to prevent excavation cave-in.
- The excavation self-assessment checklist shall be used to evaluate excavations prior to entry.

## 9.9 Forklift Operations

(Reference CH2M HILL, SOP HSE-309, *Forklifts*)

Below are the hazard controls and safe work practices to follow when working around or operating forklifts. Ensure the requirements in the referenced SOP are followed.

- Forklift operators are prohibited from using any wireless device while operating forklifts.
- A rated lifting capacity must be posted in a location readily visible to the operator.
- A forklift truck must not be used to elevate employees unless a platform with guardrails, a back guard, and a kill switch is provided on the vehicle. When guardrails are not possible, fall arrest protection is required.

- The subcontractor operating the forklift must post and enforce a set of operating rules for forklift trucks.
- Only certified forklift operators shall operate forklifts.
- Stunt driving and horseplay are prohibited.
- Employees must not ride on the forks.
- Employees must never be permitted under the forks (unless forks are blocked).
- The driver must inspect the forklift once a shift and document this inspection.
- The operator must look in the direction of travel and must not move the vehicle until all persons are clear of the vehicle.
- Forks must be carried as low as possible.
- The operator must lower the forks, shut off the engine, and set the brakes (or block the wheels) before leaving the forklift operator's position unless maintenance or safety inspections require the forklift to be running.
- Trucks must be blocked and have brakes set when forklifts are driven onto their beds.
- Extreme care must be taken when tilting elevated loads.
- Every forklift must have operable brakes capable of safely stopping it when fully loaded.
- Forklifts must have parking brakes and an operable horn.
- When the operator is exposed to possible falling objects, industrial trucks must be equipped with overhead protection (canopy).
- If using certified CH2M HILL forklift operators – forklifts must be inspected and documented daily using the forklift inspection form.

## 9.10 Groundwater Sampling/Water Level Measurements

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are performing groundwater sampling and/or water level measurements.

- Full coolers are heavy. Plan in advance to have two people available at the end of the sampling effort to load full coolers into vehicles. If two people won't be available use several smaller coolers instead of fewer large ones.
- Wear the appropriate PPE when sampling, including safety glasses, nitrile gloves, and steel toe boots (see PPE section of this HSP).
- Monitor headspace of wells prior to sampling to minimize any vapor inhalation (refer to the "Site Monitoring" section of this HSP).
- Use caution when opening well lids. Wells may contain poisonous spiders and hornet or wasp nests.
- Use the appropriate lifting procedures (see CH2M HILL SOP HSE-112) when unloading equipment and sampling at each well.
- Avoid sharp edges on well casings.
- If dermal contact occurs with groundwater or the acid used in sample preservation, immediately wash all affected skin thoroughly with soap and water.
- Avoid eating and drinking on site and during sampling.

- Use ear plugs during sampling if sampling involves a generator.
- Containerize all purge water and transport to the appropriate storage area.
- Use two people to transport full coolers/containers whenever possible. If two people are not available use a dolly to move coolers. If the coolers weigh more than 40 pounds Attachment 1 of the HSE-112, *Manual Lifting*, shall be completed by the SC. If the coolers weigh more than 50 pounds they should never be lifted by one person.

## 9.11 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are followed:

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service;
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand and power tools in a safe condition;
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool;
- Do not carry or lower a power tool by its cord or hose;
- Portable power tools will be plugged into GFCI protected outlets;
- Portable power tools will be Underwriters Laboratories (UL) listed and have a three-wire grounded plug or be double insulated;
- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters);
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed;
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials;
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications;
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.); and
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

### Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.

- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

## 9.12 Haul Trucks

Below are the hazard controls and safe work practices to follow when working around or operating haul trucks:

- Haul truck operators are prohibited from using any wireless device while operating trucks on site. Trucks must be stopped before using devices such as two way radios or cell phones.
- Haul truck operators should be familiar with their equipment and inspect all equipment before use;
- Haul truck operators should ensure all persons are clear before operating truck or equipment. Before moving operators should sound horn or alarm, all equipment should be equipped with a working back up alarm;
- Haulage trucks or equipment with restricted visibility should be equipped with devices that eliminate blind spots;
- Employees should stay off haul roads. When approaching a haul area, employees should make eye contact and communicate their intentions directly with the equipment operator;
- If possible minimize steep grades on haul roads;
- Where grades are steep provide signage indicating the actual grade as well as measures for a runaway truck;
- Trucks are to be operated within the manufacturer's recommendations (for example- retarder charts indicate the combination of loads, grades and speeds that should not be exceeded if the truck's retarder is to work properly – to ensure the truck does not descend grade at speeds greater than listed);
- Haul roads should be well lit, sufficiently wide (at least 50% of the width of the equipment on both sides of road) and equipped with reflectors to indicate access points;
- Haul roads should have adequate right-of-way signs indicating haul directions;
- Haul trucks will follow designated haul roads; and
- Haul trucks will comply with posted speed limits.

## 9.13 Munitions and Explosives of Concern (MEC) and/or Materials Potentially Posing an Explosives Hazard (MPPEH)

(Reference CH2M HILL, SOP HSE-610, Explosives Usage and Munitions Response)

The following will be required before any MR related field work:

- Setting up a conference call with all required personnel to conduct a basic safety risk assessment.
- Providing written directions detailing job-specific requirements and what actions to take to ensure safety during the work.
- 3R Training (Recognize, Retreat, and Report) will be required for all affected project personnel.

### 9.13.1 Hazard Identification

The nature of activities on this project will result in the potential of encountering Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH) items that have been fired,

disposed, or abandoned, but may still represent a hazard. Non-Unexploded Ordnance (UXO) trained personnel will avoid all contact with MEC/MPPEH.

The Explosives Safety Submission (ESS) Amendment for UXO-27 covers the types of munitions likely used and the intrusive activities at the MRA. All work will follow the approved Work Plan Addendum, which is based on the DDESB-approved ESS Amendment.

### 9.13.2 Hazard Mitigation/Prevention

All field personnel will be given munitions recognition training prior to working on the site. The training will be verified by signature on the site training form. Personnel will be instructed to be alert for MEC/MPPEH. The following general precautions concerning suspect MEC will be observed at all times:

- Suspect MEC item(s) WILL NOT be touched or moved regardless of the markings or apparent condition. Only UXO trained personnel are allowed to handle MEC/MPPEH.
- Radios or cellular phones WILL NOT be used in the vicinity of suspect MEC items.
- Areas where the ground cannot be seen WILL NOT be traveled across without escort.
- Vehicles WILL NOT be driven into suspected MEC areas; clearly marked lanes will be used.
- Matches, cigarettes, lighters, or other flame-producing devices WILL NOT be carried on to a munitions response site (MRS).
- Color codes WILL NOT be relied upon for positive identification of MEC items or their contents.
- Suspect MEC items will be approached from the side whenever possible; approaching the front or rear areas will be avoided.
- Personnel will always assume that a MEC item contains a live charge until it can be determined otherwise.
- Earth Moving Equipment (EME) Operations within an EZ will be performed under the supervision of a UXO technician III
- EME will not be used to excavate soils within 12 inches of an anomaly.
- Anomaly investigation personnel are not permitted to enter an excavation greater than four feet in depth. If an investigation needs to be performed in an excavation deeper than four feet, operations at that work area will be halted and the Site Safety & Health Officer (SSHO) will be notified. If further investigation is warranted, the SSHO will notify the Health & Safety Manager (HSM) to determine the appropriate safety measures (e.g. sloping, shoring, etc.) to be implemented. The implementation of excavation safety provisions will require an amendment to this HSP.
- When anomaly investigation personnel must be in the area of EME:
  - Sufficient separation between ground support personnel and operating EME must be maintained.
  - Wear reflective vests or high visibility clothing to promote visibility of ground personnel by equipment operators.
  - Isolate equipment swing areas from workers, fixed objects or other equipment. Ground personnel shall avoid positioning themselves between fixed object and operating equipment.
  - Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator. Stay out of the swing radius of operating heavy equipment.

- Suspended loads shall not be passed over ground personnel and ground personnel shall not walk under or in front of suspended loads.

The following actions will be taken if munitions are found:

- Personnel who are not UXO-qualified will note the area of concern, and leave the immediate vicinity. They WILL NOT touch, move, or otherwise disturb the item.
- Personnel should not be misled by markings on the munitions item stating or indicating that the item is a practice bomb or inert. Even practice bombs may have explosive charges that are used to mark/spot the point of impact, or the item could be incorrectly marked.
- Immediately upon locating any suspect MEC, the Senior UXO Supervisor (SUXOS) and UXO Safety Officer (UXOSO) will be notified. In turn, the SUXOS will notify the Project Manager who will then provide required notifications to the client.
- Operations in the immediate area of the suspect MEC will be halted and the appropriate procedures (as described below) will be implemented.

Removal and disposal of MEC is part of this scope of work and will be undertaken by a MEC support contractor under the oversight of CH2M HILL UXO qualified personnel. MEC will be consolidated, demilitarized, and disposed of in accordance with procedures outline in the approved Work Plan Addendum and ESS.

When MEC is detected and identified as potentially loaded with explosives, chemicals, propellant or pyrotechnics, or when a buried object is exposed and cannot be identified as non-MEC, the MEC support contractor will coordinate with the CH2M HILL SUXOS for assistance. The location of the object will be marked with a yellow survey marker flag and all investigation activities at that location will cease. The MEC support contractor will maintain site access control and ensure personnel safety until Explosive Ordnance Disposal (EOD) Personnel arrive and take control of the site. The contractor must supply the GPS coordinates for each item upon arrival of the Emergency Response Team. The GPS positions must also be noted in the final report. The contractor will allow the Government EOD personnel sufficient time to complete field evaluation, render safe, recover and dispose of MEC, per incident, when MEC that cannot be identified is detected.

### 9.13.3 MEC Avoidance Procedures

MEC avoidance operations will be required for select non-intrusive tasks associated with the investigation. Avoidance operations will consist of a team composed of one or more UXO Technicians. **Contact with MEC is prohibited during avoidance activities.** The UXO Team will initiate disposal operations for any MEC/MPPEH encountered as discussed in the section above.

## 9.14 Portable Generator Hazards

(Reference CH2M HILL SOP HSE-206, Electrical Safety)

- Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide (CO) poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.
- NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide (CO) very quickly. When you use a portable generator, remember that you cannot smell or see CO. Even if you can't smell exhaust fumes, you may still be exposed to CO.
- If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The CO from generators can rapidly lead to full incapacitation and death.
- If you experience serious symptoms, get medical attention immediately. Inform project staff that CO poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.

- Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow CO to come indoors.
- Ensure the generator is grounded in accordance with the manufacturer's operation manual.
- Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.
- Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.
- Most generators come with Ground Fault Circuit Interrupters (GFCI). Test the GFCIs daily to determine whether they are working
- If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.
- Never store fuel near the generator or near any sources of ignition.
- Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

## 9.15 Powder-Actuated Tools

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when working around or using powder-actuated tools. Ensure the requirements in the referenced SOP are followed.

- Only trained personnel are permitted to operate powder-actuated tools.
- Inspect and test powder-actuated tools each day before they are loaded per manufacturer's instruction. Remove from service any tool that is not in proper working order.
- Wear appropriate personal protective equipment (eye, face, and hearing protection) when using powder-actuated tools.
- Never point powder-actuated tools at other workers, whether empty or loaded. Tools shall not be loaded until just before use. Never leave loaded tools unattended.
- Do not drive fasteners into very hard or brittle materials such as, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Avoid driving fasteners into easily penetrable materials unless backing is provided. Pins or fasteners can otherwise become flying missiles when they pass right through such materials.
- Use powder-actuated tools with the manufacturer's specified guard, shield, or other attachment.
- Do not use powder-actuated tools in explosive or flammable atmospheres.

## 9.16 Pressure Line/Vessel Systems

- Operate and maintain pressure vessels, pumps and hosing in accordance with the manufacturer's recommendations.
- Do not exceed the rated pressure of the vessels and hosing of the system.
- The system must be provided with a pressure relief valve/controller that safely reduces the system pressure to within the system rated pressure.

- The pressure relief valve must be rated at no more than 110% the rated pressure of the system and must be tested at regular intervals.
- Each vessel must be equipped with a functioning pressure gauge to monitor pressure.

## 9.17 Pressure Washing Operations

Below are the hazard controls and safe work practices to follow when working around or performing pressure washing.

- Only trained, authorized personnel may operate the high-pressure washer.
- Follow manufacturer's safety and operating instructions.
- Inspect pressure washer before use and confirm deadman trigger is fully operational
- The wand must always be pointed at the work area.
- The trigger should never be tied down
- Never point the wand at yourself or another worker.
- The wand must be at least 42 inches (1.1 meter) from the trigger to the tip and utilize greater than 10 degree tips.
- The operator must maintain good footing.
- Non-operators must remain a safe distance from the operator.
- No unauthorized attachment may be made to the unit.
- Do not modify the wand.
- All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- Polycoated Tyvek or equivalent, 16-inch-high steel-toed rubber boots, safety glasses, hard hat with face shield, and inner and outer nitrile gloves will be worn, at a minimum.

## 9.18 Slips, Trips and Falls

### General

- Institute and maintain good housekeeping practices.
- Designate foot traffic paths in and out of sites, when necessary, to ensure paths are kept free from slip, trip, and fall hazards or to deter personnel from taking "shortcuts" where slip, trip, hazards may be.
- Mitigate icy conditions by keeping foot traffic paths clear of ice and snow.
- Watch footing as you walk to avoid trip hazards, animal holes, or other obstacles, especially in tall grassy areas.

### Muddy Conditions

- Muddy conditions present a slipping hazard. Use mats or other similar surface to work from if footing cannot be stabilized.
- Take shortened steps across muddy areas.
- Use a walking staff or other similar means to assist with balance.

## Steep Slopes/Uneven Ground/Rock and Vertical Slopes

- Be aware that escarpments can slough. Avoid these areas.
- Exercise caution in relying on rocks and trees/tree stumps to support yourself – many times they are loose.
- Whenever possible, switchback your way up/down steep areas, and maintain a slow pace with firm footing.
- Employees walking in ditches, swales and other drainage structures adjacent to roads or across undeveloped land must use caution to prevent slips and falls which can result in twisted or sprained ankles, knees, and backs.
- Whenever possible observe the conditions from a flat surface and do not enter a steep ditch or side of a steep road bed.
- If steep terrain must be negotiated coordinate with RHSM to evaluate the need for ladders or ropes to provide stability.

## 9.19 Traffic Control

(Reference CH2M HILL SOP HSE-216, *Traffic Control*)

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by a sub contractor. Ensure the requirements in the referenced SOP are followed.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route (e.g., behind an established barrier, parked vehicle, guardrail, etc).
- Always pay attention to moving traffic – never assume drivers are looking out for you.
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a “buddy system” should be used, where one worker is looking towards traffic.
- When working on highway projects, obtain a copy of the contractor’s traffic control plan.
- Work area should be protected by a physical barrier – such as a K-rail or Jersey barrier.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited

sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.

- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet (12.2 meters) of traffic should have an orange flashing hazard light atop the vehicle.
- Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers.
- Vehicles should be parked at least 40 feet (12.2 meters) away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.
- Traffic control training module on the VO shall be completed when CH2M HILL workers who work in and around roadways and who exposed to public vehicular traffic.

## 9.20 Unknown or Suspect Objects/Materials

If unknown or suspect objects/materials are encountered (i.e. exposed or partially buried drums, biological waste, cylinders, munitions of explosive concern, unexpected stained/discolored soil) are encountered during site operations, ongoing activities shall be immediately suspended. CH2M HILL or subcontractor personnel encountering unknown or suspect objects/materials shall:

- 1) Secure the area and identify the location of the object/material to the extent possible, without causing bodily injury to yourself or others and without disturbing the object,
- 2) Evacuate the work area,
- 3) Immediately notify the project manager/HSM of the encountered condition and
- 4) Not provide additional disturbance or otherwise handle the suspect object/material.

The site supervisor or SC shall contact the Project Manager and the HSM to evaluate potential hazards associated with the specific situation encountered. The project team will then address the need for the use of special procedures, engineering controls, PPE or specialized subcontract personnel to safely mitigate the situation.

## 9.21 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact underground utilities or similar subsurface obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand augering, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include at least the following elements:

1. A background and records assessment of known utilities or other subsurface obstructions.
2. Contacting and using the designated local utility locating service.
3. Conducting an independent field survey to identify, locate, and mark potential underground utilities or subsurface obstructions. *Note: This is independent of, and in addition to, any utility survey conducted by the designated local utility locating service above.*
4. A visual survey of the area to validate the chosen location.

When any of these steps identifies an underground utility within 5 feet (1.5 meters) of intrusive work, then non-aggressive means must be used to physically locate the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified high risk utility (see paragraph below).

Any deviation from these requirements must be approved by the Responsible HS Manager and the Project Manager.

### **Background and Records Assessment of Known Utilities**

Identify any client- or location-specific permit and/or procedural requirements (e.g., dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility.

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical lines, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

### **Designated Local Utility Locating Service**

Contact your designated local utility locating service (e.g., Dig-Safe, Blue Stake, One Call) to identify and mark the location of utilities. Call 811 in the US or go to [www.call811.com](http://www.call811.com) to identify the appropriate local service group. Contacting the local utility locating service is a legal requirement in most jurisdictions.

### **Independent Field Survey (Utility Locate)**

The organization conducting the intrusive work (CH2M HILL or subcontractor) shall arrange for an independent field survey to identify, locate, and mark any potential subsurface utilities in the work area. This survey is in addition to any utility survey conducted by the designated local utility locating service.

The independent field survey provider shall determine the most appropriate instrumentation/technique or combinations of instrumentation/techniques to identify subsurface utilities based on their experience and expertise, types of utilities anticipated to be present, and specific site conditions.

A CH2M HILL or subcontractor representative must be present during the independent field survey to observe the utility locate and verify that the work area and utilities have been properly identified and marked. If there is any question that the survey was not performed adequately or the individual was not qualified, then arrangements must be made to obtain a qualified utility locate service to re-survey the area. Obtain documentation of the survey and clearances in writing and signed by the party conducting the clearance. Maintain all documentation in the project file.

If the site owner (military installation or client) can provide the independent field survey, CH2M HILL or the subcontractor shall ensure that the survey includes:

- Physically walking the area to verify the work location and identify, locate, and mark underground utility locations:

- Having qualified staff available and instrumentation to conduct the locate;
- Agreeing to document the survey and clearances in writing.
- Should any of the above criteria not be met, CH2M HILL or subcontractor must arrange for an alternate independent utility locate service to perform the survey.
- The markings from utility surveys must be protected and preserved until the markings are no longer required. If the utility location markings are destroyed or removed before intrusive work commences or is completed, the PM, SC, or designee must notify the independent utility locate service or the designated local utility locating service to resurvey and remark the area.

### **Visual Assessment before and during Intrusive Activities**

Perform a “360 degree” assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area.

The visual survey shall include all surface landmarks, including manholes, previous liner cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

If any unanticipated items are found, conduct further research before initiating intrusive activities and implement any actions needed to avoid striking the utility or obstruction.

### **Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty**

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility or when there is uncertainty about utility locations, locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

### **Intrusive Activities within 2 feet of an Underground Utility**

Use non-aggressive methods (hand digging, vacuum excavation, etc.) to perform intrusive activities within 2 feet of a high risk utility (i.e., a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

### **Spotter**

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered stop work immediately and contact the PM or RHSM to evaluate the situation. The spotter must have a method to alert an operator to stop the intrusive activity (e.g., air horn, hand signals).

## 9.22 Utilities (overhead)

### Proximity to Power Lines

It must be determined whether equipment operations including, positioning, and traveling will occur in proximity to power lines within 20 feet (6.1 meters) for line voltage up to 350 kilo volts (kV), and within 50 feet (15.2 meters) for line voltage between 350 kV to 1000 kV. For power lines over 1000 kV, the distance must be determined by the utility/operator or qualified registered professional engineer in electrical power transmission and distribution.

**Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:**

- Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the table.

**MINIMUM DISTANCES FROM POWERLINES**

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
0-50	10 (3.0)
50-200	15 (4.6)
201-350	20 (6.1)
351-500	25 (7.6)
501-750	35 (10.7)
751-1000	45 (13.7)
Over 1000	Established by utility owner/operator or by a professional engineer in electrical power transmission/distribution

*(These distances have been determined to eliminate the potential for arcing based on the line voltage.)*

- The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.
- All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

## 9.23 Working Around Material Handling Equipment

When CH2M HILL personnel are exposed to material handling equipment, the following safe work practices/hazard controls shall be implemented:

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Never turn your back on any operating equipment.

- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers and equipped with firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.
- Wear a high visibility safety vest or high visibility clothing

## 10.0 Physical Hazards and Controls

Physical hazards include exposure to temperature extremes, sun, noise, and radiation. If you encounter a physical hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made.

### 10.1 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels, A-weighted, (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 85 dBA or a noise dose of 50% must participate in the Hearing Conservation program including initial and annual (as required) audiograms.
- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's virtual office.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner and a copy of the OSHA standard 29 CFR 1910.95 shall be posted in the workplace.

### 10.2 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

#### Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.

- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

### Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

### Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or “Foreign Legion” style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

### Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

## 10.3 Temperature Extremes

(Reference CH2M HILL SOP HSE-211, *Heat and Cold Stress*)

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress;
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections); and
- Communicating any concerns regarding heat and cold stress to their supervisor or SC.

### 10.3.1 Heat

Heat-related illnesses are caused by more than just temperature and humidity factors.

**Physical fitness** influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

**Acclimatization** is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least two continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in three to four weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level; such as during a heat wave.

**Dehydration** reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool—but not cold—water. Call ambulance, and get medical attention immediately!

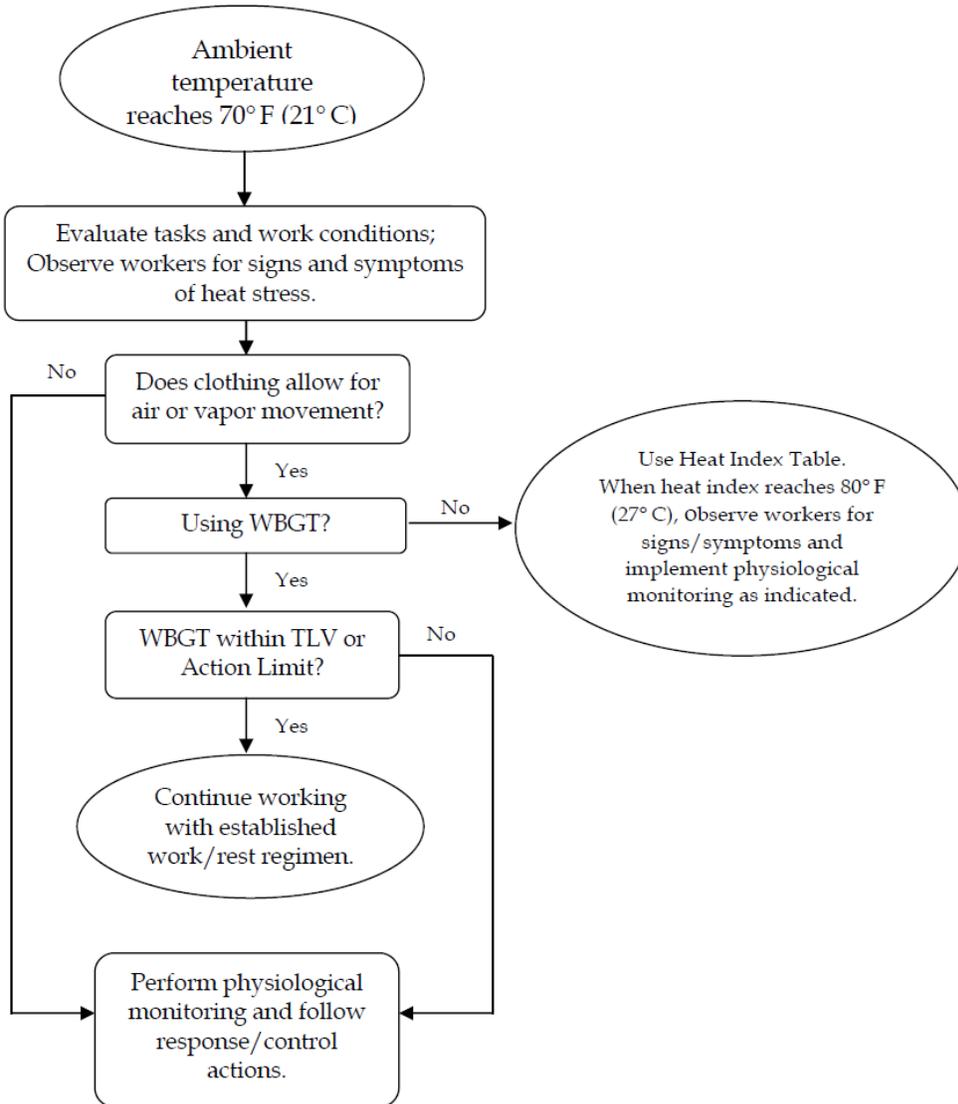
#### Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°Fahrenheit (10 degrees Celsius [C]) to 60°Fahrenheit (F) (15.6 degrees C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Remind employees to drink water throughout their work shift.

- Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate to site work conditions by slowly increasing workloads; for example, do not begin site work with extremely demanding activities. Closely monitor employees during their first 14 days of work in the field.
- Supervisors and SCs must continually observe employees throughout the work shift for signs and symptoms of heat stress or illness. Employees must monitor themselves for heat stress as well as observe their co-workers.
- Effective communication must be maintained with employees throughout the work shift either by voice, observation, or electronic device.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Use portable fans for convection cooling or in extreme heat conditions, an air-conditioned rest area when needed.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.
- Brief employees initially before the project work begins and routinely as part of the daily safety briefing, on the signs and symptoms, of heat-relatedness illnesses, precautions to measures and emergency procedures to follow as described in this plan.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

# Thermal Stress Monitoring

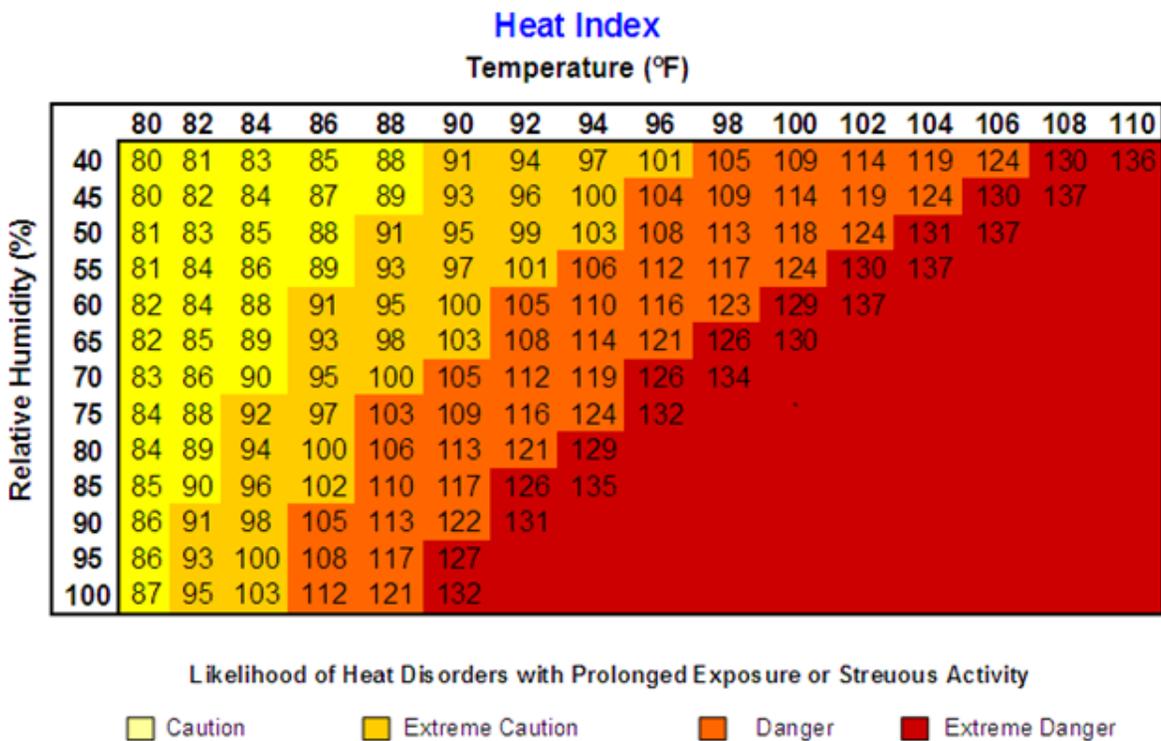
## Thermal Stress Monitoring Flow Chart



## Thermal Stress Monitoring – Permeable or Impermeable Clothing

When **permeable work clothes** are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80° F (27° C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8°C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing** (e.g., clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below shall be conducted when the ambient temperature reaches 70° F (21° C) or sooner when climatic conditions may present greater risk of heat stress combined with wearing unique variations of impermeable clothing, or workers exhibit symptoms of heat stress



Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline and observe workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline, then at least every hour, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Conduct initial monitoring as baseline, then every 30 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Conduct initial monitoring as baseline, then every 15 minutes or sooner if signs of heat stress are observed.
Source: National Weather Service		

### Physiological Monitoring and Associated Actions

For employees wearing permeable clothing, follow the minimum frequency of physiological monitoring listed in the Heat Index Table.

For employees wearing impermeable clothing, physiological monitoring should begin initially at a 15 minute interval, then if the employee's heart rate or body temperature is within acceptable limits, conduct the subsequent physiological monitoring at 30 minutes, and follow the established regimen protocol below.

When physiological monitoring is required, use either radial pulse or aural temperature and follow actions below:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (e.g. 180 - 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 beats per minute (bpm).
- If the heart rate is higher than 120 bpm after the FIRST minute into the rest period, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm after the FIRST minute into the rest period.

Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.

- If the oral or aural temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.

- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6 ° F (37.6° C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken.

### Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

### 10.3.2 Cold

#### General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

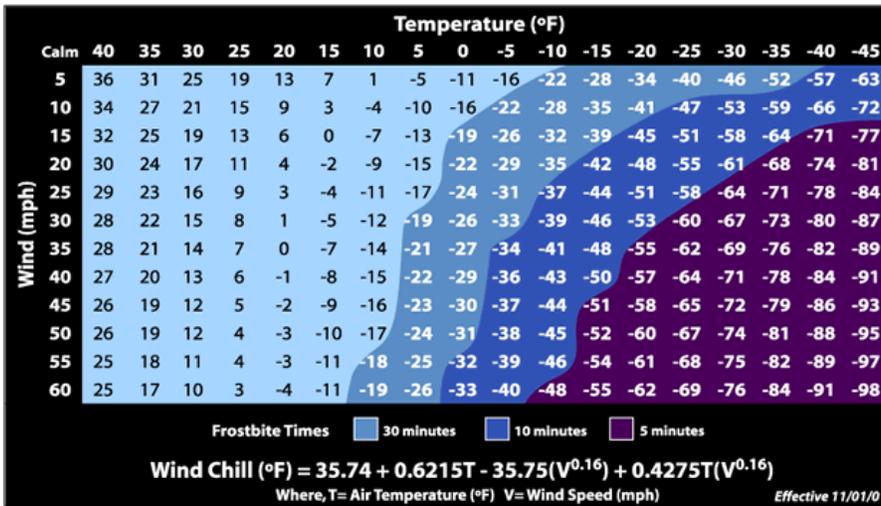
Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

#### Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.

- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but <b>not</b> hot—water. Have victim drink warm fluids, but <b>not</b> coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but <b>not</b> coffee or alcohol. Get medical attention.



## 10.4 Radiological Hazards

Refer to CH2M HILL’s Core Standard, Radiological Control and Radiological Controls Manual for additional requirements.

Hazards	Controls
None Known	None Required

## 11.0 Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. During project planning stages, ask the site Point of Contact if there are insect or other biological hazards have been noted in any of the work sites.

Biological hazards are everywhere and change with the region and season. If you encounter a biological hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take bites or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact the occupational nurse at 1-866-893-2514.

### 11.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.

Precautions include:

- Watching for and avoiding nests.
- Keep exposed skin to a minimum.
- Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. When working at a remote location, ensure that first-aid kits contain over-the-counter allergy and itch medication (e.g., Benadryl, Claritin, etc) as well as other over-the-counter medications that may not be available to aid in symptom treatment.
- If bees or other stinging insects are known to be present, determine whether additional protective clothing should be donned before entering/working in brushy areas.
- Before entering a heavily vegetated or brushy area, observe the area for several minutes to see if bees or other stinging insects may be present. If nests or individual insects are observed, retreat and inquire whether a specialist or a client service can be contacted to clear the area before work proceeds.
- Consider if heavy-weight clothing or tyvek, or head netting would provide additional protection in areas where wasps/bees are known or suspected. Be aware of heat stress conditions additional clothing may cause.
- Use insect repellent on clothing. Wear light-colored clothing and remove bright reflective safety-colored clothing if not working near a roadway as these may attract the wasps.
- Wear fragrance-free or lightly-scented sunscreen, and body lotions. Bees are attracted to sweet scents. Avoid using floral scented soaps, shampoos, or conditioners.
- Move slowly and calmly through vegetated areas and try to avoid major disturbance of vegetation as wasps/bees often react to aggressive movement.
- If you encounter a wasp, back away slowly and calmly, do not run or swat at the insect. Wait for it to leave, or gently move or brush it off gently with a piece of paper or other light object. Do not use your hand.

If you are stung, contact the occupational nurse at 1-866-893-2514, no matter how minor it may seem. If a stinger is present, remove it as soon as possible using something with a thin, hard edge (e.g., credit card) to scrape the stinger out. Be sure to sanitize the object first with hand sanitizer, alcohol or soap and water. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

## 11.2 Bird Droppings

Large amounts of bird droppings may present a disease risk. The best way to prevent exposure to fungus spores in bird droppings is to avoid disturbing it. A brief inhalation exposure to highly contaminated dust may be all that is needed to cause infection and subsequent development of fungal disease.

If disturbing the droppings or if removal is necessary to perform work, follow these controls:

- Use dust control measures (wetting with water or HEPA vacuuming) for all activities that may generate dust from the accumulated droppings.
- Wear Tyvek with hoods, disposable gloves and booties, and air-purifying respirators with a minimum N95 rating.
- Put droppings into plastic/poly bags and preferably into a 55-gallon drum to prevent bag from ripping.

## 11.3 Feral Dogs

Avoid all dogs – both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears and a direct stare. If you are threatened by a dog, remain calm, do not scream and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run, try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g. vehicle). If attacked, retreat to vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the occupational nurse at 1-866-893-2514. Report the incident to the local authorities.

## 11.4 Mosquito Bites

Due to the recent detection of the West Nile Virus in the southwestern United States it is recommended that preventative measures be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent:

- Stay indoors at dawn, dusk, and in the early evening;
- Wear long-sleeved shirts and long pants whenever you are outdoors;
- Spray clothing with repellents containing permethrin or N,N-diethyl-meta-toluamide (DEET) since mosquitoes may bite through thin clothing;
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands; and
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

## Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3 to 15 days.

Contact the project RHSM with questions, and immediately report any suspicious symptoms to your supervisor, PM, and contact the occupational nurse at 1-866-893-2514.

## 11.5 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose its (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

*Poison Ivy*



*Poison Sumac*



*Poison Oak*



Contamination with poison ivy, sumac or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed).
- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urushiol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you must work on a site with poison ivy, sumac or oak the following precautions are necessary:

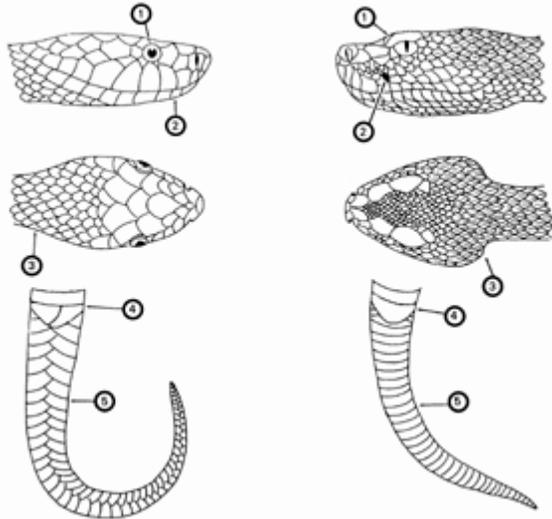
- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac or oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
- Personal protective equipment, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu or other product designed for removing urushiol. If you do not have Zanfel or Tecnu wash with cold water. Do not take a bath, as the oils can form an invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.

If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

## 11.6 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

## Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
<ol style="list-style-type: none"> <li>1. Round pupils</li> <li>2. No sensing pit</li> <li>3. Head slightly wider than neck</li> <li>4. Divided anal plate</li> <li>5. Double row of scales on the underside of the tail</li> </ol>	<ol style="list-style-type: none"> <li>1. Elliptical pupils</li> <li>2. Sensing pit between eye and nostril</li> <li>3. Head much wider than neck</li> <li>4. Single anal plate</li> <li>5. Single scales on the underside of the tail</li> </ol>
	

### 11.7 Spiders - Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

#### Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.

- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood;
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite;
- Elevate the bitten area, if possible;
- Do not apply a tourniquet, do not try to remove venom; and
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider – especially if you think it is a poisonous spider.

Black Widow



Red Widow



Brown Widow



Brown Recluse



## 11.8 Ticks

Every year employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks.

Where site conditions (vegetation above knee height, tick endemic area) or when tasks (having to sit or kneel in vegetation) diminish the effectiveness of the other controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting field work. Avoid habitats where possible, reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this HSP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear that looks like a bull's eye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the Hours and Incident Tracking System [HITS] system on the VO) if you do come in contact with a tick.

### 11.8.1 Navy Clean Clothing Options

Several clothing options are available for tick prevention, as described below.

- **Self-applied Clothing Treatment** - Permethrin-based repellents such as Permanone have proven to be highly effective in preventing tick bites. Permethrin is actually an insecticide, rather than a traditional repellent, and works primarily by killing ticks on contact with the clothes (although it also has some repellent properties). Repellents containing permethrin are for use on clothing only and are not intended for skin application. These products are formulated as aerosol sprays or pumps, and will typically provide up to 2 weeks of protection from a single treatment (lasting through several washings). Instructions on product labels should be followed for proper application. Typically, these products are applied in a well-ventilated area and allowed to dry for 2 to 4 hours (more time is required for higher-humidity environments). Although skin reactions are not common, it is recommended to avoid contact with face, eyes, or skin when treating clothing.
- **Pretreated Clothing** - Some manufacturers produce clothing that has already been treated with Permethrin. Typically, the fibers are impregnated with the repellent, reportedly making them able to withstand up to 70 wash cycles. Purchasing pre-treated clothing is one alternative to applying a Permethrin-based repellent to your clothing.
- **Bug Suits** - Bug suits are garments assembled with a mesh foundation woven throughout the pants and jacket, along with a mesh/fabric hood. These provide a physical barrier to small insects (including ticks and chiggers). Typically, these garments are not treated with repellents and still are susceptible to infiltration through seams. Additionally, mesh hoods may impair vision. Bug suits add an additional layer of clothing to the wearer, and may result in increased heat stresses to the body. Bug suits are an approved alternative to treated clothing, but particular attention must be paid to seams, vision impairment, and heat stress when they are worn for tick bite prevention. Bug suits should not be used around heavy equipment or moving parts that could catch the material and pull an individual into the equipment.
- **Tyvek Suits** - Tyvek suits provide a continuous physical barrier for the legs and torso, which makes it very difficult for ticks to infiltrate. The light color also makes it easier to see ticks that have transferred onto the body. The disposable nature of Tyvek also reduces the hazard associated with ticks that go undetected in clothing at the end of the day. Tyvek clothing presents an additional heat stress hazard for employees, which may make use difficult in late spring through early fall.

### 11.8.2 Skin Treatment

The use of skin-applied repellents is required when working in areas where the presence of ticks is anticipated. Although other repellents may provide some level of protection, DEET-based repellents are preferred for use on CH2M HILL projects. However, alternative repellents that can be used must include one of the following active ingredients: Picaridin, IR3535, oil of lemon eucalyptus (also known as PMD), IR3535, methyl nonyl ketone, and oil of citronella.

These repellents must be reapplied periodically in accordance with manufacturer's recommendations. The effectiveness of DEET on the skin is influenced by the concentration of DEET, absorption through the skin, evaporation, sweating, air temperature, wind, and abrasion of the treated surface by rubbing or washing. Studies

have shown that 100 percent DEET may offer up to 12 hours of protection, while lower concentrations of DEET (20 percent-34 percent) may provide between 3 to 6 hours of protection. The Center for Disease Control and Prevention recommends repellents with between 20 percent-30 percent DEET content. Some non-DEET repellent products also provide some level of protection, but to a lesser degree than DEET-based products. DEET will repel ticks and decrease the chance of a tick bite, but it may not deter a tick from walking across the skin to unexposed and untreated areas.

### 11.8.2.1 Active Ingredients in Insect Repellents

#### 11.8.2.1.1 Conventional Repellents

- DEET is the active ingredient found in many insect repellent products. It is used to repel biting pests such as mosquitoes and ticks, including ticks that may carry Lyme disease. Products containing DEET currently are available to the public in a variety of liquids, lotions, sprays, and impregnated materials (for example, wrist bands). Formulations registered for direct application to human skin contain from 4 to 100 percent DEET. Picaridin (chemical name, 2-[2-hydroxyethyl]-1-piperidinecarboxylic acid 1-methylpropyl ester) is a colorless, nearly odorless liquid active ingredient that is used as an insect repellent against biting flies, mosquitoes, chiggers, and ticks. Picaridin products were sold in Europe and Australia for several years before being introduced to the U.S. market in 2005. Products contain a range of 5 to 20 percent of the active ingredient.

#### 11.8.2.1.2 Biopesticide Repellents

- Biopesticides are certain types of pesticides derived from natural materials such as animals, plants, bacteria, and certain minerals. These include: IR3535 (chemical name, 3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester), also called Merck 3535, oil of lemon, P-Mentane-3,8-diol (the chemically synthesized version of oil of lemon eucalyptus), methyl nonyl ketone, and oil of citronella.

#### 11.8.2.1.3 Repellents Used on Clothing

- Permethrin is registered for use as both an insecticide and a repellent. Permethrin products are used on clothing, shoes, bed nets, and camping gear. Permethrin-impregnated clothing such as pre-treated shoes, socks, and pants repel and kill ticks, mosquitoes, and other insects and retain this effect after repeated laundering. Permethrin is also found in treated tents, tarps, bed nets, sleeping bags, and mattresses.

### 11.8.3 Required Protective Actions

Ticks can come in contact with skin anywhere that there is an uncovered area or an opening. Tyvek suits and bug suits provide continuous protection from the legs to the upper torso. The following actions are required for CH2M HILL employees when working in potential tick habitats at MCIEAST-MCB CAMLEJ :

- Wear light colored clothing.
- Wear long sleeves and long pants .
- Tuck shirts into pants; shirts should be long enough to not come untucked easily.
- Tuck pants into socks or tape pant legs to boots (close cuff openings).
- Remove clothing within 1 hour of being in the woods (and shower soon afterwards).
- Place clothes in hot dryer for 1 hour (or in sealed plastic bag).
- Apply repellents (both skin and clothing repellents).

<b>TICKS- REQUIRED PROTECTIVE MEASURES</b>	
<b>Body Part</b>	<b>Protective Measure</b>
Head	Light colored hat (recommended) Treat neck with approved repellent (required)
Upper Body	Light-colored long-sleeve shirt (required) Treat exposed skin with approved repellent (required) One of the following must be used: 1) Permethrin clothing treatment 2) Tyvek coverall 3) Bug suit
Lower Body	Long pants (required) One of the following must be used: 1) Permethrin clothing treatment 2) Tyvek coverall 3) Bug suit

#### 11.8.4 Tick Checks

By checking ourselves and others for ticks, ticks may be located and removed before they have a chance to attach or transfer diseases. The field personnel will conduct personal checks often; and at lunch and the end of the day, they will perform a full-body check for ticks.

#### 11.8.5 Tick Bite and Removal

If bitten by a tick, act promptly. Remove the tick immediately, using tweezers and pulling gently at the point of attachment (head). It is essential to remove the tick as soon as possible (best if found and removed within 24 hours of attachment). Wash your hands and skin after removing the tick. Place the tick in a re-sealable plastic bag for testing at a later date. Call the occupational nurse at 1-866-893-2514 as soon as possible, and provide as much information as possible regarding the date, time, and location of the bite. Report the tick bite to your supervisor and PM. Complete the Hours and Incident Tracking System (HITS) report. Follow the nurse's advice regarding monitoring symptoms and follow-up contact.

Be aware of the symptoms of Lyme disease or RMSF. Lyme disease begins with a rash that looks like a bullseye with a small welt in the center. RMSF begins with a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, contact the occupational nurse at 1-866-893-2514 and seek medical attention.

Take precautions to avoid exposure by including pre-planning measures for biological hazards before starting field work. Avoid habitats where possible and reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing, and tick removal kits. Use the buddy system and perform tick inspections before entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See the tick fact sheet attached to this HSP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

**Be sure to complete an Incident Report (either use the HITS on the VO) if you do come in contact with a tick.**

## 12.0 Contaminants of Concern

The table below summarizes the potential contaminants of concern (COC) and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and media that was sampled (groundwater, soil boring, surface soil). These concentrations were used to determine engineering and administrative controls described in the "Project-Specific Hazard Controls" section of this HSP, as well as PPE and site monitoring requirements.

Contaminants of Concern					
Contaminant	Location and Maximum <sup>a</sup> Concentration (ppm)	Exposure Limit <sup>b</sup>	IDLH <sup>c</sup>	Symptoms and Effects of Exposure	PIP <sup>d</sup> (eV)
Chlorobenzene	GW: SB: SS:	75 ppm (350 mg/m <sup>3</sup> )	1000 ppm	Irritant to eyes, skin, and nose; drowsiness; narcosis, restlessness, tremors, and muscle spasms	9.07
2,4-Dinitrotoluene	GW: SB: SS:	1.5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> Ca	Anoxia, cyanosis; anemia, jaundice; reproductive effects; [potential occupational carcinogen]	UK
2,4,6-Trinitrotoluene	GW: SB: SS:	1.5 mg/m <sup>3</sup>	500 mg/m <sup>3</sup>	Irritated skin, liver damage, sneezing, cough, sore throat, muscle pain	UK
Nitrobenzene	GW: SB: SS:	1 ppm	25	Toxic by skin exposure. Skin, eye, and mucous membrane irritant. Respiratory disruption. Anemia	9.92
Nitrotoluenes	GW: SB: SS:	5 ppm	200 ppm	Head ache, dizziness, nausea, vomiting	9.50
Nitroglycerine	GW: SB: SS:	0.2 ppm	75 mg/m <sup>3</sup>	Throbbing head, dizziness, nausea, abdominal pain, hypertension, flushing, palpitations, delirium, CNS depressant, angina, skin irritation	UK
Chlorobenzene	GW: SB: SS:	10 ppm	1,000	Skin, eye, and nose irritation; drowsiness; loss of coordination; CNS depression	9.07
Perchlorate		NA	NA	Disrupts the iodide uptake in the thyroid gland. Can result in hypothyroidism. Tiredness, depression, muscle cramps, dry/itchy skin.	UK
Silica (crystalline)	GW: SB: SS:	0.025 mg/m <sup>3</sup>	Ca [25 mg/m <sup>3</sup> (cristobalite, tridymite); 50 mg/m <sup>3</sup> (quartz, tripoli)]	Cough, dyspnea (breathing difficulty), wheezing; decreased pulmonary function, progressive resp symptoms (silicosis); irritation eyes; [potential occupational carcinogen]	NA
Footnotes:					
<sup>a</sup> Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water). <sup>b</sup> Appropriate value of permissible exposure limit (PEL), recommended exposure limit (REL), or threshold limit value (TLV) listed. <sup>c</sup> IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen. <sup>d</sup> PIP = photoionization potential; NA = Not applicable; UK = Unknown. eV = electron volt mg/kg = milligram per kilogram mg/m <sup>3</sup> = milligrams per cubic meter ug/m <sup>3</sup> = micrograms per cubic meter					
Potential Routes of Exposure					
<b>Dermal:</b> Contact with contaminated media. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of PPE.		<b>Inhalation:</b> Vapors and contaminated particulates. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of respiratory protection when other forms of control do not reduce the potential for exposure.		<b>Other:</b> Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).	

# 13.0 Site Monitoring

(Reference CH2M HILL SOP HSE-207, *Exposure Monitoring for Airborne Chemical Hazards*)

When performing site monitoring, record all the information, such as in a field logbook. Note date and time, describe monitoring location (for example, in breathing zone, at source and site location), and what the reading is. If any action levels are reached, note it in the field logbook and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment plus thirty years. Ensure that copies of the field log book are maintained in the project file.

Copies of all project exposure records (e.g., copies of field logbook pages where air monitoring readings are recorded and associated calibration) shall be sent to the regional SPA for retention and maintained in the project files.

## 13.1 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels <sup>a</sup>	Action to be Taken when Action Level reached	Frequency <sup>b</sup>	Calibration
<b>FID:</b> TVA 1000 or equivalent	Intrusive Work	<0.5 ppm	Level D	Initially and periodically during task	Daily
	Soil sampling	0.5 to 10 ppm ≥ 10 ppm	Level C Evacuate work area and contact RHSM		
<b>PID:</b> MiniRAE with 10.6 eV lamp or greater					
<b>CGI:</b> MultiRAE or equivalent	Intrusive Work	0-10% LEL:	No explosion hazard	Initially and periodically during task	Daily
	Soil sampling	≥10% LEL:	Explosion hazard; evacuate or vent		
<b>O<sub>2</sub>Meter:</b> MultiRAE or equivalent	Intrusive Work	>25% <sup>c</sup> O <sub>2</sub> :	Explosion hazard; evacuate or vent	Initially and periodically during task	Daily
	Soil sampling	20.9% <sup>c</sup> O <sub>2</sub> : <19.5% <sup>c</sup> O <sub>2</sub> :	Normal O <sub>2</sub> O <sub>2</sub> deficient; vent or use SCBA		
<b>Dust Monitor:</b> DataRAM or equivalent	All other sites-soil sampling, drilling and other intrusive work	<1.0 mg/m <sup>3</sup> >1.0 mg/m <sup>3</sup>	Level D Start dust suppression	Initially and periodically during task	Zero Daily
<b>Noise-Level Monitor</b> <sup>d</sup>	High noise work	<85 dBA	No action required	Initially and periodically during task	Daily
		85-120 dBA	Hearing protection required		
		120 dBA	Stop; re-evaluate		

<sup>a</sup> Action levels apply to **sustained** breathing-zone measurements above background for **more than 5 minutes**.

<sup>b</sup> The exact frequency of monitoring depends on field conditions and is to be determined by the SC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate.

<sup>c</sup> If the measured percent of O<sub>2</sub> is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O<sub>2</sub> action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O<sub>2</sub> action levels are required for confined-space entry.

<sup>d</sup> Noise monitoring and audiometric testing also required.

FID = flame ionization detector; PID= photoionization detector; ppm = parts per million:

## 13.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
<b>PID:</b> MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
<b>PID:</b> TVA 1000	100 ppm isobutylene	CF = 1.0	100 ppm	1.5 lpm reg T-tubing
<b>FID:</b> TVA 1000	100 ppm methane	NA	100 ppm	2.5 lpm reg T-tubing
<b>Dust Monitor:</b> DataRAM	Dust-free air	Not applicable	0.00 mg/m <sup>3</sup> in "Measure" mode	Dust-free area OR Z- bag with HEPA filter
<b>CGI:</b> MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL + 5% LEL	1.5 lpm reg direct tubing
<b>Multi-gas:</b> MultiRae or equivalent	H <sub>2</sub> S	CF = 25	25 ppm	1.5 lpm reg
	CO	CF = 50	50 ppm	T-tubing
	LEL	CF = 50	50 %	
	O <sub>2</sub>	CF = 20.9	20.9 %	
	100 ppm isobutylene	CF = 100	100 ppm	
<b>GEM 2000</b> (or equivalent)	Methane, O <sub>2</sub>	Various	Refer to Instrument Manual on site,	

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name
- Serial Number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature and wind direction)
- Calibration/instrument readings
- Operator's name and signature
- Date and time

## 14.0 Personal Protective Equipment

(Reference CH2M HILL- SOP HSE-117, *Personal Protective Equipment*)

### 14.1 Required Personal Protective Equipment

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.

A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM that approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE;
- Employees must be trained in the limitations of the PPE;
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area;
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner;
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage;
- PPE must be maintained in a clean and reliable condition;
- Damaged PPE shall not be used and must either be repaired or discarded; and
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

## Project-Specific Personal Protective Equipment Requirements<sup>a</sup>

Task	Level	Body	Head	Respirator <sup>b</sup>
<ul style="list-style-type: none"> <li>• Surveying</li> <li>• Site walk over</li> <li>• Utility locating</li> <li>• Mob/Demob</li> </ul>	D	<b>Body:</b> Work clothes <b>Boots:</b> Safety toed leather work boots <b>Gloves:</b> Leather gloves (if necessary)	Hardhat <sup>c</sup> Safety glasses with side shields Ear protection <sup>d</sup>	None required
<ul style="list-style-type: none"> <li>• DMG Survey and intrusive investigations</li> <li>• Soil and groundwater sampling</li> <li>• IDW management</li> </ul>	Modified D	Work clothes or cotton coveralls <b>Boots:</b> Safety-toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers <b>Gloves:</b> Inner surgical-style nitrile & outer chemical-resistant nitrile gloves. OR Work Clothes or Coveralls. SC to determine body protection based on potential contact with site contaminants. If outer layer of personal clothing cannot be kept clean, then outer cotton coveralls or uncoated Tyvek coveralls shall be worn. (Polycoated Tyvek when there is potential to contact contaminated groundwater or free liquids from drums.)	Hardhat <sup>c</sup> Safety glasses with side shields Ear protection <sup>d</sup>	None required
Work near vehicular traffic ways or earth moving equipment.	All	Appropriate level of ANSI/ISEA 107-2010 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	
Equipment decontamination if using pressure washer	Modified D with splash protection	<b>Coveralls:</b> Polycoated Tyvek® <b>Boots:</b> 16-inch-high steel-toed rubber boots <b>Gloves:</b> Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> over safety glasses with side shields or splash goggles Ear protection <sup>d</sup>	None required.
Those tasks requiring upgrade according to Section 13.1	C	<b>Coveralls:</b> Polycoated Tyvek® <b>Boots:</b> Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers <b>Gloves:</b> Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> Ear protection <sup>d</sup> Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; [specify cartridge type] <sup>e</sup> .

## Reasons for Upgrading or Downgrading Level of Protection (with approval of the RHSM)

Upgrade <sup>f</sup>	Downgrade
<ul style="list-style-type: none"> <li>• Request from individual performing tasks.</li> <li>• Change in work tasks that will increase contact or potential contact with hazardous materials.</li> <li>• Occurrence or likely occurrence of gas or vapor emission.</li> <li>• Known or suspected presence of dermal hazards.</li> <li>• Instrument action levels in the "Site Monitoring" section exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>• New information indicating that situation is less hazardous than originally thought.</li> <li>• Change in site conditions that decrease the hazard.</li> <li>• Change in work task that will reduce contact with hazardous materials.</li> </ul>

<sup>a</sup> Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

<sup>b</sup> No facial hair that would interfere with respirator fit is permitted.

<sup>c</sup> Hardhat and splash-shield areas are to be determined by the SC.

<sup>d</sup> Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

<sup>e</sup> See cartridge change-out schedule.

<sup>f</sup> Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

## 14.2 Respiratory Protection

(Reference CH2M HILL SOP HSE-121, *Respiratory Protection*)

Implement the following when using respiratory protection:

- Respirator users must have completed appropriate respirator training within the past 12 months. Level C training is required for air-purifying respirators (APR) use and Level B training is required for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) use. Specific training is required for the use of powered air-purifying respirators (PAPR);
- Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used;
- Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months;
- Respirator use shall be limited to those activities identified in this plan. If site conditions change that alters the effectiveness of the specified respiratory protection, the RHSM shall be notified to amend the written plan;
- Tight-fitting facepiece respirator users shall be clean-shaven and shall perform a user seal check before each use;
- Canisters/cartridges shall be replaced according to the change-out schedule specified in this plan. Respirator users shall notify the SC or RHSM of any detection of vapor or gas breakthrough. The SC shall report any breakthrough events to the RHSM for schedule upgrade;
- Respirators in regular use shall be inspected before each use and during cleaning;
- Respirators in regular use shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition;
- Respirators shall be properly stored to protect against contamination and deformation;
- Field repair of respirators shall be limited to routine maintenance. Defective respirators shall be removed from service;
- When breathing air is supplied by cylinder or compressor, the SC or RHSM shall verify the air meets Grade D air specifications; and
- The SC or designee shall complete the Self-Assessment Checklist – Respiratory Protection included in as attachment to this plan to verify compliance with CH2M HILL’s respiratory protection program.

### Respirator Change-Out Schedule

Contaminant	Change-Out Schedule
Nitrobenzene	End-of-service life or end of shift (whichever occurs first)
Nitrotoluene	End-of-service life or end of shift (whichever occurs first)

## 15.0 Worker Training and Qualification

### 15.1 CH2M HILL Worker Training

(Reference CH2M HILL SOP HSE-110, *Training*)

#### 15.1.1 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

##### 15.1.1.1 Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

##### 15.1.1.2 Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

##### 15.1.1.3 Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

##### 15.1.1.4 Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as Safety Coordinator - Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor trained.

### 15.1.2 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR training. Bloodborne pathogen training located on CH2M HILL's Virtual Office is also required for those designated as first aid/CPR trained.

### 15.1.3 Safety Coordinator Training

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific HSP for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SCs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

### 15.1.4 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

### 15.1.5 Project-Specific Training Requirements

Project-specific training for this project includes:

- Training on this and subcontractor HSPs/AHAs
- Training qualifications outlined in SOP HSE-610, *Explosives Usage and Munitions Response* (for all UXO personnel)
- Excavator Operator Training/Competent Person Training (Subcontractor)
- 3R training for non-UXO personnel
- Training on SOPs on the VO as applicable:
  - Excavation
  - Drum Handling
  - Manual Lifting
  - Traffic Safety

## 16.0 Medical Surveillance and Qualification

(Reference CH2M HILL SOP HSE-113, *Medical Surveillance*)

All site workers participating in hazardous waste operations or emergency response (HAZWOPER) will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (e.g., physician's written opinion) will be maintained in the project files and made available for inspection.

### 16.1 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in on site HAZWOPER tasks are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

### 16.2 Job or Site-Specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

### 16.3 Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

### 16.4 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85dBA time-weighted average shall be included in a hearing conservation program that includes annual audiometric testing.

## 17.0 Site-Control Plan

### 17.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Site control is established to prevent the spread of contamination throughout the site and to ensure that only authorized individuals are permitted into potentially hazardous areas.

The SC will implement site control procedures including the following bulleted items.

- Establish support, contamination reduction, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals;
  - Air horn; and
  - Two-way radio or cellular telephone if available.
- Establish offsite communication.
- Establish and maintain the “buddy system.”

### 17.2 Remediation Work Area Zones

(Reference CH2M HILL SOP HSE-218 Hazardous Waste Operations)

A three-zone approach will be used to control areas where site contaminants exist. Access will be allowed only after verification of appropriate training and medical qualification. The three-zone approach shall include an EZ, Contamination Reduction Zone (CRZ) and a Support Zone (SZ). The three-zone approach is not required for construction work performed outside contaminated areas where control of site contamination is not a concern.

Specific work control zones shall be established as necessary during task planning. Site work zones should be modified in the field as necessary, based on such factors as equipment used, air monitoring results, environmental conditions, or alteration of work plans. The following guidelines shall be used for establishing and revising these preliminary zone designations.

#### 17.2.1 Support Zone

The SZ is an uncontaminated area (trailers, offices, field vehicles, etc.) that will serve as the field support area for most operations. The SZ provides field team communications and staging for emergency response. Appropriate sanitary facilities and safety and emergency response equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged and decontaminated materials, or personnel with medical emergencies that cannot be decontaminated.

#### 17.2.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ, upwind of the contaminated area where possible. The CRZ provides an area for decontamination of personnel, portable handheld equipment and tools, and heavy equipment. In addition, the CRZ serves as access for heavy equipment and emergency support services.

### 17.2.3 Exclusion Zone

The EZ is where activities take place that may involve exposure to site contaminants and/or hazardous materials or conditions. This zone shall be demarcated to prevent unauthorized entry. More than one EZ may be established if there are different levels of protection to be employed or different hazards that exist in the same work area. The EZ shall be large enough to allow adequate space for the activity to be completed, including field personnel and equipment, as well as necessary emergency equipment.

The EZ shall be demarcated with some form of physical barrier or signage. The physical barrier or signage shall be placed so that they are visible to personnel approaching or working in the area. Barriers and boundary markers shall be removed when no longer needed.

### 17.2.4 Other Controlled Areas

Other work areas may need to be controlled due to the presence of an uncontrolled hazard, to warn workers of requirements, or to prevent unauthorized entry. Examples include general construction work areas, open excavations, high noise areas, vehicle access areas, and similar activities or limited access locations. These areas shall be clearly demarcated with physical barriers (fencing, cones, reinforced caution tape or rope) as necessary and posted with appropriate signage.

## 18.0 Decontamination

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Decontamination areas will be established for work in potentially contaminated areas to prevent the spread of contamination. Decontamination areas should be located upwind of the exclusion zone where possible and should consider any adjacent or nearby projects and personnel. The SC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC. The SC must ensure that procedures are established for disposing of materials generated on the site.

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

### 18.1 Contamination Prevention

Preventing or avoiding contamination of personnel, tools, and equipment will be considered in planning work activities at all field locations. Good contamination prevention and avoidance practices will assist in preventing worker exposure and result in a more efficient decontamination process. Procedures for contamination prevention and avoidance include the following:

- Do not walk through areas of obvious or known contamination;
- Do not directly handle or touch contaminated materials;
- Make sure there are no cuts or tears in PPE;
- Fasten all closures in suits and cover them with duct tape, if appropriate;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contamination, where possible;
- Do not eat or drink in contaminated work areas;
- Do not carry food, beverages, tobacco, or flame-producing equipment into contaminated work areas;
- Minimize the number of personnel and amount of equipment in contaminated areas to that necessary for accomplishing the work;
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned and decontaminated;
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary; and
- Minimize the amount of tools and equipment necessary in contaminated areas.

### 18.2 Personnel and Equipment Decontamination

Personnel exiting an EZ must ensure that they are not spreading potential contamination into clean areas or increasing their potential for ingesting or inhaling potential contaminants. Personal decontamination may range from removing outer gloves as exiting the EZ, to proceeding through an outer layer doffing station including a boot and glove wash and rinse, washing equipment, etc. Equipment that has come into contact with contaminated media must also be cleaned/decontaminated when it is brought out of the EZ.

### **18.3 Decontamination During Medical Emergencies**

Standard personnel decontamination practices will be followed whenever possible. For emergency life saving first aid and/or medical treatment, normal decontamination procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany contaminated victims to advise emergency response personnel on potential contamination present and proper decontamination procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances or medical personnel. Outer garments can then be removed at the medical facility.

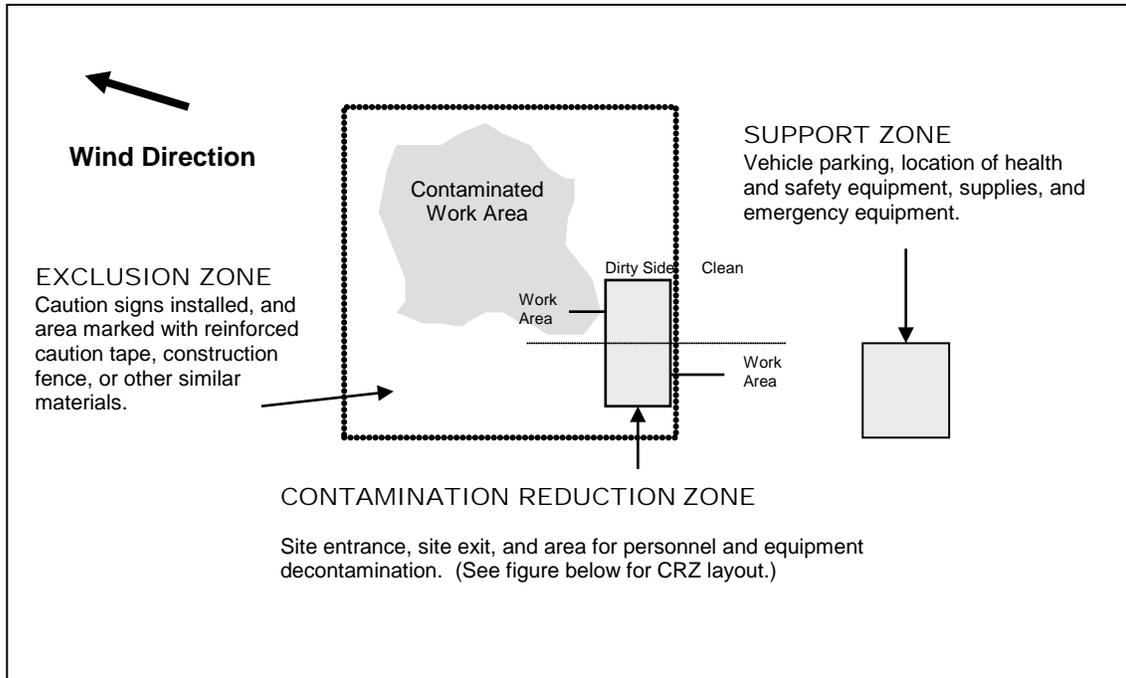
### **18.4 Waste Collection and Disposal**

All contaminated material generated through the personnel and equipment decontamination processes (e.g., contaminated disposable items, gross debris, liquids, sludges) will be properly containerized and labeled, stored at a secure location, and disposed in accordance with the project plans.

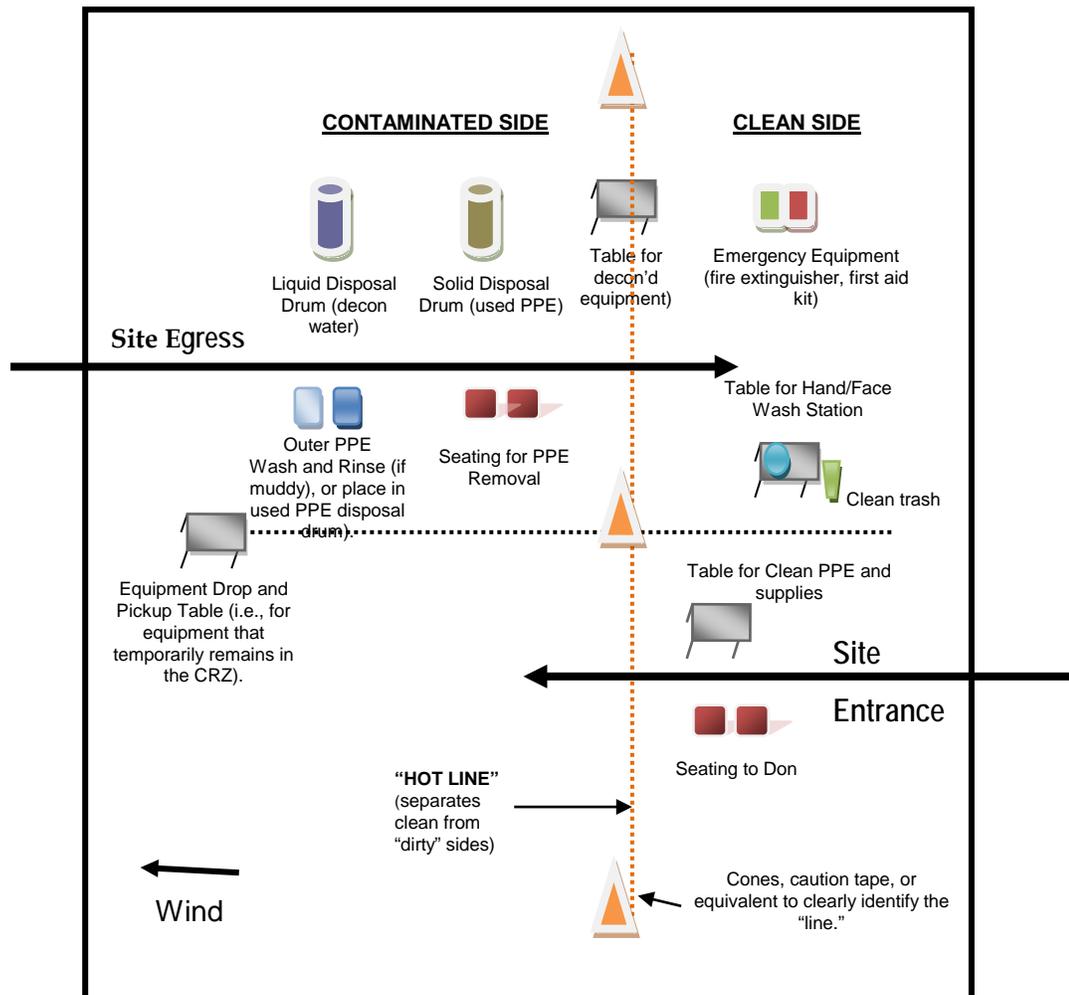
### **18.5 Diagram of Personnel-Decontamination Line**

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

Work Area - Set up appropriately based on wind direction



### Typical Contamination Reduction Zone



# 19.0 Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*)

## 19.1 Pre-Emergency Planning

The Emergency Response Coordinator (ERC), typically the SC or designee, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the ERC include:

- Review the facility emergency and contingency plans where applicable;
- Determine what onsite communication equipment is available (two-way radio, air horn);
- Determine what offsite communication equipment is needed (nearest telephone, cell phone);
- Confirm and post the “Emergency Contacts” page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated;
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear;
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures;
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies;
- Inventory and check site emergency equipment, supplies, and potable water;
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases;
- Rehearse the emergency response plan before site activities begin. This may include a “tabletop” exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year;
- Brief new workers on the emergency response plan; and
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

## 19.2 Emergency Equipment and Supplies

The ERC shall ensure the following emergency equipment is on the site. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer’s recommendations. The inspection shall be documented in a field logbook or similar means to be kept in the project files.

<b>Emergency Equipment and Supplies</b>	<b>Location</b>
20 (or two 10) class A,B,C fire extinguisher	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne-pathogen kit	Support Zone/Field Vehicle
Additional equipment (specify): Cell Phone	On SSC

## 19.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel;
- Shut down CH2M HILL operations and evacuate the immediate work area;
- Account for personnel at the designated assembly area(s);
- Assess the need for site evacuation, and evacuate the site as warranted;
- Implement HSE-111, Incident Notification, Reporting and Investigation; and
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this HSP.

## 19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing or heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, Incident Notification, Reporting and Investigation, and complete incident report using the HITS system on the VO or if not feasible, use the hard copy forms provided as an attachment to this HSP.
- Notify and submit reports to client as required in contract.

## 19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.

- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The ERC will follow the incident reporting procedures in the “Incident Notification, Reporting and Investigation” section of this HSP.

## 19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

## 19.7 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop--seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area;
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae, and towers;
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding;
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands; and
- Do not use telephones during electrical storms, except in the case of emergency.

Remember that lightning may strike several miles from the parent cloud, so work should be stopped and restarted accordingly. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

### 19.7.1 Tornado Safety

Recognizing imminent tornado signs include seeing an unusually dark sky, possibly with some green or yellow clouds. You may hear a roaring or rumbling sound like a train, or a whistling sound like a jet. Large hail may also be falling. You may be able to see funnels, or they may be hidden by rain or hail.

Listen to your radio for tornado warnings during bad thunderstorms. If a tornado warning is issued, don't panic. Instead, listen and look. Quickly but calmly follow directions for getting to shelter.

Take cover. Indoors you should go down into the basement and crouch down under the stairs, away from windows. Do not take an elevator. If you can't get to a basement, go into a closet or bathroom and pull a mattress over you or sit underneath a sturdy piece of furniture on the ground floor near the center of the building. Pull your knees up under you and protect your head with your hands.

A bad place to be in a tornado is in a building with a large freestanding roof such as a gymnasium, arena, auditorium, church or shopping mall. If you are caught in such a building, take cover under something sturdy.

More than half of tornado deaths occur in mobile homes. If a tornado threatens, get out and go to a building with a good foundation, or lay down in a ditch away from vehicles and other objects.

If you are driving, get to a shelter, lie down in a ditch or seek cover up under the girders of an overpass or bridge. Stay as close to the ground as you can. Protect your head and duck flying debris.

Stay away from metal and electrical equipment because lightning accompanies tornadoes.

If you have time before the tornado strikes, secure objects such as garbage cans and lawn furniture which can injure people. While most tornado damage is a result of the violent winds, most injuries and deaths actually result from flying debris.

## Emergency Contacts

**24-hour CH2M HILL Injury Reporting– 1-866-893-2514**  
**24-hour CH2M HILL Serious Incident Reporting Contact – 720-286-4911**

<p><b>Medical Emergency – 911</b>  <b>Local Ambulance #:</b> 910-451-9111  <b>Base Ambulance #:</b> 910-451-3004</p>	<p><b>CH2M HILL- Medical Consultant</b>                  WorkCare                  Dr. Peter Greaney M.D.                  300 S. Harbor Blvd, Suite 600                  Anaheim , CA 92805                  800-455-6155/866-893-2514                  714-978-7488</p>
<p><b>Fire/Spill Emergency – 911</b>  <b>Base Fire Response #:</b> 910-451-9111</p>	<p><b>CH2M HILL Director – Health, Safety, Security &amp; Environment</b>                  Andy Strickland/DEN                  (720) 480-0685 (cell) or (720) 286-2393 (office)</p>
<p><b>Security &amp; Police – 911</b>  <b>Base Security #:</b> 910-451-2555</p>	<p><b>CH2M HILL Responsible Health and Safety Manager (RHSM)</b>                  Name: Carl Woods                  Phone: 513 –319-5771</p>
<p><b>Utilities Emergency Phone Numbers</b>                  Water: Contact Base EMD                  Gas: Contact Base EMD                  Electric: Contact Base EMD</p>	<p><b>CH2M HILL Human Resources Department</b>                  Phone: Employee Connect toll-free number                  1-877-586-4411                  (U.S. and Canada)</p>
<p><b>CH2M HILL Project Manager</b>                  Name: Keith LaTorre                  Phone: 865-323-3300</p>	<p><b>CH2M HILL Worker’s Compensation:</b>                  Contact Business Group HR dept. to have form completed or contact Jennifer Rindahl after hours:                  (720)891-5382</p>
<p><b>CH2M HILL Safety Coordinator (SC)</b>                  Name: TBD                  Phone:</p>	<p><b>Media Inquiries Corporate Strategic Communications</b>                  Name: John Corsi                  Phone: (720) 286-2087</p>
<p><b>CH2M HILL Project Environmental Manager</b>                  Name: Hope Wilson/ATL                  Telephone Number: 678-530-4226                  Cellular Number: 678-656-5411</p>	<p><b>Automobile Accidents</b>                  Rental: Jennifer Rindahl/DEN: 720-286-2449                  CH2M HILL owned vehicle: Linda George/DEN:                  720-286-2057</p>
<p><b>Federal Express Dangerous Goods Shipping</b>                  Phone: 800/238-5355</p>	<p><b>CHEMTEL (hazardous material spills)</b>  <b>Phone: 800/255-3924</b></p>
<p>Facility Alarms: TBD</p>	<p>Evacuation Assembly Area(s): TBD daily by SC</p>

Facility/Site Evacuation Route(s): TBD daily by SC

## Directions to Local Hospital

**Nearest On-Base hospital:**

Base Naval Hospital (only to be used in extreme emergency)

Building NH100

100 Brewster Blvd.

Camp Lejeune, NC 28547

Phone: (910) 451-4840, (910) 451-4841, (910) 451-4842

**Local hospital:**

Onslow County Memorial Hospital

317 Western Boulevard

Jacksonville, NC 28546

Phone: (910) 577-2240

**Local ambulance service:**

Base Ambulance: (910) 451-3004, (910) 451-3005

Public Ambulance: (910) 451-9111

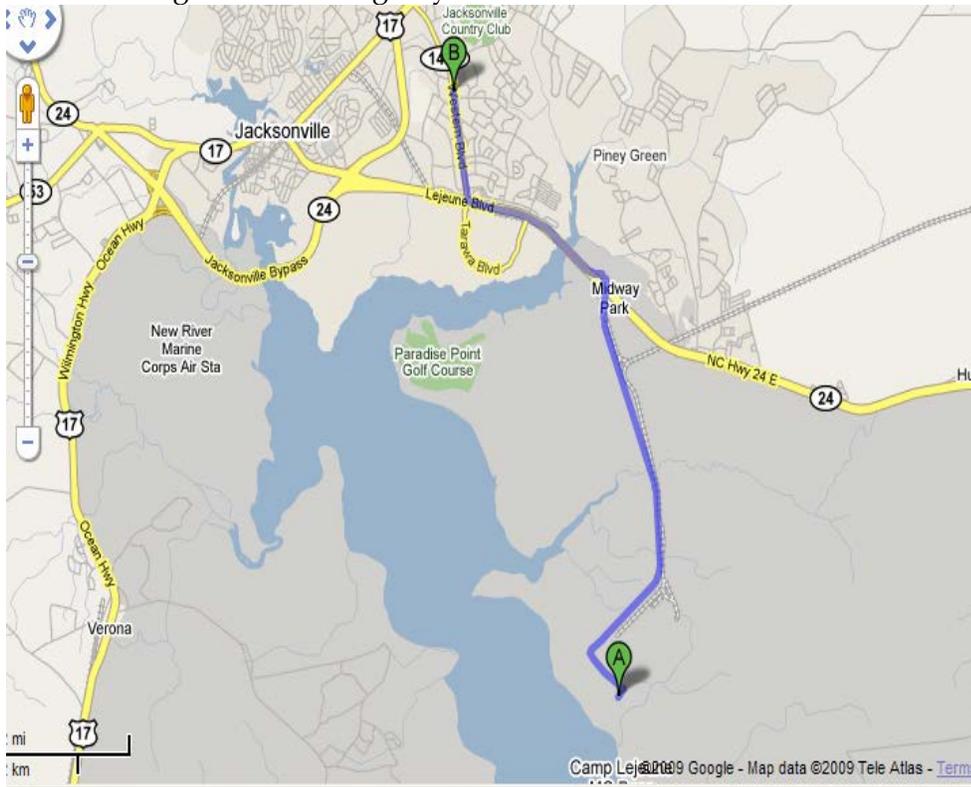
---

Directions to the Base Naval Hospital (Building NH100)  
(nearest hospital; only to be used in an extreme emergency)

1. Proceed north towards Highway 24.
2. Turn left onto Brewster Boulevard (heading west)
3. Continue on Brewster Boulevard until intersection with the driveway to the Naval Hospital.
4. Turn onto Hospital driveway, and proceed to emergency room.

Directions to Onslow County Memorial Hospital:

1. From Holcomb Boulevard, exit Base through main gate.
2. Follow Highway 24 west until intersecting with Western Boulevard.
3. Turn right onto Western Boulevard.
4. The Onslow County Memorial Hospital is on the left, approximately 2 miles (fifth stop light) from Highway 24.
5. Follow the signs to the emergency room.



6.

## 20.0 Spill Containment Procedures

CH2M HILL and subcontractor personnel working at the project site shall be knowledgeable of the potential health, safety and environmental concerns associated with petroleum and other substances that could potentially be released at the project site.

The following is a list of criteria that must be addressed in CH2M HILL's or the subcontractor's plans in the event of a spill or release. In the event of a large quantity spill notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop or contain the spill immediately (if possible) or note source. Shut off the source (e.g., pump, treatment system) if possible. If unsafe conditions exist, then leave the area, call emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. The SC shall be notified immediately;
- Extinguish sources of ignition (flames, sparks, hot surfaces, cigarettes);
- Clear personnel from the spill location and barricade the area;
- Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread;
- Use sorbent materials to control the spill at the source;
- Construct a temporary containment dike of sorbent materials, cinder blocks, bricks or other suitable materials to help contain the spill;
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified;
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required;
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion; and
- Follow incident notification, reporting, and investigation section of this plan.

# 21.0 Inspections

## 21.1 Management Health, Safety, Security, and Environment Inspections

The Management Inspection Checklist (attached to this plan) is intended to facilitate PM leadership, provide an opportunity for PM's to mentor field staff on HSE and identify any big picture actions that need to be addressed. Observations that would improve global HSE program should also be included on the form. This Checklist does NOT take the place of a formal HSE audit. The PM shall:

- Complete one checklist per month during field work when visiting the site. The PM may delegate completion to the task lead, field team leader, or construction manager if the project is short duration and a visit is not planned for.
- Complete applicable sections of the checklist (can be typed or hand-written). Address issues with the field team, taking the opportunity to mentor staff by identifying the "root cause" of observation (e.g., why are SBOs not being completed, had this hazard been noted by any other team members?).
- Send completed form to Project Delivery Manager, Sector HSE Lead, and RHSM for tracking and review. Original should be kept in the project files.

## 21.2 Project Activity Self-Assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-Assessment Checklists are contained as an attachment to this HSP. The Project-Activity Self-Assessment Checklists are based upon minimum regulatory compliance and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SC.

The self-assessment checklists will also be used by the SC in evaluating the subcontractors and any client contractors' compliance on site.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SC or other CH2M HILL representative and maintained in project files.

- Biological Prevention Measures
- Excavations
- Hand and Power Tools
- Intentional Detonations
- Manual Lifting
- PPE
- Traffic Control

## 21.3 Safe Behavior Observations

Safe Behavior Observations (SBOs) are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss.

The SC or designee shall perform at least one SBO each week for any field work performed by subcontractors or when there are at least two CH2M HILL personnel performing field work.

The SC or designee shall complete the SBO form (attached to this HSP) for the task/ operation being observed and submit them weekly.

For Federal projects, SBOs may be submitted electronically by e-mailing them to the address, "CH2M HILL ES FED Safe Behavior Observations" when connected to the network or at [CH2MHILLESFEDSafeBehaviorObservation@ch2m.com](mailto:CH2MHILLESFEDSafeBehaviorObservation@ch2m.com).

## 22.0 Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, *Incident Notification, Reporting and Investigation*)

### 22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public;
- Damage to property or equipment;
- Interruptions to work or public service (hitting a utility);
- Incidents which attract negative media coverage;
- Near misses;
- Spills, leaks, or regulatory violations; and
- Motor vehicle accidents.

Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SC and maintained onsite for the duration of the project.

### 22.2 Section Definitions

**Incident:** An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public;
- Property damage;
- Spill or release;
- Environmental requirement or permit violation;
- A “near-miss”; or
- Other (e.g., fire, explosion, bomb threat, workplace violence, threats)**Accident:** an incident involving actual loss through injury, damage to assets, or environmental harm.

**Near Miss:** A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation or other event from occurring. Examples of near-miss situations include: a hard hat or other personal protective equipment (PPE) prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert co-worker prevented an incident.

**Serious Incident:**

A Serious Incident must be immediately reported to senior management includes:

- Work related death, or life threatening injury or illness of a CH2M HILL employee;
- subcontractor, or member of the public;
- Kidnap/missing person;
- Acts or threats of terrorism;

- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

## 22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SC.

The SC shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name and Site Manager;
- Date and time of incident;
- Description of incident;
- Extent of known injuries or damage;
- Level of medical attention; and
- Preliminary root cause/corrective actions

**If the incident was an environmental permit issue (potential permit non-compliance, other situation that result in a notice of violation) or a spill or release, contact the Project EM immediately so evaluation of reportable quantity requirements and whether agency reporting is required;**

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA, the police, or state or Federal environmental agency.

Be aware that many OSHA-designated states require reporting to the area OSHA office if one person is admitted to the hospital (e.g., California and Washington); whereas Federal OSHA requires it if three or more are admitted.

## 22.4 HITS System and Incident Report Form

CH2M HILL maintains a HITS entry and/or Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

The SC shall complete an entry into the Hours and Incident Tracking System (HITS) database system located on CH2M HILL's Virtual Office (or if VO not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

## 22.5 Injury Management/Return-to-Work (for US/Puerto Rico based CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work)

### 22.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness.

It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program;
- Become familiar with the Notification Process (detailed below); and
- Post the Injury Management/Return-to-Work Notification Poster.

### 22.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker, if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment). The supervisor or SC accompanies the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.
- Supervisor or SC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured or ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

## 22.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, *Incident Reporting, Notification and Investigation*)

The serious incident reporting requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security and Environment and Firm Wide Security Operations requirements for the consistent reporting of and managing of serious events throughout our operations.

### 22.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

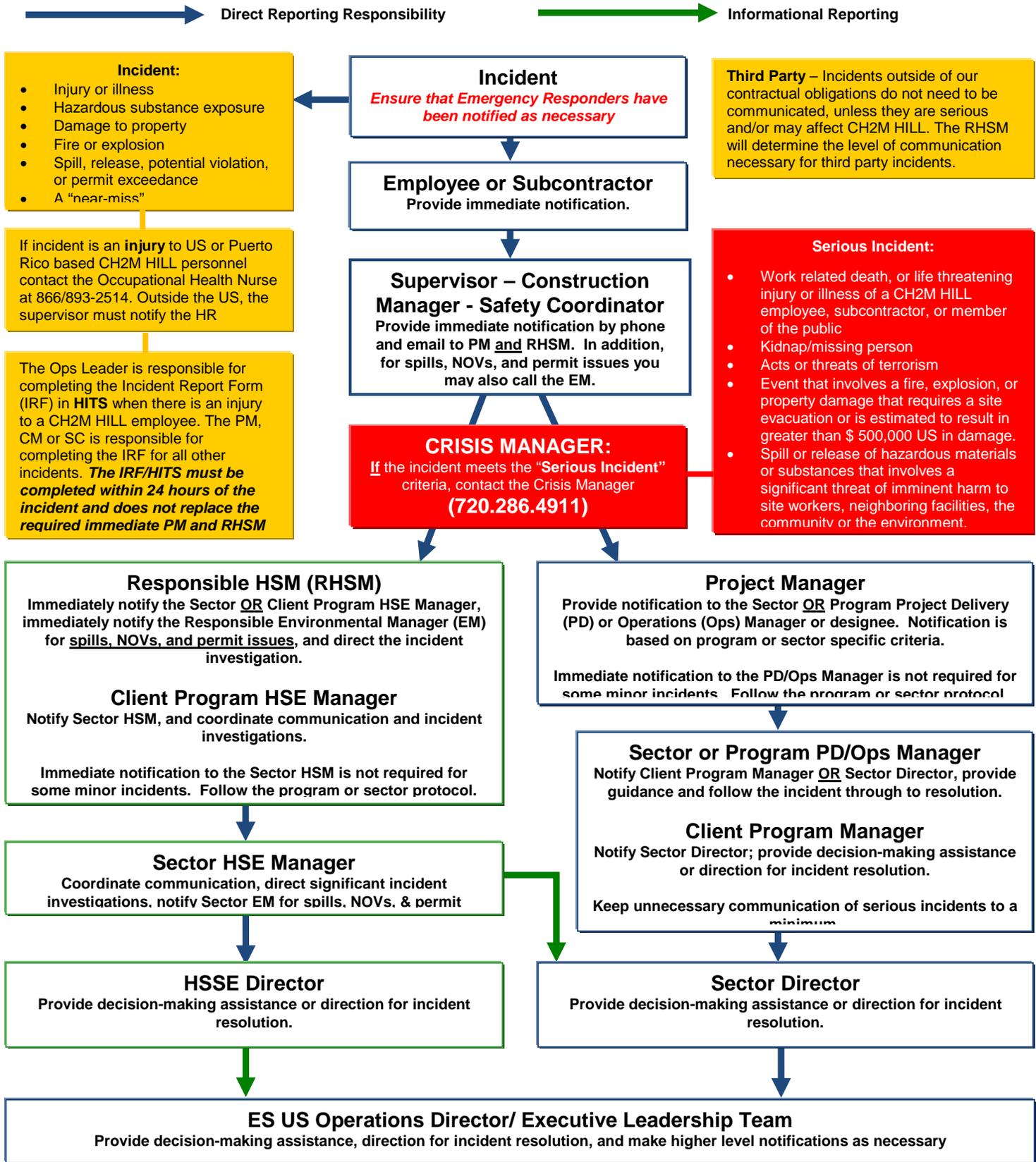
- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public;
- Kidnap or missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

#### 22.6.2 Serious Incident Reporting

*If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.*

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

# ESBG US Operations Incident Reporting Flow Diagram



**Third Party** – Incidents outside of our contractual obligations do not need to be communicated, unless they are serious and/or may affect CH2M HILL. The RHSM will determine the level of communication necessary for third party incidents.

**Serious Incident:**

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 US in damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

**Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.**

## 22.7 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. Root Cause Analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of \$5000.00 (US), environmental permit violations, spills and releases which are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/REM is responsible for ensuring it is completed and results entered in the incident report form in HITS. RCA's must be completed using a Team that includes, at least the RHSM or designee, the involved party(ies), a responsible operations representative (e.g. PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must follow the Root Cause Analysis Flow Chart (see Attachment 4 of the SOP) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

Personal factors include:

- Lack of skill or knowledge;
- Correct way takes more time and/or requires more effort;
- Short-cutting standard procedures is positively reinforced or tolerated; or
- Person thinks there is no personal benefit to always doing the job according to standards.

Job Factors include:

- Lack of or inadequate operational procedures or work standards;
- Inadequate communication of expectations regarding procedures or standards; or
- Inadequate tools or equipment.

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

### 22.7.1 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, EM, or FWSO.
- Incident investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

## 23.0 Records and Reports

An organized project filing system is essential for good documentation and recordkeeping. There are many benefits to an organized filing system:

- Other CH2M HILL employees can easily and quickly find documents;
- Records are readily available for review;
- Records may be needed during OSHA investigations, audits, or other legal matters;
- Records may be needed on short notice in case of an accident, illness or other emergency; and
- Systematic recordkeeping aids in overall project organization.

The project filing system shall be established at the beginning of the project and maintained throughout all phases of construction and archived in accordance with CH2M HILL's Records Retention Policy. The information contained in the filing system shall be updated regularly and/or as specified in this document. The PM and SC are responsible for collecting documentation, including subcontractor documentation, and maintaining a complete and organized filing system.

Below are examples of records that must be maintained as the project progresses:

- Exposure records includes air monitoring data (including calibration records), MSDSs, exposure modeling results;
- Physical hazard exposure records include noise, ionizing radiation, non-ionizing radiation, vibration, and lasers exposure assessments and measurements;
- Respiratory fit test records;
- Training records;
- Incident reports, investigations and associated back-up information such as agency notifications, calculations, and corrective actions taken;
- Federal or state agency inspection records;
- Other Records:
  - Ergonomic evaluations;
  - HSE audits and assessments;
  - Project-specific HSE plans;
  - Confined space entry permits;
  - Equipment inspections;
  - Equipment maintenance;
  - Emergency equipment inspection records;
  - SBOs;
  - Self-assessment checklists
- The RHSM shall coordinate with the PM or designee to ensure that final project-specific HSE records described in this section, including negative exposure determinations, are maintained with the project files in accordance with the CH2M HILL records retention schedule, or forwarded to the Medical Surveillance Program Administrator, as appropriate. Records retention requirements are detailed in the Recordkeeping and Access to Records SOP, HSE-119.

## **HSP Attachments**

**CH2M HILL Health and Safety Plan**  
**Attachment 1**

**Health and Safety Plan Employee Sign-off Form**



**CH2M HILL Health and Safety Plan**  
**Attachment 2**

**Chemical Inventory/Register Form**

**CHEMICAL INVENTORY/REGISTER FORM**

---

Refer to SOP HSE-107, Attachment 1, for instructions on completing this form.

Location: HCC: <input type="checkbox"/> Office <input type="checkbox"/> Warehouse <input type="checkbox"/> Laboratory <input type="checkbox"/> Project: Project No.:
---

Regulated Product	Location	Container labeled (✓if yes)	MSDS available (✓if yes)

MSDS for the listed products will be maintained at:
---

**CH2M HILL Health and Safety Plan**  
**Attachment 3**

**Chemical-Specific Training Form**

**CHEMICAL-SPECIFIC TRAINING FORM**

Refer to SOP HSE-107 Attachment 1 for instructions on completing this form.

Location:	Project # :
HCC:	Trainer:

**TRAINING PARTICIPANTS:**

NAME	SIGNATURE	NAME	SIGNATURE

**REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:**


The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- Physical and health hazards
- Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

# **CH2M HILL Health and Safety Plan**

## **Attachment 4**

### **Project Activity Self-Assessment Checklists/Permits/Forms**

Heat stress physiological monitoring form

Drilling

Excavations

Hand and Power Tools

Hazardous Materials Handling

Intentional Detonation of MEC or MPPEH

Manual Lifting

Personal Protective Equipment

Traffic Control

**HEAT STRESS PHYSIOLOGICAL MONITORING FORM**

Project:

Date:

Company:

1. Take and record measurement of temperature or pulse at the frequency indicated in the safety plan.
2. Follow the Physiological Monitoring Protocol in the safety plan.
3. Never continue work if your body temperature is more than 100.4° F/38° C, or if you are experiencing sudden and severe fatigue, nausea, dizziness, or lightheadedness.

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

# **CH2M HILL Health and Safety Plan**

## **Attachment 5**

### **Key Target Zero Program Elements**

**(blank forms for field use)**

**Activity Hazard Analysis**

**Pre-Task Safety Plans**

**Safe Behavior Observation**

**Incident Report and Investigation**

**(use electronic form when possible)**

[HITS](#)

**Lessons Learned Template**

## ACTIVITY HAZARD ANALYSIS

<b>Activity:</b>	<b>Date:</b>
<b>Description of the work:</b>	<b>Project Name:</b>
	<b>Site Supervisor:</b>
	<b>Site Safety Officer:</b>
	<b>Review for latest use: Before the job is performed</b>

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)

## ACTIVITY HAZARD ANALYSIS

<b>Work Activity Sequence</b> (Identify the principal steps involved and the sequence of work activities)	<b>Potential Health and Safety Hazards</b> (Analyze each principal step for potential hazards)	<b>Hazard Controls</b> (Develop specific controls for each potential hazard)

<b>Equipment to be used</b> (List equipment to be used in the work activity)	<b>Inspection Requirements</b> (List inspection requirements for the work activity)	<b>Training Requirements</b> (List training requirements including hazard communication)

**ACTIVITY HAZARD ANALYSIS**

PRINT NAME

SIGNATURE

Supervisor Name: \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name: \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Employee Name(s): \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

**Pre-Task Safety Plan (PTSP) and Safety Meeting Sign-in Sheet**

Project: _____ Location: _____ Date: _____		
Supervisor: _____ Job Activity: _____		
Attendees:	Print Name	Sign Name
List Tasks and verify that applicable AHAs have been reviewed:		
Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):		
Potential H&S Hazards, including chemical, physical, safety, biological and environmental (check all that apply):		
<input type="checkbox"/> Chemical burns/contact	<input type="checkbox"/> Trench, excavations, cave-ins	<input type="checkbox"/> Ergonomics
<input type="checkbox"/> Pressurized lines/equipment	<input type="checkbox"/> Overexertion	<input type="checkbox"/> Chemical splash
<input type="checkbox"/> Thermal burns	<input type="checkbox"/> Pinch points	<input type="checkbox"/> Poisonous plants/insects
<input type="checkbox"/> Electrical	<input type="checkbox"/> Cuts/abrasions	<input type="checkbox"/> Eye hazards/flying projectile
<input type="checkbox"/> Weather conditions	<input type="checkbox"/> Spills	<input type="checkbox"/> Inhalation hazard
<input type="checkbox"/> Heights/fall > 6 feet	<input type="checkbox"/> Overhead Electrical hazards	<input type="checkbox"/> Heat/cold stress
<input type="checkbox"/> Noise	<input type="checkbox"/> Elevated loads	<input type="checkbox"/> Water/drowning hazard
<input type="checkbox"/> Explosion/fire	<input type="checkbox"/> Slips, trip and falls	<input type="checkbox"/> Heavy equipment
<input type="checkbox"/> Radiation	<input type="checkbox"/> Manual lifting	<input type="checkbox"/> Aerial lifts/platforms
<input type="checkbox"/> Confined space entry	<input type="checkbox"/> Welding/cutting	<input type="checkbox"/> Demolition
<input type="checkbox"/> Underground Utilities	<input type="checkbox"/> Security	<input type="checkbox"/> Poor communications
Other Potential Hazards (Describe):		

Hazard Control Measures (Check All That Apply):			
<b>PPE</b> <input type="checkbox"/> Thermal/lined <input type="checkbox"/> Eye <input type="checkbox"/> Dermal/hand <input type="checkbox"/> Hearing <input type="checkbox"/> Respiratory <input type="checkbox"/> Reflective vests <input type="checkbox"/> Flotation device <input type="checkbox"/> Hard Hat <input type="checkbox"/> Safety-Toed Boots	<b>Protective Systems</b> <input type="checkbox"/> Sloping <input type="checkbox"/> Shoring <input type="checkbox"/> Trench box <input type="checkbox"/> Barricades <input type="checkbox"/> Competent person <input type="checkbox"/> Locate buried utilities <input type="checkbox"/> Daily inspections <input type="checkbox"/> Entry Permits/notification	<b>Fire Protection</b> <input type="checkbox"/> Fire extinguishers <input type="checkbox"/> Fire watch <input type="checkbox"/> Non-spark tools <input type="checkbox"/> Grounding/bonding <input type="checkbox"/> Intrinsically safe equipment	<b>Electrical</b> <input type="checkbox"/> Lockout/tagout <input type="checkbox"/> Grounded <input type="checkbox"/> Panels covered <input type="checkbox"/> GFCI/extension cords <input type="checkbox"/> Power tools/cord inspected <input type="checkbox"/> Overhead line clearance <input type="checkbox"/> Underground utils ID'd
<b>Fall Protection</b> <input type="checkbox"/> Harness/lanyards <input type="checkbox"/> Adequate anchorage <input type="checkbox"/> Guardrail system <input type="checkbox"/> Covered opening <input type="checkbox"/> Fixed barricades <input type="checkbox"/> Warning system	<b>Air Monitoring</b> <input type="checkbox"/> PID/FID <input type="checkbox"/> Detector tubes <input type="checkbox"/> Radiation <input type="checkbox"/> Personnel sampling <input type="checkbox"/> LEL/O2 <input type="checkbox"/> No visible dust <input type="checkbox"/> Other	<b>Proper Equipment</b> <input type="checkbox"/> Aerial lift/ladders/scaffolds <input type="checkbox"/> Forklift/heavy equipment <input type="checkbox"/> Backup alarms <input type="checkbox"/> Hand/power tools <input type="checkbox"/> Crane with current inspection <input type="checkbox"/> Proper rigging <input type="checkbox"/> Operator qualified	<b>Welding &amp; Cutting</b> <input type="checkbox"/> Cylinders secured/capped <input type="checkbox"/> Cylinders separated/upright <input type="checkbox"/> Flash-back arrestors <input type="checkbox"/> No cylinders in CSE <input type="checkbox"/> Flame retardant clothing <input type="checkbox"/> Appropriate goggles
<b>Confined Space Entry</b> <input type="checkbox"/> Isolation <input type="checkbox"/> Air monitoring <input type="checkbox"/> Trained personnel <input type="checkbox"/> Permit completed <input type="checkbox"/> Rescue	<b>Medical/ER</b> <input type="checkbox"/> First-aid kit <input type="checkbox"/> Eye wash <input type="checkbox"/> FA-CPR trained personnel <input type="checkbox"/> Route to hospital	<b>Heat/Cold Stress</b> <input type="checkbox"/> Work/rest regime <input type="checkbox"/> Rest area <input type="checkbox"/> Liquids available <input type="checkbox"/> Monitoring <input type="checkbox"/> Training	<b>Vehicle/Traffic</b> <input type="checkbox"/> Traffic control <input type="checkbox"/> Barricades <input type="checkbox"/> Flags <input type="checkbox"/> Signs
<b>Permits</b> <input type="checkbox"/> Hot work <input type="checkbox"/> Confined space <input type="checkbox"/> Lockout/tagout <input type="checkbox"/> Excavation <input type="checkbox"/> Demolition <input type="checkbox"/> Energized work	<b>Demolition</b> <input type="checkbox"/> Pre-demolition survey <input type="checkbox"/> Structure condition <input type="checkbox"/> Isolate area/utilities <input type="checkbox"/> Competent person <input type="checkbox"/> Hazmat present	<b>Inspections:</b> <input type="checkbox"/> Ladders/aerial lifts <input type="checkbox"/> Lanyards/harness <input type="checkbox"/> Scaffolds <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Drill rigs/geoprobe rigs <input type="checkbox"/> Cranes and rigging <input type="checkbox"/> Utilities marked	<b>Training:</b> <input type="checkbox"/> Hazwaste (current) <input type="checkbox"/> Construction <input type="checkbox"/> Competent person <input type="checkbox"/> Task-specific <input type="checkbox"/> FA/CPR <input type="checkbox"/> Confined Space <input type="checkbox"/> Hazcom
<b>Underground Utilities</b> <input type="checkbox"/> Dig alert called <input type="checkbox"/> 3 <sup>rd</sup> Party locator <input type="checkbox"/> As-builts reviewed <input type="checkbox"/> Interview site staff <input type="checkbox"/> Client review <input type="checkbox"/> soft locate necessary?	<b>Incident Communications</b> <input type="checkbox"/> Work stops until cleared by TM/CM <input type="checkbox"/> Immediate calls to TM/CM <input type="checkbox"/> Client notification <input type="checkbox"/> 24 hour notification setup <input type="checkbox"/> Clear communications	<b>AHA' s</b> <input type="checkbox"/> reviewed and approved by HSM <input type="checkbox"/> on site and current <input type="checkbox"/> applicable for this day's work <input type="checkbox"/> Communication and incident processes included?	
<b>Field Notes (including observations from prior day, etc.):</b> <hr/> <hr/> <hr/>			

Name (Print): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Safe Behavior Observation Form			
<input type="checkbox"/> Federal <input type="checkbox"/> Commercial    (check one)		<input type="checkbox"/> Construction or <input type="checkbox"/> Consulting (check one)	
<input type="checkbox"/> International			
Project Number (required):		Client/Program:	
Project Name:		Observer:	Date:
Position/Title of worker observed:		Background Information/ comments:	
Task/Observation Observed: _____			
<ul style="list-style-type: none"> <li>❖ Identify and reinforce safe work practices/behaviors</li> <li>❖ Identify and improve on at-risk practices/acts</li> <li>❖ Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards</li> <li>❖ Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)</li> <li>❖ Positive, corrective, cooperative, collaborative feedback/recommendations</li> </ul>			
Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			<b>Positive Observations/Safe Work Practices:</b>
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			<b>Questionable Activity/Unsafe Condition Observed:</b>
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			<b>Observer's Corrective Actions/Comments:</b>
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			<b>Observed Worker's Corrective Actions/Comments:</b>
Apparel (hair, loose clothing, jewelry)			
Repetitive motion			
Other...			

For ES Federal Sector projects please email completed forms to: [CH2M HILL ES FED Safe Behavior Observation](mailto:CH2MHILL.ES.FED.Safe.Behavior.Observation@ch2m.com)  
 For ES Commercial Sector projects please email completed forms to: [CH2M HILL ES COM Safe Behavior Observation](mailto:CH2MHILL.ES.COM.Safe.Behavior.Observation@ch2m.com)  
 For CNR ES staff please email completed forms to: [cnessafe@ch2m.com](mailto:cnessafe@ch2m.com)  
 For International ES projects please e-mail completed forms to: [ESINTLSafeBehaviorObservation@ch2m.com](mailto:ESINTLSafeBehaviorObservation@ch2m.com)

# HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

## Phase 1 – Initial Entry

### Type of Incident (May select more than one)

- |  |   |                                    |
|--|---|------------------------------------|
| <input type="checkbox"/> Injury/Illness  | <input type="checkbox"/> Spill/Release      | <input type="checkbox"/> Near Miss |
| <input type="checkbox"/> Property Damage | <input type="checkbox"/> Environment/Permit | <input type="checkbox"/> Other     |

### General Information Section

Preparer's Name: \_\_\_\_\_ Preparer's Phone Number: \_\_\_\_\_

Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_ AM / PM

What Business Group is accountable for this incident: \_\_\_\_\_

What Business Group SubGroup is accountable for this incident: \_\_\_\_\_

What CH2M HILL Company is accountable for this incident: \_\_\_\_\_

#### Where did the Incident occur?

- United States, Geographic Region: \_\_\_\_\_
- Canada, Province/Territory: \_\_\_\_\_
- International, County: \_\_\_\_\_

### Location of Incident?

- Company Premises, CH2M HILL Office (use 3 letter office code if available): \_\_\_\_\_
- Project, Project name: \_\_\_\_\_
- In Transit  
Traveling from: \_\_\_\_\_  
Traveling to: \_\_\_\_\_
- At Home
- Other, Specify: \_\_\_\_\_

Describe the incident: \_\_\_\_\_

Describe how this event could have been prevented: \_\_\_\_\_

#### Provide Witness Information:

Name: _____	Phone: _____
Name: _____	Phone: _____
Name: _____	Phone: _____

#### Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel: \_\_\_\_\_

Client Personnel: \_\_\_\_\_

#### Additional Comments:

### Injury/Illness Section [Complete only if Injury/Illness Incident type selected]

#### Who was injured?

- CH2M HILL Employee or CH2M HILL Temp Employee
- Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
- LLC Joint Venture Partner Employee
- LLC Joint Venture Project Subcontractor/Contractor
- Other

Name of Injured: \_\_\_\_\_ Job Title: \_\_\_\_\_

Employer Name: \_\_\_\_\_ Supervisor of Employee: \_\_\_\_\_

#### Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee: \_\_\_\_\_

Has the employee called the Injury Management Administrator (1-866-893-2514)?

- Yes       No       Not Sure

Has the injured employee's supervisor been notified of this incident?

Yes       No       Not Sure

**Complete for Non-CH2M HILL Employee Injuries**

Has the project safety coordinator been notified of this incident?

Yes       No       Not Sure

Project Safety Coordinator: \_\_\_\_\_

Body Part Affected: \_\_\_\_\_

Injury/Illness (Result): \_\_\_\_\_

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription): \_\_\_\_\_

Describe any work restriction prescribed (include dates and number of days): \_\_\_\_\_

**Physician/Health Care Provider Information**

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Was treatment provided away from the worksite?

No  
 Yes

Facility Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Was injured treated in an emergency room?

No       Yes

Was injured hospitalized overnight as an in-patient?

No       Yes

**General Information Environmental Section [Complete only if Environment/Permit or Spill/Release Incident type selected]**

Who had control of the area during the incident?

- CH2M HILL, Company: \_\_\_\_\_
- Subcontractor, Company: \_\_\_\_\_
- Joint Venture Partner/Contractor/Subcontractor, Company: \_\_\_\_\_
- Other, Company: \_\_\_\_\_  
Relationship to CH2M HILL: \_\_\_\_\_

**Property Damage Section [Complete only if Property Damage Incident type selected]**

Property Damaged: \_\_\_\_\_

Property Owner: \_\_\_\_\_

Damage Description: \_\_\_\_\_

Estimated US Dollar Amount: \_\_\_\_\_

**Spill or Release Section [Complete only if Spill/Release Incident type selected]**

Substance: \_\_\_\_\_

Estimated Quantity: \_\_\_\_\_

Did the spill/release move off the property?: \_\_\_\_\_

Spill/Release From: \_\_\_\_\_

Spill/Release To: \_\_\_\_\_

**Environment/Permit Section [Complete only if Environment/Permit Incident type selected]**

Describe Environmental or Permit Issue: \_\_\_\_\_

Permit Type: \_\_\_\_\_

Permitted Level or Criteria (e.g., discharge limit): \_\_\_\_\_

Permit Name and Number (e.g., NPDES No. ST1234): \_\_\_\_\_

Substance and Estimated Quantity: \_\_\_\_\_

Duration of Permit Exceedence: \_\_\_\_\_



# Lessons Learned

[Date] ESBG LL-11-xx

<b>Subject</b>	[Insert Descriptive Name of Lessons Learned]
<b>CH2M HILL Project?</b>	[Yes or No]
<b>Situation</b>	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
<b>Lessons Learned (Recommendations and Comments)</b>	<ul style="list-style-type: none"><li>• Bullet out any lessons learned, recommendations or other important “take away” information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.</li></ul>
<b>Submitted By</b>	[Name/Office Location/Phone]
<b>Additional Information Contact</b>	[Name/Office Location/Phone]
<b>Keywords/Categories</b>	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution. Please include a recommended distribution list.

Field Documentation, Readiness, and Implementation		Comments
<b>Health and Safety Plan(s)</b>		
<input type="checkbox"/>	CH2M HILL plan signed by HSM and PM	
<input type="checkbox"/>	CH2M HILL plan approved (within last year)	
<input type="checkbox"/>	Sub HSP, if applicable, accepted by HSM and on site	
<input type="checkbox"/>	All field workers signed both CH2M HILL and, if applicable, Sub plan	
<b>AHAs</b>		
<input type="checkbox"/>	All field tasks covered by AHA	
<input type="checkbox"/>	CH2M HILL AHAs present and approved by HSM	
<input type="checkbox"/>	Sub AHAs present and accepted by HSM	
<b>Training and Medical Certs</b>		<a href="#">Tracking form available</a>
<input type="checkbox"/>	CH certs verified current	
<input type="checkbox"/>	Sub certs verified current	
<input type="checkbox"/>	Specialized training certs verified (CSE, fall protection, forklift)	
<b>Safety Meeting/PTSP Documentation</b>		
<input type="checkbox"/>	<a href="#">Forms available</a>	
<b>HazCom-required paperwork</b>		
<input type="checkbox"/>	Inventory developed (HSP Attachment)	
<input type="checkbox"/>	SDSs available	
<input type="checkbox"/>	Training documented (HSP Attachment)	
<b>Project Self-Assessment Checklists</b>		
<input type="checkbox"/>	Checklists available per HSP	
<input type="checkbox"/>	Corrective actions to be taken tracked and closed out	
<b>SBOs</b>		
<input type="checkbox"/>	<a href="#">Forms available and frequency of completion known</a>	
<input type="checkbox"/>	SBO e-mail addresses known (see form, send once a week)	
<b>Incident/Injury reporting process/paperwork (HITS)</b>		
<input type="checkbox"/>	Notification and HITS entry process known and paperwork available	
<b>Air monitoring instrumentation and documentation</b>		
<input type="checkbox"/>	Correct equipment per HSP (correct PID lamp, if applicable) available	
<input type="checkbox"/>	Calibration gas, if applicable, ordered and onsite	
<input type="checkbox"/>	Action levels known	
<input type="checkbox"/>	<a href="#">Calibration documented prior to use</a>	
<input type="checkbox"/>	<a href="#">Breathing zone readings documented</a>	
<input type="checkbox"/>	Completed air monitoring documentation sent to SPA	
<b>Physiological monitoring paperwork</b>		
<input type="checkbox"/>	Action levels known	
<input type="checkbox"/>	WBGT, thermometer, or watch available	
<input type="checkbox"/>	Form available	
<b>Special permits (Hot Work, CSE, etc.)</b>		
<input type="checkbox"/>	Required forms and permits available	
<b>Specific/specialized plans and postings (Lone Worker, Critical Lift, asbestos)</b>		
<input type="checkbox"/>	Lone worker protocol established (if applicable)	

<input type="checkbox"/>	Lead or asbestos plans in place (if applicable)	
<input type="checkbox"/>	Critical lift plan necessary?	
<b>Emergency Planning</b>		
<input type="checkbox"/>	Emergency Contacts and route to hospital posted	
<input type="checkbox"/>	Emergency plan rehearsed (table top at minimum)	
<b>Equipment Inspections</b>		
<input type="checkbox"/>	Equipment inspected as brought on site	
<input type="checkbox"/>	Regular heavy equipment inspections documented	
<b>Personal Protective Equipment</b>		
<input type="checkbox"/>	PPE verified per HSP/AHAs and on site	
<b>Environmental Considerations</b>		
<input type="checkbox"/>	Waste drums on-site	
<input type="checkbox"/>	Erosion control devices on site	
<input type="checkbox"/>	Labels available and crew knows how to fill out?	
<b>Decon</b>		
<input type="checkbox"/>	Any special equipment needed? (Tubs, brushes, waste drums?)	
<input type="checkbox"/>		
<b>SC REMINDERS</b>		
<b>DAILY</b>		
<input type="checkbox"/>	PTSP, Daily Safety Meeting, review observations from previous day's work with CH team/subs	
<input type="checkbox"/>	Informal site inspections (documented in logbook along with any corrective actions taken)	
<input type="checkbox"/>	Air monitoring calibration documented on daily site monitoring form or in logbook	
<input type="checkbox"/>	Air monitoring readings documented on daily site monitoring (or equivalent) form and kept in project file	
<input type="checkbox"/>	Heat stress monitoring conducted if specified in plan	
<input type="checkbox"/>	Incident reporting/assist with investigations	
<input type="checkbox"/>	Filling out field logbook	
<input type="checkbox"/>	Ensure SDSs for new chemicals brought onsite are inventoried and added to SDS book, training is given to CH personnel or subs are giving training to their workers	
<input type="checkbox"/>	Briefing on CH2M HILL HSP for any new personnel coming onsite, including subcontractor personnel and verifying training	
<input type="checkbox"/>	Project file maintenance for H&S documentation	
<b>WEEKLY</b>		
<input type="checkbox"/>	Safe Behavior Observations – send to SBO mailbox (more frequently if indicated in safety plan)	
<input type="checkbox"/>	Complete self-assessment checklists (applicable to type of work going on and as specified in safety plan)	
<b>MONTHLY</b>		
<input type="checkbox"/>	Fire extinguisher inspections (document on fire extinguisher tags)	
<input type="checkbox"/>	First aid kit/eyewash inspections (documented—for eyewash on tag—first aid kit in logbook)	

---

**MANDATORY POSTINGS**

<input type="checkbox"/>	State and Federal required postings including minimum wage, OSHA "It's the Law," fair employment, worker's compensation, etc. (Vendor for all-in-one poster is <i>Compliance Poster Company</i> 1-800-817-767)
<input type="checkbox"/>	Evacuation routes and rally points
<input type="checkbox"/>	Tornado shelter (as applicable)
<input type="checkbox"/>	OSHA 300 log (February thru April of every year)
<input type="checkbox"/>	Emergency phone numbers
<input type="checkbox"/>	Route to Hospital map and phone number
<input type="checkbox"/>	<a href="#">Others -- CH2M HILL VO Enterprise HSE Page - Posters</a>

---

**CH2M HILL Health and Safety Plan**  
**Attachment 6**

**Fact Sheets**  
**Tick Fact Sheet**  
**Vehicle Accident Guidance**  
**Working Alone**

## Tick-Borne Pathogens — A Fact Sheet

Most of us have heard of Lyme disease or Rocky Mountain Spotted Fever (RMSF), but there are actually six notifiable tick-borne pathogens that present a significant field hazard. In some areas, these account for more than half of our serious field incidents. The following procedures should be applied during any field activity—even in places that are predominantly paved with bordering vegetation.

### Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

### Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

### Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture.

On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. For this region, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

### Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite—normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. For Lyme disease, the bite area will sometimes resemble a target pattern. A variety of long-term symptoms may result if the illness is left untreated, including debilitating effects and death.



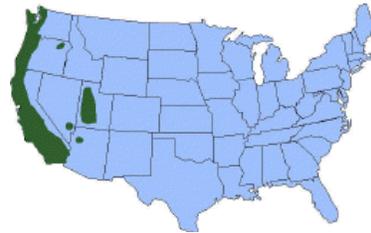
Deer Tick



Distribution of Deer Tick (dark green)



From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)



Distribution of Pacific Deer Tick (dark green)



Lone Star Tick



Distribution of Lone Star Tick (Green)



Dog Tick



Yellow indicates approximate distribution area



Rocky Mountain Wood Tick



Yellow indicates approximate distribution area

---

## Hazard Control

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acaricide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

## Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants—tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced by between 72 and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant or to a licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

## Personal Protection

After other prevention and controls are implemented, personal protection is still necessary to control exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be easily seen, wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used
- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots
- Wear long-sleeved shirts, a hat, and high boots
- Apply DEET repellent to exposed skin or clothing per product label
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label
- Frequently check for ticks and remove from clothing
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower

- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid situations such as hand-to-face contact, eating, drinking, and smoking when applying or using repellents.

Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMERix™ Lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician.

#### Tick Check

A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

If a tick has embedded itself into the skin, remove the tick as described below.

#### Tick Removal

1. Use the tick removal kit obtained through the CH2M HILL Milwaukee warehouse, or a fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.

**Error! Objects cannot be created from editing field codes.**

2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.



3. Avoid squeezing, crushing or puncturing the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.

4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.

5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

6. Should you wish to save the tick for identification, place it in a plastic bag, with the date of the tick bite, and place in your freezer. It may be used at a later date to assist a physician with making an accurate diagnosis (if you become ill).



---

**Note:** Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

#### First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Individuals previously infected with Lyme disease does not confer immunity—re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

The employee should contact the Injury Management/Return To Work provider (IMRTW), WorkCare using the toll-free number 866-893-2514 to report the tick bite. WorkCare will follow-up with each CH2M Hill employee who reports a tick bite and is at risk of developing Lyme disease by monitoring for symptoms up to 45 days, and will refer the employee to a medical provider for evaluation and treatment as necessary.



---

## 2011 Vehicle Accident Guidance – ESBG

Remember that if you are **renting** a non-CH2M HILL owned vehicle (short-term rental) in the U.S., you should carry the [insurance card](#) from the state where your driver's license is issued.

If you operate a **fleet vehicle**, carry the [insurance card](#) where the vehicle is registered.

### **For ALL Vehicles if you are in an accident:**

1. If you are injured, call 911 for emergency medical treatment or 1-866-893-2514 to contact the CH2M HILL Occupational Nurse/Physician for minor injuries. If you feel you have not been injured, contact the RHSM for guidance on whether calling the CH2M HILL Occupation Nurse/Physician is applicable.
2. **Call the Police**--For any vehicle accident/damage, it is recommended that the local police (or site security/emergency services if working on a client site that provides such services) be called to determine if a report needs to be filed. In some instances, a report may not be required (during accident alerts, or in public parking lots). Document that the authorities were called and follow up with any guidance they give you. State requirements vary. If a report is filed, obtain a copy.
3. Notify Supervisor, (and PM/RHSM if working on a project site)
4. Complete a HITS report on the VO.

### **Additional Steps**

To report an auto accident, and before a claim can be taken by telephonic reporting, have available your name (the company name alone is no longer accepted, a driver's name must be provided even for fender benders), location of accident and your office address if different than the accident location, business group and project number. A claim cannot be taken without your name, address, business group and your project number. By location the state where the accident occurred, and which office you are aligned to, i.e., accident occurs in Idaho, but you are out of the Denver office. Advise the claim recorder the accident occurred in ID, but that your office location is Denver. This will assist the claim intake person in identifying location coding for the claims.

### **Auto accidents involve two different sections of an Auto policy:**

- 1) Liability to others due to Bodily Injury and Property Damage
- 2) Physical Damage - Comprehensive and Collision - damage to the vehicle CH employee is driving

CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Refer to the table below for additional notifications to make based on the type of accident experienced and type of vehicle being used.



### Liability - Bodily Injury or Property Damage to Others

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill - Primary	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill - Primary	Contact Jennifer Rindahl/DEN (720-286-2449)
Client vehicle driven by CH2M Hill employee	Client's auto policy unless client has made CH2M Hill responsible for vehicle	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN (720-286-2449); contact client;
Short term lease (30 days or less)	Rental car company if rented through Enterprise, Budget or Hertz; CH2M Hill excess	Contact Broadspire (1-800-753-6737); Contact local branch of rental car company where vehicle leased (ERAC includes 24 hour roadside assistance) and Jennifer Rindahl/DEN (720-286-2449)
Short term lease (30 days or less)	CH2M Hill - Primary if rented through company other than our national agreements; \$100,000 deductible	Contact Broadspire (1-800-753-6737); Contact rental car company and Jennifer Rindahl/DEN (720-286-2449)
Personal vehicle used on business	Employee's personal auto policy; CH2M Hill on an excess basis	Contact personal auto insurance company; contact Jennifer Rindahl/DEN (720-286-2449)

### Physical Damage - damage to vehicle CH employee was driving

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill ONLY if vehicle is scheduled on policy - \$5,000 deductible	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill Equipment Schedule if scheduled on policy	Contact Jennifer Rindahl/DEN (720-286-2449)
CH2M Hill fleet, pool or project vehicle - long term lease	ARI if physical damage coverage purchased - \$500 deductible	Contact Jennifer Rindahl/DEN 720.286.2449; call ARI at 1-800-221-1645 give them Client Code and ARI fleet vehicle number; and notify Linda George/DEN - Fleet Coordinator - 720-286-2057
Client vehicle CH2M Hill Employee is driving	Client's auto policy unless client has made CH2M Hill contractually responsible for vehicle	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)
Short term lease (30 days or less) using corporate VISA	VISA if corporate credit card used and vehicle is not a pickup, truck, cargo van or used off-road	Contact VISA - 1-800-847-2911 or <a href="http://www.visa.com/eclaim">http://www.visa.com/eclaim</a>
Short term lease (30 days or less) through Enterprise (ERAC) and vehicle is used off-road and physical damage coverage included when vehicle leased	ERAC up to \$3,000 in damage; CH2M Hill's coverage is excess	Notify Rental Car Company; contact Jennifer Rindahl/DEN (720-286-2449) if damage over \$5,000
Short term lease (30 days or less) did <b>not</b> use corporate VISA	CH2M Hill - \$5,000 deductible (project responsibility)	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN 720-286-2449; contact VISA - 1-800-847-2911 or <a href="http://www.visa.com/eclaim">http://www.visa.com/eclaim</a>
Personal vehicle used on business	CH will reimburse the amount of the deductible carried on the employee's policy up to \$500 whichever is less	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)

Details for reporting a claim on the CH2M Hill VO are accessed by going to the VO home page and clicking:

GLOBAL ENTERPRISE SERVICES/INSURANCE & BONDING/CLAIMS REPORTING

HOW DO I REPORT A CLAIM TAB or access the following URL:

<https://www.int.ch2m.com/intrnl/voffice/corp/insurance/claims/report.asp?Menu=menu3h>



**Insurance & Bonding**

Home

Bond Request Forms

Best Practices - Risk Management in Difficult Economic Times

Certificate Request Forms

Claims Reporting

- > How Do I Report a Claim?
- > Claim Contacts Form
- > General Liability Form
- > Property and Equipment Form
- > Claims Resource Information

General Insurance Info

Global Subcontractor Insurance Guidelines

ORE

Project Insurance Request Forms

Resources

Legal Site

### How Do I Report a Claim?

Domestic

Definitions of Physical Damage and Auto Liability

Physical Damage = Comprehensive and Collision – damage to the vehicle the CH employee is driving. CH2M Hill has Liability coverage for any auto – our policy will respond on either a primary or excess basis.

Auto Liability = Liability to others due to Bodily Injury and/or Property Damage.

Auto accidents prior to 5/1/11 – complete Automobile Loss Notice form and report to Zurich; form on the VO, (GLOBAL ENTERPRISE SERVICES/INSURANCE AND BONDING/CLAIMS REPORTING-HOW DO I REPORT A CLAIM/BUSINESS AUTO-ALL).

Phone: +1 (877) 246-3478 or +1 (800) 987-3373  
Fax: +1 (877) 962-2567

Accidents that occur after 5/1/11, follow reporting instructions below.

**Business Auto-Owned by Leasing Company, Rental Agency, for Physical Damage**

**Initial Report:** Employee involved in auto accident reports claim as soon as possible, per instructions in Special Reporting Section, to owner of vehicle (i.e., Enterprise, Hertz, Budget, ARI, etc.)

**Copy:** Jennifer Rindahl/DEN/Legal & Insurance Department

**Backup:** Carol Dietz/DEN/Legal & Insurance Department

**Copy:** Broadspire involving any injury or damage to a third party; you will need to call in the claim using the 1-800 number below and advise this is an auto claim involving a rental agency vehicle.

**Insurer:** Greenwich Insurance Co (an XL company)

**TPA:** Broadspire

**Phone:** 800-753-6737 (telephonic reporting for all auto claims, manned 24/7, 365 per year)

### For Personally Owned Vehicles (POVs):

CH2M HILL does not provide auto insurance for POVs, it is responsibility of the owner. If you are in a vehicle accident conducting company business, contact the police as above, supervisor, and 911 or CH2M HILL's occupational nurse/physician as stated above. Complete a HITS report. Contact Jennifer Rindahl/DEN for assistance for meeting personal insurance deductibles (up to \$500) with proof of insurance and deductible.

If using your POV for extended project use, notify the PM to make sure a rental car is not needed. Check your insurance policy for guidance on using the POV for business use.

### Additional Resources:

[Claims Resource Manual](#)

---

**WORKING ALONE PROTOCOL  
CALL - IN CONTACT FORM**

Date of site work: \_\_\_\_\_ Expected start time: \_\_\_\_\_

Name of CH2M HILL employee in the field: \_\_\_\_\_

Name of CH2M HILL employee responsible to receive contact: \_\_\_\_\_

Client Emergency Contact (if any): \_\_\_\_\_

CH2M HILL employee's contact numbers:

Radio # \_\_\_\_\_

Cell Phone # \_\_\_\_\_

Address and Location of work: \_\_\_\_\_

Directions/Map: \_\_\_\_\_

Planned Activity: \_\_\_\_\_

Specified Frequency and time for call in: \_\_\_\_\_

Time

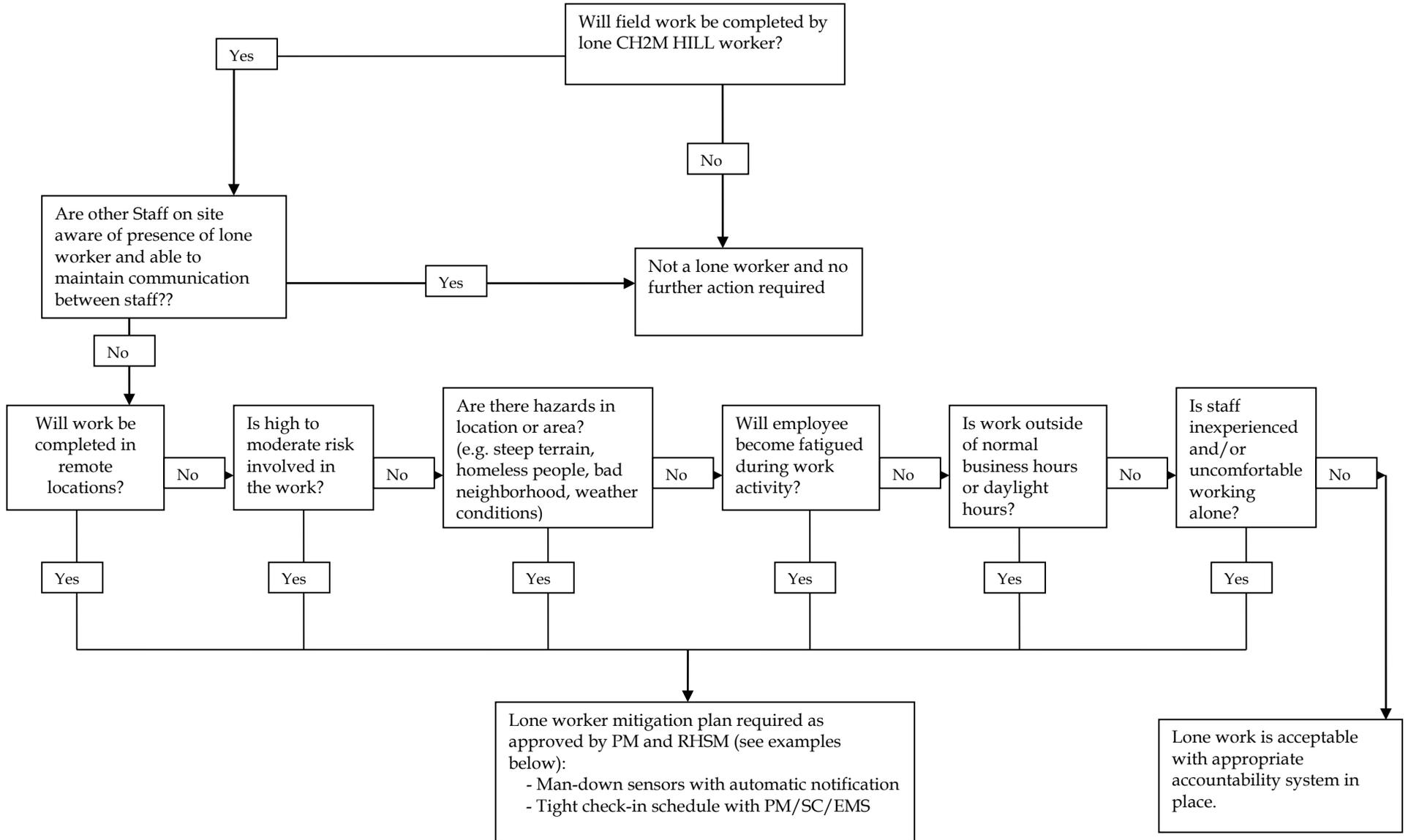
Verified

Location

If lone worker fails to call in at specified frequency/time:

- 1) Call worker's radio and cell to determine if an emergency exists.
- 2) If no reply, immediately call Client security/emergency service if there is one at the site.
- 3) If there is no client security call Emergency Services (911). Inform the dispatcher there is a lone worker that cannot be contacted and there may be an emergency on site. Provide the lone worker's name, their last known location, and your contact information.
- 4) After Emergency Services have been contacted, call the other emergency contacts, Project Manager, and Responsible Health and Safety Manager.

# Lone Worker Protocol





## Management Health, Safety, Security and Environment Inspection

**Program/Project Name:** \_\_\_\_\_  
**Management Inspector:** \_\_\_\_\_  
**Date:** \_\_\_\_\_

**Work Being Performed:** \_\_\_\_\_  
**Project Number:** \_\_\_\_\_  
**Sector:** \_\_\_\_\_

1. Job Information/Postings	A	C	I	N/A	Comments/Corrective Action(s)
a. Required postings in place (OSHA/State/Country)					
b. Emergency Contacts and Phone list posted					
c. Directions and map to hospital posted					
d. Incident Reporting Flow Chart posted					
2. HSSE Documentation					
a. HASP current (within 1 year), onsite, and signed					
b. AHAs available for all work and reviewed/signed					
c. Daily Pre-Task Safety Plan/Meeting completed					
d. SBO's completed weekly and emailed					
e. Self-Assessment checklists completed per HASP					
f. Environmental Plan available					
g. Emergency drill completed and documented					
h. E Permit compliance assurance measures documented					
i. HSE training up to date and documented					
3. Housekeeping/First Aid					
a. Work areas clean and organized					
b. Fire extinguisher, eye wash, 1 <sup>st</sup> aid/BBP kit in place					
c. Materials and waste labeled and in closed containers					
4. PPE and Air Monitoring					
a. PPE being worn as specified in HASP/AHA					
b. Air monitoring done per HASP and documented					
5. Heavy Equipment and Construction Operations					
a. Documentation of Competent/Qualified Operators					
b. Back-up alarms audible & no cell phone use					
c. High-visibility vests on ground personnel					
d. Daily inspections completed and documented					
e. Windshields/mirrors OK and seat belts worn					
6. Excavation, Trenching, and Land Disturbing Activities					
a. Competent person identified					
b. Daily inspection completed prior to entry					
c. Proper setup (sloping, shoring, exits, spoils)					
d. 3 <sup>rd</sup> party Utility Locate service used					
d. Storm water PPP and inspections/sampling conducted					
d. Erosion/sediment controls and dust controls in place					
7. Hand Tools					
a. Hand tools inspected prior to use					
b. Guards in place on tools					
c. Right tool for the job at hand					
8. Electrical					
a. All electrical cords, prongs, receptacles OK					
b. GFCI used on all circuits					
c. No energized electrical work incl. voltage testing					
d. Written Lockout Tagout system in use					

**(Column - A=Adequate, C=Needs Consideration, I=Needs Immediate Action, N/A= Not Applicable or Not Assessed)**

<b>9. Ladders and Scaffolds</b>	<b>A</b>	<b>C</b>	<b>I</b>	<b>N/A</b>	<b>Comments/Corrective Action(s)</b>
a. Ladders extend 36" above the landing and secured					
b. Ladders selected and used properly					
c. Scaffold planked, unaltered, and in good condition					
d. Scaffold/ladder users trained in inspection and use					
<b>10. Hot Work</b>					
a. Gas cylinders stored upright and secured					
b. Minimum 20' distance between fuels and oxygen					
c. PPE in use per HASP/AHA					
d. Fire watch in place w/adequate fire extinguishers					
<b>11. Cranes</b>					
a. Outriggers extended, swing radius protected					
b. Operator CCO licensed, competent person for rigging					
c. Annual certified crane inspection					
d. Chains and slings inspected, have rating tag					
e. Suspended load tag lines - no one underneath					
<b>12. Drill Rigs</b>					
a. Overhead electrical clearance adequate					
b. Daily inspections completed and available					
c. Emergency shut off functioning					
d. 3 <sup>rd</sup> party Utility Locate service used					
<b>13. Hazard Communication and Chemical Use</b>					
a. MSDS's present for all chemicals					
b. Chemical Inventory current and in HSP or on file					
c. Hazard communication briefing for all chemicals					
d. All chemicals labeled/stored as required					
e. SPPC Plan implemented for >1320 gals fuels/oils on site					
<b>14. Fall Protection</b>					
a. Full body harness worn properly, workers tied off over 6'					
b. Guard rails 42" high					
<b>15. Material Handling</b>					
a. Proper body positioning					
b. Objects less than 40 lbs. for one person lift					
<b>16. Site Control</b>					
a. Work Zones delineated, necessary signage in place					
b. Decontamination method is adequate					
<b>17. Waste and Hazardous Materials Management</b>					
a. Waste Tracking Log					
b. Hazardous waste onsite for <90 days					
c. Containers labeled, inspections conducted/documentated					
d. HW manifests signed, tracked, copies kept on site					
e. HW Transporters trained and licensed, placards used					
<b>18. Security and Emergency Planning</b>					
a. Emergency coordinator designated					
b. Severe weather plans/controls in place					
c. Security plan/measures adequate					
<b>19. Demolition</b>					
a. ACM and Hazardous Materials Survey					
b. Asbestos/Lead based paint work approved per policy					

(Column - A=Adequate, C=Needs Consideration, I=Needs Immediate Action, N/A= Not Applicable or Not Assessed)

---

# **CH2M HILL HEALTH AND SAFETY PLAN**

## **Attachment 7**

### **Observed Hazard Form**

**OBSERVED HAZARD FORM**

Name/Company of Observer (*optional*):

Date reported: \_\_\_\_\_

Time reported: \_\_\_\_\_

Contractor/s performing unsafe act or creating unsafe condition:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Unsafe Act or Condition:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Location of Unsafe Act or Condition:

**Name of CH2M HILL Representative:**

\_\_\_\_\_

Corrective Actions Taken: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Project Safety Committee Evaluation: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

---

# **CH2M HILL HEALTH AND SAFETY PLAN**

## **Attachment 8**

### **Stop Work Order Form**

---

**CH2MHILL**

# Stop Work Order

**REPORT PREPARED BY:**

Name:	Title:	Signature:	Date:

---

**ISSUE OF NONPERFORMANCE:**

Description:	Date of Nonperformance:

**SUBCONTRACTOR SIGNATURE OF NOTIFICATION:**

Name:	Title:	Signature:	Date:

---

*\* Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.\* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,*

**SUBCONTRACTOR'S CORRECTIVE ACTION**

Description:	Date of Nonperformance:

**SUBCONTRACTOR SIGNATURE OF CORRECTION**

Name:	Title:	Signature:	Date:

---

# **CH2M HILL HEALTH AND SAFETY PLAN**

## **Attachment 9**

### **Agency Inspection Target Zero Bulletin**

# TARGET ZERO BULLETIN

**Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)**

## **Do you know what YOU would do if an agency inspector arrived at your site unannounced?**

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications*, describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

### **Notification of Inspections**

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (RHSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Safety Coordinator (SC).
- The **ERC must immediately notify the RHSM/REM**, as appropriate, of unannounced inspections, or designate someone to call the RHSM/REM. The RHSM/REMs can provide guidance to the field staff and PM.

### **Inspector Credential Verification**

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

### **Opening Conference**

- The CH2M HILL Project Manager, ERC, RHSM, or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.
- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

### **Requests for OSHA Logs**

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your RHSM for assistance in obtaining the OSHA 300 Log.

- 
- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.
  - Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

### **The Inspection**

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the RHSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

### **Closing Conference**

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, RHSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;
- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and LID.

**Unannounced regulatory agency inspections may happen at any time on our projects -**

**Get your RHSM/REM and PM involved immediately if an Inspector arrives.**

# **CH2M HILL HEALTH AND SAFETY PLAN**

## **Attachment 10**

### **Completed CH2M HILL AHAs**

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Mobilization/Site Preparation**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>
Mobilization/Site Preparation	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Use sturdy hard toe work boots with sufficient ankle support.</li> <li>Institute and maintain good housekeeping practices.</li> </ul>	<p>Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots, hand and hearing protection, as dictated by task.</p>
	Heavy Equipment	<ul style="list-style-type: none"> <li>Workers to remain beyond the swing radius of heavy equipment.</li> <li>Communicate with equipment operators with clear hand signals.</li> </ul>	Standard Level D PPE
	Manual Lifting	<ul style="list-style-type: none"> <li>CH2M HILL or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</li> <li>When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 50lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</li> <li>Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</li> <li>Avoid carrying heavy objects above shoulder level.</li> </ul>	Standard Level D PPE
	Noise	<ul style="list-style-type: none"> <li>Personnel exposed to loud working environments shall wear hearing protection.</li> </ul>	Standard Level D PPE
	High Ambient Temperature	<ul style="list-style-type: none"> <li>Provide fluids to prevent worker dehydration.</li> <li>Monitor for heat stress in accordance with HSP (maintain use of buddy system).</li> <li>Institute a proper work-break regimen to avoid heat stress symptoms and overexertion.</li> </ul>	Standard Level D PPE (light colored clothing)
Mobilization/Site Preparation (continued)	Struck/pinched	<ul style="list-style-type: none"> <li>Wear reflective warning vests or high visibility clothing.</li> <li>Isolate equipment swing areas from workers, fixed objects or other equipment.</li> <li>Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator.</li> <li>Understand and review hand signals. Designate one person to provide hand signals to equipment operators.</li> <li>Ensure equipment has operable back-up alarms.</li> <li>Avoid positioning between fixed objects and operating equipment.</li> <li>No one shall walk under or in front of suspended loads. Only tagged, load rated and inspected rigging shall be used to lift loads. Become familiar with vertical, basket and choker load ratings of rigging.</li> </ul>	Standard Level D PPE

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Mobilization/Site Preparation**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Biological	<ul style="list-style-type: none"> <li>• Observe ground surfaces especially in wet or grassy areas, tree trunks, and rock piles for evidence and presence of snakes (poisonous).</li> <li>• Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives etc.</li> <li>• Observe areas for presence of stinging insects. <b>Notify supervisors of known allergies to stinging insects and location of antidotes.</b></li> <li>• Use insect repellent. Tape pant legs to boots. Frequently check body and clothing for ticks, chiggers, spiders.</li> <li>• Avoid exposure to blood borne pathogens</li> </ul>	Standard Level D PPE
	Electric Hazards	<ul style="list-style-type: none"> <li>• If/when electrical extension cords are required to complete work, extension cords must be:               <ul style="list-style-type: none"> <li>- Equipped with third-wire grounding.</li> <li>- Covered, elevated, or protected from damage when passing through work areas.</li> <li>- Protected from pinching if routed through doorways.</li> <li>- Not fastened with staples, hung from nails, or suspended with wire.</li> <li>- Extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.</li> </ul> </li> <li>- Rated to handle the voltage/amperage of equipment.</li> </ul>	Standard Level D PPE
	Fire Prevention	<ul style="list-style-type: none"> <li>• Use only metal safety cans for storage and transfer of fuel.</li> <li>• Use funnels and nozzles during fueling operations.</li> <li>• Allow warm engine parts (generator motor) to cool before refueling.</li> <li>• Appropriately sized, easily accessible ABC fire extinguisher in work area.</li> </ul>	Standard Level D PPE
	Pressure Washing/Equipment Decon	<ul style="list-style-type: none"> <li>• Only qualified personnel will operate high pressure water cleaning equipment.</li> <li>• Operator will be aware of surroundings at all times.</li> <li>• Operator will never point pressure wand in direction of other personnel.</li> <li>• Pressure wands shall not be modified in field (i.e. shortened, bent, or trigger tied open).</li> <li>• Non-operating support personnel must never walk in front of operator during operation.</li> <li>• High pressure equipment shall be equipped with pressure dump safety valves.</li> <li>• Operator to wear pressure resistant foot wear and face splash shield.</li> <li>• Operator shall inspect high pressure hoses, fittings and safety equipment daily.</li> </ul>	Modified Level D PPE with pressure resistant footwear and face splash shield

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Mobilization/Site Preparation**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Other	<ul style="list-style-type: none"> <li>• Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</li> <li>• Shut down operations in heavy rain and lightning.</li> <li>• Buddy System maintained for all phases of work.</li> <li>• Base Emergency Dispatch numbers programmed into CH2M HILL personnel cellular phones. Have hospital route maps readily available.</li> <li>• Report all unsafe conditions and acts, injury/illness or property damage to supervisors immediately.</li> <li>• Site work should always be performed with adequate lighting.</li> <li>• Site equipment, materials, and waste should be maintained according to good housekeeping practices.</li> </ul>	NA
EQUIPMENT REQUIRED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ul style="list-style-type: none"> <li>• Fire extinguisher (with fuel and electrical sources) <ul style="list-style-type: none"> <li>• Eye wash (small portable type)</li> </ul> </li> <li>• Miscellaneous power and manual hand tools. <ul style="list-style-type: none"> <li>• Miscellaneous rigging.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Visual Inspections of designated work areas identify and address hazardous conditions.</li> <li>• Equipment inspections and maintenance.</li> <li>• Inspections of hand tools (power) and extension chords if used.</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan for new site personnel.</li> <li>• Review operations/safety manuals for all equipment utilized.</li> <li>• Behavior Based Loss Prevention Training (supervisors).</li> <li>• Power tool and equipment operators qualified by previous training or experience.</li> </ul>

**PRINT**

**SIGNATURE**

**Supervisor Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Safety Officer Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Site Personnel:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_



**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – Soil and Groundwater Sampling**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Soil and Groundwater Sampling	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Use sturdy hard toe work boots with sufficient ankle support.</li> <li>• Institute and maintain good housekeeping practices.</li> </ul>	<p align="center">Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots, hand and hearing protection, as dictated by task.</p>
	Chemical Exposure	<ul style="list-style-type: none"> <li>• All personnel performing this task shall be trained in accordance with 29CFR1910.120 and be deemed “fit for duty” by a licensed occupation physician.</li> <li>• Follow PPE and action level requirements identified in the site specific HSP.</li> <li>• Do not allow dermal contact or incidental ingestion of impacted soil or groundwater. Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times. Do not kneel or step in potentially contaminated media (soil or ground water).</li> <li>• Exercise good hygiene practices. Always wash hands before eating, drinking, smoking and leaving site. Only eat, drink, smoke or chew tobacco in designated areas.</li> <li>• Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents.</li> </ul>	<p align="center">Modified Level D PPE (see table in Section 14)</p>
	Manual Lifting	<ul style="list-style-type: none"> <li>• CH2M HILL or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</li> <li>• When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn’t available to have someone assist with the lift— especially for heavy (&gt; 50lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</li> <li>• Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</li> <li>• Avoid carrying heavy objects above shoulder level.</li> </ul>	<p align="center">Standard Level D PPE</p>
	Noise	<ul style="list-style-type: none"> <li>• Personnel exposed to loud working environments shall wear hearing protection.</li> </ul>	<p align="center">Standard Level D PPE</p>
	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Provide fluids to prevent worker dehydration.</li> <li>• Monitor for heat stress in accordance with HSP (maintain use of buddy system).</li> <li>• Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</li> </ul>	<p align="center">Standard Level D PPE (light colored clothing)</p>

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – Soil and Groundwater Sampling**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Struck/pinched	<ul style="list-style-type: none"> <li>• Wear reflective warning vests or high visibility clothing.</li> <li>• Isolate equipment swing areas from workers, fixed objects or other equipment.</li> <li>• Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator.</li> <li>• Understand and review hand signals. Designate one person to provide hand signals to equipment operators.</li> <li>• Ensure equipment has operable back-up alarms.</li> <li>• Avoid positioning between fixed objects and operating equipment.</li> <li>• No one shall walk under or in front of suspended loads. Only tagged, load rated and inspected rigging shall be used to lift loads. Become familiar with vertical, basket and choker load ratings of rigging.</li> </ul>	Standard Level D PPE
Soil and Groundwater Sampling (continued)	Biological	<ul style="list-style-type: none"> <li>• Observe ground surfaces especially in wet or grassy areas, tree trunks, and rock piles for evidence and presence of snakes (poisonous).</li> <li>• Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives etc.</li> <li>• Observe areas for presence of stinging insects. <b>Notify supervisors of known allergies to stinging insects and location of antidotes.</b></li> <li>• Use insect repellent. Tape pant legs to boots. Frequently check body and clothing for ticks, chiggers, spiders.</li> <li>• Avoid exposure to blood borne pathogens</li> </ul>	Standard Level D PPE Bug-out suits if needed
	Electric Hazards	<ul style="list-style-type: none"> <li>• If/when electrical extension cords are required to complete work, extension cords must be:               <ul style="list-style-type: none"> <li>- Equipped with third-wire grounding.</li> <li>- Covered, elevated, or protected from damage when passing through work areas.</li> <li>- Protected from pinching if routed through doorways.</li> <li>- Not fastened with staples, hung from nails, or suspended with wire.</li> <li>- Extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.</li> </ul> </li> <li>- Rated to handle the voltage/amperage of equipment.</li> </ul>	Standard Level D PPE
	Fire Prevention	<ul style="list-style-type: none"> <li>• Use only metal safety cans for storage and transfer of fuel.</li> <li>• Use funnels and nozzles during fueling operations.</li> <li>• Allow warm engine parts (generator motor) to cool before refueling.</li> <li>• Appropriately sized, easily accessible ABC fire extinguisher in work area.</li> </ul>	Standard Level D PPE
	Pressure Washing/Equipment Decon	<ul style="list-style-type: none"> <li>• Only qualified personnel will operate high pressure water cleaning equipment.</li> <li>• Operator will be aware of surroundings at all times.</li> <li>• Operator will never point pressure wand in direction of other personnel.</li> <li>• Pressure wands shall not be modified in field (i.e. shortened, bent, or trigger tied open).</li> <li>• Non-operating support personnel must never walk in front of operator during operation.</li> <li>• High pressure equipment shall be equipped with pressure dump safety valves.</li> <li>• Operator to wear pressure resistant foot wear and face splash shield.</li> <li>• Operator shall inspect high pressure hoses, fittings and safety equipment daily.</li> </ul>	Modified Level D PPE with pressure resistant footwear and face splash shield

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – Soil and Groundwater Sampling**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Chemical Exposure	<ul style="list-style-type: none"> <li>• All personnel performing this task shall be trained in accordance with 29CFR1910.120 and be deemed “fit for duty” by a licensed occupation physician.</li> <li>• Follow PPE and action level requirements identified in the site specific HSP.</li> <li>• Do not allow dermal contact or incidental ingestion of impacted soil or groundwater. Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times. Do not kneel or step in potentially contaminated media (soil or ground water).</li> <li>• Exercise good hygiene practices. Always wash hands before eating, drinking, smoking and leaving site. Only eat, drink, smoke or chew tobacco in designated areas.</li> <li>• Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents.</li> </ul>	Modified Level D PPE (see table in Section 14)
	Other	<ul style="list-style-type: none"> <li>• Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Shut down operations in heavy rain and lightning.</li> <li>• Buddy System maintained for all phases of work.</li> <li>• Base Emergency Dispatch numbers programmed into CH2M HILL personnel cellular phones. Have hospital route maps readily available.</li> <li>• Report all unsafe conditions and acts, injury/illness or property damage to supervisors immediately.</li> <li>• Site work should always be performed with adequate lighting.</li> <li>• Site equipment, materials, and waste should be maintained according to good housekeeping practices.</li> </ul>	NA
EQUIPMENT REQUIRED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ul style="list-style-type: none"> <li>• Fire extinguisher (with fuel and electrical sources)                             <ul style="list-style-type: none"> <li>• Eye wash (small portable type)</li> </ul> </li> <li>• Miscellaneous power and manual hand tools.                             <ul style="list-style-type: none"> <li>• Miscellaneous rigging.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Visual Inspections of designated work areas identify and address hazardous conditions.</li> <li>• Equipment inspections and maintenance.</li> <li>• Inspections of hand tools (power) and extension cords if used.</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan for new site personnel.</li> <li>• Review operations/safety manuals for all equipment utilized.</li> <li>• Behavior Based Loss Prevention Training (supervisors).</li> <li>• Power tool and equipment operators qualified by previous training or experience.</li> </ul>

**PRINT**

**SIGNATURE**

Supervisor Name: \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name: \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Site Personnel: \_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – IDW Handling and Management**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
IDW Handling and Management	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Use sturdy hard toe work boots with sufficient ankle support.</li> <li>• Institute and maintain good housekeeping practices.</li> </ul>	<p align="center">Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots, hand and hearing protection, as dictated by task.</p>
	Heavy Equipment/Haul Trucks	<ul style="list-style-type: none"> <li>• Operator experienced with safe operation of excavation/loading equipment.</li> <li>• Workers to remain beyond the swing radius of heavy equipment.</li> <li>• Workers to remain out of the haul route when possible.</li> <li>• Communicate with equipment and haul truck operators with clear hand signals.</li> </ul>	<p align="center">Standard Level D PPE</p>
	Manual Lifting	<ul style="list-style-type: none"> <li>• CH2M HILL or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</li> <li>• When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 50lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</li> <li>• Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</li> <li>• Avoid carrying heavy objects above shoulder level.</li> </ul>	<p align="center">Standard Level D PPE</p>
	Noise	<ul style="list-style-type: none"> <li>• Personnel exposed to loud working environments shall wear hearing protection.</li> </ul>	<p align="center">Standard Level D PPE</p>
	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Provide fluids to prevent worker dehydration.</li> <li>• Monitor for heat stress in accordance with HSP (maintain use of buddy system).</li> <li>• Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</li> </ul>	<p align="center">Standard Level D PPE (light colored clothing)</p>
	Struck/pinched	<ul style="list-style-type: none"> <li>• Wear reflective warning vests or high visibility clothing.</li> <li>• Isolate equipment swing areas from workers, fixed objects or other equipment.</li> <li>• Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator.</li> <li>• Understand and review hand signals. Designate one person to provide hand signals to equipment operators.</li> <li>• Ensure equipment has operable back-up alarms.</li> <li>• Avoid positioning between fixed objects and operating equipment.</li> <li>• No one shall walk under or in front of suspended loads. Only tagged, load rated and inspected rigging shall be used to lift loads. Become familiar with vertical, basket and choker load ratings of rigging.</li> </ul>	<p align="center">Standard Level D PPE</p>

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – IDW Handling and Management**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
IDW Handling and Management (continued)	Biological	<ul style="list-style-type: none"> <li>• Observe ground surfaces especially in wet or grassy areas, tree trunks, and rock piles for evidence and presence of snakes (poisonous).</li> <li>• Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives etc.</li> <li>• Observe areas for presence of stinging insects. <b>Notify supervisors of known allergies to stinging insects and location of antidotes.</b></li> <li>• Use insect repellent. Tape pant legs to boots. Frequently check body and clothing for ticks, chiggers, spiders.</li> <li>• Avoid exposure to blood borne pathogens</li> </ul>	Standard Level D PPE
	Fire Prevention	<ul style="list-style-type: none"> <li>• Use only metal safety cans for storage and transfer of fuel.</li> <li>• Use funnels and nozzles during fueling operations.</li> <li>• Allow warm engine parts (generator motor) to cool before refueling.</li> <li>• Appropriately sized, easily accessible ABC fire extinguisher in work area.</li> </ul>	Standard Level D PPE
	Overhead/Suspended Loads	<ul style="list-style-type: none"> <li>• No personnel are allowed to walk under elevated buckets on excavation equipment</li> <li>• If personnel have to work beneath elevated buckets for maintenance purpose, then safety blocks must be positioned on hydraulic arms to prevent lowering.</li> <li>• Hardhats to be worn at all times if potential for falling objects</li> </ul>	Standard Level D PPE
	Chemical Exposure	<ul style="list-style-type: none"> <li>• All personnel performing this task shall be trained in accordance with 29CFR1910.120 and be deemed “fit for duty” by a licensed occupation physician.</li> <li>• Follow PPE and action level requirements identified in the site specific HSP.</li> <li>• Do not allow dermal contact or incidental ingestion of impacted soil or groundwater. Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times. Do not kneel or step in potentially contaminated media (soil or ground water).</li> <li>• Exercise good hygiene practices. Always wash hands before eating, drinking, smoking and leaving site. Only eat, drink, smoke or chew tobacco in designated areas.</li> <li>• Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents.</li> </ul>	Modified Level D <sub>1</sub> or D <sub>2</sub> PPE (see table G5-1)

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ- ACTIVITY HAZARD ANALYSIS – IDW Handling and Management**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
IDW Handling and Management (continued)	Other	<ul style="list-style-type: none"> <li>• Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</li> <li>• Shut down operations in heavy rain and lightning.</li> <li>• Buddy System maintained for all phases of work.</li> <li>• Base Emergency Dispatch numbers programmed into CH2M HILL personnel cellular phones. Have hospital route maps readily available.</li> <li>• Report all unsafe conditions and acts, injury/illness or property damage to supervisors immediately.</li> <li>• Site work should always be performed with adequate lighting.</li> <li>• Site equipment, materials, and waste should be maintained according to good housekeeping practices.</li> </ul>	NA
EQUIPMENT REQUIRED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ul style="list-style-type: none"> <li>• Fire extinguisher (with fuel and electrical sources)                             <ul style="list-style-type: none"> <li>• Eye wash (small portable type)</li> </ul> </li> <li>• Miscellaneous power and manual hand tools.                             <ul style="list-style-type: none"> <li>• Miscellaneous rigging.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Visual Inspections of designated work areas identify and address hazardous conditions.</li> <li>• Equipment inspections and maintenance.</li> <li>• Inspections of hand tools (power) and extension chords if used.</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan for new site personnel.</li> <li>• Review operations/safety manuals for all equipment utilized.</li> <li>• Behavior Based Loss Prevention Training (supervisors).</li> <li>• Power tool and equipment operators qualified by previous training or experience.</li> </ul>

**PRINT**

**SIGNATURE**

**Supervisor Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Safety Officer Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Site Personnel:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Demobilization / Cleanup**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Demobilization/ Cleanup	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Use sturdy hard toe work boots with sufficient ankle support.</li> <li>• Institute and maintain good housekeeping practices.</li> </ul>	<p align="center">Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots, hand and hearing protection, as dictated by task.</p>
	Heavy Equipment/Haul Trucks	<ul style="list-style-type: none"> <li>• Operator experienced with safe operation of excavation/loading equipment.</li> <li>• Workers to remain beyond the swing radius of heavy equipment.</li> <li>• Workers to remain out of the haul route when possible.</li> <li>• Communicate with equipment and haul truck operators with clear hand signals.</li> </ul>	<p align="center">Standard Level D PPE</p>
	Manual Lifting	<ul style="list-style-type: none"> <li>• CH2M HILL or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</li> <li>• When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 50lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</li> <li>• Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</li> <li>• Avoid carrying heavy objects above shoulder level.</li> </ul>	<p align="center">Standard Level D PPE</p>
	Noise	<ul style="list-style-type: none"> <li>• Personnel exposed to loud working environments shall wear hearing protection.</li> </ul>	<p align="center">Standard Level D PPE</p>
	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Provide fluids to prevent worker dehydration.</li> <li>• Monitor for heat stress in accordance with HSP (maintain use of buddy system).</li> <li>• Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</li> </ul>	<p align="center">Standard Level D PPE (light colored clothing)</p>
Demobilization/ Cleanup (continued)	Struck/pinched	<ul style="list-style-type: none"> <li>• Wear reflective warning vests or high visibility clothing.</li> <li>• Isolate equipment swing areas from workers, fixed objects or other equipment.</li> <li>• Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator.</li> <li>• Understand and review hand signals. Designate one person to provide hand signals to equipment operators.</li> <li>• Ensure equipment has operable back-up alarms.</li> <li>• Avoid positioning between fixed objects and operating equipment.</li> <li>• No one shall walk under or in front of suspended loads. Only tagged, load rated and inspected rigging shall be used to lift loads. Become familiar with vertical, basket and choker load ratings of rigging.</li> </ul>	<p align="center">Standard Level D PPE</p>

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Demobilization / Cleanup**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Biological	<ul style="list-style-type: none"> <li>• Observe ground surfaces especially in wet or grassy areas, tree trunks, and rock piles for evidence and presence of snakes (poisonous).</li> <li>• Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives etc.</li> <li>• Observe areas for presence of stinging insects. <b>Notify supervisors of known allergies to stinging insects and location of antidotes.</b></li> <li>• Use insect repellent. Tape pant legs to boots. Frequently check body and clothing for ticks, chiggers, spiders.</li> <li>• Avoid exposure to blood borne pathogens</li> </ul>	Standard Level D PPE
	Electric Hazards	<ul style="list-style-type: none"> <li>• If/when electrical extension cords are required to complete work, extension cords must be: <ul style="list-style-type: none"> <li>- Equipped with third-wire grounding.</li> <li>- Covered, elevated, or protected from damage when passing through work areas.</li> <li>- Protected from pinching if routed through doorways.</li> </ul> </li> <li>- Not fastened with staples, hung from nails, or suspended with wire.</li> <li>- Extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.</li> <li>- Rated to handle the voltage/amperage of equipment.</li> </ul>	Standard Level D PPE
	Fire Prevention	<ul style="list-style-type: none"> <li>• Use only metal safety cans for storage and transfer of fuel.</li> <li>• Use funnels and nozzles during fueling operations.</li> <li>• Allow warm engine parts (generator motor) to cool before refueling.</li> <li>• Appropriately sized, easily accessible ABC fire extinguisher in work area.</li> </ul>	Standard Level D PPE
	Pressure Washing/Equipment Decon	<ul style="list-style-type: none"> <li>• Only qualified personnel will operate high pressure water cleaning equipment.</li> <li>• Operator will be aware of surroundings at all times.</li> <li>• Operator will never point pressure wand in direction of other personnel.</li> <li>• Pressure wands shall not be modified in field (i.e. shortened, bent, or trigger tied open).</li> <li>• Non-operating support personnel must never walk in front of operator during operation.</li> <li>• High pressure equipment shall be equipped with pressure dump safety valves.</li> <li>• Operator to wear pressure resistant foot wear and face splash shield.</li> <li>• Operator shall inspect high pressure hoses, fittings and safety equipment daily.</li> </ul>	Modified Level D PPE with pressure resistant footwear and face splash shield
	Overhead/Suspended Loads	<ul style="list-style-type: none"> <li>• No personnel are allowed to walk under elevated buckets on excavation equipment</li> <li>• If personnel have to work beneath elevated buckets for maintenance purpose, then safety blocks must be positioned on hydraulic arms to prevent lowering.</li> <li>• Hardhats to be worn at all times if potential for falling objects</li> </ul>	Standard Level D PPE

**Contract Task Order WE99 MCIEAST-MCB CAMLEJ  
ACTIVITY HAZARD ANALYSIS – Demobilization / Cleanup**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Demobilization/ Cleanup (continued)	Other	<ul style="list-style-type: none"> <li>• Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</li> <li>• Shut down operations in heavy rain and lightning.</li> <li>• Buddy System maintained for all phases of work.</li> <li>• Base Emergency Dispatch numbers programmed into CH2M HILL personnel cellular phones. Have hospital route maps readily available.</li> <li>• Report all unsafe conditions and acts, injury/illness or property damage to supervisors immediately.</li> <li>• Site work should always be performed with adequate lighting.</li> <li>• Site equipment, materials, and waste should be maintained according to good housekeeping practices.</li> </ul>	NA
EQUIPMENT REQUIRED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ul style="list-style-type: none"> <li>• Fire extinguisher (with fuel and electrical sources)</li> <li>• Eye wash (small portable type)</li> <li>• Miscellaneous power and manual hand tools.</li> <li>• Miscellaneous rigging.</li> </ul>		<ul style="list-style-type: none"> <li>• Visual Inspections of designated work areas identify and address hazardous conditions.</li> <li>• Equipment inspections and maintenance.</li> <li>• Inspections of hand tools (power) and extension chords if used.</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan for new site personnel.</li> <li>• Review operations/safety manuals for all equipment utilized.</li> <li>• Behavior Based Loss Prevention Training (supervisors).</li> <li>• Power tool and equipment operators qualified by previous training or experience.</li> </ul>

**PRINT**

**SIGNATURE**

**Supervisor Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Safety Officer Name:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_

**Site Personnel:**

\_\_\_\_\_

\_\_\_\_\_

**Date/Time:** \_\_\_\_\_



TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – Vegetation removal

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Vegetation removal	Manual Lifting, Back Injury	<p>CH2M HILL personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</p> <p>When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 40lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</p> <p>Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</p> <p>Avoid carrying heavy objects above shoulder level.</p> <p>Do not climb on objects not designed for access by personnel without proper fall protection.</p>	<p>Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots or sturdy leather work boots, hand and hearing protection, as dictated by task.</p>
	Slips, Trips, Falls	<p>Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe, mark and avoid these identified site areas. Use sturdy leather work boots with sufficient ankle support.</p> <p>Institute and maintain good housekeeping practices.</p>	<p>Standard Level D PPE *</p>
	High Ambient Temperature	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p>	<p>Standard Level D PPE (light colored/weight, breathable clothing)</p>
	Fire Prevention	<p>Use only metal safety cans for storage and transfer of fuel.</p> <p>Secure flammable storage lock-up (vented) for flammable/combustible material storage.</p> <p>Use funnels and nozzles during fueling operations.</p> <p>Appropriately sized, easily accessible ABC fire extinguisher in work area.</p> <p>Review and be cognizant of MCB LEJUENE Fire Prevention Procedures and Requirements</p>	<p>Standard Level D PPE *</p>
	Visible Lighting	<p>Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lighting must be provided to sufficient illuminate work area(s).</p> <p>Do not enter poorly lit areas without first providing portable illumination.</p>	<p>Standard Level D PPE *</p>

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – Vegetation removal

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Vegetation Removal (continued)	Biological	<p>Observe areas for presence of stinging or biting or stinging insects and nests such as spiders (widows/recluse), bee/wasp hives, fire ants mounds etc.</p> <p>Prior to starting field activities, notify supervisors of known allergies to stinging insects and location and quantity of antidote in the event the employee becomes incapacitated as a result of an insect bite.</p> <p>Observe work area for presence of snakes (cottonmouth as primary, copperhead and rattlers as secondary).</p> <p>Observe wetland/creek, river areas for presence of alligators (nests, eggs)</p> <p>Frequently check body and clothing for ticks, chiggers, spiders.</p> <p>Protect yourself from and avoid exposure to blood bourn pathogens when administering first aid.</p> <p>Exposure to some insect and reptile biological hazards may be temperature dependant.</p>	Standard Level D PPE *
	Weather Exposure	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress and cold stress s in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p> <p>Use sun protection (sun screen, hats, shaded eye protection, etc.) when appropriate.</p>	Standard Level D PPE (weather appropriate clothing)
	Cuts & Abrasions	Wear long sleeve clothing and proper PPE (eye protection, hard hats, leather gloves, sturdy leather boots) when traversing through wooded areas.	Standard Level D PPE *
	Other	<p>Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</p> <p>Drive 5 mph when driving past troops on maneuvers. If drive past troops on maneuvers could interrupt their activities, vehicle drivers are to bring vehicles to a complete stop in a safe location and yield to troop activities.</p> <p>Shut down operations in heavy rain, wind and/or lightning. At first sight of lightning, operations shall be stopped and only resumed when conditions permit. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.</p> <p>Buddy System maintained for all phases of work.</p> <p>Base or local Emergency Dispatch numbers programmed into cellular phones. Have hospital route maps readily available.</p> <p>Report all conditions which may create accidents, injury, illness or property damage to supervisors immediately.</p>	NA

PRINT

SIGNATURE

Supervisor Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Site Personnel:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – Loading Material for Off-site Disposal

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Loading Material for Off-site Disposal	Manual Lifting, Back Injury	<p>CH2M HILL personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</p> <p>When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 40lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</p> <p>Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</p> <p>Avoid carrying heavy objects above shoulder level.</p> <p>Do not climb on objects not designed for access by personnel without proper fall protection.</p>	<p>Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed or leather work boots (SSC determination), hand and hearing protection, as dictated by task.</p>
	Slips, Trips, Falls	<p>Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe, mark and avoid these identified site areas. Use sturdy, leather work boots with sufficient ankle support.</p> <p>Institute and maintain good housekeeping practices.</p>	Standard Level D PPE *
	High Ambient Temperature	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p>	Standard Level D PPE (light colored/weight, breathable clothing)
	Fire Prevention	<p>Use only metal safety cans for storage and transfer of fuel.</p> <p>Secure flammable storage lock-up (vented) for flammable/combustible material storage.</p> <p>Use funnels and nozzles during fueling operations.</p> <p>Appropriately sized, easily accessible ABC fire extinguisher in work area.</p> <p>Review and be cognizant of MCB LEJUENE Fire Prevention Procedures and Requirements</p>	Standard Level D PPE *
	Visible Lighting	<p>Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lighting must be provided to sufficient illuminate work area(s).</p> <p>Do not enter poorly lit areas without first providing portable illumination.</p>	Standard Level D PPE *

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – Loading Material for Off-site Disposal

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Loading Material for Off-site Disposal (continued)	Biological	<p>Observe areas for presence of stinging or biting or stinging insects and nests such as spiders (widows/recluse), bee/wasp hives, fire ants mounds etc.</p> <p>Prior to starting field activities, notify supervisors of known allergies to stinging insects and location and quantity of antidote in the event the employee becomes incapacitated as a result of an insect bite.</p> <p>Observe work area for presence of snakes (cottonmouth as primary, copperhead and rattlers as secondary).</p> <p>Observe wetland/creek, river areas for presence of alligators (nests, eggs)</p> <p>Frequently check body and clothing for ticks, chiggers, spiders.</p> <p>Protect yourself from and avoid exposure to blood bourn pathogens when administering first aid.</p> <p>Exposure to some insect and reptile biological hazards may be temperature dependant.</p>	Standard Level D PPE *
	Weather Exposure	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress and cold stress s in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p> <p>Use sun protection (sun screen, hats, shaded eye protection, etc.) when appropriate.</p>	Standard Level D PPE (weather appropriate clothing)
	Suspended Loads	Work not permitted under suspended loads.	Standard Level D PPE *
	Cuts & Abrasions	Wear long sleeve clothing and proper PPE (eye protection, hard hats, leather gloves, sturdy leather boots) when traversing through wooded areas.	Standard Level D PPE *

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – Loading Material for Off-site Disposal

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
Loading Material for Off-site Disposal (continued)	Other	<p>Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</p> <p>Drive 5 mph when driving past troops on maneuvers. If drive past troops on maneuvers could interrupt their activities, vehicle drivers are to bring vehicles to a complete stop in a safe location and yield to troop activities.</p> <p>Shut down operations in heavy rain, wind and/or lightning. At first sight of lightning, operations shall be stopped and only resumed when conditions permit. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.</p> <p>Buddy System maintained for all phases of work.</p> <p>Base or local Emergency Dispatch numbers programmed into cellular phones. Have hospital route maps readily available.</p> <p>Report all conditions which may create accidents, injury, illness or property damage to supervisors immediately.</p>	NA

PRINT

SIGNATURE

Supervisor Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Site Personnel:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – MEC Demolition

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
MEC Demolition	Manual Lifting, Back Injury	<p>CH2M HILL personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities.</p> <p>When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. If heavy equipment isn't available to have someone assist with the lift— especially for heavy (&gt; 40lbs.) or awkward loads. Use heavy equipment to transfer heavy or awkward loads wherever possible.</p> <p>Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear prior to the lift.</p> <p>Avoid carrying heavy objects above shoulder level.</p> <p>Do not climb on objects not designed for access by personnel without proper fall protection.</p>	<p>Standard Level D PPE *</p> <p>* Work clothes, reflective vests/ high visibility clothing, hard hat, safety glasses and sturdy hard toed work boots, hand and hearing protection, as dictated by task.</p>
	Flying debris/objects	Maintain distance from helicopter rotors (shielding if necessary).	Standard Level D PPE *
	Noise > 85 decibels (dBA)	Noise protection required if working near the helicopter.	Standard Level D PPE * and ear protection , if necessary
	Slips, Trips, Falls	<p>Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet/steep slopes, stumps/roots, unprotected holes, ditches, rip rap, utilities, ground protrusions. Observe, mark and avoid these identified site areas. Use sturdy, hard toe work boots with sufficient ankle support.</p> <p>Institute and maintain good housekeeping practices.</p>	Standard Level D PPE *
	High Ambient Temperature	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p>	Standard Level D PPE (light colored/weight, breathable clothing)
	Fire Prevention	<p>Use only metal safety cans for storage and transfer of fuel.</p> <p>Secure flammable storage lock-up (vented) for flammable/combustible material storage.</p> <p>Use funnels and nozzles during fueling operations.</p> <p>Appropriately sized, easily accessible ABC fire extinguisher in work area.</p> <p>Review and be cognizant of MCB LEJUENE Fire Prevention Procedures and Requirements</p>	Standard Level D PPE *
MEC Demolition (continued)	Visible Lighting	<p>Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lighting must be provided to sufficient illuminate work area(s).</p> <p>Do not enter poorly lit areas without first providing portable illumination.</p>	Standard Level D PPE *

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – MEC Demolition

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Biological	<p>Observe areas for presence of stinging or biting or stinging insects and nests such as spiders (widows/recluse), bee/wasp hives, fire ants mounds etc.</p> <p>Prior to starting field activities, notify supervisors of known allergies to stinging insects and location and quantity of antidote in the event the employee becomes incapacitated as a result of an insect bite.</p> <p>Observe work area for presence of snakes (cottonmouth as primary, copperhead and rattlers as secondary).</p> <p>Observe wetland/creek, river areas for presence of alligators (nests, eggs)</p> <p>Frequently check body and clothing for ticks, chiggers, spiders.</p> <p>Protect yourself from and avoid exposure to blood bourn pathogens when administering first aid.</p> <p>Exposure to some insect and reptile biological hazards may be temperature dependant.</p>	Standard Level D PPE *
	Weather Exposure	<p>Provide fluids to prevent worker dehydration.</p> <p>Monitor for heat stress and cold stress s in accordance with HSP (maintain use of buddy system).</p> <p>Institute a proper work-break regiment to avoid heat stress symptoms and overexertion.</p> <p>Use sun protection (sun screen, hats, shaded eye protection, etc.) when appropriate.</p>	Standard Level D PPE (weather appropriate clothing)
	Explosion Hazard	Personnel will maintain the exclusion zones as specified in the Explosives Safety Submission.	Standard Level D PPE
	Cuts & Abrasions	Wear long sleeve clothing and proper PPE (eye protection, hard hats, leather gloves, sturdy hard toe boots) when traversing through wooded areas.	Standard Level D PPE *

TASK ORDER WE99 MCIEAST-MCB CAMLEJ

ACTIVITY HAZARD ANALYSIS – MEC Demolition

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment
	Other	<p>Always using a seat belt while driving on military/government facilities. Always observe posted speed limits, traffic signs and signals. Never using a cell phone or two way radio <u>while driving</u> on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges.</p> <p>Drive 5 mph when driving past troops on maneuvers. If drive past troops on maneuvers could interrupt their activities, vehicle drivers are to bring vehicles to a complete stop in a safe location and yield to troop activities.</p> <p>Shut down operations in heavy rain, wind and/or lightning. At first sight of lightning, operations shall be stopped and only resumed when conditions permit. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.</p> <p>Buddy System maintained for all phases of work.</p> <p>Base or local Emergency Dispatch numbers programmed into cellular phones. Have hospital route maps readily available.</p> <p>Report all conditions which may create accidents, injury, illness or property damage to supervisors immediately.</p>	NA

PRINT

SIGNATURE

Supervisor Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Site Personnel:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

# **CH2M HILL HEALTH AND SAFETY PLAN**

## **Attachment 11**

### **Material Safety Data Sheets**

**Appendix C**  
**Geophysical Investigation Plan**

---

Draft

**Geophysical Investigation Plan  
Lot 202  
Environmental Condition of Property Study  
Phase II**

**Marine Corps Installation East – Marine Corp Base Camp Lejeune  
North Carolina**

**Contract Task Order WE99**

**October 2013**

Prepared for

**Department of the Navy  
Naval Facilities Engineering Command  
Southeast**

**Contract N62470-11-D-8012**

Prepared by



**CH2MHILL**

**Knoxville, Tennessee**

# Contents

---

<b>Acronyms/Abbreviations .....</b>	<b>v</b>
<b>1 Overview .....</b>	<b>1-1</b>
1.1 Introduction .....	1-1
1.2 Safety Issues.....	1-1
1.3 Background .....	1-1
1.4 Vegetation and Topography .....	1-1
1.5 Geologic Conditions .....	1-1
1.6 Shallow Groundwater Conditions .....	1-2
1.7 Adverse Geophysical Conditions.....	1-2
1.8 Site Utilities.....	1-2
1.9 Site Access.....	1-2
1.10 Possible Worker Hazards .....	1-2
<b>2 Geophysical Survey .....</b>	<b>2-1</b>
2.1 Project Personnel.....	2-1
2.2 Technical Approach.....	2-1
2.3 Geonics, Ltd. EM31 .....	2-1
2.4 Positional Data .....	2-2
<b>3 Measurement Quality Objectives .....</b>	<b>3-3</b>
<b>4 Quality Control .....</b>	<b>4-1</b>
<b>5 Data Acquisition, Processing, and Reporting .....</b>	<b>5-1</b>
5.1 Field Notes .....	5-1
5.2 Data Processing.....	5-1
5.3 Interpretation .....	5-1
5.4 Final Maps.....	5-1
5.5 Schedule.....	5-2
5.6 Corrective Measures.....	5-2

## Figures

- 1 Lot 202 Investigation Area

## Table

- 1 Lot 202 Measurement Quality Objectives

**Approved By:**

---

Project Manager

---

Date

**Approved By:**

---

Senior Geophysicist

---

Date

**Approved By:**

---

Activity Manager and QC Manager

---

Date

# Acronyms/Abbreviations

---

AHA	Activity Hazard Analysis
DGM	Digital Geophysical Mapping
DGPS	Differential Global Positioning System
EM	Electromagnetic
ft	feet
FTP	File Transfer Protocol
GIP	Geophysical Investigation Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
m	meter(s)
MCIEAST-MCB CAMLEJ	Marine Corps Installation East – Marine Corps Base Camp Lejeune
MEC	Munitions and Explosives of Concern
MPC	Measurement Performance Criteria
MPPEH	Material Potentially Presenting an Explosive Hazard
MQO	Measurement Quality Objective
mS/m	milliSiemens/meter
NAD83	North American Datum 1983
OSHA	Occupational Safety and Health Administration
ppt	Parts Per Thousand
RTK	Real-time Kinematic
QC	Quality Control
UXO	Unexploded Ordnance
UXOSO	Unexploded Ordnance Safety Officer

# Overview

---

## 1.1 Introduction

This document presents the Geophysical Investigation Plan (GIP) to conduct digital geophysical mapping (DGM) at Lot 202 on Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ), North Carolina. Lot 202 consists of an approximate 4.2-acre container storage lot located between Holcomb Boulevard and Piney Green Road (**Figure 1**). It is bordered to the north by the former Defense Utilization and Materials Office Lot 203 and Lot 201 to the south. Abandoned railroad tracks extend along the western site boundary.

The geophysical investigation is being conducted as part of a Phase II Environmental Condition of Property Study. The objective of the DGM is to identify the lateral extent (i.e. footprint) of suspected disposal areas within Lot 202.

This GIP provides details of the survey objectives, equipment, technical approach, operational procedures, quality control (QC), and reporting requirements associated with DGM at the site. It has been prepared on behalf of the Department of the Navy, Naval Facilities Engineering Command Mid-Atlantic, under Contract Task Order WE99.

## 1.2 Safety Issues

DGM survey personnel are prohibited from touching, handling, or moving suspected MEC/MPPEH. Upon encountering such an item, survey personnel will immediately inform on-site Unexploded Ordnance (UXO) personnel. In the event that such an item is discovered, either inside or outside the investigation area, and no UXO personnel are present, DGM personnel will conspicuously mark and secure a perimeter around the item and immediately contact the on-site UXO Safety Officer (UXOSO). DGM survey personnel should not remain within 100 feet (ft) (33 meters [m]) of MEC/MPPEH.

DGM survey personnel will not access areas beyond the investigation area limits established for this investigation. UXO personnel will conduct MEC/MPPEH avoidance during DGM. DGM personnel will also be required to adhere to the project Health and Safety Plan (HSP).

## 1.3 Background

Lot 202 was historically used for disposal and storage of waste and supplies, including pesticides, transformers containing PCBs, solvents, electrolytes, and waste oils. Lot 202 is currently used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies. No documentation has been located which indicates that MEC/MPPEH has been used within the site boundaries. However, previous intrusive investigations conducted within Lot 203 and within Site 6 (storage lot east of Lot 202) have revealed the presence of MEC/MPPEH.

## 1.4 Vegetation and Topography

The majority of the proposed DGM survey area is a gravel-covered open lot that consists of relatively flat ground. Therefore, vegetation clearance is not anticipated.

## 1.5 Geologic Conditions

No information on the site-specific geology of the DGM survey area at Lot 202 is available. Based on investigations at other adjacent areas of MCIEAST-MCB CAMLEJ, it is anticipated that shallow soils at the site consist of unconsolidated deposits of silty and clayey-sand, silt, and clay. It is assumed that geologic

conditions at the site will not significantly impact proposed DGM because these variations would most likely be relatively subtle compared to the responses from buried wastes.

## **1.6 Shallow Groundwater Conditions**

Localized groundwater conditions may present potential access issues or safety hazards if the survey area is prone to standing water during periods of heavy precipitation. In addition, site-specific groundwater conditions (e.g. depth to water table, salinity) may result in variations of geophysical response signatures of potential burial areas. Similar to the site-specific geology, these conditions are unlikely to adversely impact the proposed DGM because these variations would most likely be relatively subtle compared to the responses from buried wastes.

## **1.7 Adverse Geophysical Conditions**

Conditions that may adversely impact geophysical data collection at the site include primarily manmade objects (e.g. fence, railroad tracks, and underground utilities). These objects may result in localized data gaps or may result in the potential masking of geophysical anomalies associated with disposal areas.

## **1.8 Site Utilities**

Prior to conducting preparations for DGM, utilities within Lot 202 will be marked by a utility locating subcontractor licensed and insured in the State of North Carolina. Available MCIEAST-MCB CAMLEJ underground utility maps will also be reviewed by CH2M HILL to assess the presence of potential underground utilities within the proposed DGM area. Electronic files or maps that can be obtained from MCIEAST-MCB CAMLEJ will be used, to the extent possible, as overlays on the DGM data to assist with interpretation of the DGM results.

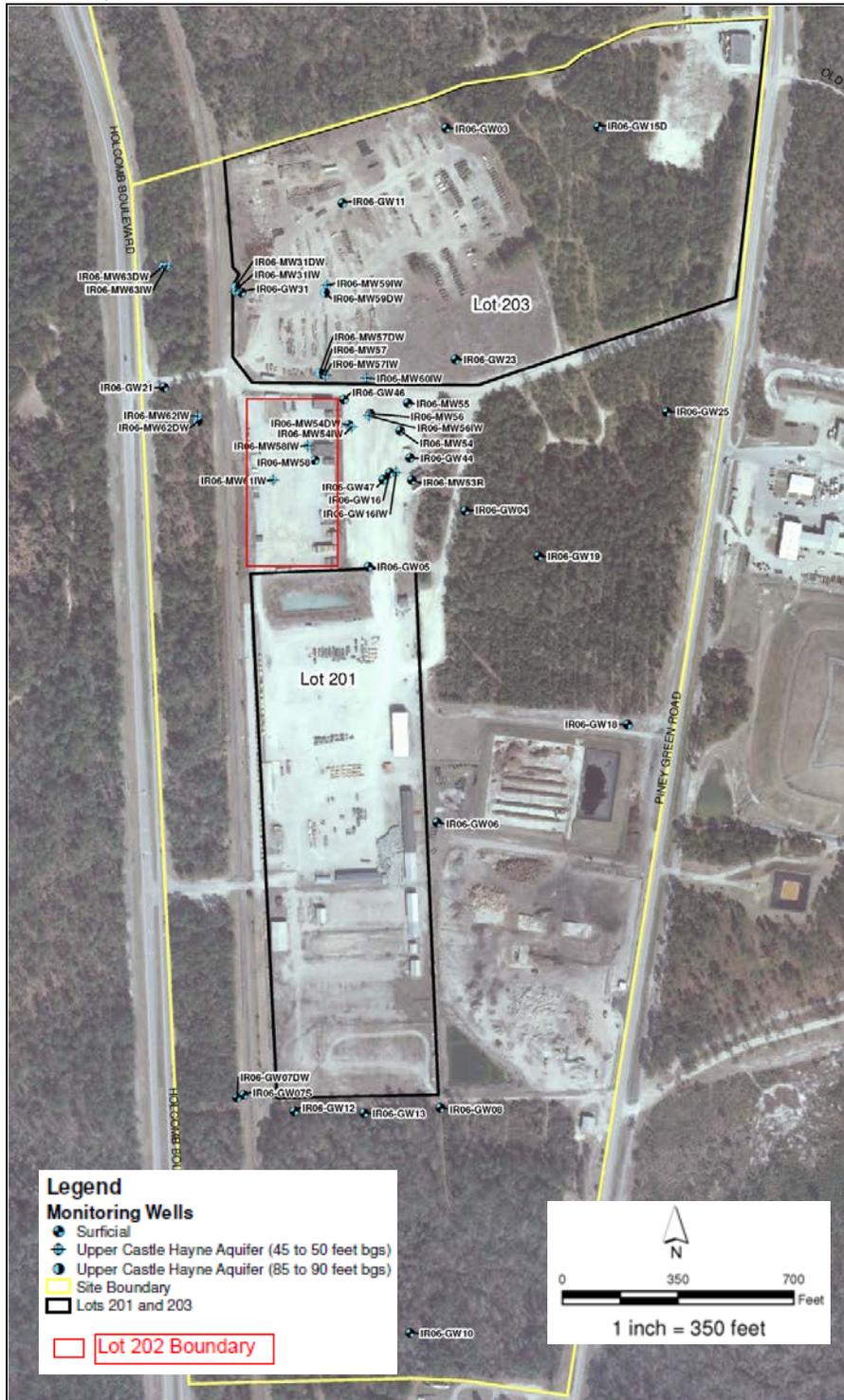
## **1.9 Site Access**

The site is accessed via Holcomb Boulevard. Other than required clearance and security protocols associated with getting onto the installation, there are no anticipated access impediments.

## **1.10 Possible Worker Hazards**

Potential worker hazards at the site include those associated with conducting DGM and associated field tasks (e.g. slips, trips, and falls). These hazards are described in the project HSP and also will be addressed in the DGM-specific activity hazard analysis (AHA) and on-site daily pre-task safety briefing. Other hazards include the potential for encountering MEC/MPPEH at the surface (Section 1.2).

FIGURE 1  
 Lot 202 Location  
 MCIEAST-MCBCAMLEJ  
 Jacksonville, North Carolina



# Geophysical Survey

---

## 2.1 Project Personnel

DGM operations will involve the following key CH2M HILL personnel:

- **Senior Geophysicist:** The Senior Geophysicist provides technical and geophysical staff oversight and is responsible for allocating appropriate resources to the project. The Senior Geophysicist serves as the Geophysicist-of-Record for the project, conducting independent technical reviews of results and deliverables.
- **QC Geophysicist:** The QC Geophysicist is responsible for QC of DGM data, project compliance with the GIP, achievement of the measurement quality objectives (MQOs), and delivery of draft and final deliverable packages.
- **Project Geophysicist:** The Project Geophysicist is responsible for data collection, safe and proper operation of the geophysical instruments, daily field QC measures, and in-field data processing. The Project Geophysicist is also responsible for conducting DGM in accordance with this GIP and the HSP.
- **Geophysical Data Processor:** The Data Processor is responsible for processing DGM data, data management throughout the project, and preparation of data delivery packages in accordance with this GIP.

On-site DGM personnel will have documented proof of completion of the following:

- 40-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) training with annual 8-hour refreshers
- Required medical monitoring physical exams
- 3-R (recognize, retreat, report) munitions response safety and awareness training.

At least two on-site personnel will be qualified to administer first aid and cardiopulmonary resuscitation.

## 2.2 Technical Approach

The geophysical survey will be conducted using the Geonics, Ltd. EM31. This instrument has been selected based on its successful use in previous disposal area delineation efforts by CH2M HILL at MCIEAST-MCB CAMLEJ and other locations. In addition, it was selected because of the potential for both metallic and non-metallic debris to be present.

The EM31 will be operated in vertical dipole mode in order to provide the maximum effective survey depth with the instrument and because burial depth and cover material thickness are not known. Terrain conductivity (i.e. quadrature) and in-phase response data will be collected simultaneously, evaluated, and presented.

EM31 data will be collected along profiles with an intended spacing of 10 ft (3 m) across the approximate 4.2-acre investigation area where site conditions permit. Inaccessible portions of the survey area will result in greater spacing or potential data gaps. CH2M HILL will perform on-site preliminary data processing prior to demobilization in order to assess whether additional surveying is necessary to refine anomaly locations.

## 2.3 Geonics, Ltd. EM31

The EM31 measures the electrical conductivity of subsurface materials by inducing a time-varying magnetic field and measuring the amplitude and phase shift of an induced secondary magnetic field. Variations in

subsurface conductivity may be caused by the presence of buried metal objects, presence of non-metallic wastes and debris, or by changes in geologic conditions that alter the conductive signature of subsurface materials.

The EM31 operates at a single frequency of 10 kilohertz, has a fixed intercoil spacing of 12 ft (3.7 m), and provides two measurements: quadrature (apparent conductivity) and inphase (metallic response). One transmitter coil generates the EM energy, and a second receiver coil detects secondary EM fields caused by the transmitter as well as fields induced in subsurface conductive regions.

Quadrature and in-phase are the two components of the EM31 induced magnetic field. The quadrature phase (measured in milliSiemens/meter [mS/m]) component is generally indicative of the bulk soil and groundwater properties, whereas the in-phase component (measured in parts per thousand [ppt]) is generally indicative of buried metal objects. By recording both the in-phase and quadrature-phase components and comparing the results from these two components, it is possible to evaluate whether a detected change in bulk conductivity is due to the presence of buried metallic objects or to the presence of non-metallic materials that may impact subsurface soil or pore fluid conductivity.

## 2.4 Positional Data

GPS satellites orbit the earth transmitting signals that can be detected with a GPS receiver. The GPS receiver uses the known locations of the satellites and the elapsed time of signal transmittal to calculate its position. Differential GPS (DGPS) increases the accuracy of GPS readings through the use of two receivers: a stationary receiver that acts as a base station and collects data at a known location and a second roving receiver that makes the position measurements. The base stations can be configured to save the data for correcting positional data during post-processing or to transmit the correction data to the rover system in real-time kinematic (RTK) mode. RTK GPS instruments are ideal for DGM at sites with adequate satellite visibility conditions because they typically provide centimeter-level accuracy. The DGM at Lot 202 will be conducted using RTK GPS.

The project coordinate system, projection, and units are as follows: Universal Transverse Mercator (UTM) Zone 18 North, North American Datum 1983 (NAD83) CONUS, and meters.

SECTION 3

# Measurement Quality Objectives

**Table 1** presents the MQOs, measurement performance criteria (MPC), and test methods for the DGM at Lot 202.

TABLE 1  
 Lot 202 Measurement Quality Objectives  
**MCIEAST-MCBCAMLEJ**  
*North Carolina*

Measurement Quality Objective	Measurement Performance Criteria	Test Method
<b>General System Operation</b>		
System Operation – Geophysical instrument is operating properly.	<p>No excessive data spikes (&gt;5 mS/m above the mean for EM31 quadrature; &gt;2 ppt above the mean for EM31 inphase) will be present in static QC test files.</p> <p>The EM31 instrument will be free of obvious defects. Cables and system components will be in good working order.</p> <p>EM31 responds consistently to known subsurface or surface metallic object.</p>	<p>Battery levels will be periodically checked throughout surveys.</p> <p>Instruments will undergo sufficient warm-up period and functional checks before use.</p> <p>Cables, connections, and system components will be inspected daily prior to use.</p> <p>Static background and dynamic response tests will be conducted in accordance with <b>Section 4</b> of this Work Plan.</p>
<b>Geophysical Survey</b>		
Data Quantity and Spacing – Down line data density is sufficient to achieve project objective.	<p>Maximum permissible spacing between individual data points will be ≤2.5 ft (0.76 m) unless an obstruction or hazard is present. A spacing greater than this will not meet the MQO.</p>	<p>Results of survey will be quantitatively evaluated to ensure compliance.</p>
Survey Coverage (Lane Spacing)	<p>Lane spacing varies by no more than 1.5x the intended lane spacing of 10 ft (3 m), unless an obstruction or hazard is present. This results in a maximum permissible lane spacing of 15 ft (4.6 m).</p>	<p>Results of survey will be quantitatively evaluated to ensure compliance.</p>
Repeatability	<p>2x daily dynamic response data demonstrate good repeatability from start of the field day through the end of the day.</p>	<p>Repeat data collection will be conducted in accordance with <b>Section 4</b> of this Work Plan and qualitatively evaluated for compliance.</p>
<b>Data Handling</b>		
Data must be made available to the project team in accordance with the project schedule.	<p>Raw data will be uploaded to a project-specific secure file transfer protocol (FTP) or Share Point site.</p> <p>Draft survey results will be available within 2 weeks of demobilization from the site. Final results will be provided within 1 week of receipt of comments on draft results.</p> <p>CH2M HILL will back up data to a secure server location for retention throughout the duration of the project</p>	<p>Results will be evaluated based on actual delivery of data.</p>

# Quality Control

---

The EM31 will be field tested to confirm proper operating conditions. Several basic QC tests will be performed as part of this investigation.

- **Instrument Warm-up and Functional Checks** – Standard warm-up time is generally 10 to 15 minutes to allow for sufficient sensor warm-up and minimization of drift. Longer warm-up periods may be needed in cold weather. EM31 functional checks (battery level check, zero setting check, nulling, phase test, and sensitivity test) will be conducted in accordance with Geonics' specifications. Equipment warm-up and functional checks will be performed the first time the instrument is turned on for the day or after it has been turned off for an extended period of time.
- **Static Background Tests** – Static background tests will be performed at the start and end of each survey day. The test will be conducted in an area that is relatively free of sources of interference and with the instrument kept stationary. Data will be collected for at least 1 minute with the instrument placed on the ground surface. The instrument will then be raised to the intended carrying height for the production survey, a new survey line within the data file will be started, and the process will be repeated.
- The purpose of this test is to assess background conditions (i.e. effect of the ground component) and determine whether unusual levels of instrument or ambient noise exist in the data from the start of the day through the end of the day. The results of this test will be quantitatively evaluated.
- **Dynamic Response Test** – The dynamic test will be performed at the start and end of each survey day by collecting data along a profile that extends across a surface or subsurface object capable of producing a measurable response in each instrument (e.g. metal pipe, manhole lid, metal equipment case on ground surface). Data collection will occur along the profile in two directions passing over the object in order to also assess positional lag and latency.

The purpose of the dynamic test is to evaluate whether unusually large noise spikes occur in the data due to vibration of the cables and connectors during walking as well as to demonstrate repeatability in the instrument responses over a known object throughout the duration of the survey. The responses recorded during this test will be qualitatively evaluated due to factors that cannot be strictly controlled while the instruments are in motion.

# Data Acquisition, Processing, and Reporting

---

## 5.1 Field Notes

Field notes will be kept daily and will include the following information:

- Field team leader name
- Field team members' names
- Date(s) of data collection
- Working hours onsite
- Instrument used
- Positioning method used
- Production and QC data file names with line numbers labeled with corresponding QC test
- Weather conditions
- Terrain conditions (including obstructions and data gaps)
- Other relevant field notes and observations

These field data will be reviewed on a daily basis and archived at the conclusion of the fieldwork. Pertinent field data will be compiled and summarized in support of the data summary report (described below).

## 5.2 Data Processing

Data processing will be system specific, but the general final processing steps that may be performed on the data include the following:

- Sensor bias, background leveling, and/or standardization adjustment
- Sensor drift removal
- Latency or lag correction
- Geophysical noise identification and removal (spatial, temporal, motional, terrain induced)
- Contour level selection with background shading
- Digital filtering and enhancement (low pass, high pass, band pass, convolution, correlation, nonlinear, etc.)

## 5.3 Interpretation

Interpretation of the geophysical results will be completed by annotating the final contour maps to indicate the lateral extent of the suspected disposal areas. Annotations will also be provided depicting inaccessible survey areas (i.e. data gaps) and suspected or known sources of interference.

QC test results will be presented in an appropriate graphical format (e.g. line plot, Geosoft static test format, etc.) that demonstrates the data meeting the quality objectives listed in this Work Plan.

## 5.4 Final Maps

The results of the geophysical investigation will be presented as a series of plan-view, color-contoured maps depicting instrument response (quadrature and inphase) across the survey area. Interpretations will be made directly on the maps as well as addressed in the accompanying report.

## 5.5 Schedule

This proposed geophysical surveying field work is expected take less than one week to complete. It is assumed no vegetation clearing will be required for using the required DGM instruments. The Project Geophysicist will provide preliminary in-field processed results prior to demobilization for review by the CH2M HILL project team.

Draft results and a draft report (in Word format) shall be provided within **2 weeks** of demobilization. The draft report will present a description of the survey methods, survey execution, encountered site conditions, data processing steps and data adjustments, results and interpretation, discussion of QC results, limitations and any other relevant information pertaining to the interpretation of the results.

In addition to the report, the draft data delivery package will include the following:

- Raw instrument files
- Pre-processed instrument files
- Initial processed survey and QC files in a format that can be directly read by Geosoft (.XLS, .GDB, .XYZ format)
- PDF and native files of QC test results
- Draft PDF maps depicting contoured results
- Native map files (note: if Geosoft .MAP files provided, files must be packed .MAP files)
- Grid (.GRD) files and color mapping files

The final report will be available within **1 week** of receipt of comments from CH2M HILL on the draft report and figures. Submitted data files will include, at a minimum, Easting and Northing values (in the specified project coordinate system), raw instrument channels, time stamp, pre-processed, and processed data channels. The final data delivery package will include the following:

- Updated pre-processed instrument files (if applicable)
- Updated PDF and native files of QC test results (if applicable)
- Final processed survey and QC files in a format that can be directly read by Geosoft (.XLS, .GDB, .XYZ format)
- Final PDF maps depicting contoured results
- Final native map files (note: if Geosoft .MAP files provided, files must be packed .MAP files)
- Final grid (.GRD) files and color mapping files

## 5.6 Corrective Measures

The following are the basic corrective measures to be followed in association with the DGM conducted as part of this investigation:

- Replacement of the instrument if it fails to meet functional check requirements.
- Potential re-collection of survey area units if MQOs are not met.
- Potential re-analysis of the DGM data if a feature is not present in the data that would be expected to elicit a response in the EM31.

**Appendix D**  
**Quality Assurance Project Plan**

---

Draft

**Quality Assurance Project Plan  
Lot 202  
Lot 202 Environmental Condition of Property Study, Phase II**

**Marine Corps Installations East - Marine Corps Base Camp Lejeune  
North Carolina**

**Contract Task Order WE99**

**November 2013**

Prepared for

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

Under the

**NAVFAC CLEAN 8012 Program  
Contract N62470-11-D-8012**

Prepared by



**CH2MHILL**

**Knoxville, Tennessee**

# Contents

---

Acronyms and Abbreviations.....	v
QAPP Identifying Information.....	vii
Crosswalk to Related Information .....	ix
<b>1 Introduction and Project Organization.....</b>	<b>1-1</b>
1.1 Introduction .....	1-1
1.2 Project Organization Roles and Responsibilities.....	1-1
1.2.1 Project Communication .....	1-1
1.2.2 Laboratory Work Group.....	1-2
1.3 Problem Definition and Background.....	1-2
1.4 Project Description .....	1-2
1.5 Quality Objectives and Criteria for Measurement Data .....	1-3
1.5.1 Levels of Data Quality .....	1-3
1.5.2 Data Quality Objective Development.....	1-4
1.5.3 Quality of Data .....	1-4
1.5.4 Project Quality/Systematic Planning Process Statements, Data Quality Objectives	1-4
1.6 Special Training, Requirements, and Certifications.....	1-5
1.7 Documentation and Records .....	1-5
1.7.1 Field Documentation .....	1-5
1.7.2 Laboratory Documentation .....	1-5
<b>2 Measurement and Data Acquisition .....</b>	<b>2-1</b>
2.1 Sampling Process Design.....	2-1
2.2 Sampling Method Requirements.....	2-1
2.3 Sample Handling and Custody Requirements .....	2-1
2.4 Analytical Methods Requirements .....	2-1
2.4.1 Analytical Methods.....	2-1
2.4.2 Detection, Quantitation, and Reporting Limits .....	2-2
2.4.3 Target Analytes and Reporting Limits.....	2-2
2.5 Quality Control Requirements .....	2-2
2.6 Field and Laboratory Corrective Action .....	2-2
2.7 Instrument/Equipment Testing, Inspection, and Maintenance Requirements.....	2-2
2.7.1 Field Instruments.....	2-2
2.7.2 Analytical Laboratory Instruments .....	2-2
2.8 Instrument Calibration and Frequency.....	2-2
2.9 Inspection and Acceptance Requirements for Supplies and Consumables.....	2-3
2.10 Data Acquisition Requirements .....	2-3
<b>3 Assessment and Oversight .....</b>	<b>3-1</b>
3.1 Assessments and Response Actions .....	3-1
3.1.1 Laboratory Performance and System Audits.....	3-1
3.1.2 Field Team Performance and System Audits.....	3-1
3.2 Reports to Management.....	3-2
<b>4 Data Review, Validation, and Verification Requirements.....</b>	<b>4-1</b>
4.1 Data Review, Validation, and Verification Requirements.....	4-1
4.2 Verification and Validation Methods.....	4-1
4.2.1 Data Verification .....	4-1

4.2.2 Data Validation.....4-1

4.3 Usability Assessment.....4-1

4.3.1 Data Quality Evaluation.....4-2

4.3.2 Reconciliation with Data Quality Objectives .....4-3

**5 References.....5-1**

**Attachments**

- I Tables
- II Department of Defense ELAP Accreditation Letters – Analytical Laboratories

# Acronyms and Abbreviations

---

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
CompQAP	Comprehensive Quality Assurance Plan
DL	detection limit
DQE	data quality evaluation
DQO	data quality objective
LOD	limit of detection
LOQ	limit of quantitation
MC	munitions constituents
MCIEAST-MCB CAMLEJ	Marine Corps Installations East - Marine Corp Base Camp Lejeune
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCDENR	North Carolina Department of Environment and Natural Resources
PA	Preliminary Assessment
PC	Project Chemist
PM	Project Manager
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
SAP	Sampling and Analysis Plan
SI	Site Investigation
SOP	standard operating procedure
USEPA	U.S. Environmental Protection Agency

# QAPP Identifying Information

---

**Site Name/Number:** Marine Corps Installations East - Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ)

**Operable Unit:** Not Applicable

**Contractor Name:** CH2M HILL

**Contract Number:** N62470-11-D-8012

**Contract Title:** Naval Facilities Engineering Command (NAVFAC) Comprehensive Long-term Environmental Action—Navy (CLEAN) 8012 Program

**Work Assignment Number (optional):** Contract Task Order WE99

1. This Quality Assurance Project Plan (QAPP) was prepared in accordance with the requirements of:
  - *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005)
  - *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 QAMS* (USEPA, 2002)
  - Identify any additional guidance used to prepare SAP: None
2. Identify regulatory program:
  - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
3. This Quality Assurance Project Plan (QAPP) is a project-specific QAPP.
4. List dates of scoping sessions that were held:
  - Formal scoping sessions were not used. This QAPP is for CERCLA and the criteria for the Environmental Condition of Property (ECP) study had previously been agreed upon by the MCIEAST-MCB CAMLEJ Partnering Team.
5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.
  - None
6. List organizational partners (stakeholders) and connection with lead organization:
  - MCIEAST-MCB CAMLEJ
  - U.S. Environmental Protection Agency (USEPA) Region IV
  - North Carolina Department of the Environment and Natural Resources (NCDENR)
7. Lead organization
  - NAVFAC Mid-Atlantic
8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below:
  - Worksheet #9 – Not applicable. Scope was issued by NAVFAC.
  - Worksheet #13 – Not applicable. No secondary data was used in developing this QAPP.
  - The crosswalk table below references the location of all 37 required elements of the Uniform Federal Policy-SAP. They are either provided in the attached QAPP or in accompanying documents.

# Crosswalk to Related Information

UFP-SAP Worksheet #	Required Information	Crosswalk to Related Information
<b>1.0 Introduction and Project Organization</b>		
<i>Documentation</i>		
1	Title and Approval Page	Page 1
2	Table of Contents QAPP Identifying Information	Page 5
3	Distribution List	Table 1 of Attachment I
4	Project Personnel Sign-off Sheet	Table 1 of Attachment I
<i>Project Organization</i>		
5	Project Organizational Chart	
6	Communication Pathways	Table 1 of Attachment I
7	Personnel Responsibilities and Qualifications Table	Table 1 of Attachment I
8	Special Personnel Training Requirements Table	Section 1.6
<i>Project Planning/Problem Definition</i>		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	Not applicable
10	Problem Definition, Site History, and Background  Site Maps (historical and present)	Introduction to Section 1 and Section 1.5 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)  Figures 1-1 through 1-6 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)
11	Site-Specific Project Quality Objectives	Section 1.5.4
12	Measurement Performance Criteria Table	Table 9-1 through 9-18 of Attachment I
13	Sources of Secondary Data and Information Secondary Data Criteria and Limitations Table	Not Applicable
14	Summary of Project Tasks	Section 3 and 4 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)
15	Reference Limits and Evaluation Table	Table 6-1 through 6-12 of Attachment I
16	Project Schedule / Timeline Table	Figure 2-1 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)
<b>B. Measurement Data Acquisition</b>		
<i>Sampling Tasks</i>		
17	Sampling Design and Rationale	Section 3.7 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)
18	Sampling Locations and Methods / Standard Operating Procedure (SOP) Requirements Table	Table 2 of Attachment I / Table 4 of Attachment I

UFP-SAP Worksheet #	Required Information	Crosswalk to Related Information
	Sample Location Map(s)	Figures 3-1 and 3-2 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)
19	Analytical Methods/ SOP Requirements Table	Table 4 of Attachment I
20	Field Quality Control (QC) Sample Summary Table	Table 2 of Attachment I
21	Project Sampling SOP References Table Sampling SOPs	Table 14 of Attachment I
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Section 2.7.1 Section 7 of Master QAPP (CH2M HILL, 2008)
<b>Analytical Tasks</b>		
23	Analytical SOPs Analytical SOP References Table	Table 3 of Attachment I
24	Analytical Instrument Calibration Table	Table 11 of Attachment I
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Table 10 of Attachment I
<b>Sample Collection</b>		
26	Sample Handling System, Documentation Collection, Tracking, Archiving and Disposal Sample Handling Flow Diagram	Section 2.3 of Master QAPP (CH2M HILL, 2008)
27	Sample Custody Requirements, Procedures/SOPs  Example Chain-of-Custody Form and Seal	Sections 3.7.5.4 and 3.7.5.5 of the Work Plan Addendum for the Lot 202 Environmental Condition of Property Study, Phase II (CH2M HILL, 2013)  Navy CLEAN Data Management Plan (CH2M HILL, 2009)
<b>Quality Control Samples</b>		
28	Laboratory QC Samples Table Screening/Confirmatory Analysis Decision Tree	Tables 8-1 through 8-18 of Attachment I
<b>Data Management Tasks</b>		
29	Project Documents and Records Table	Section 6.7 of Master QAPP (CH2M HILL, 2008)
30	Analytical Services Table Analytical and Data Management SOPs	Table 5 of Attachment I Navy CLEAN Data Management Plan (CH2M HILL, 2009)
<b>C. Assessment Oversight</b>		
31	Planned Project Assessments Table Audit Checklists	Section 3.1 Table 12 of Attachment I
32	Assessment Findings and Corrective Action Responses	Section 3.1
33	Quality Assurance (QA) Management Reports Table	Section 3.2
<b>D. Data Review</b>		
34	Verification (Step I) Process Table	Section 4.2.1
35	Validation (Steps IIa and IIb) Process Table	Section 4.2.2
36	Validation (Steps IIa and IIb) Summary Table	Section 4.2.2
37	Usability Assessment	Section 4.3

# Introduction and Project Organization

---

## 1.1 Introduction

This site-specific QAPP is meant to serve in conjunction with the MCIEAST-MCB CAMLEJ Master Project QAPP (CH2M HILL, 2008) and the MCIEAST-MCB CAMLEJ Military Munitions Response Program Master Project Plans (CH2M HILL, 2010). The specific information contained in this site-specific QAPP supplements the general information contained in the Master QAPP.

This document applies to investigative activities at Lot 202. The Phase II ECP is being conducted due to a potential property transfer of Lot 202, and known former disposal activities and a groundwater contaminant plume within this area of the Base. The ECP will identify areas where potential former waste disposal/burial activities may have occurred and will Evaluate whether hazardous substances are present in the soil and/or groundwater, including the potential presence or absence of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH). The ECP will also evaluate potential risks to human health and the ecology

This QAPP is a component of the site-specific work plan addendum for the Phase II Lot 202 Environmental Condition of Property Study (CH2M HILL, 2013) and has been prepared in accordance with the *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (USEPA, 2001). This QAPP describes the data quality objectives (DQOs), specific QA and QC activities, and laboratory activities necessary to achieve the DQOs of the project. It also provides QA/QC requirements for sampling activities, sample analysis, and other tests that will generate data as part of the activities performed for the intrusive investigation. Subcontractors will be required to review both the Master QAPP and the site-specific QAPP. Subcontractors will be expected to adhere to the procedures specified in these documents. All field activities will be conducted by CH2M HILL.

The requirements of this document apply to contractors and subcontractors. Deviations from these procedures will be documented.

**Section 1** provides an overview of project management and addresses the following topics:

- Project organization and roles and responsibilities
- Project definition and background
- Project description
- Quality objectives and criteria for measurement data
- Documentation and records management

## 1.2 Project Organization Roles and Responsibilities

Please refer to Table 1 of Attachment I for the list of key team members for each project, the QA/QC responsibilities associated with each position, and a description of the communication procedures that will be followed throughout the specific project. The organizational structure and responsibilities are designed to provide project control and QA for the proposed monitoring.

### 1.2.1 Project Communication

Effective communication among all project personnel will be established and maintained throughout the course of the project and is essential for effective implementation of field activities.

Attachment I, Table 1, Communication Pathway and Procedures, Distribution List, and Project Personnel Sign-Off Sheet, provides the following information:

- Distribution list and Project Personnel Sign-off Sheet: A list of all recipients of the QAPP. This list is not exclusively for CH2M HILL personnel alone, and may include laboratory, driller, surveyor, and/or data validation subcontractor information. Returned signed copies of this table shall be kept in project files as documentation that project personnel have read the QAPP.
- Communication pathways and procedures for each specific project personnel.

### 1.2.2 Laboratory Work Group

APPL is responsible for analyzing samples collected during field activities, in accordance with the *Work Plan Addendum for the Phase II Lot 202 Environmental Condition of Property Study (CH2M HILL, 2013)* and the most current version of the *Department of Defense Quality Systems Manual for Environmental Laboratories* (Department of Defense, 2009). The laboratory Project Manager (PM) or Client Service Manager acts as a liaison between laboratory and the Project Chemist (PC) and/or the field team.

## 1.3 Problem Definition and Background

The objectives of the Phase II ECP at Lot 202 are to:

- Identify areas where potential former waste disposal/burial activities may have occurred
- Evaluate whether hazardous substances are present in the soil and/or groundwater, including the potential presence or absence of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH)
- Evaluate potential risks to human health and the ecology

## 1.4 Project Description

Site-specific activities to be performed to accomplish the previously described objectives are provided in the Work Plan for Lot 202. The results of this work will be documented in a Phase II ECP Report.

The activities to be conducted at Lot 202 are:

- Collect up to six surface soil samples and six subsurface soil samples within areas where contamination is suspected. Analyze all samples for volatile organic compounds [VOCs, including benzene, toluene, ethylbenzene, and xylene (BTEX)], semi-volatile organic compounds [SVOCs, including polycyclic aromatic hydrocarbons (PAHs)], polychlorinated biphenyls (PCBs), pesticides, metals and explosive residues.
- Install and collect groundwater samples from up to three surficial aquifer monitoring wells. Analyze the groundwater samples for VOCs (including BTEX), SVOCs (including PAHs), PCBs, pesticides, metals and explosive residues.
- Conduct digital geophysical mapping (DGM) across 100 percent of the approximately 4.2-acre site to identify areas where former burial or disposal actions may have occurred.
- Excavate up to 10 test pits based on the DGM results to evaluate the nature of any potential buried waste. Sample suspect or unidentified material found within the test pits.
- Validate the analytical data and screen against human health and ecological risk-based criteria. Complete a human health risk screening for data exceeding criteria.
- Produce a Phase II ECP Report to document the findings associated with the field investigation.

## 1.5 Quality Objectives and Criteria for Measurement Data

QA involves all those planned and systematic actions necessary to provide adequate confidence that field activities are planned and performed according to accepted standards and practices. This process ensures that the resulting data are valid and retrievable, while continuing to meet minimum safety requirements. QC is an integral part of the overall QA function and is comprised of all those actions necessary to control and verify that project activities and resulting data meet established requirements.

To ensure that a minimum level of certainty about the quality of field data is being met, the following elements will be addressed to meet the requirements specified by the client and regulatory agencies:

- Field operations will be conducted in accordance with written procedures.
- To maintain accuracy within necessary limits, measuring and test equipment used in field investigations will be calibrated against traceable standards at specific intervals, using approved SOPs or manufacturer's instructions.
- When measuring and test equipment is found to be out of specification, the previous inspection or test results will be evaluated for validity and acceptability. This evaluation will be documented.
- Before project field work begins, all project staff will be trained to ensure that they are familiar with project Work Plans and associated documents.
- Internal audits may be performed to assess the quality of project activities and to evaluate compliance with established QA requirements.
- QC samples will be used to monitor the quality of field and laboratory techniques and of the data.

### 1.5.1 Levels of Data Quality

The subsection below lists the levels of data. The level of data quality is dependent on the objective use of the results supported by the data.

The data use determines the required levels of data quality. The two categories of data quality established by USEPA, **screening** and **definitive**, are defined as follows:

**Screening data** are generated by rapid methods of analysis with less rigorous sample preparation, calibration and/or QC requirements as compared to the requirements for producing definitive data. Screening data may provide analyte identification and quantitation, although the quantitation may be relatively imprecise, unless USEPA reference methods are used. Depending on the DQOs, screening methods may require confirmation samples that generate definitive data. Confirmation samples will be selected to include both detected and nondetected results from the screening technique.

**Definitive data** are generated using rigorous analytical methods such as approved USEPA reference methods. Data are analyte-specific, and both identification and quantitation are confirmed. These methods have standardized QC and documentation requirements. Definitive data are not restricted in their use unless quality problems require data qualification.

Four levels of data reporting may be performed as part of this field effort, with each level having different supporting QA/QC documentation. The four levels correspond to QC Levels I, II, III, and IV.

Level IV data packages will be requested for this project.

- Level I  
Field Surveys (Master QAPP, Section 4.1.1)
- Level II  
Screening Activities, Physical Parameters, and Investigation-derived Waste Analyses (Master QAPP, Section 4.1.2)

- Level III  
Laboratory Analysis – Not applicable
- Level IV  
Laboratory Analysis – Level IV data packages provide the most stringent level of documentation, and allows the data reviewer or data validator to recreate the analytical sequence and evaluate raw data such as quantitation reports generated from the instrumentation used in the analyses. A Level IV data package is required for this project.

### 1.5.2 Data Quality Objective Development

DQOs are both qualitative and quantitative statements that define the type, quality, and quantity of data necessary to support the decision-making process during project activities. The intended final use of the data determines the DQOs.

The credibility of the data is strengthened by the level of the supporting QA/QC documentation. The greater the importance of the data or the resulting decision, the more QA/QC information is needed to validate the data. This reasoning must be applied to the data collected for any project. The DQO process used for this project follows the *USEPA Guidance for the Data Quality Objectives Process (QA/G-4)* (USEPA, 2000).

### 1.5.3 Quality of Data

Analytical performance requirements are expressed in terms of precision, accuracy, representativeness, comparability, and completeness.

Section 4.2 of the Master QAPP (CH2M HILL, 2008) provides a detailed discussion of data quality.

### 1.5.4 Project Quality/Systematic Planning Process Statements and Data Quality Objectives

The data will be used by the Department of the Navy (Navy), CH2M HILL, USEPA, and NCDENR. Within each organization the data will be used by staff scientists/engineers and PMs.

- What are the project action limits?
  - Concentrations of contaminants identified in soil samples will be compared to the NCDENR Hazardous Waste Section Soil Screening Levels (NCDENR, 2012) and USEPA regional screening levels for residential/industrial soils (USEPA, 2013).
  - Concentrations of contaminants identified in groundwater samples will be compared to North Carolina 2L Groundwater Standards, and adjusted tap water regional screening levels (USEPA, 2013).
- What will the data be used for?
  - Data will be used to evaluate whether a potential risk to human health and the environment is present at the site, and whether further investigation may be warranted.
- What types of data are needed?
  - The site-specific work plan addendum (CH2M HILL, 2013) defines the matrices and analytes for the subject site.
  - Field activities will be recorded in a field notebook or site specific post-detonation field sampling data sheets to document adherence to the approved *Work Plan Addendum for the Phase II Lot 202 Environmental Condition of Property Study* (CH2M HILL, 2013).
- How “good” must the data be to support the environmental decision?
  - The data need to be of sufficient quality for determining the concentration of constituents in media collected such that the project objectives can be achieved.

- During the intrusive investigation, QA/QC samples will be collected as a check on sampling and analytical protocol.
- How much data should be collected (number of samples for each analytical group, matrix, and concentration)? Where, when, and how should the data be collected/ generated?
  - Sample quantities, including QA/QC samples, and chemical analyses are discussed in Attachment I, Table 2, Sample Analysis Summary Table.
  - The laboratory will generate data in accordance with the SOPs presented in Attachment I, Table 3, Analytical SOP References Table.
- Who will collect and generate the data? How will the data be reported?
  - CH2M HILL field staff will collect the samples.
  - Chemical analyses will be performed by APPL, a Department of Defense -Environmental Laboratory Accreditation Program certified laboratory.
- All chemical data will be reported in an ECP report.
- How will the data be archived?
  - Data will be archived according to procedures dictated via the CLEAN program/ contract. All analytical data will be uploaded into a centralized database developed and maintained by CH2M HILL and used for Navy projects. At the end of the project, paper copies of archived laboratory data will be returned to the Navy.
- Project quality objectives listed in the form of if/then qualitative and quantitative statements:
  - If constituents are detected at concentrations exceeding screening levels, then a human health and ecological risk evaluation will be conducted.

## 1.6 Special Training, Requirements, and Certifications

The PM works with the project delivery manager to assemble a project team that has the necessary experience and technical skills. Part of the work planning process is to identify special training requirements or certifications necessary to execute the project successfully. Special training or certifications required beyond the normal routine requirements have not been identified for this project.

## 1.7 Documentation and Records

This subsection defines which records are critical to the project and what information needs to be included in reports, as well as the data reporting format and the document control procedures. It is imperative for the defensibility of critical decisions made at the site that proper documents and records be maintained for the field and offsite data gathering activities, so that specific events can be recreated or independently evaluated. The PM will be responsible for organizing, storing, and cataloging all project information. See Section 6.7 of the Master QAPP (CH2M HILL, 2008) for specifics.

### 1.7.1 Field Documentation

See Section 6.7.1 of the Master QAPP (CH2M HILL, 2008) for specific information pertaining to field documentation.

### 1.7.2 Laboratory Documentation

Calculations to be used for data reduction are specified in the referenced analytical methods. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be stored electronically, and a hard copy file will be maintained. Laboratory data entered will be sufficient to document information used to arrive at reported values. Electronic data storage will be

utilized when possible. All electronic data will be maintained in a manner that prevents inadvertent loss, corruption, and inappropriate alteration. Raw data will be examined to assess compliance with quality control guidelines. Deviations from guidelines will call for corrective action. Deviations determined to be caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report narrative. Calculations will be checked and the report reviewed for errors and oversights.

Upon completion, a report will be reviewed for discrepancies, errors, or omissions. Data will then be submitted to the laboratory Quality Assurance Officer (QAO) for review and approval. The laboratory QAO will review the package, ensure that any necessary corrections are made, and give the package to the laboratory PM for review. A copy of the data package will be filed in the project file. Mailed data packages, along with applicable electronic data deliverables, will be sealed in an appropriate shipping container and logged into a document mailing log.

The requested turn-around time will be 28 days from the time of sample receipt at the laboratory.

## SECTION 2

# Measurement and Data Acquisition

---

Section 2 describes the measurement and data acquisition procedures and the analytical methods to be performed in support of this monitoring. It addresses the following aspects of measurement and data acquisition:

- Sampling process design
- Sampling method requirements
- Sample handling and custody requirements
- Analytical method requirements
- QC requirements
- Instrument and equipment testing, inspection, and maintenance requirements
- Instrument calibration and frequency
- Inspection and acceptance requirements for supplies and consumables
- Data acquisition requirements

## 2.1 Sampling Process Design

Refer to Section 3.7 of the *Work Plan Addendum for the Phase II Lot 202 Environmental Condition of Property Study (CH2M HILL, 2013)* for details for sampling design and rationale.

## 2.2 Sampling Method Requirements

Refer to Section 3.7 of the *Work Plan Addendum for the Phase II Lot 202 Environmental Condition of Property Study (CH2M HILL, 2013)* and Section 5.3 of the Military Munitions Response Program Master Project Plans (CH2M HILL, 2010) for details regarding sampling methods.

## 2.3 Sample Handling and Custody Requirements

See Section 6.0 of the Master QAPP (CH2M HILL, 2008) and Section 3.7.5 of the *Work Plan Addendum for the Phase II Lot 202 Environmental Condition of Property Study (CH2M HILL, 2013)*.

## 2.4 Analytical Methods Requirements

The list of methods and the corresponding target analytes have been designed to evaluate the potential for contamination at the site. Samples will be analyzed using USEPA-approved methods, and may include methods from the following documents:

- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1998)
- *Methods for Chemical Analysis of Water and Wastes* (USEPA, 1983)

Refer to *Attachment I, Table 3, Analytical Services Table*, for a table of the analytical services to be performed during intrusive investigation sampling activities.

Refer to *Attachment I, Table 4, Analytical SOP Requirements Table*, for analytical methods to be used for the analysis of the target compounds, the containers needed for sampling including preservation requirements and maximum holding times.

### 2.4.1 Analytical Methods.

Refer to *Attachment I, Table 4, Analytical Services Table*, for the list of analytical methods to be used.

Refer to *Attachment I, Table 3, Analytical SOP References Table*, for the list of analytical SOPs to be followed during analysis.

## **2.4.2 Detection, Quantitation, and Reporting Limits**

### **2.4.2.1. Detection Limits**

The detection limit (DL) is the minimum amount of an analyte that can be routinely identified using a specific method and instrument measured and reported with 99 percent confidence that the analyte concentration is greater than zero.

### **2.4.2.2. Limit of Detection**

The limit of detection (LOD) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a 99 percent confidence level. All non-detects are to be reported at the LOD. The LOD is determined using the laboratory-established DL.

### **2.4.2.3. Limit of Quantitation**

Quantitative results can only be achieved at or above the limit of quantitation (LOQ). The LOQ is defined as the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. For results falling between the DL and the LOQ, a “J” flag will be applied to the results indicating the variability associated with the result.

## **2.4.3 Target Analytes and Reporting Limits**

Refer to *Attachment I, Tables 6-1 through 6-12, Reference Limits and Evaluation Tables.*

## **2.5 Quality Control Requirements**

See Section 10.0 of the Master QAPP (CH2M HILL, 2008) for a discussion of QC requirements.

Refer to *Attachment I, Tables 8-1 through 8-18, Laboratory QC Samples.*

Refer to *Attachment I, Tables 9-1 through 9-18, Field QC Samples.*

## **2.6 Field and Laboratory Corrective Action**

See Section 14 of the Master QAPP (CH2M HILL, 2008).

## **2.7 Instrument/Equipment Testing, Inspection, and Maintenance Requirements**

### **2.7.1 Field Instruments**

All equipment used for field measurements will be maintained in accordance with the manufacturer’s instructions. Routine maintenance and all equipment repairs will be documented in the site logbook. Whenever a piece of equipment fails to operate properly, the instrument either will be repaired in-house, if possible, or be sent out for repair, and another instrument equivalent to the original will be substituted, if possible. Other than solutions/standards for calibrating the equipment, the field team keeps only a limited amount of supplies on hand. Parts are ordered on an as-needed basis.

### **2.7.2 Analytical Laboratory Instruments**

Preventive maintenance for laboratory instruments is discussed in greater detail in Attachment I, Table 10, Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table.

## **2.8 Instrument Calibration and Frequency**

See Section 7 of Master QAPP (CH2M HILL, 2008).

Refer to *Attachment I, Table 11, Analytical Instrument Calibration Table.*

## **2.9 Inspection and Acceptance Requirements for Supplies and Consumables**

All services, including subcontracted services and supplies received from vendors, must meet the project scope, specified levels of quality, and the submittal schedule. Field and laboratory personnel must evaluate the vendor's ability to provide the services and specify acceptance requirements for supplies and consumables. For example, laboratories rely on suppliers for solvents, gases, consumables, and analytical equipment, including instrument maintenance. The laboratory should have and maintain adequate contracts with its vendors to receive uninterrupted supplies, parts, and services.

## **2.10 Data Acquisition Requirements**

In addition to the electronic data, the laboratory provides hard-copy deliverables of the analytical results. The hard-copy data packages are filed onsite until the project is completed. At that time, the data packages are sent to the PM for inclusion into the project files. Alternatively, the hard-copy data packages are stored at an offsite warehouse for a period of 10 years after the project close out.

## SECTION 3

# Assessment and Oversight

---

Section 3 describes the assessment and oversight activities that will be followed to determine whether the QC measures identified in the Work Plan Addendum and this QAPP are being implemented and documented as required.

Audits and reviews are the tools used to implement this process. For example, during a review, the auditor may check that surface soil has been correctly sampled or that the field QC samples were collected at the appropriate frequency. During an audit or review, the auditor may check for:

- Adherence to the Work Plan Addendum
- Documentation of the process or system
- Proper identification, resolution, and documentation of nonconformance with the process or system
- Correction of identified deficiencies

## 3.1 Assessments and Response Actions

The need for an audit can be determined independently by the PM. Assessment activities may include surveillance, inspection, peer review, management system review, readiness review, technical systems audit, performance evaluation, and data quality assessment. The PM will be responsible for initiating audits, selecting the audit team, and overseeing audit implementation. For the fieldwork, an audit will be conducted during the sampling activities.

The laboratory will be audited in accordance with the laboratory subcontract. The PC or a designee will perform laboratory audits in compliance with the subcontract. A follow-up meeting will be held to address any deficiencies or issues identified during the audit.

Field audits will be conducted by a review team member as designated by the PM. One field audit, if requested, will be performed during the first week of sampling.

### 3.1.1 Laboratory Performance and System Audits

Laboratory systems will be audited in accordance with the project-specific requirements. Contracted laboratories may be required to submit a laboratory Comprehensive Quality Assurance Plan (CompQAP). The CompQAP must reference relevant SOPs and the laboratory's internal procurement policies and corrective action program.

The laboratory audit will address at least the following issues:

- Is the laboratory operation being performed as required by the subcontract?
- Are internal laboratory operations being conducted in accordance with the laboratory CompQAP?
- Are the laboratory analyses being performed in accordance with method requirements?

Any nonconformance noted during an audit will result in a corrective action.

### 3.1.2 Field Team Performance and System Audits

The PC or other member of the review team, as designated by the PM, will conduct an audit of the field activities in accordance with the program requirements. The audit will address at least the following issues:

- Are sampling operations being performed as stated in the Work Plan?
- Are the sample labels being filled out completely and accurately?
- Are the chain-of-custody records complete and accurate?
- Are the field notebooks being filled out completely and accurately?
- Are the sampling activities being conducted in accordance with the Work Plan and approved SOPs?

- Are the documents generated in association with the field effort being stored as described in the Work Plan?

The generation and documentation of field data also will be audited. Audits will focus on verifying that proper procedures are followed so that subsequent sample data will be valid. Any nonconformance noted during an audit will result in a corrective action.

The results of the assessment and oversight activities will be reported back to the PM, who has ultimate responsibility for ensuring that the corrective action response is completed, verified, and documented.

Refer to *Attachment I, Table 12, Field Performance Audit Checklist*.

## 3.2 Reports to Management

Reports to the PM include project status reports, the results of evaluation and system audits, data quality assessments, and significant QA problems and recommended solutions. The status reports, submitted in accordance with the requirements of the Work Plan, will discuss at least current activities, problems encountered and their resolution, and planned work.

QA reports will be submitted in accordance with the Work Plan. QA reports document implementation of the QAPP and the results of the site-specific QA/QC audits. A final QA report must be submitted as part of each project's final report. The topics to be covered are outlined in the Work Plan, but each will include at least the following information:

- Identification of nonconformances that required corrective action and resolution of the nonconformance
- Data quality assessment in terms of precision and accuracy and how they affect the usability of the analytical results
- Limitations of the qualified results and a discussion of rejected results
- Discussion of the field and laboratory QA/QC sample results
- The results of external laboratory audits

The Field Team Leader will provide feedback to the PM discussing all field activities, changes to field procedures, problems encountered, and corrective actions taken.

## SECTION 4

# Data Review, Validation, and Verification Requirements

---

This subsection addresses the QA activities that occur after the data collection has been completed. Implementation of these elements, which include data review, validation, and reconciliation to DQOs, will determine the extent to which the data conform to the specified criteria and satisfy the project objectives.

## 4.1 Data Review, Validation, and Verification Requirements

See Section 9 of the Master QAPP (CH2M HILL, 2008)<sup>1</sup>.

The data are evaluated for precision, accuracy, and completeness against the analytical protocol requirements. Non-conformances or deficiencies that could affect the usability of data are identified as noted.

All analytical data will be supported by a data package. The data package will contain the supporting QC data for the associated field samples. Before the laboratory will release each data package, the laboratory QAO (or the analytical section supervisor) must carefully review the sample and laboratory performance QC data to verify sample identity, the completeness and accuracy of the sample and QC data, and compliance with method specifications.

## 4.2 Verification and Validation Methods

### 4.2.1 Data Verification

Before the analytical results are released by the laboratory, both the sample and QC data will be reviewed carefully to verify sample identity, instrument calibration, DLs, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. Additionally, the QC data will be reduced and spike recoveries will be included in control charts, and the resulting data will be reviewed to ascertain whether they are within the laboratory-defined limits for accuracy and precision. Any non-conforming data will be discussed in the data package cover letter and case narrative. The laboratory will retain all of the analytical and QC documentation associated with each data package.

As discussed previously, the data are also verified to assess whether the electronic data deliverables and the hard-copy data deliverables are consistent with one another to ensure an accurate database.

### 4.2.2 Data Validation

The PC will ensure that the laboratory analyzed the samples using the correct methods and that all analytes from each analysis group are reported (as per tables 6A through 6D). The quantitation limits utilized by the laboratory for the project will be compared to the quantitation limits presented in tables 6A and 6B. If quantitation limits were not met, the reason will be determined and documented. Field QC sample results will be documented, the PC will establish that all required QAPP QC samples were run and met limits.

All non-analytical field data will be reviewed by the field team leader. Non-analytical field data will be compared against QAPP requirements for completeness and accuracy based on the field calibration records.

## 4.3 Usability Assessment

**Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:**

---

<sup>1</sup> Note that what is considered Level 3 QC in the Master QAPP is required for this project and that data will be reported with a "Level IV" deliverable.

It is the responsibility of CH2M HILL's PC to ensure that the analytical data meet the method DLs, reporting limits, and laboratory QC limits listed in this QAPP, the laboratory statement of work, and the various methods. During this assessment, non-conformances are documented, the data are qualified for use in decision making, and for 10 percent of the results the entire analytical process is reconstructed and recalculated from the raw data.

Non-detected site contaminants will be evaluated to ensure that project required quantitation limits (*Attachment I, Tables 6-1 through 6-12, Reference Limits and Evaluation Tables*) were achieved. If project quantitation limits were achieved and the verification and validation steps yielded acceptable data, then the data is considered usable. For statistical comparisons non-detect values will be represented by a concentration equal to one-half the sample reporting limit. For duplicate sample results, the most conservative value will be used for project decisions. Analytical data will be checked to ensure the values and any qualifiers are appropriately transferred to the electronic database. These checks include comparison of hardcopy data and qualifiers to the electronic data deliverable. Once the data has been uploaded into the electronic database, another check will be performed to ensure all results were loaded accurately. Field and laboratory precision will be compared as relative percent difference between the two results. Deviations from the QAPP will be reviewed to assess whether corrective action is warranted and to assess impacts to achievement of project objectives.

**Describe the evaluative procedures used to assess overall measurement error associated with the project:**

To assess whether a sufficient quantity of acceptable data are available for decision making, the data will be reconciled with measurement performance criteria following a review of data quality indicator. If significant biases are detected with laboratory QA/QC samples it will be evaluated to assess impact on decision making. Low biases will be described in greater detail as they represent a possible inability to detect compounds that may be present at the site. If significant deviations are noted between lab and field precision the cause will be further evaluated to assess impact on decision making.

**Identify the personnel responsible for performing the usability assessment:**

- PC – Bianca Kleist/CH2M HILL
- PM – Keith LaTorre/CH2M HILL

**Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:**

All the results will be assembled and statistically reported for an overall quality assessment provided in the final project event report. Discussion will cover completeness and representativeness.

Data tables will be produced to reflect detected and non-detected site contaminants and geochemical parameters. Data qualifiers will be reflected in the tables and discussed in the data quality evaluation. Figures will be produced representing concentrations of contamination.

### 4.3.1 Data Quality Evaluation

The PC or designee will perform the data quality evaluation (DQE). The DQE process is used to assess the effect of the overall analytical process on the usability of the data. The two major categories of data evaluation are laboratory performance and matrix interferences. Evaluation of laboratory performance is a check for compliance with the method requirements. It is a straight-forward examination—either the laboratory did, or did not, analyze the samples within the limits of the analytical method. Evaluation of the matrix interferences is more subtle and involves analysis of several results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results.

The entire data set will be evaluated for overall trends in data quality and usability. Information summarized as part of the DQE may include chemical compound frequencies of detection, dilution factors that might

affect data usability, and patterns of target compound distribution. The data set also will be evaluated to identify potential data limitations or uncertainties in the laboratory.

### **4.3.2 Reconciliation with Data Quality Objectives**

The final activity of the data evaluation process is to assess whether the data meet the planned DQOs for the project. The final results, as adjusted for the findings of any data evaluation, will be checked against the DQOs, and an assessment will be made as to whether the data are of sufficient quality to support the DQOs. The decision as to data sufficiency may be affected by the overall precision, accuracy, and completeness of the data. The main project objective should be met assuming the 90 percent completeness goal is obtained after all of the data have undergone sufficient data validation. If the data, after evaluation, are sufficient to achieve project objectives, the data quality and PMs will release the data and work may proceed.

## SECTION 5

# References

---

CH2M HILL. 2008. *Master Project Plans, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina.*

CH2M HILL. 2009. *Navy Clean Data Management Plan, Version 1.* December.

CH2M HILL. 2010. *Final Munitions Response Program Master Project Plan.* September.

CH2M HILL. 2013. *Work Plan Addendum, Lot 202 Environmental Condition of Property Study, Phase II .* October.

Department of Defense. 2009. *Department of Defense Quality Systems Manual for Environmental Laboratories; Version 4.2.* April.

North Carolina Department of Environment and Natural Resources (NCDENR). 2012. *Federal Remediation Branch Target Screening Values.* February. <http://portal.ncdenr.org/web/wm/sf>

Pennington, Judith C., Hayes, C. A., Yost, S., Crutcher, T. A., Berry, T. E., Clarke, J. U. and Bishop, M. J. 2008. 'Explosive Residues from Blow-in-Place Detonations of Artillery Munitions', *Soil and Sediment Contamination: An International Journal*, 17:2,163 — 180

Thiboutot, S., G. Ampleman, and A.D. Hewitt. 2002. *Technical Report ERDC/CRREL TR-02-1, Guide for Characterization of Sites Contaminated with Energetic Materials.* U.S. Army Corps of Engineers, Engineer Research and Development Center.

U.S. Environmental Protection Agency (USEPA). 1983. *Methods for Chemical Analysis of Water and Wastes.*

USEPA. 1998. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* SW-846. Third Edition and its updates.

USEPA. 2000. *Guidance for the Data Quality Objectives Process (QA/G-4).*

USEPA. 2001. *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations.*

USEPA. 2002. *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 QAMS.*

USEPA. 2004. *CLP National Functional Guidelines for Inorganic Data Review.* October.

USEPA. 2005. *Uniform Federal Policy for Quality Assurance Plans.*

**Attachment I**  
**Tables**

---

TABLE 1  
Communication Pathway and Procedures, Distribution List, and Project Personnel Sign Off Sheet

Name of SAP Recipients	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address	Communication Drivers	Procedure, Pathway, etc	SAP Section Reviewed	Date SAP Read
Dave Cleland	Navy Technical Representative (NTR)	NAVFAC Mid-Atlantic	(757) 322-4851	david.t.cleland@navy.mil	Communication with Camp Lejeune	Primary POC for Camp Lejeune; can delegate communication to other internal or external POCs. RPM will notify USEPA and NCDENR via email or telephone call within 24 hours for field changes effecting the scope or implementation of the design. Navy will have 30 days for Work Plan review. All sampling data will be presented and discussed during partnering meetings.		
Charity Delaney	MCB CamLej-Environmental Management Division (EMD)	MCB Camp Lejeune	(910) 451-9385	charity.rychak@usmc.mil	Communication with Camp Lejeune	POC for Camp Lejeune		
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	randy.mcelveen@ncmail.net	Communication with NCDENR	Primary POC for NCDENR; can delegate communication to other internal or external POCs. Upon notification of field changes, NCDENR will have 24 hours to approve or comment on the field changes.		
Gena Townsend	EPA Region 4 RPM	EPA	(404) 562-8538	townsend.gena@epa.gov	Communication with EPA Region 4	Primary POC for EPA; can delegate communication to other internal or external POCs. Upon notification of field changes, EPA will have 24 hours to approve or comment on the field changes. All data results will be presented and discussed during partnering meetings.		
Tom Roth	Senior Technical Consultant (STC)	CH2M HILL	(404) 474-7640	tom.roth@ch2m.com	Technical communications for project implementation, and data interpretation	Contact STC regarding questions/issues encountered in the field, input on data interpretation, as needed. STCs will have 24 hours to respond to technical field questions as necessary. Additionally, STCs will review the data as necessary prior to partnering team discussion and reporting review.		
Tim Garretson	Senior MR Technical Consultant	CH2M HILL	(904) 374-5633	timothy.garretson@ch2m.com	Technical communications for project implementation, and data interpretation pertaining to MR	Contact STC regarding questions/issues encountered in the field, input on data interpretation, as needed pertaining to MR. STCs will have 24 hours to respond to technical field questions as necessary. Additionally, STCs will review of the data as necessary prior to partnering team discussion and reporting review.		
Keith LaTorre	Project Manager	CH2M HILL	(865) 769-3204	keith.latorre@ch2m.com	Communications regarding project management and implementation/ Field CAs	All information and materials about the project will be forwarded to the Navy, Activity Mangers and Senior Consultants as soon as possible, as necessary. POC for field sampling team./ Field and analytical issues requiring CA will be determined by the FTL and/or PM on an as needed basis; the PM will ensure QAPP requirements are met by field staff for duration of project.		
Greg Schaefer	Task Manager	CH2M HILL	(865) 560-2984	greg.schaefer@ch2m.com	QAPP Field Changes/ Field Progress Reports	Will provide documentation of field activities and work plan deviations (made only with the approval of AM and/or QAO) in field logbooks; will provide daily progress reports to PM.		
Carl Woods	CH2M HILL H&S Manager	CH2M HILL	(513) 319-5771	carl.woods@ch2m.com	Health and Safety (H&S)	Responsible for generation of the Health and Safety Plan (HSP) and approval of the activity hazard analyses (AHAs) prior to the start of field work. The PM will contact the H&S Manager as needed regarding questions/issues encountered in the field.		
George DeMetropolis	CH2M HILL Safety and QC Officer	CH2M HILL	(619) 687-0120	george.demetropolis@ch2m.com	Health and Safety (H&S)	Will oversee the FTL's implementation of the Health and Safety Plan (HSP) and QCP (refer to Section 8) to ensure that they meet the specific needs of the project and that appropriate H&S and QC requirements are defined and properly executed.		
TBD	SSC	CH2M HILL			H&S	Responsible for the adherence of team members to the site safety requirements described in the HSP. Will report H&S incidents and near losses to PM as soon as possible.		

TABLE 1

Communication Pathway and Procedures, Distribution List, and Project Personnel Sign Off Sheet

Name of SAP Recipients	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address	Communication Drivers	Procedure, Pathway, etc	SAP Section Reviewed	Date SAP Read
TBD	FTL	CH2M HILL			Work Plan changes in field/ QAPP Field Changes/ Field Progress Reports/ Field CAs	Documentation of deviations from the Work Plan will be made in the field logbook and the PM will be notified immediately. Deviations will be made only with approval from the PM./ Documentation of field activities and work plan deviations (made with the approval of AM and/or QAO) in field logbooks; provide daily progress reports to PM./ Field and analytical issues requiring CA will be determined by the FTL and/or PM on an as needed basis; the PM will ensure QAPP requirements are met by field staff for duration of project.		
Bianca Kleist	Project Chemist	CH2M HILL	(704) 543-3274	bianca.kleist@ch2m.com	Field and analytical corrective actions (CAs)/ Release of Analytical Data; Data tracking from field collection to database upload	Any CAs for field and analytical issues will be determined by the FTL and/or the PC and reported to the PM within 4 hours/ No analytical data can be released until validation of the data is completed and has been approved by the PC. The PC will review analytical results within 7 days of receipt for release to the project team; On a daily basis, tracks data from sample collection through database upload.		
Mary Beth Artese	GIS	Critigen	(757) 671-6228	marybeth.artese@critigen.com	Presentation of data	Provides support as needed for field activities and evaluation of data by generating figures using GIS.		
Cynthia Clark	Laboratory PM	APPL	(559) 275-2175	cclark@applinc.com	Reporting Lab Data Quality Issues	All quality assurance/quality control (QA/QC) issues with project field samples will be reported within 2 days to the PC by the laboratory.		
Laura Maschhoff	Data Validator	DataQual Environmental Services	(636) 330-1327	dataqual@charter.net	Reporting Data Validation Issues	All data validation issues (missing lab data worksheets /calculations, etc) will be relayed to PC in the event of inadequate lab response within 2 days of initial inquiry		

TABLE 2  
Sample Analysis Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of Equipment Blanks	No. of MS/MSDs	No. of Trip Blanks	Total No. of Samples to Lab
Groundwater	VOCs	3	1	1	1/1	1	8
	SVOCs & PAHs	3	1	1	1/1	--	7
	Pesticides	3	1	1	1/1	--	7
	PCBs	3	1	1	1/1	--	7
	Total Metals	3	1	1	1/1	--	7
	Dissolved Metals	3	1	1	1/1	--	7
	Hexavalent Chromium	3	1	1	1/1	--	7
	Explosive Residues including PETN and Nitroglycerin	3	1	1	1/1	--	7
	Perchlorate	3	1	1	1/1	--	7
Surface Soil	VOCs	6	1	1	1/1	1	11
	SVOCs & PAHs	6	1	1	1/1	--	10
	Pesticides	6	1	1	1/1	--	10
	PCBs	6	1	1	1/1	--	10
	Metals	6	1	1	1/1	--	10
	Hexavalent Chromium	6	1	1	1/1	--	10
	Explosive Residues including PETN and Nitroglycerin (Multi-increment samples)	6	1	1	1/1	--	10
	Perchlorate	6	1	1	1/1	--	10
Subsurface Soil	VOCs	6	1	1	1/1	1	11
	SVOCs & PAHs	6	1	1	1/1	--	10
	Pesticides	6	1	1	1/1	--	10
	PCBs	6	1	1	1/1	--	10
	Metals	6	1	1	1/1	--	10
	Hexavalent Chromium	6	1	1	1/1	--	10
	Explosive Residues including PETN and	6	1	1	1/1	--	10
	Perchlorate	6	1	1	1/1	--	10

TABLE 2  
Sample Analysis Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of Equipment Blanks	No. of MS/MSDs	No. of Trip Blanks	Total No. of Samples to Lab
Test Pit Soil Samples	VOCs	6	1	1	1/1	1	11
	SVOCs & PAHs	6	1	1	1/1	--	10
	Pesticides	6	1	1	1/1	--	10
	PCBs	6	1	1	1/1	--	10
	Metals	6	1	1	1/1	--	10
	Hexavalent Chromium	6	1	1	1/1	--	10
	Explosive Residues including PETN and	6	1	1	1/1	--	10
	Perchlorate	6	1	1	1/1	--	10

TABLE 3  
Analytical SOP References Table

Lab SOP Number	Title, Revision Date and/or Number	Last Reviewed	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work (Y/N)
ANA8260	ANALYSIS OF WATER/SOIL/SLUDGE BY EPA METHOD 8260, Revision 5, 07/2013	07/2013	Definitive	Soil/Water: VOCs	GC-MS	APPL	N	N
ANA8270	SEMIVOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8270, Revision 2, 08/2013	08/2013	Definitive	Soil/Water: SVOCs	GC-MS	APPL	N	N
ANA8270SIM	PAH BY SIM BY EPA METHOD 8270; Revision 0, 11/2012	11/2012	Definitive	Soil/Water: PAHs	GC-MS	APPL	N	N
SEP004	625/8270 SEPARATORY FUNNEL EXTRACTION OF WATER (EPA METHOD 3510C); Revision 0, 08/2012	08/2012	Definitive	Water: SVOCs and PAHs	None (Prep)	APPL	N	N
SON009	8270, BNA, SIM AND PAH SONICATION EXTRACTION OF SOIL, SLUDGE AND SOLIDS (EPA METHOD 3550C); Revision 7, 07/2013	07/2013	Definitive	Soil: SVOCs and PAHs	None (Prep)	APPL	N	N
ANA8081	Organochlorine Pesticides by gas chromatography by EPA Method 8081, Revision 2, 06/2013	06/2013	Definitive	Soil/Water: Pesticides	GC-ECD	APPL	N	N
ANA8082	PCBs and Congeners by EPA Method 8082, Revision 1 08/2013	08/2012	Definitive	Soil/Water: PCBs	GC-ECD	APPL	N	N
SEP025	Low Level OCL/OP Separatory Funnel Extraction of water by EPA method 3510C, Revision 4, 07/2013	07/2013	Definitive	Water: Pesticides and PCBs	None (Prep)	APPL	N	N
SON002	OCL, PCB, OP and Carbamate sonication extraction of soil, sludge, solids and wipes (EPA method 3550C) , Revision 2, 07/2013	07/2013	Definitive	Soil: Pesticides and PCBs	None (Prep)	APPL	N	N
ANA6020	Inductively Coupled Plasma-Mass Spectrometry by EPA method 6020; Revision 3; 10/2013	10/2013	Definitive	Soil and Water: Metals	ICP-MS	APPL	N	N
PRE3010A	ACID DIGESTION OF AQUEOUS SAMPLES AND EXTRACTS FOR TOTAL AND DISSOLVED METALS FOR ANALYSIS BY ICP SPECTROSCOPY OR ICP MASS SPECTROSCOPY BY EPA METHOD 3010A, Rev, 0, 08/2013	08/2013	Definitive	Water: Metals	None (Prep)	APPL	N	N
PRE3051A	MICROWAVE ASSISTED ACID DIGESTION OF SOIL SAMPLES AND EXTRACTS BY EPA METHOD 3051A; Revision 1; 10/2013	10/2013	Definitive	Soil: Metals	None (Prep)	APPL	N	N

TABLE 3  
Analytical SOP References Table

Lab SOP Number	Title, Revision Date and/or Number	Last Reviewed	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work (Y/N)
ANA7471	DETERMINATION OF MERCURY IN SOLID OR SEMISOLID WASTE EPA METHOD 7471, Rev 0, 09/2013	09/2013	Definitive	Soil: Mercury	CVAA	APPL	N	N
ANA7470A	DETERMINATION OF MERCURY IN WATER BY COLD VAPOR ATOMIC ABSORPTION SPECTROMETRY BY EPA METHOD 7470A; Rev 3, 08/2013	08/2013	Definitive	Water: Mercury	CVAA	APPL	N	N
PRE7471B	DIGESTION OF MERCURY IN SOLID OR SEMISOLID WASTE EPA METHOD 7471B Rev, 0, 09/2013	09/2013	Definitive	Soil: Mercury	None (Prep)	APPL	N	N
PRE7470A	DIGESTION OF AQUEOUS SAMPLES BY EPA METHOD 7470A, Rev, 0, 09/2013	09/2013	Definitive	Water: Mercury	None (Prep)	APPL	N	N
ANA218.6-7199	HEXAVALENT CHROMIUM ANALYSIS EPA Method 7199/218.6, Revision 0, 12/2012	12/2012	Definitive	Soil/Water: Hexavalent Chromium	IC	APPL	N	N
ANA3060A	Alkaline digestion for Hexavalent chromium, Method 3060A, Revision 0, 01/2013	01/2013	Definitive	Soil: Hexavalent Chromium	None (Prep)	APPL	N	N
HPL8330	Explosive compounds: Diode array detector by high pressure liquid chromatography, Rev 2, 01/2013	01/2013	Definitive	Soil and Water: Explosives	HPLC	APPL	Y: APPL is not purchasing reference material for this project. It is impractical to prepare a reference material containing spike analytes pre-grind due to the high concentrations that would be required to spike 1 kg of soil.	N
MSE018	EPA Method 8330 Mechanical orbital shaker extraction for solid explosive samples, Rev, 19, 01/2013	01/2013	Definitive	Soil: Explosives	None (Prep)	APPL	N	N

TABLE 3  
Analytical SOP References Table

Lab SOP Number	Title, Revision Date and/or Number	Last Reviewed	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work (Y/N)
MSE018IS	Mechanical Shaker Extraction for Solid Explosive Samples using Incremental sampling (IS) techniques EPA METHOD 8330B; Revision 0, 10/2013	10/2013	Definitive	Soil: Explosives	None (Prep)	APPL	N	N
MWE3535	Solid phase extraction for aqueous explosive samples EPA method 3535A, Rev, 1, 01/2013	01/2013	Definitive	Water: Explosives	None (Prep)	APPL	N	N
HPL6850	Analysis of Perchlorate in Environmental Samples by EPA 6850; Revision 0, 07/2013	07/2013	Definitive	Soil/Water: Perchlorate	HPLC/MS/MS	APPL	N	N

TABLE 4  
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method/SOP Reference	Containers	Sample volume	Preservation Requirements	Maximum Holding Time
Groundwater	VOCs	Preparation Method/SOP: SW5030C / ANA8260 Analysis Method/SOP: SW8260C / ANA8260	Three 40mL VOA vials with septa	40 mL	HCl to pH is >2, Cool to 4±2°C	14 days
	SVOCs & PAHs	Preparation Method/SOP: SW3510C / SEP004 Analysis Method/SOP: SW8270D / ANA8270	Two 1 Liter amber glass with Teflon-lined lid	1 Liter	Cool to 4±2°C	7 days / 40 days
	Pesticides	Preparation Method/SOP: SW3510C / SEP025 Analysis Method/SOP: SW8081B / ANA8081	Two 500mL or 1L amber glass with Teflon-lined lid	500mL	Cool, < 6°C	7 days / 40 days
	PCBs	Preparation Method/SOP: SW3510C / SEP025 Analysis Method/SOP: SW8082A / ANA8082	Two 500mL or 1L amber glass with Teflon-lined lid	500mL	Cool, < 6°C	7 days / 40 days
	Total Metals	Preparation Method/SOP: SW3015A / PRE3015A Analysis Method/SOP: SW6020A / ANA6020	500mL plastic	50mL	HNO <sub>3</sub> to pH < 2	180 days

TABLE 4  
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method/SOP Reference	Containers	Sample volume	Preservation Requirements	Maximum Holding Time
	Dissolved Metals	Preparation Method/SOP: SW3015A / PRE3015A Analysis Method/SOP: SW6020A / ANA6020	500mL plastic	50mL	HNO <sub>3</sub> to pH < 2	180 days
	Hexavalent Chromium	Preparation Method/SOP: SW7199 / ANA218.6-7199 Analysis Method/SOP: SW7199 / ANA218.6-7199	125mL plastic	25mL	Cool to 4±2°C	24 hours
	Explosive Residues including PETN and Nitroglycerin	Preparation Method/SOP: SW3535A / MWE3535 Analysis Method/SOP: 8330B/HPL8330	2 x 500mL amber glass	500mL	Cool to < 6°C	7 days/40 days
	Perchlorate	EPA 6850 / HPL6850	1 x 125mL plastic	10mL	Cool to 4°C ± 2°C	28 days from sampling to analysis
Surface Soil	VOCs	Preparation Method/SOP: SW5035A/ ANA8260 Analysis Method/SOP: SW8260C / ANA8260	Three preweighed VOA Vials	5 g	Cool to 4±2°C 2 x Vials with 5mL DI water and Sodium Bisulfate 1 x Vial with 5mL MeOH	14 days
	SVOCs & PAHs	Preparation Method/SOP: SW3550C/ SON009 Analysis Method/SOP: SW8270D/ ANA8270	Two 8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30 g	Cool to 4±2°C	14 days / 40 days
	Pesticides	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8081B / ANA8081	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
	PCBs	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8082A / ANA8082	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
	Metals	Preparation Method/SOP: SW3050B or SW3051A/ PRE3050B or PRE3051A Analysis Method/SOP: SW6020A / ANA6020	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	1g	none	180 days
	Hexavalent Chromium	Preparation Method/SOP: SW3060A/ ANA3060A	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw	2.5g	Cool to 4±2°C	30 days from sample collection and 168 hours after alkaline

TABLE 4  
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method/SOP Reference	Containers	Sample volume	Preservation Requirements	Maximum Holding Time
		Analysis Method/SOP: SW7199 / ANA218.6-7199	cap			digestion.
	Explosive Residues including PETN and Nitroglycerin (Multi-increment samples)	Preparation Method/SOP: SW8330B/MSE018IS Analysis Method/SOP: 8330B/HPL8330	1G bag	10g	Cool to < 6°C	14 days/40 days
	Perchlorate	EPA 6850 / HPL6850	4 oz glass jar	1 g	Cool to 4°C ± 2°C	28 days from sampling to analysis
Subsurface Soil	VOCs	Preparation Method/SOP: SW5035A/ ANA8260 Analysis Method/SOP: SW8260C / ANA8260	Three preweighed VOA Vials	5 g	Cool to 4±2°C 2 x Vials with 5mL DI water and Sodium Bisulfate 1 x Vial with 5mL MeOH	14 days
	SVOCs & PAHs	Preparation Method/SOP: SW3550C/ SON009 Analysis Method/SOP: SW8270D/ ANA8270	Two 8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30 g	Cool to 4±2°C	14 days / 40 days
	Pesticides	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8081B / ANA8081	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
	PCBs	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8082A / ANA8082	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
Subsurface Soil	Metals	Preparation Method/SOP: SW3050B or SW3051A/ PRE3050B or PRE3051A Analysis Method/SOP: SW6020A / ANA6020	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	1g	none	180 days
	Hexavalent Chromium	Preparation Method/SOP: SW3060A/ ANA3060A Analysis Method/SOP: SW7199 / ANA218.6-7199	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	2.5g	Cool to 4±2°C	30 days from sample collection and 168 hours after alkaline digestion.
	Explosive Residues including PETN and Nitroglycerin	Preparation Method/SOP: SW8330B/MSE018 Analysis Method/SOP: 8330B/HPL8330	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	10g	Cool to < 6°C	14 days/40 days

TABLE 4  
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method/SOP Reference	Containers	Sample volume	Preservation Requirements	Maximum Holding Time
	Perchlorate	EPA 6850 / HPL6850	4 oz glass jar	1 g	Cool to 4°C ± 2°C	28 days from sampling to analysis
Test Pit Soil Samples	VOCs	Preparation Method/SOP: SW5035A/ ANA8260 Analysis Method/SOP: SW8260C / ANA8260	Three preweighed VOA Vials	5 g	Cool to 4±2°C 2 x Vials with 5mL DI water and Sodium Bisulfate 1 x Vial with 5mL MeOH	14 days
	SVOCs & PAHs	Preparation Method/SOP: SW3550C/ SON009 Analysis Method/SOP: SW8270D/ ANA8270	Two 8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30 g	Cool to 4±2°C	14 days / 40 days
	Pesticides	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8081B / ANA8081	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
	PCBs	Preparation Method/SOP: SW3550C/ SON002 Analysis Method/SOP: SW8082A / ANA8082	8 oz (250 mL) amber glass wide-mouth jar with Teflon lined screw cap	30g	Cool to 4±2°C	14 days / 40 days
	Metals	Preparation Method/SOP: SW3050B or SW3051A/ PRE3050B or PRE3051A Analysis Method/SOP: SW6020A / ANA6020	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	1g	none	180 days
	Hexavalent Chromium	Preparation Method/SOP: SW3060A/ ANA3060A Analysis Method/SOP: SW7199 / ANA218.6-7199	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	2.5g	Cool to 4±2°C	30 days from sample collection and 168 hours after alkaline digestion.
Test Pit Soil Samples	Explosive Residues including PETN and Nitroglycerin	Preparation Method/SOP: SW8330B/MSE018 Analysis Method/SOP: 8330B/HPL8330	4 oz (125 mL) amber glass wide-mouth jar with Teflon lined screw cap	10g	Cool to < 6°C	14 days/40 days
	Perchlorate	EPA 6850 / HPL6850	4 oz glass jar	1 g	Cool to 4°C ± 2°C	28 days from sampling to analysis

TABLE 5  
Analytical Services Table

Matrix	Analytical Group	Analytical Method	Data Package Turnaround Time	Laboratory / Organization	Backup Laboratory / Organization
Groundwater, Surface Soil, Subsurface Soil, and Test Pit Soil Samples	VOCs	SW846 8260C	28 Calendar days	APPL 908 North Temperance Ave. Clovis, CA 93611 (559) 275-2175 Lab PM: Cynthia Clark	TBD
	SVOCs & PAHs	SW846 8270D & SW846 8270SIM			
	Pesticides	SW846 8081B			
	PCBs	SW846 8082			
	<sup>1</sup> Total Metals	SW846 6020 & SW846 7470A/7471B			
	Hexavalent Chromium	SW846 7199			
	<sup>2</sup> Explosive Residues including PETN and Nitroglycerin	SW846 8330B			
	Perchlorate	SW846 6850			

1 Groundwater samples will also be analyzed for Dissolved Metals.

2 Surface soil samples (multi-increment samples) to be analyzed for Explosive Residues will be prepared for analysis by the laboratory using multi-incremental prep methods specified in method 8330B.

TABLE 6-1  
Analytical Services Table

Matrix: Groundwater  
Analytical Group: VOCs

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
1,1,1-Trichloroethane	71-55-6	200	750	100	1.0	0.3	0.13
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.066	0.033	1.0	0.3	0.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	200000	5300	2650	1	0.3	0.21
1,1,2-Trichloroethane	79-00-5	--	0.041	0.0205	1.0	0.5	0.2
1,1-Dichloroethane	75-34-3	6	2.4	1.2	1.0	0.3	0.19
1,1-Dichloroethene	75-35-4	7	26	3.5	1.0	0.5	0.3
1,2,4-Trichlorobenzene	120-82-1	70	0.39	0.195	1.0	0.5	0.21
1,2-Dibromo-3-chloropropane	96-12-8	0.04	0.00032	0.00016	2.0	1	0.76
1,2-Dibromoethane	106-93-4	0.02	0.0065	0.00325	1.0	0.5	0.2
1,2-Dichlorobenzene	95-50-1	20	28	10	1.0	0.3	0.17
1,2-Dichloroethane	107-06-2	0.4	0.15	0.075	1.0	0.3	0.14
1,2-Dichloropropane	78-87-5	0.6	0.38	0.19	1.0	0.3	0.17
1,3-Dichlorobenzene	541-73-1	200	--	100	1.0	0.3	0.11
1,4-Dichlorobenzene	106-46-7	6	0.42	0.21	1.0	0.3	0.19
2-Butanone	78-93-3	4000	490	245	10.0	2	0.6
2-Hexanone	591-78-6	--	3.4	1.7	10.0	2	0.92
4-Methyl-2-pentanone	108-10-1	--	100	50	10.0	5	1.9
Acetone	67-64-1	6000	1200	600	10.0	2	0.95
Benzene	71-43-2	1	0.39	0.195	1.0	0.3	0.16
Bromodichloromethane	75-27-4	0.6	0.12	0.06	1.0	0.3	0.14
Bromoform	75-25-2	4	7.9	2	1.0	0.3	0.14
Bromomethane	74-83-9	--	0.7	0.35	2.0	0.5	0.24
Carbon disulfide	75-15-0	700	72	36	1.0	0.5	0.2
Carbon tetrachloride	56-23-5	0.3	0.39	0.15	1.0	0.3	0.1
Chlorobenzene	108-90-7	50	7.2	3.6	1.0	0.5	0.21
Chloroethane	75-00-3	3000	2100	1050	1.0	0.5	0.21
Chloroform	67-66-3	70	0.19	0.095	1.0	0.3	0.07
Chloromethane	74-87-3	3	19	1.5	1.0	0.5	0.31
cis-1,2-Dichloroethene	156-59-2	70	2.8	1.4	1.0	0.3	0.16
cis-1,3-Dichloropropene	10061-01-5	0.4	0.41	0.2	1.0	0.3	0.15
Cyclohexane	110-82-7	--	1300	650	10	0.3	0.14

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
Dibromochloromethane	124-48-1	0.4	0.15	0.075	1.0	0.3	0.19
Dichlorodifluoromethane	75-71-8	1000	19	9.5	1.0	0.3	0.19
Ethylbenzene	100-41-4	600	1.3	0.65	1.0	0.5	0.23
Isopropylbenzene	98-82-8	70	39	19.5	1.0	0.3	0.16
m,p-Xylene	m&pXYLENE	500	19	9.5	2.0	0.6	0.19
Methyl acetate	79-20-9	--	1600	800	10	5	0.39
Methylcyclohexane	108-87-2	--	--	0.3	10	0.3	0.11
Methylene chloride	75-09-2	5	8.4	2.5	5.0	1	0.35
Methyl-tert-butyl ether (MTBE)	1634-04-4	20	12	6	1.0	0.52	0.26
Naphthalene	91-20-3	--	--	0.5	1.0	0.5	0.36
o-Xylene	95-47-6	500	19	9.5	1.0	0.3	0.19
Styrene	100-42-5	70	110	35	1.0	0.5	0.25
Tetrachloroethene	127-18-4	0.7	3.5	0.35	1.0	0.3	0.24
Toluene	108-88-3	600	86	43	1.0	0.3	0.17
trans-1,2-Dichloroethene	156-60-5	100	8.6	4.3	1.0	0.3	0.19
trans-1,3-Dichloropropene	10061-02-6	0.4	0.41	0.2	1.0	0.3	0.18
Trichloroethene	79-01-6	3	0.26	0.13	1.0	0.3	0.16
Trichlorofluoromethane	75-69-4	2000	110	55	1.0	0.5	0.24
Vinyl chloride	75-01-4	0.03	0.015	0.0075	1.0	0.3	0.23
Xylene, total	1330-20-7	500	19	9.5	2.0	0.6	0.19

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-1A  
QC Acceptance Limits

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,1,1-Trichloroethane	71-55-6	65-130	30
1,1,2,2-Tetrachloroethane	79-34-5	65-130	30
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	75-125	30
1,1,2-Trichloroethane	79-00-5	75-125	30
1,1-Dichloroethane	75-34-3	70-135	30
1,1-Dichloroethene	75-35-4	70-130	30
1,2,4-Trichlorobenzene	120-82-1	65-135	30
1,2-Dibromo-3-chloropropane	96-12-8	50-130	30
1,2-Dibromoethane	106-93-4	80-120	30
1,2-Dichlorobenzene	95-50-1	70-120	30
1,2-Dichloroethane	107-06-2	70-130	30
1,2-Dichloropropane	78-87-5	75-125	30
1,3-Dichlorobenzene	541-73-1	75-125	30
1,4-Dichlorobenzene	106-46-7	75-125	30
2-Butanone	78-93-3	30-150	30
2-Hexanone	591-78-6	55-130	30
4-Methyl-2-pentanone	108-10-1	60-135	30
Acetone	67-64-1	40-140	30
Benzene	71-43-2	80-120	30
Bromodichloromethane	75-27-4	75-120	30
Bromoform	75-25-2	70-130	30
Bromomethane	74-83-9	30-145	30
Carbon disulfide	75-15-0	35-160	30
Carbon tetrachloride	56-23-5	65-140	30
Chlorobenzene	108-90-7	80-120	30

TABLE 6-1A  
QC Acceptance Limits

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Chloroethane	75-00-3	60-135	30
Chloroform	67-66-3	65-135	30
Chloromethane	74-87-3	40-125	30
cis-1,2-Dichloroethene	156-59-2	70-125	30
cis-1,3-Dichloropropene	10061-01-5	70-130	30
Cyclohexane	110-82-7	70-130	30
Dibromochloromethane	124-48-1	60-135	30
Dichlorodifluoromethane	75-71-8	30-155	30
Ethylbenzene	100-41-4	75-125	30
Isopropylbenzene	98-82-8	75-125	30
m,p-Xylene	m&pXYLENE	75-130	30
Methyl acetate	79-20-9	70-130	30
Methylcyclohexane	108-87-2	70-130	30
Methylene chloride	75-09-2	55-140	30
Methyl-tert-butyl ether (MTBE)	1634-04-4	65-125	30
Naphthalene	91-20-3	55-140	30
o-Xylene	95-47-6	80-120	30
Styrene	100-42-5	65-135	30
Tetrachloroethene	127-18-4	45-150	30
Toluene	108-88-3	75-120	30
trans-1,2-Dichloroethene	156-60-5	60-140	30
trans-1,3-Dichloropropene	10061-02-6	55-140	30
Trichloroethene	79-01-6	70-125	30
Trichlorofluoromethane	75-69-4	60-145	30
Vinyl chloride	75-01-4	50-145	30

TABLE 6-1A  
QC Acceptance Limits

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Xylene, total	1330-20-7	75-130	30
Surrogates:			
1,2-Dichloroethane-D4		70-120	NA
4-Bromofluorobenzene		75-120	NA
Toluene-D8		85-120	NA
Dibromofluoromethane		85-115	NA

LCS – Laboratory Control Sample  
LCSD - Laboratory Control Sample Duplicate  
MS – Matrix Spike  
MSD – Matrix Spike Duplicate

TABLE 6-2  
Analytical Services Table

Matrix: Groundwater  
Analytical Group: SVOCs and PAHs

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
1,1'-Biphenyl	92-52-4	400	0.083	0.0415	10	5	3.3
2,2'-Oxybis(1-choloropropane)	108-60-1	--	0.31	0.155	10	5	2
2,4,5-Trichlorophenol	95-95-4	--	89	44.5	10	5	2.3
2,4,6-Trichlorophenol	88-06-2	--	0.9	0.45	10	5	2.5
2,4-Dichlorophenol	120-83-2	--	3.5	1.75	10	5	2.5
2,4-Dimethylphenol	105-67-9	100	27	13.5	10	5	2.4
2,4-Dinitrophenol	51-28-5	--	3	1.5	20	5	1.8
2,4-Dinitrotoluene	121-14-2	--	0.2	0.1	20	5	2.7
2,6-Dinitrotoluene	606-20-2	--	0.042	0.021	20	5	2.7
2-Chloronaphthalene	91-58-7	--	55	27.5	10	5	2
2-Chlorophenol	95-57-8	0.4	7.1	0.2	10	5	2
2-Methylnaphthalene	91-57-6	30	2.7	1.35	0.2	0.1	0.06
2-Methylphenol	95-48-7	40	72	20	10	5	1.9
2-Nitroaniline	88-74-4	--	15	7.5	20	5	2.4
2-Nitrophenol	88-75-5	--	7.1	3.55	10	5	2.1
3,3'-dicholorobenzidine	91-94-1	--	0.11	0.055	10	5	3
3-Nitroaniline	99-09-2	--	--	5	10	5	3
4,6-Dinitro-2-methylphenol	534-52-1	--	0.12	0.06	20	5	2.2
4-Bromophenyl-phenylether	101-55-3	--	--	5	10	5	2.6
4-Chloro-3-methylphenol	59-50-7	--	110	55	10	5	2.6
4-Chloroaniline	106-47-8	--	0.32	0.16	10	5	2.7
4-Chlorophenyl-phenyl ether	7005-72-3	--	2.7	1.35	10	5	2.6
4-Methylphenol	106-44-5	--	140	70	10	5	1.7
4-Nitroaniline	100-01-6	--	3.3	1.65	10	5	2.5
4-Nitrophenol	100-02-7	--	0.12	0.06	20	5	0.8
Acenaphthene	83-32-9	80	40	20	0.2	0.1	0.06
Acenaphthylene	208-96-8	200	40	20	0.2	0.1	0.06
Acetophenone	98-86-2	--	150	75	10	5	3.3
Anthracene	120-12-7	2000	130	65	0.2	0.1	0.05
Atrazine	1912-24-9	3	0.26	0.13	10	5	3.3
Benzaldehyde	100-52-7	--	150	75	10	5	3.3
Benzo(a)anthracene	56-55-3	0.05	0.029	0.0145	0.2	0.1	0.07

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
Benzo(a)pyrene	50-32-8	0.005	0.0029	0.00145	0.2	0.1	0.06
Benzo(b)fluoranthene	205-99-2	0.05	0.029	0.0145	0.2	0.1	0.06
Benzo(g,h,i)perylene	191-24-2	200	8.7	4.35	0.2	0.1	0.08
Benzo(k)fluoranthene	207-08-9	0.5	0.29	0.145	0.2	0.1	0.07
Bis(2-chloroethoxy) methane	111-91-1	--	4.6	2.3	10	5	2.4
Bis(2-chloroethyl) ether	111-44-4	0.03	0.012	0.006	10	5	2.2
Bis(2-ethylhexyl) phthalate	117-81-7	3	4.8	1.5	20	5	2.9
Butylbenzylphthalate	85-68-7	1000	14	7	10	5	2.8
Caprolactam	105-60-2	4000	770	385	10	5	3.3
Carbazole	86-74-8	--	--	5	10	5	3.3
Chrysene	218-01-9	5	2.9	1.45	0.2	0.1	0.05
Dibenzo(a,h)anthracene	53-70-3	0.005	0.0029	0.00145	0.2	0.1	0.05
Dibenzofuran	132-64-9	--	0.58	0.29	20	5	2.4
Diethylphthalate	84-66-2	6000	1100	550	10	5	3
Dimethylphthalate	131-11-3	--	--	5	10	5	2.9
Di-n-butylphthalate	84-74-2	700	67	33.5	10	5	3.2
Di-n-octylphthalate	117-84-0	100	16	8	10	5	2.6
Fluoranthene	206-44-0	300	63	31.5	0.2	0.1	0.08
Fluorene	86-73-7	300	22	11	0.2	0.1	0.06
Hexachlorobenzene	118-74-1	0.02	0.042	0.01	20	5	2.7
Hexachlorobutadiene	87-68-3	0.4	0.26	0.13	10	5	0.9
Hexachlorocyclopentadiene	77-47-4	--	2.2	1.1	10	5	0.8
Hexachloroethane	67-72-1	--	0.51	0.255	10	5	0.8
Indeno(1,2,3,-cd)pyrene	193-39-5	0.05	0.029	0.0145	0.2	0.1	0.07
Isophorone	78-59-1	40	67	20	10	5	2.5
Naphthalene	91-20-3	6	0.14	0.07	0.2	0.1	0.05
Nitrobenzene	98-95-3	--	0.12	0.06	10	5	2.1
N-Nitroso-di-n propylamine	621-64-7	--	0.0093	0.00465	10	5	2.2
N-nitrosodiphenylamine	86-30-6	--	10	5	10	5	2.7
Pentachlorophenol	87-86-5	0.3	0.035	0.0175	20	5	2.8
Phenanthrene	85-01-8	200	130	65	0.2	0.1	0.07
Phenol	108-95-2	30	450	15	10	5	1
Pyrene	129-00-0	200	8.7	4.35	0.2	0.1	0.08

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-2A  
 QC Acceptance Limits

Matrix: Groundwater  
 Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,1'-Biphenyl	92-52-4	40-160	30
2,2'-Oxybis(1-choloropropane)	108-60-1	25-130	30
2,4,5-Trichlorophenol	95-95-4	50-110	30
2,4,6-Trichlorophenol	88-06-2	50-115	30
2,4-Dichlorophenol	120-83-2	50-105	30
2,4-Dimethylphenol	105-67-9	30-110	30
2,4-Dinitrophenol	51-28-5	15-140	30
2,4-Dinitrotoluene	121-14-2	50-120	30
2,6-Dinitrotoluene	606-20-2	50-115	30
2-Chloronaphthalene	91-58-7	50-105	30
2-Chlorophenol	95-57-8	35-105	30
2-Methylnaphthalene	91-57-6	45-105	30
2-Methylphenol	95-48-7	40-110	30
2-Nitroaniline	88-74-4	50-115	30
2-Nitrophenol	88-75-5	40-115	30
3,3'-dicholorobenzidine	91-94-1	20-110	30
3-Nitroaniline	99-09-2	20-125	30
4,6-Dinitro-2-methylphenol	534-52-1	40-130	30
4-Bromophenyl-phenylether	101-55-3	50-115	30
4-Chloro-3-methylphenol	59-50-7	45-110	30
4-Chloroaniline	106-47-8	15-110	30
4-Chlorophenyl-phenyl ether	7005-72-3	50-110	30
4-Methylphenol	106-44-5	30-110	30

TABLE 6-2A  
 QC Acceptance Limits

Matrix: Groundwater  
 Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
4-Nitroaniline	100-01-6	35-120	30
4-Nitrophenol	100-02-7	10-125	30
Acenaphthene	83-32-9	45-110	30
Acenaphthylene	208-96-8	50-105	30
Acetophenone	98-86-2	20-140	30
Anthracene	120-12-7	55-110	30
Atrazine	1912-24-9	20-140	30
Benzaldehyde	100-52-7	20-140	30
Benzo(a)anthracene	56-55-3	55-110	30
Benzo(a)pyrene	50-32-8	55-110	30
Benzo(b)fluoranthene	205-99-2	45-120	30
Benzo(g,h,i)perylene	191-24-2	40-125	30
Benzo(k)fluoranthene	207-08-9	45-125	30
Bis(2-chloroethoxy) methane	111-91-1	45-105	30
Bis(2-chloroethyl) ether	111-44-4	35-110	30
Bis(2-ethylhexyl) phthalate	117-81-7	40-125	30
Butylbenzylphthalate	85-68-7	45-115	30
Caprolactam	105-60-2	20-140	30
Carbazole	86-74-8	50-115	30
Chrysene	218-01-9	55-110	30
Dibenzo(a,h)anthracene	53-70-3	40-125	30
Dibenzofuran	132-64-9	55-105	30
Diethylphthalate	84-66-2	40-120	30
Dimethylphthalate	131-11-3	25-125	30

TABLE 6-2A  
 QC Acceptance Limits

Matrix: Groundwater  
 Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Di-n-butylphthalate	84-74-2	55-115	30
Di-n-octylphthalate	117-84-0	35-135	30
Fluoranthene	206-44-0	55-115	30
Fluorene	86-73-7	50-110	30
Hexachlorobenzene	118-74-1	50-110	30
Hexachlorobutadiene	87-68-3	25-105	30
Hexachlorocyclopentadiene	77-47-4	170-78	30
Hexachloroethane	67-72-1	30-95	30
Indeno(1,2,3,-cd)pyrene	193-39-5	45-125	30
Isophorone	78-59-1	50-110	30
Naphthalene	91-20-3	40-100	30
Nitrobenzene	98-95-3	45-110	30
N-Nitroso-di-n propylamine	621-64-7	35-130	30
N-nitrosodiphenylamine	86-30-6	50-110	30
Pentachlorophenol	87-86-5	40-115	30
Phenanthrene	85-01-8	50-115	30
Phenol	108-95-2	10-115	30
Pyrene	129-00-0	50-130	30
Surrogates:			
2-Fluorbiphenyl		50-110	NA
Terphenyl-D14		50-135	NA
2,4,6-Tribromophenol		40-125	NA
2-Fluorophenol		20-110	NA

---

TABLE 6-2A  
QC Acceptance Limits

Matrix: Groundwater  
Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Phenol		10-115	NA
Nitrobenzene-D5		40-110	NA

TABLE 6-3  
Analytical Services Table

Matrix: Groundwater  
Analytical Group: Pesticides

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
4,4'-DDD	72-54-8	0.1	0.027	0.0135	0.05	0.01	0.003
4,4'-DDE	72-55-9	--	0.2	0.1	0.05	0.01	0.004
4,4'-DDT	50-29-3	0.1	0.2	0.05	0.05	0.01	0.007
Aldrin	309-00-2	--	0.004	0.002	0.05	0.01	0.009
alpha-BHC	319-84-6	--	0.0062	0.0031	0.05	0.01	0.005
alpha-Chlordane	5103-71-9	0.1	0.19	0.05	0.05	0.01	0.007
beta-BHC	319-85-7	--	0.022	0.011	0.05	0.01	0.008
delta-BHC	319-86-8	--	0.022	0.011	0.05	0.01	0.005
Dieldrin	60-57-1	0.002	0.0015	0.00075	0.05	0.01	0.005
Endosulfan I	959-98-8	40	7.8	3.9	0.05	0.01	0.005
Endosulfan II	33213-65-9	40	7.8	3.9	0.05	0.01	0.004
Endosulfan sulfate	1031-07-8	--	7.8	3.9	0.05	0.01	0.005
Endrin	72-20-8	2	0.17	0.085	0.05	0.01	0.007
Endrin aldehyde	7421-93-4	2	0.17	0.085	0.05	0.01	0.009
Endrin ketone	53494-70-5	2	0.17	0.085	0.05	0.01	0.006
gamma-BHC (Lindane)	58-89-9	0.03	0.036	0.015	0.05	0.01	0.005
gamma-Chlordane	5103-74-2	0.1	0.19	0.05	0.05	0.01	0.006
Heptachlor	76-44-8	0.008	0.0018	0.0009	0.05	0.01	0.008
Heptachlor epoxide	1024-57-3	0.004	0.0033	0.00165	0.05	0.01	0.007
Methoxychlor	72-43-5	40	2.7	1.35	0.05	0.01	0.008
Toxaphene	8001-35-2	0.03	0.013	0.0065	1	0.4	0.38

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-3A  
 QC Acceptance Limits

Matrix: Groundwater  
 Analytical Group: Pesticides

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
4,4'-DDD	72-54-8	25-150	30
4,4'-DDE	72-55-9	35-140	30
4,4'-DDT	50-29-3	45-140	30
Aldrin	309-00-2	25-140	30
alpha-BHC	319-84-6	60-130	30
alpha-Chlordane	5103-71-9	65-125	30
beta-BHC	319-85-7	65-125	30
delta-BHC	319-86-8	45-135	30
Dieldrin	60-57-1	60-130	30
Endosulfan I	959-98-8	50-110	30
Endosulfan II	33213-65-9	30-130	30
Endosulfan sulfate	1031-07-8	55-135	30
Endrin	72-20-8	55-135	30
Endrin aldehyde	7421-93-4	55-135	30
Endrin ketone	53494-70-5	75-125	30
gamma-BHC (Lindane)	58-89-9	25-135	30
gamma-Chlordane	5103-74-2	60-125	30
Heptachlor	76-44-8	40-130	30
Heptachlor epoxide	1024-57-3	60-130	30
Methoxychlor	72-43-5	55-150	30
Toxaphene	8001-35-2	58-116	30
Surrogates:			
TCMX		25-140	NA

---

TABLE 6-3A  
QC Acceptance Limits

Matrix: Groundwater  
Analytical Group: Pesticides

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Decachlorobiphenyl		30-135	NA

TABLE 6-4  
Analytical Services Table

Matrix: Groundwater  
Analytical Group: PCBs

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
Aroclor-1016	12674-11-2	--	0.11	0.055	0.5	0.25	0.12
Aroclor-1221	11104-28-2	--	0.004	0.002	0.5	0.25	0.08
Aroclor-1232	11141-16-5	--	0.004	0.002	0.5	0.25	0.12
Aroclor-1242	53469-21-9	--	0.034	0.017	0.5	0.25	0.12
Aroclor-1248	12672-29-6	--	0.034	0.017	0.5	0.25	0.09
Aroclor-1254	11097-69-1	--	0.031	0.0155	0.5	0.25	0.2
Aroclor-1260	11096-82-5	--	0.034	0.017	0.5	0.25	0.09

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

---

TABLE 6-4A  
QC Acceptance Limits

Matrix: Groundwater  
Analytical Group: PCBs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Aroclor-1016	12674-11-2	25-145	30
Aroclor-1260	11096-82-5	30-145	30
Surrogates:			
Decachlorobiphenyl		40-135	NA

TABLE 6-5  
Analytical Services Table

Matrix: Groundwater

Analytical Group: Total and Dissolved Metals including Mercury and <sup>1</sup>Hexavalent Chromium

Analyte	CAS Number	Project Action Limit <sup>1</sup>		PQL Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
Aluminum	7429-90-5	--	1600	800	20	10	5.7
Antimony	7440-36-0	--	0.6	0.3	1	0.5	0.14
Arsenic	7440-38-2	10	0.045	0.0225	0.5	0.2	0.09
Barium	7440-39-3	700	290	145	0.5	0.4	0.15
Beryllium	7440-41-7	--	1.6	0.8	0.2	0.1	0.04
Cadmium	7440-43-9	2	0.69	0.345	0.2	0.1	0.02
Calcium	7440-70-2	--	--	0	200	150	150
Chromium	7440-47-3	10	0.031	0.0155	0.5	0.2	0.07
Chromium (Hexavalent)	18540-29-9	10	0.031	0.0155	0.5	0.2	0.09
Cobalt	7440-48-4	--	0.47	0.235	1	0.4	0.13
Copper	7440-50-8	1000	62	31	0.5	0.4	0.13
Iron	7439-89-6	300	1100	150	40	30	13.6
Lead	7439-92-1	15	15	7.5	0.5	0.4	0.19
Magnesium	7439-95-4	--	--	0	40	20	6.1
Manganese	7439-96-5	50	32	16	0.5	0.3	0.08
Mercury	7439-97-6	1	0.43	0.215	0.2	0.15	0.06
Nickel	7440-02-0	100	30	15	0.5	0.4	0.16
Potassium	7440-09-7	--	--	0	50	40	20
Selenium	7782-49-2	20	7.8	3.9	1	0.4	0.1
Silver	7440-22-4	20	7.1	3.55	0.2	0.1	0.03
Sodium	7440-23-5	--	--	0	100	50	25.7
Thallium	7440-28-0	--	0.016	0.008	0.2	0.2	0.1
Vanadium	7440-62-2	--	6.3	3.15	0.5	0.4	0.3

Analyte	CAS Number	Project Action Limit <sup>1</sup>		PQL Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
Zinc	7440-66-6	1000	470	235	20	15	12.7

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PLOQ) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-5A  
QC Acceptance Limits

Matrix: Groundwater

Analytical Group: Total and Dissolved Metals including Mercury and <sup>1</sup>Hexavalent Chromium

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Aluminum	7429-90-5	80-120	20
Antimony	7440-36-0	80-120	20
Arsenic	7440-38-2	80-120	20
Barium	7440-39-3	80-120	20
Beryllium	7440-41-7	80-120	20
Cadmium	7440-43-9	80-120	20
Calcium	7440-70-2	80-120	20
Chromium	7440-47-3	80-120	20
Chromium (Hexavalent)	18540-29-9	90-110	20
Cobalt	7440-48-4	80-120	20
Copper	7440-50-8	80-120	20
Iron	7439-89-6	80-120	20
Lead	7439-92-1	80-120	20
Magnesium	7439-95-4	80-120	20
Manganese	7439-96-5	80-120	20
Mercury	7439-97-6	80-120	20
Nickel	7440-02-0	80-120	20
Potassium	7440-09-7	80-120	20
Selenium	7782-49-2	80-120	20
Silver	7440-22-4	80-120	20
Sodium	7440-23-5	80-120	20
Thallium	7440-28-0	80-120	20
Vanadium	7440-62-2	80-120	20
Zinc	7440-66-6	80-120	20

TABLE 6-6  
Analytical Services Table

Matrix: Groundwater

Analytical Group: Explosive Residues (including PETN and Nitroglycerin) and Perchlorate

Analyte	CAS Number	Project Action Limit <sup>1</sup>		Project Quantitation Limit Goal <sup>2</sup> (ug/l)	Laboratory-specific		
		NC2L (ug/l)	RSL Tapwater Adjusted (ug/l)		LOQ (ug/l)	LOD (ug/l)	DL (ug/l)
1,3,5-Trinitrobenzene	99-35-4	--	46	23	0.5	0.3	0.13
1,3-Dinitrobenzene	99-65-0	--	0.15	0.075	0.5	0.3	0.131
2,4,6-Trinitrotoluene	118-96-7	--	0.76	0.38	0.5	0.3	0.133
2,4-Dinitrotoluene	121-14-2	--	0.2	0.1	0.5	0.3	0.125
2,6-Dinitrotoluene	606-20-2	--	0.042	0.021	0.5	0.3	0.125
2-Amino-4,6-dinitrotoluene	35572-78-2	--	3	1.5	0.5	0.3	0.125
2-Nitrotoluene	88-72-2	--	0.27	0.135	0.5	0.3	0.126
3-Nitrotoluene	99-08-1	--	0.13	0.065	0.5	0.3	0.133
4-Amino-2,6-dinitrotoluene	19406-51-0	--	3	1.5	0.5	0.3	0.1
4-Nitrotoluene	99-99-0	--	3.7	1.85	0.5	0.3	0.133
HMX	2691-41-0	--	78	39	0.5	0.3	0.115
Nitrobenzene	98-95-3	--	0.12	0.06	0.5	0.3	0.126
Nitroglycerin	55-63-0	--	0.15	0.075	0.5	0.3	0.13
Perchlorate	14797-73-0	--	1.1	0.55	0.6	0.4	0.2
PETN	78-11-5	--	3	1.5	2.5	1.5	0.607
RDX	121-82-4	--	0.61	0.305	0.5	0.3	0.123
Tetryl	479-45-8	--	6.1	3.05	0.5	0.3	0.133

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

RSL Tapwater values were adjusted from the USEPA RSL Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-6A  
 QC Acceptance Limits

Matrix: Groundwater  
 Analytical Group: Explosive Residues (including PETN and Nitroglycerin) and Perchlorate

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,3,5-Trinitrobenzene	99-35-4	65-140	20
1,3-Dinitrobenzene	99-65-0	45-160	20
2,4,6-Trinitrotoluene	118-96-7	50-145	20
2,4-Dinitrotoluene	121-14-2	60-135	20
2,6-Dinitrotoluene	606-20-2	60-135	20
2-Amino-4,6-dinitrotoluene	35572-78-2	50-155	20
2-Nitrotoluene	88-72-2	45-135	20
3-Nitrotoluene	99-08-1	50-130	20
4-Amino-2,6-dinitrotoluene	19406-51-0	55-155	20
4-Nitrotoluene	99-99-0	50-130	20
HMX	2691-41-0	80-115	20
Nitrobenzene	98-95-3	50-140	20
Nitroglycerin	55-63-0	70-130	20
Perchlorate	14797-73-0	80-120	15
PETN	78-11-5	65-115	20
RDX	121-82-4	50-160	20
Tetryl	479-45-8	20-175	20
Surrogate:			
1,2-Dinitrobenzene		70-130	NA

TABLE 6-7  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: VOCs

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		North Carolina Soil Screening Level (NCSSL) (ug/kg)	Regional Screening Levels (RSLs) Industrial Soil (ug/kg)	Residential Regional Screening Levels Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
1,1,1-Trichloroethane	71-55-6	1200	640000	640000	600	5	2	0.81
1,1,2,2-Tetrachloroethane	79-34-5	1.2	2800	560	0.6	5	2	1.24
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9000000	910000	910000	455000	10	2	0.83
1,1,2-Trichloroethane	79-00-5	3.2	680	160	1.6	5	2	0.48
1,1-Dichloroethane	75-34-3	30	17000	3300	15	5	2	1.13
1,1-Dichloroethene	75-35-4	45	110000	24000	22.5	5	2	0.79
1,2,4-Trichlorobenzene	120-82-1	2200	27000	6200	1100	5	2	0.52
1,2-Dibromo-3-chloropropane	96-12-8	0.25	69	5.4	0.125	10	5	2.19
1,2-Dibromoethane	106-93-4	0.097	170	34	0.0485	5	2	0.6
1,2-Dichlorobenzene	95-50-1	240	380000	190000	120	5	2	0.95
1,2-Dichloroethane	107-06-2	2	2200	430	1	5	2	0.72
1,2-Dichloropropane	78-87-5	3.2	4700	940	1.6	5	2	0.62
1,3-Dichlorobenzene	541-73-1	--	--	--	2	5	2	0.6
1,4-Dichlorobenzene	106-46-7	70	12000	2400	35	5	2	0.67
2-Butanone	78-93-3	16000	20000000	2800000	8000	10	2	0.71
2-Hexanone	591-78-6	170	140000	21000	85	10	2	0.5
4-Methyl-2-pentanone	108-10-1	430	3400000	530000	215	10	2	0.93
Acetone	67-64-1	24000	63000000	6100000	12000	10	5	2.8
Benzene	71-43-2	7.3	5400	1100	3.65	5	2	0.63
Bromodichloromethane	75-27-4	2.9	1400	270	1.45	5	2	0.69
Bromoform	75-25-2	19	220000	62000	9.5	5	2	0.8
Bromomethane	74-83-9	48	3200	730	24	5	2	1.6
Carbon disulfide	75-15-0	3800	370000	82000	1900	5	2	1.08
Carbon tetrachloride	56-23-5	2.1	3000	610	1.05	5	2	0.8
Chlorobenzene	108-90-7	430	140000	29000	215	5	2	0.49
Chloroethane	75-00-3	16000	2100000	1500000	8000	5	2	1.55
Chloroform	67-66-3	340	1500	290	145	5	2	1.43
Chloromethane	74-87-3	15	50000	12000	7.5	10	5	1.82
cis-1,2-Dichloroethene	156-59-2	360	200000	16000	180	5	2	1.07

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		North Carolina Soil Screening Level (NCSSL) (ug/kg)	Regional Screening Levels (RSLs) Industrial Soil (ug/kg)	Residential Regional Screening Levels Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
cis-1,3-Dichloropropene	10061-01-5	2.3	8300	1700	1.15	5	2	0.47
Cyclohexane	110-82-7	--	120000	120000	60000	5	2	0.82
Dibromochloromethane	124-48-1	1.9	3300	680	0.95	5	2	0.85
Dichlorodifluoromethane	75-71-8	29000	40000	9400	4700	10	2	0.83
Ethylbenzene	100-41-4	8100	27000	5400	2700	5	2	0.64
Isopropylbenzene	98-82-8	1300	270000	210000	650	5	2	1.11
m,p-Xylene	m&pXYLENE	5800	250000	59000	2900	10	2	0.43
Methyl acetate	79-20-9	--	29000000	7800000	3900000	10	2	1
Methylcyclohexane	108-87-2	--	--	--	5	20	5	2
Methylene chloride	75-09-2	23	310000	36000	11.5	50	10	4.58
Methyl-tert-butyl ether (MTBE)	1634-04-4	85	220000	43000	42.5	5	2	0.89
Naphthalene	91-20-3	210	18000	3600	105	5	2	0.41
o-Xylene	95-47-6	5800	300000	69000	2900	5	2	0.61
Styrene	100-42-5	920	870000	630000	460	5	2	0.69
Tetrachloroethene	127-18-4	5	41000	8600	2.5	5	2	0.54
Toluene	108-88-3	5500	820000	500000	2750	5	2	0.65
trans-1,2-Dichloroethene	156-60-5	510	69000	15000	255	5	2	1.35
trans-1,3-Dichloropropene	10061-02-6	2.3	8300	1700	1.15	5	2	0.43
Trichloroethene	79-01-6	18	2000	440	9	5	2	0.71
Trichlorofluoromethane	75-69-4	24000	340000	79000	12000	5	2	1.26
Vinyl chloride	75-01-4	0.19	1700	60	0.095	5	2	1.68
Xylene, total	1330-20-7	5800	260000	63000	2900	10	2	0.43

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NCSSLs are from NCDENR (February 2012).

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-7A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: VOCs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,1,1-Trichloroethane	71-55-6	70-135	30
1,1,1,2-Tetrachloroethane	79-34-5	55-130	30
1,1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	70-130	30
1,1,2-Trichloroethane	79-00-5	60-125	30
1,1-Dichloroethane	75-34-3	75-125	30
1,1-Dichloroethene	75-35-4	65-135	30
1,2,4-Trichlorobenzene	120-82-1	65-130	30
1,2-Dibromo-3-chloropropane	96-12-8	40-135	30
1,2-Dibromoethane	106-93-4	70-125	30
1,2-Dichlorobenzene	95-50-1	75-120	30
1,2-Dichloroethane	107-06-2	70-135	30
1,2-Dichloropropane	78-87-5	70-120	30
1,3-Dichlorobenzene	541-73-1	70-125	30
1,4-Dichlorobenzene	106-46-7	70-125	30
2-Butanone	78-93-3	30-160	30
2-Hexanone	591-78-6	45-145	30
4-Methyl-2-pentanone	108-10-1	45-145	30
Acetone	67-64-1	20-160	30
Benzene	71-43-2	75-125	30
Bromodichloromethane	75-27-4	70-130	30
Bromoform	75-25-2	55-135	30
Bromomethane	74-83-9	30-160	30
Carbon disulfide	75-15-0	45-160	30
Carbon tetrachloride	56-23-5	65-135	30
Chlorobenzene	108-90-7	75-125	30
Chloroethane	75-00-3	40-155	30
Chloroform	67-66-3	70-125	30
Chloromethane	74-87-3	50-130	30
cis-1,2-Dichloroethene	156-59-2	65-125	30
cis-1,3-Dichloropropene	10061-01-5	70-125	30
Cyclohexane	110-82-7	65-135	30
Dibromochloromethane	124-48-1	65-130	30

TABLE 6-7A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: VOCs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Dichlorodifluoromethane	75-71-8	35-135	30
Ethylbenzene	100-41-4	75-125	30
Isopropylbenzene	98-82-8	75-130	30
m,p-Xylene	m&pXYLENE	80-125	30
Methyl acetate	79-20-9	65-135	30
Methylcyclohexane	108-87-2	65-135	30
Methylene chloride	75-09-2	55-140	30
Methyl-tert-butyl ether (MTBE)	1634-04-4	65-135	30
Naphthalene	91-20-3	40-125	30
o-Xylene	95-47-6	75-125	30
Styrene	100-42-5	75-125	30
Tetrachloroethene	127-18-4	65-140	30
Toluene	108-88-3	70-125	30
trans-1,2-Dichloroethene	156-60-5	65-135	30
trans-1,3-Dichloropropene	10061-02-6	65-125	30
Trichloroethene	79-01-6	75-125	30
Trichlorofluoromethane	75-69-4	25-185	30
Vinyl chloride	75-01-4	60-125	30
Xylene, total	1330-20-7	75-125	30
Surrogates:			
1,2-Dichloroethane-D4		54-154	NA
4-Bromofluorobenzene		85-120	NA
Toluene-D8		85-115	NA

TABLE 6-8  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: SVOCs

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		NCSSL (ug/kg)	RSLs Industrial Soil (ug/kg)	RSLs Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
1,1'-Biphenyl	92-52-4	43000	21000	5100	2550	330	167	90
2,2'-Oxybis(1-choloropropane)	108-60-1	--	22000	4600	2300	330	167	47.3
2,4,5-Trichlorophenol	95-95-4	2500	6200000	610000	1250	330	167	60.1
2,4,6-Trichlorophenol	88-06-2	160	62000	6100	80	330	167	48.3
2,4-Dichlorophenol	120-83-2	14	180000	18000	7	330	167	50.5
2,4-Dimethylphenol	105-67-9	1400	1200000	120000	700	330	167	43.9
2,4-Dinitrophenol	51-28-5	--	120000	12000	6000	660	167	53.7
2,4-Dinitrotoluene	121-14-2	1.6	5500	1600	0.8	660	167	63.8
2,6-Dinitrotoluene	606-20-2	--	1200	330	165	660	167	60.6
2-Chloronaphthalene	91-58-7	--	8200000	630000	315000	330	167	52.4
2-Chlorophenol	95-57-8	4.1	510000	39000	2.05	330	167	44.3
2-Methylnaphthalene	91-57-6	1600	220000	23000	800	5	1.67	0.94
2-Methylphenol	95-48-7	4100	3100000	310000	2050	330	167	45.2
2-Nitroaniline	88-74-4	--	600000	61000	30500	660	167	62.4
2-Nitrophenol	88-75-5	--	510000	39000	19500	330	167	47.8
3,3'-dicholorobenzidine	91-94-1	--	3800	1100	550	660	167	56.3
3-Nitroaniline	99-09-2	--	--	--	167	660	167	61.1
4,6-Dinitro-2-methylphenol	534-52-1	--	4900	490	245	660	167	56.4
4-Bromophenyl-phenylether	101-55-3	--	--	--	167	330	167	56.6
4-Chloro-3-methylphenol	59-50-7	--	6200000	610000	305000	330	167	58.8
4-Chloroaniline	106-47-8	--	8600	2400	1200	330	167	16.5
4-Chlorophenyl-phenyl ether	7005-72-3	--	310000	31000	15500	330	167	60.7
4-Methylphenol	106-44-5	400	6200000	610000	200	330	167	46.4
4-Nitroaniline	100-01-6	--	86000	24000	12000	330	167	72.8
4-Nitrophenol	100-02-7	--	24000	4800	2400	660	167	59.8
Acenaphthene	83-32-9	8400	3300000	340000	4200	5	1.67	0.97
Acenaphthylene	208-96-8	20900	3300000	340000	10450	5	1.67	0.89
Acetophenone	98-86-2	3500	2500000	780000	1750	330	167	90
Anthracene	120-12-7	660000	17000000	1700000	330000	5	1.67	0.83
Atrazine	1912-24-9	25	7500	2100	12.5	330	167	90
Benzaldehyde	100-52-7	3000	1200000	780000	1500	330	167	90
Benzo(a)anthracene	56-55-3	180	2100	150	75	5	1.67	0.91
Benzo(a)pyrene	50-32-8	59	210	15	7.5	5	1.67	0.93

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		NCSSL (ug/kg)	RSLs Industrial Soil (ug/kg)	RSLs Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
Benzo(b)fluoranthene	205-99-2	600	2100	150	75	5	1.67	1.11
Benzo(g,h,i)perylene	191-24-2	7800000	1700000	170000	85000	5	1.67	1.34
Benzo(k)fluoranthene	207-08-9	5900	21000	1500	750	5	1.67	1.04
Bis(2-chloroethoxy) methane	111-91-1	--	180000	18000	9000	330	167	49.9
Bis(2-chloroethyl) ether	111-44-4	0.14	1000	210	0.07	330	167	50
Bis(2-ethylhexyl) phthalate	117-81-7	7200	120000	35000	3600	660	167	61.6
Butylbenzylphthalate	85-68-7	150000	910000	260000	75000	330	167	55.5
Caprolactam	105-60-2	18000	31000000	3100000	9000	330	167	90
Carbazole	86-74-8	370	--	--	185	330	167	81.6
Chrysene	218-01-9	18000	210000	15000	7500	5	1.67	0.85
Dibenzo(a,h)anthracene	53-70-3	190	210	15	7.5	5	1.67	0.92
Dibenzofuran	132-64-9	5200	100000	7800	2600	660	167	57.3
Diethylphthalate	84-66-2	37000	49000000	4900000	18500	330	167	62.1
Dimethylphthalate	131-11-3	--	--	--	167	330	167	63.3
Di-n-butylphthalate	84-74-2	19000	6200000	610000	9500	330	167	65.9
Di-n-octylphthalate	117-84-0	38000	620000	61000	19000	330	167	58.4
Fluoranthene	206-44-0	330000	2200000	230000	115000	5	1.67	1.2
Fluorene	86-73-7	56000	2200000	230000	28000	5	1.67	1
Hexachlorobenzene	118-74-1	2.6	1100	300	1.3	660	167	60.3
Hexachlorobutadiene	87-68-3	8.7	22000	6100	4.35	330	167	51.7
Hexachlorocyclopentadiene	77-47-4	--	370000	37000	18500	330	167	44
Hexachloroethane	67-72-1	--	43000	4300	2150	330	167	49.9
Indeno(1,2,3,-cd)pyrene	193-39-5	2000	2100	150	75	5	1.67	0.9
Isophorone	78-59-1	210	1800000	510000	105	330	167	57
Naphthalene	91-20-3	210	18000	3600	105	5	1.67	0.89
Nitrobenzene	98-95-3	--	24000	4800	2400	330	167	49.8
N-Nitroso-di-n propylamine	621-64-7	--	--	--	167	330	167	54.9
N-nitrosodiphenylamine	86-30-6	--	350000	99000	49500	330	167	50.6
Pentachlorophenol	87-86-5	31	2700	890	15.5	660	167	58.7
Phenanthrene	85-01-8	67600	17000000	1700000	33800	5	1.67	1.1
Phenol	108-95-2	230	18000000	1800000	115	330	167	43
Pyrene	129-00-0	220000	1700000	170000	85000	5	1.67	1.24

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NCSSLs are from NCDENR (February 2012).

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-8A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,1'-Biphenyl	92-52-4	50-150	30
2,2'-Oxybis(1-choloropropane)	108-60-1	45-110	30
2,4,5-Trichlorophenol	95-95-4	50-110	30
2,4,6-Trichlorophenol	88-06-2	45-110	30
2,4-Dichlorophenol	120-83-2	45-110	30
2,4-Dimethylphenol	105-67-9	30-105	30
2,4-Dinitrophenol	51-28-5	15-130	30
2,4-Dinitrotoluene	121-14-2	50-115	30
2,6-Dinitrotoluene	606-20-2	50-110	30
2-Chloronaphthalene	91-58-7	45-105	30
2-Chlorophenol	95-57-8	45-105	30
2-Methylnaphthalene	91-57-6	45-105	30
2-Methylphenol	95-48-7	40-105	30
2-Nitroaniline	88-74-4	45-120	30
2-Nitrophenol	88-75-5	40-110	30
3,3'-dicholorobenzidine	91-94-1	10-130	30
3-Nitroaniline	99-09-2	25-110	30
4,6-Dinitro-2-methylphenol	534-52-1	30-135	30
4-Bromophenyl-phenylether	101-55-3	45-115	30
4-Chloro-3-methylphenol	59-50-7	45-115	30
4-Chloroaniline	106-47-8	10-100	30
4-Chlorophenyl-phenyl ether	7005-72-3	45-110	30
4-Methylphenol	106-44-5	40-105	30
4-Nitroaniline	100-01-6	35-115	30
4-Nitrophenol	100-02-7	15-140	30
Acenaphthene	83-32-9	45-110	30
Acenaphthylene	208-96-8	45-105	30
Acetophenone	98-86-2	40-160	30
Anthracene	120-12-7	55-105	30
Atrazine	1912-24-9	20-140	30
Benzaldehyde	100-52-7	20-140	30
Benzo(a)anthracene	56-55-3	50-110	30
Benzo(a)pyrene	50-32-8	50-110	30
Benzo(b)fluoranthene	205-99-2	45-115	30

TABLE 6-8A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Benzo(g,h,i)perylene	191-24-2	40-125	30
Benzo(k)fluoranthene	207-08-9	45-125	30
Bis(2-chloroethoxy) methane	111-91-1	45-110	30
Bis(2-chloroethyl) ether	111-44-4	40-105	30
Bis(2-ethylhexyl) phthalate	117-81-7	45-125	30
Butylbenzylphthalate	85-68-7	50-125	30
Caprolactam	105-60-2	20-140	30
Carbazole	86-74-8	45-115	30
Chrysene	218-01-9	55-110	30
Dibenzo(a,h)anthracene	53-70-3	40-125	30
Dibenzofuran	132-64-9	50-105	30
Diethylphthalate	84-66-2	50-115	30
Dimethylphthalate	131-11-3	50-110	30
Di-n-butylphthalate	84-74-2	55-110	30
Di-n-octylphthalate	117-84-0	40-130	30
Fluoranthene	206-44-0	55-115	30
Fluorene	86-73-7	50-110	30
Hexachlorobenzene	118-74-1	45-120	30
Hexachlorobutadiene	87-68-3	40-115	30
Hexachlorocyclopentadiene	77-47-4	10-126	30
Hexachloroethane	67-72-1	35-110	30
Indeno(1,2,3,-cd)pyrene	193-39-5	40-120	30
Isophorone	78-59-1	45-110	30
Naphthalene	91-20-3	40-105	30
Nitrobenzene	98-95-3	40-115	30
N-Nitroso-di-n propylamine	621-64-7	40-115	30
N-nitrosodiphenylamine	86-30-6	50-115	30
Pentachlorophenol	87-86-5	25-120	30
Phenanthrene	85-01-8	50-110	30
Phenol	108-95-2	40-100	30
Pyrene	129-00-0	45-125	30
Surrogates:			
2-Fluorobiphenyl		45-105	NA
Terphenyl-D14		30-125	NA

TABLE 6-8A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: SVOCs and PAHs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
2,4,6-Tribromophenol		35-125	NA
2-Fluorophenol		35-105	NA
Phenol		40-100	NA
Nitrobenzene-D5		35-100	NA

TABLE 6-9  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Pesticides

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		NCSSL (ug/kg)	RSLs Industrial Soil (ug/kg)	RSLs Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
4,4'-DDD	72-54-8	240	7200	2000	120	5	4	1.8
4,4'-DDE	72-55-9	240	5100	1400	120	5	4	1.6
4,4'-DDT	50-29-3	340	7000	1700	170	5	1.6	0.4
Aldrin	309-00-2	3.3	100	29	1.65	5	1.6	1.4
alpha-BHC	319-84-6	0.36	270	77	0.18	5	1.6	0.5
alpha-Chlordane	5103-71-9	68	6500	1600	34	5	1.6	0.9
beta-BHC	319-85-7	1.2	960	270	0.6	5	1.6	1
delta-BHC	319-86-8	--	960	270	135	5	1.6	1.1
Dieldrin	60-57-1	0.81	110	30	0.405	5	1.6	1.1
Endosulfan I	959-98-8	5600	370000	37000	2800	5	1.6	0.44
Endosulfan II	33213-65-9	5600	370000	37000	2800	5	1.6	0.44
Endosulfan sulfate	1031-07-8	8000	370000	37000	4000	5	1.6	0.44
Endrin	72-20-8	810	18000	1800	405	5	1.6	1.1
Endrin aldehyde	7421-93-4	810	18000	1800	405	5	4	2.9
Endrin ketone	53494-70-5	810	18000	1800	405	5	4	3.5
gamma-BHC (Lindane)	58-89-9	1.8	2100	520	0.9	5	1.6	0.9
gamma-Chlordane	5103-74-2	68	6500	1600	34	5	1.6	1.1
Heptachlor	76-44-8	6.6	380	110	3.3	5	1.6	1.1
Heptachlor epoxide	1024-57-3	0.82	190	53	0.41	5	1.6	1.1
Methoxychlor	72-43-5	22000	310000	31000	11000	5	1.6	1.4
Toxaphene	8001-35-2	46	1600	440	23	1000	50	15.7

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NCSSLs are from NCDENR (February 2012).

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-3A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Pesticides

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
4,4'-DDD	72-54-8	30-135	30
4,4'-DDE	72-55-9	70-125	30
4,4'-DDT	50-29-3	45-140	30
Aldrin	309-00-2	45-140	30
alpha-BHC	319-84-6	60-125	30
alpha-Chlordane	5103-71-9	65-120	30
beta-BHC	319-85-7	60-125	30
delta-BHC	319-86-8	55-130	30
Dieldrin	60-57-1	65-125	30
Endosulfan I	959-98-8	15-135	30
Endosulfan II	33213-65-9	35-140	30
Endosulfan sulfate	1031-07-8	60-135	30
Endrin	72-20-8	60-135	30
Endrin aldehyde	7421-93-4	35-145	30
Endrin ketone	53494-70-5	65-135	30
gamma-BHC (Lindane)	58-89-9	60-125	30
gamma-Chlordane	5103-74-2	65-125	30
Heptachlor	76-44-8	50-140	30
Heptachlor epoxide	1024-57-3	65-130	30
Methoxychlor	72-43-5	55-145	30
Toxaphene	8001-35-2	39-147	30
Surrogates:			
TCMX		70-125	NA
Decachlorobiphenyl		55-130	NA

TABLE 6-10  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: PCBs

Analyte	CAS Number	Project Action Limit <sup>1</sup>			Project Quantitation Limit Goal <sup>2</sup> (ug/kg)	Laboratory-specific		
		NCSSL (ug/kg)	RSLs Industrial Soil (ug/kg)	RSLs Residential Soil (ug/kg)		LOQ (ug/kg)	LOD (ug/kg)	DL (ug/kg)
Aroclor-1016	12674-11-2	140	3700	390	70	50	20	9.8
Aroclor-1221	11104-28-2	140	540	140	70	50	20	5.5
Aroclor-1232	11141-16-5	140	540	140	70	50	10	3.6
Aroclor-1242	53469-21-9	140	740	220	70	50	10	3.6
Aroclor-1248	12672-29-6	140	740	220	70	50	10	3.6
Aroclor-1254	11097-69-1	140	740	110	55	50	10	3.6
Aroclor-1260	11096-82-5	140	740	220	70	50	10	3.6

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NCSSLs are from NCDENR (February 2012).

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

TABLE 6-10A  
QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: PCBs

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Aroclor-1016	12674-11-2	40-140	30
Aroclor-1260	11096-82-5	60-130	30
Surrogates:			
Decachlorobiphenyl		60-125	NA

TABLE 6-11  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Metals including Mercury and Hexavalent Chromium

Analyte	CAS Number	Project Action Limit <sup>1</sup>			PQL Goal <sup>2</sup> (mg/kg)	Laboratory-specific		
		NCSSL (mg/kg)	RSLs Industrial Soil (mg/kg)	RSLs Residential Soil (mg/kg)		LOQ (mg/kg)	LOD (mg/kg)	DL (mg/kg)
Aluminum	7429-90-5	--	99000	7700	3850	5	4	3.2
Antimony	7440-36-0	0.9	41	3.1	0.45	0.2	0.2	0.1
Arsenic	7440-38-2	5.8	2.4	0.61	0.305	0.5	0.3	0.08
Barium	7440-39-3	580	19000	1500	290	0.1	0.08	0.04
Beryllium	7440-41-7	63	200	16	8	1	0.3	0.07
Cadmium	7440-43-9	3	80	7	1.5	0.1	0.08	0.03
Calcium	7440-70-2	--	--	--	15	20	15	8.76
Chromium	7440-47-3	3.8	5.6	0.29	0.145	0.5	0.2	0.035
Chromium (Hexavalent)	18540-29-9	3.8	5.6	0.29	0.145	0.6	0.4	0.3
Cobalt	7440-48-4	3.8	30	2.3	1.15	0.1	0.08	0.02
Copper	7440-50-8	700	4100	310	155	0.1	0.08	0.04
Iron	7439-89-6	150	72000	5500	75	10	8	6.1
Lead	7439-92-1	270	800	400	135	0.1	0.05	0.02
Magnesium	7439-95-4	--	--	--	5	10	5	1.9
Manganese	7439-96-5	65	2300	180	32.5	0.1	0.1	0.05
Mercury	7439-97-6	1	31	2.3	0.5	0.1	0.04	0.01
Nickel	7440-02-0	130	2000	150	65	0.2	0.2	0.14
Potassium	7440-09-7	--	--	--	8	10	8	3.86
Selenium	7782-49-2	2.1	510	39	1.05	0.2	0.1	0.04
Silver	7440-22-4	3.4	510	39	1.7	0.1	0.05	0.02
Sodium	7440-23-5	--	--	--	8	10	8	5.1
Thallium	7440-28-0	0.28	1	0.078	0.039	0.1	0.05	0.02
Vanadium	7440-62-2	6	510	39	3	0.1	0.1	0.08
Zinc	7440-66-6	1200	31000	2300	600	2	1.5	1.2

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

NCSSLs are from NCDENR (February 2012).

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-11A  
 QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
 Analytical Group: Metals including Mercury and Hexavalent Chromium

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
Aluminum	7429-90-5	80-120	20
Antimony	7440-36-0	80-120	20
Arsenic	7440-38-2	80-120	20
Barium	7440-39-3	80-120	20
Beryllium	7440-41-7	80-120	20
Cadmium	7440-43-9	80-120	20
Calcium	7440-70-2	80-120	20
Chromium	7440-47-3	80-120	20
Chromium (Hexavalent)	18540-29-9	80-120	20
Cobalt	7440-48-4	80-120	20
Copper	7440-50-8	80-120	20
Iron	7439-89-6	80-120	20
Lead	7439-92-1	80-120	20
Magnesium	7439-95-4	80-120	20
Manganese	7439-96-5	80-120	20
Mercury	7439-97-6	80-120	20
Nickel	7440-02-0	80-120	20
Potassium	7440-09-7	80-120	20
Selenium	7782-49-2	80-120	20
Silver	7440-22-4	80-120	20
Sodium	7440-23-5	80-120	20
Thallium	7440-28-0	80-120	20
Vanadium	7440-62-2	80-120	20
Zinc	7440-66-6	80-120	20

TABLE 6-12  
Analytical Services Table

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Explosive Residues including PETN, Nitroglycerin, and Perchlorate

Analyte	CAS Number	Project Action Limit <sup>1</sup>			PQL Goal <sup>2</sup> (mg/kg)	Laboratory-specific		
		NCSSL (mg/kg)	RSLs Industrial Soil (mg/kg)	RSLs Residential Soil (mg/kg)		LOQ (mg/kg)	LOD (mg/kg)	DL (mg/kg)
1,3,5-Trinitrobenzene	99-35-4	--	2700	220	110	0.5	0.2	0.079
1,3-Dinitrobenzene	99-65-0	--	6.2	0.61	0.305	0.45	0.2	0.063
2,4,6-Trinitrotoluene	118-96-7	--	42	3.6	1.8	0.5	0.2	0.083
2,4-Dinitrotoluene	121-14-2	0.0016	5.5	1.6	0.0008	0.5	0.2	0.083
2,6-Dinitrotoluene	606-20-2	--	62	6.1	3.05	0.5	0.2	0.083
2-Amino-4,6-dinitrotoluene	35572-78-2	--	200	15	7.5	0.5	0.2	0.075
2-Nitrotoluene	88-72-2	--	13	2.9	1.45	0.5	0.2	0.066
3-Nitrotoluene	99-08-1	--	6.2	0.61	0.305	0.5	0.2	0.071
4-Amino-2,6-dinitrotoluene	19406-51-0	--	190	15	7.5	0.5	0.2	0.075
4-Nitrotoluene	99-99-0	--	110	24	12	0.5	0.2	0.08
HMX	2691-41-0	--	4900	380	190	0.5	0.2	0.08
Nitrobenzene	98-95-3	--	24	4.8	2.4	0.5	0.2	0.075
Nitroglycerin	55-63-0	--	6.2	0.61	0.305	0.5	0.2	0.085
Perchlorate	14797-73-0	--	72	5.5	2.75	0.006	0.004	0.002
PETN	78-11-5	--	120	12	6	2.5	1	0.579
RDX	121-82-4	--	24	5.6	2.8	0.5	0.2	0.08
Tetryl	479-45-8	--	250	24	12	0.5	0.2	0.091

<sup>1</sup> Project Action Limits (PALs) were developed to be protective of human health and the environment.

<sup>2</sup> Project Quantitation Limit (PQL) Goals are half of the minimum PAL.

Industrial and Residential Soil RSL values were adjusted from the USEPA RSLs Table (May 2013).

NCSSLs are from NCDENR (February 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-12A  
 QC Acceptance Limits

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
 Analytical Group: Explosive Residues including PETN, Nitroglycerin, and Perchlorate

Analyte	CAS Number	MS/MSD and LCS/LCSD Limits	
		%R	RPD
1,3,5-Trinitrobenzene	99-35-4	75-125	20
1,3-Dinitrobenzene	99-65-0	80-125	20
2,4,6-Trinitrotoluene	118-96-7	55-140	20
2,4-Dinitrotoluene	121-14-2	80-125	20
2,6-Dinitrotoluene	606-20-2	80-120	20
2-Amino-4,6-dinitrotoluene	35572-78-2	80-125	20
2-Nitrotoluene	88-72-2	80-125	20
3-Nitrotoluene	99-08-1	75-120	20
4-Amino-2,6-dinitrotoluene	19406-51-0	80-125	20
4-Nitrotoluene	99-99-0	75-125	20
HMX	2691-41-0	75-125	20
Nitrobenzene	98-95-3	75-125	20
Nitroglycerin	55-63-0	68-131	20
Perchlorate	14797-73-0	80-120	15
PETN	78-11-5	69-132	20
RDX	121-82-4	70-135	20
Tetryl	479-45-8	10-150	20
Surrogate:			
1,2-Dinitrobenzene		70-130	NA

TABLE 7  
Data Package Deliverables

All Analytical Fractions	
Case Narrative – A detailed case narrative per analytical fraction is required and will include explanation of any non-compliance and/or exceptions and CA. Exceptions will be noted for receipt, holding times, methods, preparation, calibration, blanks, spikes, surrogates (if applicable), and sample exceptions.	•
Sample Identification (ID) Cross Reference Sheet (Lab IDs and Client IDs)	•
Completed COC and any sample receipt information	•
Sample preparation (extraction/digestion) logs	•
Copies of non-conformance memos and CAs	•

Form *	Gas Chromatograph/Mass Spectrometer Organic Fractions	Level II	Level IV
1	Sample results	•	• + raw
2	Surrogate Recovery Summary (w/ applicable control limits)	•	•
3	MS/MSD Accuracy & Precision Summary **	•	• + raw
3	Laboratory Control Sample (LCS) Accuracy Summary	•	• + raw
4	Method Blank Summary	•	• + raw
5	Instrument Tuning Summary (including tuning summary for applicable initial calibrations)		•
6	Initial Calibration Summary (including concentration levels of standards)		• + raw
7	Continuing Calibration Summary		• + raw
8	Internal Standard Summary (including applicable initial calibrations)		•
Form *	Gas Chromatograph//High-Performance Liquid Chromatograph Organic Fractions	Level II	Level IV
1	Sample results	•	• + raw
2	Surrogate Recovery Summary (with applicable control limits)	•	•
3	MS/MSD Accuracy and Precision Summary **	•	• + raw
3	LCS Accuracy Summary	•	• + raw
4	Method Blank Summary	•	• + raw
6	Initial Calibration Summary (including concentration levels of standards) ***		• + raw
7	Continuing Calibration Summary ***		• + raw
7	Degradation Summary (Organochlorine Pesticides only) ***		• + raw
8	Analytical Sequence (including internal standard area performance where applicable) ***		•
10	Compound Identification Summary (where confirmation required) ***		•
Form *	Metals Inorganic Fractions	Level II	Level IV
1	Sample Results	•	• + raw
2A	Initial and Continuing Calibration Summary		• + raw
3	Initial and Continuing Calibration Blanks and Method Blanks Summary	•	• + raw
4	Interference Check Standard Summary		• + raw
5A	Pre-digestion Matrix Spike Recoveries Summary	•	• + raw
5B	Post-digestion Spike Recoveries Summary		• + raw
6	Native Duplicate or MS/MSD Precision Summary **	•	• + raw

TABLE 7  
Data Package Deliverables

Form *	Metals Inorganic Fractions (continued)	Level II	Level IV
7	LCS Recovery Summary	•	• + raw
8	Method of Standard Addition (if necessary)		• + raw
9	Serial Dilution		• + raw
10	Instrument or Method Detection Limit Summary		•
11	ICP Interelement Correction Factors		•
12	Linear Range Summary		•
13	Preparation Log Summary		• + raw
14	Analytical Run Sequence and GFAA Post-spike Recovery Summary		• + raw

TABLE 8-1  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: VOCs

Analytical Method/SOP Reference: SW846 8260C/ANA8260

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	Every field sample, standard, and QC sample.	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected $>$ $\frac{1}{2}$ RL and $>$ 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.		Accuracy / Sensitivity	No analytes detected $>$ $\frac{1}{2}$ RL and $>$ 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-1A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-1A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	<i>Refer to Table 6-1A.</i>  MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD (refer to Table 6A-1), if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate).	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	<i>Refer to Table 6-1A.</i>  MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD (refer to Table 6A-1), if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate).
Surrogates	All samples	<i>Refer to Table 6-1A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	<i>Refer to Table 6-1A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	$>$ 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	$>$ 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-2  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: SVOCs/PAHs

Analytical Method/SOP Reference: SW846 8270D & SW846 8270SIM/ANA8270 & ANA8270SIM

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	Every field sample, standard, and QC sample.	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected $>$ $\frac{1}{2}$ RL and $>$ $\frac{1}{10}$ the amount measured in any sample or $\frac{1}{10}$ the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.		Accuracy / Sensitivity	All target analytes $\leq$ $\frac{1}{2}$ laboratory LOQ, For common laboratory contaminants, no analytes detected $>$ LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-2A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-2A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	<i>Refer to Table 6-2A.</i>  MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD (refer to Table 6-2A), if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate).	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	<i>Refer to Table 6-2A.</i>  MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD (refer to Table 6-2A), if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate).
Surrogates	All samples	<i>Refer to Table 6-2A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	<i>Refer to Table 6-2A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.		Laboratory QA Officer	Sensitivity
Data completeness check	Once, after all validated data are received	$>$ 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	$>$ 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-3  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Pesticides

Analytical Method/SOP Reference: SW846 8081B/ANA8081

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > 1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-3A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-3A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	<i>Refer to Table 6-3A.</i> For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits.	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	<i>Refer to Table 6-3A.</i> For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits.
Surrogates	All samples	<i>Refer to Table 6-3A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	<i>Refer to Table 6-3A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-4  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: PCBs

Analytical Method/SOP Reference: SW846 8082/ANA8082

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. (see Box D-1).	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-4A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>Refer to Table 6-4A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits., <i>Refer to Table 6-4A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits., <i>Refer to Table 6-4A.</i>
Surrogates	All samples	<i>Refer to Table 6-4A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	<i>Refer to Table 6-4A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-5  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Total and Dissolved Metals

Analytical Method/SOP Reference: SW846 6020A/ANA6020

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > ½ LOQ and greater than 1/10 the amount measured in any sample. For common lab contaminants, no analytes detected > LOQ.	Correct problem. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank	Analyst, Laboratory QA Officer	Accuracy/Bias, Representativeness	All target analytes < 1/2 laboratory LOQs
Interference Check Solution	At the beginning of an analytical run and every 12 hours	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spikes analytes); ICS-AB: Within 20% of true value	Terminate analysis; locate and correct problem; reanalyze LCS, reanalyze all samples		Accuracy	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spikes analytes); ICS-AB: Within 20% of true value
Matrix spike	One per matrix per analytical method for each batch of at most 20 samples	<i>Refer to Table 6-5A.</i>	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Accuracy/Bias	<i>Refer to Table 6-5A.</i>
Laboratory duplicate	One per matrix per analytical method for each batch of at most 20 samples	<i>Refer to Table 6-5A.</i>	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Precision	<i>Refer to Table 6-5A.</i>
Serial Dilution	One per matrix per analytical method for each batch of at most 20 samples	Five-fold dilution must agree within ± 10% of the original measurement.	Applicable when the concentration is >50x the DL. If the %D is greater than 10%, then perform post-digestion spike addition.		Precision	Five-fold dilution must agree within ± 10% of the original measurement.
Post-digestion spike	When dilution test fails or analyte concentration for all samples < 50 x LOD.	75-125%R	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Accuracy	75-125%R
Internal Standards	Every sample	IS intensity within 30-120% of intensity of the IS in the ICAL	Reanalyze sample at 5-fold dilution with addition of appropriate amounts of internal standards.		Accuracy	IS intensity within 30-120% of intensity of the IS in the ICAL
Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-6  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Mercury

Analytical Method/SOP Reference: SW846 7470A/ANA7470A

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > ½ RL and greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1)	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	No analytes detected > ½ RL and greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1)
Calibration Blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected > LOD	Correct problem. Re-prepare and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		Accuracy / Sensitivity	No analytes detected > LOD
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	<i>Refer to Table 6-5A.</i>	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	<i>Refer to Table 6-5A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	<i>Refer to Table 6-5A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	<i>Refer to Table 6-5A.</i>
Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-7  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Hexavalent Chromium

Analytical Method/SOP Reference: SW846 7199/ANA218.6-7199

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per preparatory batch of up to 20 samples.	No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes>LOQ.	Correct problem, then reprep and reanalyze the MB and all samples in the associated batch for failed analytes, except when sample results are below the LOD if sufficient material is available.	Analyst, Laboratory QA Officer	Sensitivity/ Bias	No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes>LOQ.
LCS	One per preparatory batch of up to 20 samples.	<i>Refer to Table 6-5A.</i> Spike recovery within 90-110%	Correct problem, then reprep and reanalyze the LCS/LCSD and all samples in the associated batch for failed analytes, if sufficient material is available.		Accuracy/ Precision	<i>Refer to Table 6-5A.</i> Spike recovery within 90-110%
MS	One per preparatory batch of up to 20 samples.	<i>Refer to Table 6-5A.</i> Spike recovery within 80-120%	Examine the project-specific DQOs. Notify lab QA officer and project chemist as to additional measures to be taken.		Accuracy/ Precision	<i>Refer to Table 6-5A.</i> Spike recovery within 80-120%
MSD or Matrix Duplicate	One per preparatory batch per matrix.	<i>Refer to Table 6-5A.</i> RPD ≤ 20% (between MS and MSD or sample and sample duplicate).	Examine the project-specific DQOs. Notify lab QA officer and project chemist as to additional measures to be taken.		Accuracy/ Precision	<i>Refer to Table 6-5A.</i> RPD ≤ 20% (between MS and MSD or sample and sample duplicate).

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-8  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Explosive Residues including PETN and Nitroglycerin

Analytical Method/SOP Reference: SW846 8330B/HPL8330

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No target analytes detected > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1).	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples.	QC acceptance criteria specified by DoD, <i>refer to Table 6-6A.</i>	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, <i>refer to Table 6-6A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits, <i>refer to Table 6-6A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits, <i>refer to Table 6-6A.</i>
Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-9  
Laboratory QC Samples

Matrix: Groundwater

Analytical Group: Perchlorate

Analytical Method/SOP Reference: SW846 6850/HPL6850

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	No target analytes $\geq$ ½ RL in accordance with DoD QSM requirements	Correct problem, then re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Analyst	Accuracy/Bias Contamination	No target analytes $\geq$ ½ RL in accordance with DoD QSM requirements
IS	During acquisition of calibration standard, samples, and QC check samples	Areas within -50% to +100% of the midpoint of the last ICAL for each sample and QC in accordance with DoD QSM requirements	Inspect LCMS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning in accordance with DoD QSM requirements		Accuracy/Bias	Areas within -50% to +100% of the midpoint of the last ICAL for each sample and QC in accordance with DoD QSM requirements
Isotope Ratio	Every Sample and QC	83/85 ratio within $\pm$ 30% of the mid-range ICAL standard ratio, or within $\pm$ 30% of the ratio of the average of the areas from all CCVs in the run, if the ICAL is not run the same day	NA		Qualitative Identification	83/85 ratio within $\pm$ 30% of the mid-range ICAL standard ratio, or within $\pm$ 30% of the ratio of the average of the areas from all CCVs in the run, if the ICAL is not run the same day
LCS	One LCS per analytical/preparation batch	QC acceptance criteria: 80% to 120% accuracy, 15% precision; <i>refer to Table 6-6A.</i>	Correct problem, then re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements.		Accuracy/Bias	QC acceptance criteria: 80% to 120% accuracy, 15% precision; <i>refer to Table 6-6A.</i>

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-10  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: VOCs

Analytical Method/SOP Reference: SW846 8260C/ANA8260

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	Every field sample, standard, and QC sample.	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected $>$ $\frac{1}{2}$ RL and $>$ $\frac{1}{10}$ the amount measured in any sample or $\frac{1}{10}$ the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.		Accuracy / Sensitivity	All target analytes $\leq$ $\frac{1}{2}$ laboratory LOQ, For common laboratory contaminants, no analytes detected $>$ LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-7A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-7A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate). <i>See Table 6-7A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate). <i>See Table 6-7A.</i>
Surrogates	All samples	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits; <i>refer to Table 6-7A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits; <i>refer to Table 6-7A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	$>$ 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	$>$ 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-11  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: SVOCs/PAHs

Analytical Method/SOP Reference: SW846 8270D & SW846 8270SIM/ANA8270 & ANA8270SIM

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	Every field sample, standard, and QC sample.	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	Retention time $\pm$ 30 seconds from retention time of the midpoint standard in the ICAL; EICP area within -50% to +100% of ICAL midpoint standard.
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected $>$ $\frac{1}{2}$ RL and $>$ $\frac{1}{10}$ the amount measured in any sample or $\frac{1}{10}$ the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.		Accuracy / Sensitivity	All target analytes $\leq$ $\frac{1}{2}$ laboratory LOQ, For common laboratory contaminants, no analytes detected $>$ LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-8A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than $\pm$ 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-8A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate). <i>See Table 6-8A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	MSD: For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. MSD or sample duplicate: RPD $\leq$ 30% (between MS and MSD or sample and sample duplicate). <i>See Table 6-8A.</i>
Surrogates	All samples	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-8A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-8A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	$>$ 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	$>$ 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-12  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Pesticides

Analytical Method/SOP Reference: SW846 8081B/ANA8081

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > 1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-9A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-9A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-9A</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-9A</i>
Surrogates	All samples	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-9A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-9A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-13  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: PCBs

Analytical Method/SOP Reference: SW846 8082/ANA8082

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > 1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-10A.</i>	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. Otherwise, use in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery. <i>See Table 6-10A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-10A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-10A.</i>
Surrogates	All samples	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-10A.</i>	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic		Accuracy	Limits as per DoD QSM 4.2, if available. Otherwise, use in-house control limits. <i>Refer to Table 6-10A.</i>
Method Detection Limit (MDL) Study	At initial set-up and subsequently once per 12-month period; otherwise quarterly MDL verification checks	MDL verification checks must produce a signal at least 3 times the instrument's noise level	Run MDL verification check at higher level and set MDL higher or reconduct MDL study.	Laboratory QA Officer	Sensitivity	MDL verification checks must produce a signal at least 3 times the instrument's noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-14  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Metals

Analytical Method/SOP Reference: SW846 6020A/ANA6020

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > 1/2 LOQ and greater than 1/10 the amount measured in any sample. For common lab contaminants, no analytes detected > LOQ.	Correct problem. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank	Analyst, Laboratory QA Officer	Accuracy/Bias, Representativeness	All target analytes < 1/2 laboratory LOQs
Interference Check Solution	At the beginning of an analytical run and every 12 hours	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spikes analytes); ICS-AB: Within 20% of true value	Terminate analysis; locate and correct problem; reanalyze LCS, reanalyze all samples		Accuracy	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spikes analytes); ICS-AB: Within 20% of true value
Matrix spike	One per matrix per analytical method for each batch of at most 20 samples	<i>Refer to Table 6-11A.</i>	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Accuracy/Bias	<i>Refer to Table 6-11A.</i>
Laboratory duplicate	One per matrix per analytical method for each batch of at most 20 samples	<i>Refer to Table 6-11A.</i>	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Precision	<i>Refer to Table 6-11A.</i>
Serial Dilution	One per matrix per analytical method for each batch of at most 20 samples	Five-fold dilution must agree within ± 10% of the original measurement.	Applicable when the concentration is >50x the DL. If the %D is greater than 10%, then perform post-digestion spike addition.		Precision	Five-fold dilution must agree within ± 10% of the original measurement.
Post-digestion spike	When dilution test fails or analyte concentration for all samples < 50 x LOD.	75-125%R	Examine the project specific data quality objectives. Contact client as to additional measure that may need to be taken.		Accuracy	75-125%R
Internal Standards	Every sample	IS intensity within 30-120% of intensity of the IS in the ICAL	Reanalyze sample at 5-fold dilution with addition of appropriate amounts of internal standards.		Accuracy	IS intensity within 30-120% of intensity of the IS in the ICAL
Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-15  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Mercury

Analytical Method/SOP Reference: SW846 7470A/ANA7470A

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No analytes detected > ½ RL and greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	No analytes detected > ½ RL and greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1)
Calibration Blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected > LOD	Correct problem. Re-prepare and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		Accuracy / Sensitivity	No analytes detected > LOD
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples	QC acceptance criteria specified by DoD, <i>refer to Table 6-11A.</i>	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, <i>refer to Table 6-11A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>Refer to Table 6-11A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>Refer to Table 6-11A.</i>
Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-16  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Hexavalent Chromium

Analytical Method/SOP Reference: SW846 7199/ANA218.6-7199

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per preparatory batch of up to 20 samples.	No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes>LOQ.	Correct problem, then reprep and reanalyze the MB and all samples in the associated batch for failed analytes, except when sample results are below the LOD if sufficient material is available.	Analyst, Laboratory QA Officer	Sensitivity/ Bias	No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes>LOQ.
LCS	One per preparatory batch of up to 20 samples.	<i>Per Table 6-11A</i> , spike recovery must be within 80-120%	Correct problem, then reprep and reanalyze the LCS/LCSD and all samples in the associated batch for failed analytes, if sufficient material is available.		Accuracy/ Precision	<i>Per Table 6-11A</i> , spike recovery must be within 80-120%
MS	One per preparatory batch of up to 20 samples.	<i>Per Table 6-11A</i> , spike recovery within 80-120%	Examine the project-specific DQOs. Notify lab QA officer and project chemist as to additional measures to be taken.		Accuracy/ Precision	<i>Per Table 6-11A</i> , spike recovery within 80-120%
MSD or Matrix Duplicate	One per preparatory batch per matrix.	RPD ≤ 30% (between MS and MSD or sample and sample duplicate).	Examine the project-specific DQOs. Notify lab QA officer and project chemist as to additional measures to be taken.		Accuracy/ Precision	RPD ≤ 30% (between MS and MSD or sample and sample duplicate).

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 8-17  
Laboratory QC Samples

Matrix: Surface Soil (Multi-increment samples), Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Explosive Residues including PETN and Nitroglycerin

Analytical Method/SOP Reference: SW846 8330B/HPL8330

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Soil drying procedure	Each sample	Laboratory must have a procedure to determine when the sample is dry to constant weight. Record date, time, and ambient temperature on a daily basis while drying samples.	NA	Analyst/Technician	NA	NA
Soil sieving procedure (Multi-increment samples only)	Each sample	Weigh entire sample. Sieve entire sample with a 10 mesh sieve. Breakup pieces of soil (especially clay) with gloved hands. Do not intentionally include vegetation in the portion of the sample that passes through the sieve unless this is a project specific requirement. Collect and weigh any portion unable to pass through the sieve.	NA		NA	NA
Soil grinding Procedure (Multi-increment samples only)	Initial demonstration	The laboratory must initially demonstrate that the grinding procedure is capable of reducing the particle size to < 75 µm by passing representative portions of ground sample through a 200 mesh sieve (ASTM E11).	NA		NA	NA
Soil grinding blank (Multi-increment samples only)	Between each sample.	A grinding blank using clean solid matrix (such as Ottawa sand) must be prepared (e.g., ground and subsampled) and analyzed in the same manner as a field sample. Grinding blanks are composited and analyzed as the batch method blank. No target analytes detected greater than 1/2 Reporting Limit (RL).	Individual blanks must be analyzed and results must be reported and the affected samples must be flagged accordingly if blank criteria is not met	Analyst Lab QA Officer Project Chemist	Accuracy / Sensitivity	No target analytes detected greater than 1/2 the LOQ.
Soil subsampling Process (Multi-increment samples only)	Each sample and duplicate	Entire ground sample is mixed, spread out on a large flat surface (e.g., baking tray), and 30 or more randomly located increments are removed from the entire depth to sum a ~10 g subsample.	NA	Analyst/Technician	NA	NA
Soil sample triplicate (Multi-increment samples only)	At the subsampling step, one sample per batch. Cannot be performed on any type of blank sample. Client to designate sample or lab to randomly pick sample.	Three 10 g subsamples are taken from the designated sample. The RSD for results above the RL must not exceed 20%.	Corrective action must be taken if this criterion is not met (e.g., the grinding process should be investigated to ensure that the samples are being reduced to a sufficiently small particle size).	Analyst Lab QA Officer Project Chemist	Accuracy / Precision	The RSD for results above the LOQ must not exceed 20%.
Method Blank	One per matrix per analytical method for each batch of at most 20 samples	No target analytes detected > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL	Re-extract or re-analyze samples associated with the MB except if the sample is non-detect for the blank contaminants.	Analyst, Laboratory QA Officer	Accuracy / Sensitivity	All target analytes < 1/2 laboratory LOQ, For common laboratory contaminants, no analytes detected > LOQ
Laboratory Control Sample (LCS)	One per matrix per analytical method for each batch of at most 20 samples. Multi Incremental samples: The LCS is prepared from a ground clean sand matrix that has been spiked post-grind. <sup>1</sup>	QC acceptance criteria specified by DoD, if available. <i>See Table 6-12A.</i>	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated batch for failed analytes, if sufficient sample material is available.		Accuracy / Precision - Analytical	QC acceptance criteria specified by DoD, if available. <i>See Table 6-12A.</i>
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	1 per matrix spike pair per analytical batch	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-12A.</i>	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.		Precision - Analytical	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available. Otherwise, use in-house LCS control limits. <i>See Table 6-12A.</i>

Method Detection Limit (MDL) Study	Annually for each analytical method and matrix	MDL verifications checks must produce a signal above the instrument noise level	Repeat MDL study	Laboratory QA Officer	Sensitivity	MDL verifications checks must produce a signal above the instrument noise level
Data completeness check	Once, after all validated data are received	> 95% sample collection and analysis	Request corrections from laboratory or data validator	Project Chemist	Completeness	> 95% sample collection and analysis

1 This is an APPL variance to the requirements of the DoD QSM v4.2. It is impractical to prepare a reference material containing spike analytes pre-grind, due to the high concentrations that would be required to spike 1kg of soil.

DoD QSM v. 4.2 is the basis for specifications on this table with the exception of the LCS for multi-increment samples as described above.

TABLE 8-18  
Laboratory QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Perchlorate

Analytical Method/SOP Reference: SW846 6850/HPL6850

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	No target analytes $\geq$ ½ RL in accordance with DoD QSM requirements	Correct problem, then re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Analyst	Accuracy/Bias Contamination	No target analytes $\geq$ ½ RL in accordance with DoD QSM requirements
IS	During acquisition of calibration standard, samples, and QC check samples	Areas within -50% to +100% of the midpoint of the last ICAL for each sample and QC in accordance with DoD QSM requirements	Inspect LCMS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning in accordance with DoD QSM requirements		Accuracy/Bias	Areas within -50% to +100% of the midpoint of the last ICAL for each sample and QC in accordance with DoD QSM requirements
Isotope Ratio	Every Sample and QC	83/85 ratio within $\pm$ 30% of the mid-range ICAL standard ratio, or within $\pm$ 30% of the ratio of the average of the areas from all CCVs in the run, if the ICAL is not run the same day	NA		Qualitative Identification	83/85 ratio within $\pm$ 30% of the mid-range ICAL standard ratio, or within $\pm$ 30% of the ratio of the average of the areas from all CCVs in the run, if the ICAL is not run the same day
LCS	One LCS per analytical/preparation batch	QC acceptance criteria: 80% to 120% accuracy, 15% precision; or laboratory statistically derived control limits,	Correct problem, then re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements.		Accuracy/Bias	QC acceptance criteria: 80% to 120% accuracy, 15% precision; or laboratory statistically derived control limits

DoD QSM v. 4.2 is the basis for specifications on this table.

TABLE 9-1

FIELD QC SAMPLES

Matrix: Groundwater

Analytical Group: VOCs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	VOCs	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq 30\%$	S & A
Equipment Rinsate Blank		One per day	Bias/Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy/Representativeness	2-6 degrees Celsius ( $^{\circ}\text{C}$ )	S

TABLE 9-2  
Field QC Samples

Matrix: Groundwater  
Analytical Group: SVOCs & PAHs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	SVOCs & PAHs	One per 10 field samples	Precision	RPD $\leq$ 20%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-3  
Field QC Samples

Matrix: Groundwater  
Analytical Group: Pesticides

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Pesticides	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-4  
Field QC Samples

Matrix: Groundwater  
Analytical Group: PCBs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	PCBs	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq 30\%$	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}\text{C}$ )	S

TABLE 9-5  
Field QC Samples

Matrix: Groundwater  
Analytical Group: Total and Dissolved Metals

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	TAL Metals	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-6  
Field QC Samples

Matrix: Groundwater  
Analytical Group: Mercury

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Mercury	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-7  
Field QC Samples

Matrix: Groundwater

Analytical Group: Hexavalent Chromium

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Hexavalent Chromium	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-8  
Field QC Samples

Matrix: Groundwater

Analytical Group: Explosive Residues including PETN and Nitroglycerin

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Explosive Residues including PETN and Nitroglycerin	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-9  
Field QC Samples

Matrix: Groundwater  
Analytical Group: Perchlorate

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Perchlorate	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq 15\%$	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}\text{C}$ )	S

TABLE 9-10  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: VOCs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	VOCs	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 20%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-11  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: SVOCs & PAHs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	SVOCs & PAHs	One per 10 field samples	Precision	Relative Percent Difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-12  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Pesticides

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Pesticides	One per 10 field samples	Precision	%RPD $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-13  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: PCBs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	PCBs	One per 10 field samples	Precision	%RPD $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-14  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples

Analytical Group: Metals

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Metals	One per 10 field samples	Precision	RPD $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius (°C)	S

TABLE 9-15  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Mercury

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Mercury	One per 10 field samples	Precision	RPD $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius (°C)	S

TABLE 9-16  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Hexavalent Chromium

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Hexavalent Chromium	One per 10 field samples	Precision	RPD $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius (°C)	S

TABLE 9-17  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Explosive Residues including PETN and Nitroglycerin

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Explosive Residues including PETN and Nitroglycerin	One per 10 field samples	Precision	Relative percent difference (RPD) $\leq$ 30%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius ( $^{\circ}$ C)	S

TABLE 9-18  
Field QC Samples

Matrix: Surface Soil, Subsurface Soil, and Test Pit Soil Samples  
Analytical Group: Perchlorate

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Perchlorate	One per 10 field samples	Precision	RPD < 15%	S & A
Equipment Rinsate Blank		One per day	Bias / Contamination	No analyte detected > 1/2 LOQ	S & A
Temperature Blank		One per cooler	Accuracy / Representativeness	2-6 degrees Celsius (°C)	S

TABLE 10  
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC-MS (VOCs, SVOCs, and PAHs)	Routine Maintenance under Service contract	N/A	N/A	Twice a year and additionally as needed	N/A	N/A	Certified instrument technician	ANA8260, ANA8270, ANA8270SIM
	Replace hydrocarbon traps and oxygen traps on helium and hydrogen gas lines; replace Chemical traps; Replacing converter tube in gas purifier system	Check oxygen/moisture indicator (OM-1) tube for a color change	Check GC system for high detector noise and reduced detector response.	As needed	N/A	N/A	Analyst or certified instrument technician	ANA8260
	Clean and/or replace GC inlet.	Check System pressure for vacuum range and for steadiness with an HP Ion Gauge Pressure Measuring Device; Run a manual tune	Check and Tighten Interface column nut inside GC oven.	As needed	N/A	N/A	Analyst or certified instrument technician	ANA8270, ANA8270SIM
	Inspect, clean and/or replace ALS syringe. Replace column.	N/A	N/A	As needed	N/A	N/A	Analyst or certified instrument technician	ANA8270, ANA8270SIM
	Add oil to vacuum rough pump	Check oil in vacuum rough pump	N/A	Every 4 to 6 weeks	N/A	N/A	Analyst or certified instrument technician	ANA8270, ANA8270SIM
	Replace/refill oxygen and moisture traps.	N/A	N/A	Yearly, or as needed	N/A	N/A	Analyst or certified instrument technician	ANA8270, ANA8270SIM
GC-ECD (Pesticides and PCBs)	Change gas purifier	N/A	Visually inspect if traps changing color	Every 6 to 12 months	No moisture	Replace indicating traps	Analyst or certified instrument technician	ANA8081, ANA8082
	Change syringes / syringe needles	N/A	Visually inspect for wear or damage	Every 3 months	N/A	Replace syringe if dirt is noticeable in the syringe	Analyst or certified instrument technician	ANA8081, ANA8082
	Change Inlet liner, Liner O-rings, and Inlet Septum	N/A	Visually inspect for dirt or deterioration	Weekly for liner Monthly for O-rings Daily for septum	N/A	Replace them and check often	Analyst or certified instrument technician	ANA8081, ANA8082
	Change front-end column	N/A	Check peak tailing, decreased sensitivity, retention time changes	Weekly, monthly, or when needed	N/A	Remove 1/2 to 1 meter from the front of the column when experiencing problems	Analyst or certified instrument technician	ANA8081, ANA8082
	Perform 'Wipe Test' and clean up the baseline.	N/A	Baseline is noisy.	Every 6 month or as needed	In accordance with manufacturer's recommendation or lab SOP	Thermally clean by "baking-out" the instrument over-night.	Analyst or certified instrument technician	ANA8081, ANA8082
ICP-MS (Metals)	Check windings	N/A	Visually inspect for wear or damage	8 hours of operation	N/A	Replace windings	Analyst or certified manufacture instrument technician	ANA6020
	Clean nebulizer	N/A	Visually inspect for wear or damage	Daily prior to operation	N/A	Flush with DI water	Analyst or certified manufacture instrument technician	ANA6020
	Clean spray chamber	N/A	Visually inspect for dirt or deterioration	As necessary	N/A	Rinse with DI water	Analyst or certified manufacture instrument technician	ANA6020
	Clean Torch	N/A	Visually inspect for dirt or deterioration	Monthly	N/A	Clean with a 10% HNO3 solution and soak any parts with buildup overnight in a 5% HNO3 solution. Rinse with DI water and air dry.	Analyst or certified manufacture instrument technician	ANA6020
CVAA (Mercury)	Record Cathode Lamp Energy; Clean the gas liquid separator and cold vapor cell	Verify Nitrogen Tank Pressure	Verify Nitrogen Tank Pressure; Empty Waste Container	Daily and annual maintenance from manufacturer	Intensity of spectrum is within manufacture's recommendation	Call for maintenance service.	Analyst or certified instrument technician	ANA7470A, ANA7471
	Change pump windings of VGA-76 (vapor generation assembly)	NA	NA	Once monthly or when needed	NA	Call for maintenance service.	Analyst or certified instrument technician	ANA7470A, ANA7471

Dionex IC (Hexavalent Chromium)	Inject DI rinse at the end of every run; Rinse the piston seals	NA	Check for and isolate leaks	Daily	none	Clean up and repair any leaks.	Analyst or certified instrument technician	ANA218.6-7199, INO29
	Locate and replace any pinched or damaged airlines	NA	NA	Weekly	NA	NA	Analyst or certified instrument technician	ANA218.6-7199, INO29
	Replace primary and rinse seals in pump heads	NA	NA NA	Every 6 months, more frequently if needed	NA	NA	Analyst or certified instrument technician	ANA218.6-7199, INO29
HPLC (Explosive Residues including PETN and Nitroglycerin, and Perchlorate)	Change guard cartridge, inlet filter and PTFE frit	N/A	Review pressure profile	As needed, based on pressure profile	N/A	Replace them and check often	Analyst or certified instrument technician	HPL8330, HPL6850
	Change analytical column	N/A	Check peak tailing, decreased sensitivity, retention time changes, etc.	When chromatography indicates	N/A	N/A	Analyst or certified instrument technician	HPL8330, HPL6850
	Replace mobile phase daily	N/A	N/A	Daily	N/A	N/A	Analyst or certified instrument technician	HPL8330, HPL6850
Sieve (Explosive Residues Surface Soil Samples)	Wash the sieve with soap and water and rinse with acetone. Allow the sieves to dry thoroughly, especially at the seal between the screen and the metal cylinder.	N/A	N/A	in between each sample	N/A	N/A	technician	MSE018IS
Grinder bowl (Explosive Residues Surface Soil Samples)	Thoroughly clean the grinder bowl, puck and lid with warm soapy water and rinse with clean water and then acetone. The Teflon lid seal should be removed with a small spatula and cleaned separately.	N/A	N/A	in between each sample	N/A	N/A	technician	MSE018IS

TABLE 11  
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC-MS (VOCs, SVOCs, and PAHs)	Tuning	Prior to ICAL and at the beginning of each 12-hour period	Refer to method for specific ion criteria	Retune instrument and verify. Rerun affected samples.	Analyst or certified instrument technician	ANA8260, ANA8270, ANA8270SIM
	5-point ICAL for linear calibration	Prior to sample analysis	1. Average response factor (RF) for SPCCs: VOCs $\geq 0.30$ for chlorobenzene and 1,1,2,2-tetrachloroethane; $\geq 0.1$ for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs $\geq 0.050$ . 2. RSD for RFs for CCCs: VOCs and SVOCs $\leq 30\%$ and one option below: Option 1: RSD for each analyte $\leq 15\%$ ; Option 2: linear least squares regression $r \geq 0.995$ ; Option 3: non-linear regression—coefficient of determination (COD) $r^2 \geq 0.99$ (6 points shall be used for second order, 7 points shall be used for third order).	Correct problem, then repeat ICAL.	Analyst or certified instrument technician	ANA8260, ANA8270, ANA8270SIM
	Second source calibration verification (ICV)	After ICAL	All analytes within $\pm 20\%$ of expected value	Correct problem and verify second source standard. Rerun second source verification. If fail, correct problem and repeat ICAL.	Analyst or certified instrument technician	ANA8260, ANA8270, ANA8270SIM
	Establish Retention Time (RT) window position for each analyte and surrogate	Once per ICAL	Position shall be set using the midpoint standard for the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used..	N/A	Analyst or certified instrument technician	ANA8260, ANA8270, ANA8270SIM
	Evaluation of relative retention times (RRT)	With each sample	RRT of each target analyte within $\pm 0.06$ RRT units.	Correct problem, then rerun ICAL.	NA	ANA8260, ANA8270, ANA8270SIM
	CCV	Daily before sample analysis and every 12 hours of analysis time.	1. Average RF for SPCCs: VOCs $\geq 0.30$ for chlorobenzene and 1,1,2,2-tetrachloroethane; $\geq 0.1$ for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs $\geq 0.050$ . 2. %Difference/Drift for all target compounds and surrogates: VOCs and SVOCs $\leq 20\%D$ (Note: D = difference when using RFs or drift when using least squares regression or nonlinear alibration).	DoD project level approval must be obtained for each of the failed analytes or corrective action must be taken. Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since last acceptable CCV	Analyst or certified instrument technician	ANA8260, ANA8270, ANA8270SIM
GC-MS (SVOCs only)	Breakdown check (DDT)	At beginning of each 12-hour period, prior to analyzing samples	Degradation $\leq 20\%$ for DDT. Benzidine and pentachlorophenol should be present at their normal responses, and should not exceed a tailing factor of 2.	Correct Problem then repeat breakdown check	Analyst or certified instrument technician	ANA8270
GC-ECD (Pesticides and PCBs)	5-point ICAL for linear calibration	Prior to sample analysis	One of the options below: Option 1: RSD for each analyte $\leq 20\%$ ; Option 2: linear least squares regression: $r \geq 0.995$ ; Option 3: non-linear regression: coefficient of determination (COD) $r^2 \geq 0.99$ (6 points shall be used for second order, 7 points shall be used for third order).	Correct problem, then repeat ICAL.	Analyst or certified instrument technician	ANA8081, ANA8082
	Second source calibration verification (ICV)	After ICAL	All analytes within $\pm 20\%$ of expected value	Correct problem and verify second source standard. Rerun second source verification. If fail, correct problem and repeat ICAL.	Analyst or certified instrument technician	ANA8081, ANA8082
	Establish Retention Time (RT) window position for each	Once per ICAL and at beginning of	Position shall be set using the midpoint standard for the ICAL curve when ICAL is	N/A	Analyst or certified	ANA8081, ANA8082

TABLE 11  
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
	analyte and surrogate	analytical shift	performed. On days when ICAL is not performed, the initial CCV is used..		instrument technician	
GC-ECD (Pesticides and PCBs)	Retention time (RT) window width calculated for each analyte and surrogate	At method set-up and after major maintenance (e.g., column change).	RT width is $\pm 3$ times standard deviation for each analyte RT from a 72-hour study.	NA	NA	ANA8081, ANA8082
	CCV	Daily, before sample analysis, unless ICAL performed same day and after every 10 samples and at the end of the analysis sequence	All analytes within $\pm 20\%$ of expected value (%D)	Correct problem, rerun CCV. Reanalyze all samples since last successful calibration verification. If fail, repeat ICAL.	Analyst or certified instrument technician	ANA8081, ANA8082
	Breakdown check (Endrin / DDT Method 8081 only)	At beginning of each 12-hour period, prior to analyzing samples	Degradation $\leq 15\%$ for both DDT and Endrin	Correct Problem then repeat breakdown check	Analyst or certified instrument technician	ANA8081, ANA8082
ICP-MS (Metals)	IDL Study	At initial set-up and after significant change in instrument type, personnel, test method, or sample matrix	IDLs shall be $\leq$ LOD.	Samples may not be analyzed without a valid IDL.	Analyst or certified instrument technician	ANA6020
	Tuning	Prior to ICAL	Mass calibration $\leq 0.1$ amu from the true value; Resolution $< 0.9$ amu full width at 10% peak height; For stability, RSD $\leq 5\%$ for at least four replicate analyses.	Retune instrument then reanalyze tuning solutions.	Analyst or certified instrument technician	ANA6020
	Linear dynamic range or high-level check standard	Every 6 months	Within $\pm 10\%$ of true value.	NA	Analyst or certified instrument technician	ANA6020
	Initial calibration (ICAL) for all analytes (minimum one high standard and a calibration blank)	Daily ICAL prior to sample analysis.	If more than one calibration standard is used, $r \geq 0.995$ .	Correct problem, then repeat ICAL.	Analyst or certified instrument technician	ANA6020
	Second source calibration verification (ICV)	Once after each ICAL, prior to beginning a sample run.	Value of second source for all analyte(s) within $\pm 10\%$ of true value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Analyst or certified instrument technician	ANA6020
	Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All analytes within $\pm 10\%$ of true value;	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.	Analyst or certified instrument technician	ANA6020
	Low-level calibration check standard	Daily, after one-point ICAL	Within $\pm 20\%$ of true value	Correct problem, then reanalyze	Analyst or certified instrument technician	ANA6020
	Run Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected $>$ LOD	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.	Analyst or certified instrument technician	ANA6020
CVAA (Mercury)	Initial calibration (ICAL) for all analytes : minimum 5 standards and a calibration blank	Daily ICAL prior to sample analysis.	If more than one calibration standard is used, $r \geq 0.995$ .	Correct problem, then repeat ICAL.	Analyst or certified instrument technician	ANA7470A, ANA7471
	Second source calibration verification (ICV)	Once after each ICAL, prior to beginning a sample run.	Value of second source for all analyte(s) within $\pm 10\%$ of true value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Analyst or certified instrument technician	ANA7470A, ANA7471
	Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	Within $\pm 20\%$ of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.	Analyst or certified instrument technician	ANA7470A, ANA7471
Dionex IC (Hexvalent Chromium)	ICAL (minimum three standards and a calibration blank)	Daily ICAL prior to sample analysis	$r \geq 0.999$ .	Correct problem, then repeat ICAL.	Lab Manager/Analyst	ANA218.6-7199

TABLE 11  
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
Dionex IC (Hexvalent Chromium)	Second-source calibration verification (ICV)	Immediately following ICAL	Value of second source within $\pm 10\%$ of true value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat calibration.	Lab Manager/Analyst	ANA218.6-7199
	Continuing calibration verification (CCV)	Before and after every 10 field samples and at the end of the run.	Value of CCV within $\pm 10\%$ of true value	Correct problem then repeat CCV and reanalyze all samples since last successful calibration verification.	Lab Manager/Analyst	ANA218.6-7199
	Continuing calibration Blank (CCB)	Before and after every 10 field samples and at the end of the run.	No analytes detected > LOD	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.	Lab Manager/Analyst	ANA218.6-7199
HPLC (Explosive Residues including PETN and Nitroglycerin)	5-point ICAL for linear calibration	Prior to sample analysis. Minimum of 5 calibration standards with the lowest standard concentration at or below the RL. Once calibration curve or line is generated, the lowest calibration standard must be re-analyzed.	The apparent signal-to-noise ratio at the RL must be at least 5:1. If linear regression is used, $r \geq 0.995$ . If using Internal Standardization, $RSD \leq 15\%$ .  External Standardization $RSD = 20\%$	Correct problem then repeat initial calibration	Analyst or certified instrument technician	HPL8330
	Second source calibration verification	Once after each initial calibration	Analytes within $\pm 20\%$ of expected value (initial source)	Correct problem and verify second source standard. Rerun second source verification. If fails, correct problem and repeat initial calibration	Analyst or certified instrument technician	HPL8330
	RT window width	At method set-up and after major maintenance	RT width is $\pm 3$ times standard deviation for each analyte RT from 72-hour study.	N/A	Analyst or certified instrument technician	HPL8330
	Establishment and verification of the RT window for each analyte and surrogate	Once per ICAL and at the beginning of the analytical shift for establishment of RT; and with each CCV for verification of RT	Using the midpoint standard or the CCV at the beginning of the analytical shift for RT establishment; analyte must fall within established window during RT verification	N/A	Analyst or certified instrument technician	HPL8330
	Run second source calibration verification (ICV) and CCV	ICV: Daily, before sample analysis, unless ICAL performed same day. CCV: After every 10 samples and at the end of the analysis sequence	All analytes within $\pm 20\%$ of expected value (%D)	ICV: Correct problem, rerun ICV. If fails, repeat initial calibration. CCV: Correct problem, rerun CCV. Reanalyze all samples since last successful calibration verification	Analyst or certified instrument technician	HPL8330
HPLC-MS (Perchlorate)	Minimum six-point initial calibration for target analytes, lowest concentration standard at or near the reporting limit	Initial calibration prior to sample analysis	Linear: $r^2 > 0.990$ ( $r > 0.995$ ), $b < MDL$ ; Quadratic: $r^2 > 0.995$	Correct problem, then repeat initial calibration	Analyst	HPL6850
	Second-source calibration verification	Once per five-point initial calibration	Less than 15% difference for target analytes	Correct problem, then repeat. If still fails, repeat initial calibration.	Analyst	HPL6850
	Daily calibration verification	Before sample analysis and every 10 samples or every 12 hours, as specified by the method, and at the end of the sequence.	Low-range standard: Perchlorate within $\pm 50\%$ of the true value Mid-range standard: Perchlorate within $\pm 15\%$ of the true value	Correct problem, then repeat. If still fails, repeat initial calibration	Analyst	HPL6850
	Initial Calibration Blank and Continuing Calibration Blank (ICB/CCB)	Following ICV/CCVs	No target analyte concentrations above $\frac{1}{2}$ the reporting limit (RL).	Rerun ICB. Isolate and correct problem. Reanalyze associated samples.	Analyst	HPL6850
	Interference Check Standard (ICS)	Before sample analysis.	70% -130%	Rerun MCT. If problem still exists, recalibrate.	Analyst	HPL6850
	Internal Standard	Every Calibration Standard	ICAL: IS for each standard must be within $\pm 50\%$ of the average area of the ICAL.  ICV, CCV: Within $\pm 50\%$ of the average area of the ICAL or within $\pm 50\%$ of the 1st CCV of the run, if the ICAL is not run the same day.	Evaluate the system. Reanalyze/repeat the calibration.	Analyst	HPL6850

TABLE 11  
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference

---

TABLE 12  
Field Performance Audit Checklist

**Project Responsibilities**

Project No.: \_\_\_\_\_

Date: \_\_\_\_\_

Project Location: MCB Camp Lejeune

Signature: \_\_\_\_\_

**Team Members:**

---

---

Yes    No    1) Is the approved work plan being followed?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    2) Was a briefing held for project participants?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    3) Were additional instructions given to project participants?  
Comments \_\_\_\_\_  
\_\_\_\_\_

**Sample Collection**

Yes    No    1) Is there a written list of sampling locations and descriptions?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    2) Are samples collected as stated in the Master SOPs?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    3) Are samples collected in the type of containers specified in the work plan?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    4) Are samples preserved as specified in the work plan?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes    No    5) Are the number, frequency, and type of samples collected as specified in the work plan?  
Comments \_\_\_\_\_  
\_\_\_\_\_

---

Yes No 6) Are quality assurance checks performed as specified in the work plan?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 7) Are photographs taken and documented?  
Comments \_\_\_\_\_  
\_\_\_\_\_

**Document Control**

Yes No 1) Have any accountable documents been lost?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 2) Have any accountable documents been voided?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 3) Have any accountable documents been disposed of?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 4) Are the samples identified with sample tags?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 5) Are blank and duplicate samples properly identified?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 6) Are samples listed on a chain-of-custody record?  
Comments \_\_\_\_\_  
\_\_\_\_\_

Yes No 7) Is chain-of-custody documented and maintained?  
Comments \_\_\_\_\_  
\_\_\_\_\_

TABLE 13

## Project Documents and Records

Document	Where Maintained
Field Notebooks	Electronic .pdf copies in the project file. Hardcopy (bound notebook) in the project file. Archived at project closeout.
Chain-of-Custody Records	Electronic .pdf copies in the project file. Hardcopy in the project file. Archived at project closeout.
Air Bills	Hardcopy in the project file. Archived at project closeout.
Telephone Logs	Hardcopy in the project file. Archived at project closeout.
Corrective Action Forms	Electronic .pdf copies in the project file. Hardcopy in the project file. Archived at project closeout.
PID/FID readings	Recorded in Field Notebook. Stored in EnDat.
Water quality parameters collected during sediment sampling	Recorded in Field Notebook. Stored in EnDat.
OVM/OVA readings	Recorded in Field Notebook. Stored in EnDat.
Various field measurements	Recorded in Field Notebook.
All equipment calibration information	Recorded in Field Notebook.
Pertinent telephone conversations	Recorded in Field Notebook.
Equipment maintenance records	Inspected by Field Team Leader. Not maintained.
Sample Receipt, Custody, and Tracking Records	Electronic .pdf copies in the project file. Hardcopy in the full data package.
Standard Traceability Logs	Hardcopy in the full data package. Archived at project closeout.
Equipment Calibration Logs	Hardcopy in the full data package. Archived at project closeout.
Sample Prep Logs	Hardcopy in the full data package. Archived at project closeout.
Run Logs	Hardcopy in the full data package. Archived at project closeout.
Equipment Maintenance, Testing, and Inspection Logs	Hardcopy in the full data package. Archived at project closeout.
Reported Field Sample Results	Electronic .pdf copies in the project file. Hardcopy in the data package. Archived at project closeout.
Reported Results for Standards, QC Checks, and QC Samples	Hardcopy in the full data package. Archived at project closeout.
Instrument Printouts (raw data) for Field Samples, Standards, QC Checks, and QC Samples	Hardcopy in the full data package. Archived at project closeout.
Data Package Completeness Checklists	Hardcopy in the data validation report. Archived at project closeout.
Sample Disposal Records	Maintained by the laboratory.
Extraction/Clean-up Records	Maintained by the laboratory.
Raw Data	Hardcopy in the full data package. Archived at project closeout.
Field Sampling Audit Checklists	Hardcopy in the project file. Archived at project closeout.
Fixed Laboratory Audit Checklists	If completed, hardcopy in the project file. Archived at project closeout.
Data Validation Reports	Electronic .pdf copies in the project file. Hardcopy stored with the data package. Archived at project closeout.

---

TABLE 14  
Field Sampling SOPs

### **Field Sample Requirements and Collection Methods**

Composite surface soil samples will be collected using the TR-02-1 sampling approach inside the crater resulting from controlled detonation activities and the incremental sampling method will be utilized to collect a sample from outside of the crater.

#### **Surface Soil TR-02-1 Sampling**

Surface soil samples from inside the crater shall be collected using the TR-02-1 approach described in the USACE Technical Report ERDC/CRREL TR-02-1, *Guide for Characterization of Sites Contaminated with Energetic Materials* (Thiboutot, et al., 2002). Coordinates of the sampling locations will be based on the center of the sampling area. Soil samples will be collected by compositing a minimum of 30 sample increments from random locations within each crater. The 30 sample increments will be approximately equal in the amount of collected soil and the sample depth interval will be from 0 to 2 inches bgs. The sample increments at each location will be homogenized using the procedure described in section 3.3.

#### **Incremental Soil Sampling**

Surface soil samples shall be collected outside the crater utilizing the incremental sampling method. The decision unit for the post-BIP sample collected outside the crater (outside the 1 m × 1 m TR-02-01 sampling area) will be roughly circular and centered upon the crater, with a radius of up to 15 m to encompass the visible ejecta pattern. The maximum radius of 15 m is based on work conducted by the US Army Engineer Research and Development Center entitled “Explosive Residues from Blow-in-Place Detonations of Artillery Munitions” (Pennington, et al., 2008). This paper concluded that the majority of the explosives residue mass falls within 15 m of the detonation center. The soil samples will be collected in accordance with the incremental sampling SOP in Appendix C MRP MPP (CH2M HILL, 2010). At least 30 aliquots of soil will be collected from 0 to 2 inches bgs and homogenized using the procedure described in section 3.3.

#### **Soil Sample Homogenization Procedure**

Soil samples to be analyzed for explosives residues, perchlorate, and metals shall be homogenized in the field. After a sample is taken, a stainless steel spatula shall be used to remove the sample from the split sampling device. The sampler should not use fingers to do this, as gloves may introduce organic interferences into the sample.

The sample should be placed in a decontaminated stainless steel pan and thoroughly mixed using a stainless steel spoon. The soil in the pan should be scraped from the sides, corners, and bottom, rolled into the middle of the pan, and initially mixed. The sample should then be quartered and moved to the four corners of the pan. Each quarter of the sample should be mixed individually, and then rolled to the center of the pan and mixed with the entire sample again.

All stainless steel spoons, spatulas, and pans must be decontaminated following procedures specified in the appropriate SOP prior to homogenizing the sample. A composite equipment rinse blank of homogenization equipment should be taken each day it is used.

TABLE 15  
Post-Detonation Sampling Data Sheet



POST-DETONATION SOIL SAMPLING DATA SHEET	
Client:	Project Number:
Location:	Inside Crater Sample ID:
Event:	Outside Crater Sample ID:
Date:	Field Duplicate Sample ID:
Weather:	MS/MSD Sample ID:
Sampling Team:	EB Sample ID:
Easting Coordinate UTM Zone 18 (Meters)	
Northing Coordinate UTM Zone 18 (Meters)	

Sample information: method, container number, size, and type, preservative used.			
Soil Samples			
Analytical Method	Preservative	Container requirements <sup>1</sup>	Total No. of Containers <sup>2</sup>
SW846 8330B Explosive Residues, including PETN and Nitroglycerin	Cool to 0-6°C	One 2oz. wide-mouth jars per sample	
SW846 6850 Perchlorate	Cool to 0-6°C	One 4oz. amber glass jar per sample	
SW846 6010C and 7470A/7471B Metals	Cool to 0-6°C	Two 2oz. wide-mouth jars per sample	
SW846 7199 Hexavalent Chromium	Cool to 0-6°C	One 4oz. wide-mouth jar per sample	
Groundwater Sample and Aqueous Blanks			
SW846 8330B Explosive Residues, including PETN and Nitroglycerin	Cool to 0-6°C	Two 1L Amber per sample	
SW846 6850 Perchlorate	Cool to 0-6°C	One 250mL polyethylene bottle per sample	
SW846 6010C and 7470A/7471B Metals	pH < 2 with HNO <sub>3</sub> & Cool to 0-6°C	One 250mL polyethylene bottles per sample	
SW846 7199 Hexavalent Chromium	Cool to 0-6°C	One 250mL high-density polyethylene bottle per sample	
Notes:			
<sup>1</sup> Container types and quantities per sample vary among laboratories. Confirm container information with the project chemist.			
<sup>2</sup> Including field and QA/QC Samples			

---

Observations:

**Attachment II**  
**Department of Defense**  
**Environmental Laboratory Accreditation Program**  
**Accreditation Letters – Analytical Laboratories**

---



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

*Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:*

***APPL, Inc.***

***908 N. Temperance Avenue, Clovis, CA 93611***

*(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the DoD Quality Systems Manual for Environmental Laboratories Version 4.2 10/26/2010 and is accredited in accordance with the:*

### **United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)**

***This accreditation demonstrates technical competence for the defined scope:  
Environmental Testing  
(As detailed in the supplement)***

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

*Initial Accreditation Date:*

*May 13, 2013*

*Issue Date:*

*May 13, 2013*

*Expiration Date:*

*November 23, 2013*

Tracy Szerszen  
President/Operations Manager

*Accreditation No.:*

74807

*Certificate No.:*

L13-145

Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48084

*The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: [www.pjlabs.com](http://www.pjlabs.com)*



# Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

## APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611  
Diane Anderson Phone: 559-275-2175

*Accreditation is granted to the facility to perform the following testing:*

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 608	GC/ECD	PCB
Aqueous	EPA 160.1 SM 2540C	Gravimetric	Total Dissolved Solids
Aqueous	EPA 1664A	Gravimetric	Oil & Grease
Aqueous	SM 2320B	Titrimetric	Alkalinity
Aqueous	SM 2510B	EC meter	Electrical Conductance
Aqueous	SM 2540D	Gravimetric	Total Suspended Solids
Aqueous	EPA 300.0 EPA 9056 EPA 9056A	Dionex Ion Chromatography	Anion analysis
Aqueous	SM 5310B EPA 9060A	TOC Analyzer	DOC / TOC
Aqueous	SM 5520B	Gravimetric	Oil & Grease
Aqueous	SM 5520BF	Gravimetric	TRPH
Aqueous	SM 5540C	UV/Vis	MBAS
Aqueous	EPA 9040C	Ion Selective Electrode	Corrosivity - pH
Aqueous	RSK175	GC / FID	Ethane / Ethene / Methane
Aqueous/Solids	EPA 314	Dionex Ion Chromatography	Perchlorate analysis
Aqueous/Solids	EPA 350.1	Lachat Flow Injection Analysis	Ammonia
Aqueous/Solids	EPA 351.2	Lachat Flow Injection Analysis	TKN
Aqueous/Solids	EPA 353.2	Lachat Flow Injection Analysis	Nitrate / Nitrite
Aqueous/Solids	EPA 6850	HPLC/Electrospray Ionization/MS	Perchlorate
Aqueous/Solids	EPA 8011	GC/ECD	Chlorinated & Brominated Hydrocarbons
Aqueous/Solids	EPA 8290	HRGC/HRMS	Dioxins
Aqueous/Solids	EPA 9014	UV/Vis	Total Cyanide Analysis
Aqueous/Solids	EPA 8081A EPA 8081B	GC/ECD	OCL Pesticides
Aqueous/Solids	EPA 8151A	GC/ECD	Herbicides
Aqueous/Solids	EPA 218.6 EPA 7199	Dionex Ion Chromatography	Hexavalent Chromium
Aqueous/Solids	SM 4500S2F	Titrimetric	Sulfide
Aqueous/Solids	EPA 6010B EPA 6010C	ICP	Total Metals
Aqueous/Solids	EPA 6020 EPA 6020A	ICP/MS	Total Metals
Aqueous/Solids	EPA 7196A	UV/Vis	Hexavalent Chromium



*Certificate of Accreditation: Supplement*  
ISO/IEC 17025:2005 and DoD-ELAP

**APPL, Inc.**

908 N. Temperance Avenue, Clovis, CA 93611  
Diane Anderson Phone: 559-275-2175

*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solids	EPA 8015 BCD	GC/FID	DRO/GRO
Aqueous/Solids	EPA 8082 EPA 8082A	GC/ECD	PCB
Aqueous/Solids	EPA 8141A EPA 8141B	GC/ECD	OP Pesticides
Aqueous/Solids	EPA 8260B EPA 8260C	GC/MS	VOA
Aqueous/Solids	EPA 8270C EPA 8270D	GC/MS	Semi-VOA
Aqueous/Solids	EPA 8270C SIM EPA 8270D SIM	GC/MS	PAH
Aqueous/Solids	EPA 8321A	HPLC	Carbamates
Aqueous/Solids	EPA 8330A EPA 8330B EPA 8321A	HPLC	Nitroaromatics & Nitramines & Nitroguanadine, PGDN, Picric Acid
Aqueous/Solids	EPA 9010C	Midi-Distillation unit	Total Cyanide Distillation
Aqueous/Solids	AK101	GC-FID	Gasoline Range Organics, C6-C10
Aqueous/Solids	AK102	GC-FID	Diesel Range Organics, C10-C25
Drinking Water / Aqueous/Solids	EPA 1668A	High Resolution GC/MS	PCB Congeners
Solids	EPA 1030	Combustion	Ignitability
Solids	EPA 9045D	Ion Selective Electrode	Corrosivity - pH
Solids	EPA 9056 EPA 9056A	Dionex Ion Chromatography	Anion analysis
Solids	AK103	GC-FID	Residual Range Organics (RRO)
Solids	Walkley-Black	Titration	TOC



*Certificate of Accreditation: Supplement*  
ISO/IEC 17025:2005 and DoD-ELAP

**APPL, Inc.**

908 N. Temperance Avenue, Clovis, CA 93611  
Diane Anderson Phone: 559-275-2175

*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous	EPA 245.1 EPA 7470A	Hotplate digestion	Mercury Digestion and Analysis
Aqueous	EPA 3010A	Hot Block	Acid Digestion for Metals Analysis
Aqueous	EPA 3015A	Microwave	Microwave assisted Acid Digestion for Metals Analysis
Aqueous	EPA 3510C	Separatory funnel	Separatory Funnel Extraction
Aqueous	EPA 3520C	Liquid-Liquid Extractor	Liquid-Liquid Extraction
Aqueous	EPA 5030B EPA 5030C	Purge and trap	Purge and Trap for Aqueous Samples
Aqueous/Solids	EPA 3630C	Cleanup	Silica gel cleanup
Aqueous/Solids	EPA 3640A	Cleanup	Gel permeation cleanup
Aqueous/Solids	EPA 3660B	Cleanup	Sulfur cleanup
Aqueous/Solids	EPA 3665A	Cleanup	Sulfuric acid – permanganate cleanup
Solids	EPA 1311	Rotary Tumbler	TCLP extraction
Solids	EPA 1312	Rotary Tumbler	SPLP extraction
Solids	EPA 3050B	Hotplate digestion	Acid digestion for Metals Analysis
Solids	EPA 3051A	Microwave	Microwave assisted Acid Digestion for Metals Analysis
Solids	EPA 3540C	Soxhlet Extractors	Soxhlet Extraction
Solids	EPA 3550B	Ultrasonic waterbath	Ultrasonic Extraction
Solids	EPA 5035 EPA 5035A	Closed system purge and trap	Closed-system purge and trap extraction for VOA analysis
Solids	EPA 7471B	Hotplate digestion	Mercury Digestion and Analysis
Solids	8330B, Appendix A	Puck mill grinder	Incremental sampling
Solids	CA W.E.T.	Rotary Tumbler	Waste Extraction Test (WET)
Solids	EPA 3060A	Hotplate digestion	Alkaline digestion for Hexavalent chromium



# CERTIFICATE OF ACCREDITATION

**ANSI-ASQ National Accreditation Board/AClass**  
500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

**APPL, Inc.**  
**908 N. Temperance Avenue**  
**Clovis, CA 93611**

has been assessed by AClass  
and meets the requirements of

**ISO/IEC 17025:2005 and DoD-ELAP**

while demonstrating technical competence in the field(s) of

**TESTING**

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of tests to which this accreditation applies.

ADE-1410

Certificate Number

AClass Approval



Certificate Valid: 10/23/2011-10/23/2013  
Version No. 003 Issued: 12/08/2011



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).



# ANSI-ASQ National Accreditation Board

## SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & DoD-ELAP

### APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611  
Diane Anderson Phone: 559-275-2175

### TESTING

Valid to: October 23, 2013

Certificate Number: ADE- 1410

#### I. Environmental

MATRIX	SPECIFIC TEST or GROUP OF ANALYTES**	SPECIFICATION OR STANDARD METHOD (all EPA unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water / Wastewater	Acid Digestion for Metals Analysis	3010A	
Solid / Solid Waste	Acid digestion for Metals Analysis	3050B	
Water / Wastewater	Mercury Digestion and Analysis	245.1 / 7470A	AAS
Solid / Solid Waste	Mercury Digestion and Analysis	7471B	AAS
Water / Wastewater	Microwave assisted Acid Digestion for Metals Analysis	3015A	Microwave
Solid / Solid Waste	Microwave assisted Acid Digestion for Metals Analysis	3051A	Microwave
Water / Wastewater	Purge and Trap for Aqueous Samples	5030B / 5030C	
Solid / Solid Waste	Closed-system purge and trap extraction for VOA analysis	5035 / 5035A	
Water / Wastewater	Separatory Funnel Extraction	3510C	
Solid / Solid Waste	Ultrasonic Extraction	3550B	Ultrasonic waterbath



<b>MATRIX</b>	<b>SPECIFIC TEST or GROUP OF ANALYTES**</b>	<b>SPECIFICATION OR STANDARD METHOD (all EPA unless specified)</b>	<b>* KEY EQUIPMENT OR TECHNOLOGY USED</b>
Solid / Solid Waste	Soxhlet Extraction	3540C	Soxhlet Extractors
Water / Wastewater	Liquid-Liquid Extraction	3520C	Liquid-Liquid Extractor
Water / Wastewater / Solid / Solid Waste	Silica gel cleanup	3630C	
Solid / Solid Waste	Incremental sampling	8330B, Appendix A	Puck mill grinder
Water / Wastewater / Solid / Solid Waste	Sulfur cleanup	3660B	
Water / Wastewater / Solid / Solid Waste	Sulfuric acid – permanganate cleanup	3665A	
Water / Wastewater / Solid / Solid Waste	Gel permeation cleanup	3640A	
Solid / Solid Waste	TCLP extraction	1311	Rotary Tumbler
Solid / Solid Waste	SPLP extraction	1312	Rotary Tumbler
Solid / Solid Waste	Waste Extraction Test (WET)	CCR Chapter 11, Article 5, Appendix II	Rotary Tumbler
Water / Wastewater	Total Dissolved Solids	160.1 / 2540C	Gravimetric
Water / Wastewater	Total Suspended Solids	2540D	Gravimetric
Water / Wastewater	Anion analysis	300.0 / 9056 / 9056A	Dionex Ion Chromatography
Solid / Solid Waste	Anion analysis	9056 / 9056A	Dionex Ion Chromatography



<b>MATRIX</b>	<b>SPECIFIC TEST or GROUP OF ANALYTES**</b>	<b>SPECIFICATION OR STANDARD METHOD (all EPA unless specified)</b>	<b>* KEY EQUIPMENT OR TECHNOLOGY USED</b>
Water / Wastewater / Solid / Solid Waste	Perchlorate analysis	314.0	Dionex Ion Chromatography
Water / Wastewater / Solid / Solid Waste	Ammonia	350.1	Lachat Flow Injection Analysis
Water / Wastewater / Solid / Solid Waste	TKN	351.2	Lachat Flow Injection Analysis
Water / Wastewater / Solid / Solid Waste	Nitrate / Nitrite	353.2	Lachat Flow Injection Analysis
Water / Wastewater / Solid / Solid Waste	Sulfide	4200S2F	Titrimetric
Drinking Water / Water / Wastewater / Solid / Solid Waste	PCB Congeners	1668A	High Resolution GC/MS
Water / Wastewater / Solid / Solid Waste	Perchlorate	6850	HPLC/Electrospray Ionization/MS
Water / Wastewater	Oil & Grease	1664A	Gravimetric
Water / Wastewater	Oil & Grease	SM 5520B	Gravimetric
Water / Wastewater	TRPH	SM 5520BF	Gravimetric
Water / Wastewater / Solid / Solid Waste	Total Metals	6010B / 6010C	ICP
Water / Wastewater / Solid / Solid Waste	Total Metals	6020 / 6020A	ICP/MS
Water / Wastewater / Solid / Solid Waste	Hexavalent Chromium	7196A	UV/Vis
Solid / Solid Waste	Alkaline digestion of Hexavalent Chromium	3060A	



<b>MATRIX</b>	<b>SPECIFIC TEST or GROUP OF ANALYTES**</b>	<b>SPECIFICATION OR STANDARD METHOD (all EPA unless specified)</b>	<b>* KEY EQUIPMENT OR TECHNOLOGY USED</b>
Water / Wastewater / Solid / Solid Waste	Hexavalent Chromium	218.6 / 7199	Dionex Ion Chromatography
Water / Wastewater / Solid / Solid Waste	Total Cyanide Distillation	9010C	Midi-Distillation unit
Water / Wastewater / Solid / Solid Waste	Total Cyanide Analysis	9014	UV/Vis
Water / Wastewater	Corrosivity - pH	9040C	Ion Selective Electrode
Solid / Solid Waste	Corrosivity - pH	9045D	Ion Selective Electrode
Water / Wastewater / Solid / Solid Waste	Chlorinated & Brominated Hydrocarbons	8011	GC/ECD
Water / Wastewater / Solid / Solid Waste	DRO/GRO	8015B/C/D	GC/FID
Water / Solid	OP Pesticides	8141A / 8141B	GC/ECD
Water / Wastewater / Solid / Solid Waste	OCL Pesticides	8081A / 8081B	GC/ECD
Water / Waste Water	PCB	608	GC/ECD
Water / Wastewater / Solid / Solid Waste	PCB	8082 / 8082A	GC/ECD
Water / Wastewater / Solid / Solid Waste	Herbicides	8151A	GC/ECD
Water / Wastewater / Solid / Solid Waste	VOA	8260B / 8260C	GC/MS
Water / Wastewater / Solid / Solid Waste	PAH	8270C SIM / 8270D SIM	GC/MS
Water / Wastewater / Solid / Solid Waste	Semi-VOA	8270C / 8270D	GC/MS



MATRIX	SPECIFIC TEST or GROUP OF ANALYTES**	SPECIFICATION OR STANDARD METHOD (all EPA unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water / Wastewater / Solid / Solid Waste	Dioxins	8290	HRGC/HRMS
Water / Wastewater / Solid / Solid Waste	Nitroaromatics & Nitramines & Nitroguanidine PGDN Picric Acid	8330A / 8330B / 8321A	HPLC
Water / Wastewater / Solid / Solid Waste	Carbamates	8321A	HPLC
Solid / Solid Waste	Ignitability	1030	
Solid / Solid Waste	TOC	Walkley-Black	Titration
Water	DOC / TOC	SM 5310B / 9060A	TOC Analyzer
Water	Ethane / Ethene / Methane	RSK175	GC / FID
Water	Alkalinity	SM 2320B	Titrimetric
Water	MBAS	SM 5540C	UV/Vis
Water	Electrical Conductance	SM 2510B	EC meter

**Notes:**

1. \* = As Applicable
2. \*\* = Refer to Accredited Analytes Listing for specific analytes in which the laboratory is accredited
3. This scope is part of and must be included with the Certificate of Accreditation No. ADE- 1410



\_\_\_\_\_  
Vice President



**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.					
City/State :	Clovis, CA					
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results	
WP Minerals #1	55144	1955	Total Dissolved Solids (TDS)	160.1	Approved	
Oil & Grease	4120	1860	Oil & Grease	1664A	Approved	
Oil & Grease - n-Hexadecane & Stearic	55084	1860	Oil & Grease	1664A	Approved	
PCB Congeners in Water	PEO-403	9070	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	1668A	Approved	
PCB Congeners in Water	PEO-403	9025	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	1668A	Approved	
PCB Congeners in Water	PEO-403	9040	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)	1668A	Approved	
PCB Congeners in Water	PEO-403	8980	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	1668A	Approved	
PCB Congeners in Water	PEO-403	8955	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	1668A	Approved	
PCB Congeners in Water	PEO-403	9085	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)	1668A	Approved	
PCB Congeners in Water	PEO-403	9050	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 156)	1668A	Approved	
PCB Congeners in Water	PEO-403	9045	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)	1668A	Approved	
PCB Congeners in Water	PEO-403	8985	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	1668A	Approved	
PCB Congeners in Water	PEO-403	9055	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)	1668A	Approved	
PCB Congeners in Water	PEO-403	9005	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)	1668A	Approved	
PCB Congeners in Water	PEO-403	8995	2,3,4,4',5-Pentachlorobiphenyl (PCB 118)	1668A	Approved	
PCB Congeners in Water	PEO-403	9000	2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)	1668A	Approved	
PCB Congeners in Water	PEO-403	8936	2,4,4'-Trichlorobiphenyl (PCB 28)	1668A	Approved	
PCB Congeners in Water	PEO-403	9060	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)	1668A	Approved	
PCB Congeners in Water	PEO-403	9015	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)	1668A	Approved	
PCB Congeners in Water	PEO-403	8965	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)	1668A	Approved	
PCB Congeners in Water	PEO-403	8970	3,4,4',5-Tetrachlorobiphenyl (PCB 81)	1668A	Approved	
PCB Congeners in Water	PEO-403	9025	PCB (129)+(138)+(163)	1668A	Approved	
PCB Congeners in Water	PEO-403	9040	PCB (153)+(168)	1668A	Approved	
PCB Congeners in Water	PEO-403	9046	PCB (156)+(157)	1668A	Approved	
PCB Congeners in Water	PEO-403	9070	PCB (180)+(193)	1668A	Approved	
PCB Congeners in Water	PEO-403	8936	PCB (20)+(28)	1668A	Approved	
PCB Congeners in Water	PEO-403	8980	PCB (90)+(101)+(113)	1668A	Approved	
PCB Congeners in Water	PEO-403	8870	PCBs, total	1668A	Approved	
WP Hexavalent Chromium	55096	1045	Chromium VI	218.6	Approved	
SWA Anions	55131	1540	Bromide	300.0	Approved	
WP Minerals #1	55144	1575	Chloride	300.0	Approved	
WP & DMRQA Nutrients	55035	1810	Nitrate as N	300.0	Approved	
WP & DMRQA Nutrients	55035	1870	Orthophosphate as P	300.0	Approved	
WP Nitrate & Nitrite	55130	1810	Nitrate as N	300.0	Approved	
WP Nitrate & Nitrite	55130	1820	Nitrite + Nitrate as N	300.0	Approved	
WP Nitrate & Nitrite	55130	1840	Nitrite as N	300.0	Approved	
WP Minerals #2	55145	1730	Fluoride	300.0	Approved	
WP Minerals #2	55145	2000	Sulfate	300.0	Approved	
WP Perchlorate	55116	1895	Perchlorate	314.0	Approved	
WP & DMRQA Nutrients	55035	1515	Ammonia as N	350.1	Approved	
WP & DMRQA Nutrients #2	55064	1795	Total Kjeldahl Nitrogen	351.2	Approved	
WP & DMRQA Nutrients	55035	1810	Nitrate as N	353.2	Approved	
WP Nitrate & Nitrite	55130	1810	Nitrate as N	353.2	Approved	
WP Nitrate & Nitrite	55130	1820	Nitrite + Nitrate as N	353.2	Approved	
WP Nitrate & Nitrite	55130	1840	Nitrite as N	353.2	Approved	
WP & DMRQA Trace Elements	55024	1000	Aluminum	6010B	Approved	
WP Trace Elements	55025	1005	Antimony	6010B	Approved	
WP & DMRQA Trace Elements	55024	1010	Arsenic	6010B	Approved	
WP Trace Elements	55025	1015	Barium	6010B	Approved	
WP Trace Elements	55025	1015	Barium	6010B	Approved	
WP Trace Elements	55025	1020	Beryllium	6010B	Approved	
WP Trace Elements	55025	1020	Beryllium	6010B	Approved	
WP Trace Elements	55025	1025	Boron	6010B	Approved	
WP & DMRQA Trace Elements	55024	1030	Cadmium	6010B	Approved	
WP Minerals #1	55144	1035	Calcium	6010B	Approved	
WP & DMRQA Trace Elements	55024	1040	Chromium	6010B	Approved	
WP & DMRQA Trace Elements	55024	1050	Cobalt	6010B	Approved	
WP & DMRQA Trace Elements	55024	1055	Copper	6010B	Approved	
WP & DMRQA Trace Elements	55024	1070	Iron	6010B	Approved	
WP & DMRQA Trace Elements	55024	1075	Lead	6010B	Approved	
WP Minerals #1	55144	1085	Magnesium	6010B	Approved	
WP & DMRQA Trace Elements	55024	1090	Manganese	6010B	Approved	
WP Trace Elements	55025	1100	Molybdenum	6010B	Approved	
WP & DMRQA Trace Elements	55024	1105	Nickel	6010B	Approved	
WP Minerals #2	55145	1125	Potassium	6010B	Approved	
WP & DMRQA Trace Elements	55024	1140	Selenium	6010B	Approved	
WP Trace Elements	55025	1150	Silver	6010B	Approved	
WP Minerals #2	55145	1155	Sodium	6010B	Approved	
WP Trace Elements	55025	1160	Strontium	6010B	Approved	
WP Trace Elements	55025	1165	Thallium	6010B	Approved	
WP Tin	55095	1175	Tin	6010B	Approved	
WP Tin	55095	1175	Tin	6010B	Approved	
WP Trace Elements	55025	1180	Titanium	6010B	Approved	
WP & DMRQA Trace Elements	55024	1185	Vanadium	6010B	Approved	

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :		APPL, Inc.			
City/State :		Clovis, CA			
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
WP & DMRQA Trace Elements	55024	1190	Zinc	6010B	Approved
NPTA			Zirconium	6010B	Approved
WP & DMRQA Trace Elements	55024	1000	Aluminum	6010C	Approved
WP Trace Elements	55025	1005	Antimony	6010C	Approved
WP & DMRQA Trace Elements	55024	1010	Arsenic	6010C	Approved
WP Trace Elements	55025	1015	Barium	6010C	Approved
WP Trace Elements	55025	1015	Barium	6010C	Approved
WP Trace Elements	55025	1020	Beryllium	6010C	Approved
WP Trace Elements	55025	1020	Beryllium	6010C	Approved
WP Trace Elements	55025	1025	Boron	6010C	Approved
WP & DMRQA Trace Elements	55024	1030	Cadmium	6010C	Approved
	55144	1035	Calcium	6010C	Approved
WP & DMRQA Trace Elements	55024	1040	Chromium	6010C	Approved
WP & DMRQA Trace Elements	55024	1050	Cobalt	6010C	Approved
WP & DMRQA Trace Elements	55024	1055	Copper	6010C	Approved
WP & DMRQA Trace Elements	55024	1070	Iron	6010C	Approved
WP & DMRQA Trace Elements	55024	1075	Lead	6010C	Approved
WP & DMRQA Trace Elements	55024	1090	Manganese	6010C	Approved
WP Trace Elements	55025	1100	Molybdenum	6010C	Approved
WP & DMRQA Trace Elements	55024	1105	Nickel	6010C	Approved
	55145	1125	Potassium	6010C	Approved
WP & DMRQA Trace Elements	55024	1140	Selenium	6010C	Approved
WP Trace Elements	55025	1150	Silver	6010C	Approved
WP Trace Elements	55025	1160	Strontium	6010C	Approved
WP Trace Elements	55025	1165	Thallium	6010C	Approved
WP Trace Elements	55095	1175	Tin	6010C	Approved
WP Trace Elements	55025	1180	Titanium	6010C	Approved
WP & DMRQA Trace Elements	55024	1185	Vanadium	6010C	Approved
WP & DMRQA Trace Elements	55024	1190	Zinc	6010C	Approved
NPTA			Zirconium	6010C	Approved
WP & DMRQA Trace Elements	55024	1000	Aluminum	6020	Approved
WP Trace Elements	55025	1005	Antimony	6020	Approved
WP & DMRQA Trace Elements	55024	1010	Arsenic	6020	Approved
WP Trace Elements	55025	1015	Barium	6020	Approved
WP Trace Elements	55025	1020	Beryllium	6020	Approved
WP Trace Elements	55025	1025	Boron	6020	Approved
WP & DMRQA Trace Elements	55024	1030	Cadmium	6020	Approved
	55144	1035	Calcium	6020	Approved
WP & DMRQA Trace Elements	55024	1040	Chromium	6020	Approved
WP & DMRQA Trace Elements	55024	1050	Cobalt	6020	Approved
WP & DMRQA Trace Elements	55024	1055	Copper	6020	Approved
WP & DMRQA Trace Elements	55024	1070	Iron	6020	Approved
WP & DMRQA Trace Elements	55024	1075	Lead	6020	Approved
WP & DMRQA Trace Elements	55024	1090	Manganese	6020	Approved
WP Trace Elements	55025	1100	Molybdenum	6020	Approved
WP & DMRQA Trace Elements	55024	1105	Nickel	6020	Approved
NPTA			Total Phosphorous	6020	Approved
	55145	1125	Potassium	6020	Approved
WP & DMRQA Trace Elements	55024	1140	Selenium	6020	Approved
WP Trace Elements	55025	1150	Silver	6020	Approved
WP Trace Elements	55025	1160	Strontium	6020	Approved
WP Trace Elements	55025	1165	Thallium	6020	Approved
WP Tin	55095	1175	Tin	6020	Approved
WP Trace Elements	55025	1180	Titanium	6020	Approved
WP & DMRQA Trace Elements	55024	1185	Vanadium	6020	Approved
WP & DMRQA Trace Elements	55024	1190	Zinc	6020	Approved
NPTA			Zirconium	6020	Approved
WP & DMRQA Trace Elements	55024	1000	Aluminum	6020A	Approved
WP Trace Elements	55025	1005	Antimony	6020A	Approved
WP & DMRQA Trace Elements	55024	1010	Arsenic	6020A	Approved
WP Trace Elements	55025	1015	Barium	6020A	Approved
WP Trace Elements	55025	1020	Beryllium	6020A	Approved
WP Trace Elements	55025	1025	Boron	6020A	Approved
WP & DMRQA Trace Elements	55024	1030	Cadmium	6020A	Approved
	55144	1035	Calcium	6020A	Approved
WP & DMRQA Trace Elements	55024	1040	Chromium	6020A	Approved
WP & DMRQA Trace Elements	55024	1050	Cobalt	6020A	Approved
WP & DMRQA Trace Elements	55024	1055	Copper	6020A	Approved
WP & DMRQA Trace Elements	55024	1070	Iron	6020A	Approved
WP & DMRQA Trace Elements	55024	1075	Lead	6020A	Approved
WP & DMRQA Trace Elements	55024	1090	Manganese	6020A	Approved
WP Trace Elements	55025	1100	Molybdenum	6020A	Approved
WP & DMRQA Trace Elements	55024	1105	Nickel	6020A	Approved
NPTA			Total Phosphorous	6020A	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.				
City/State :	Clovis, CA				
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
	55145	1125	Potassium	6020A	Approved
WP & DMRQA Trace Elements	55024	1140	Selenium	6020A	Approved
WP Trace Elements	55025	1150	Silver	6020A	Approved
WP Trace Elements	55025	1160	Strontium	6020A	Approved
WP Trace Elements	55025	1165	Thallium	6020A	Approved
	55095	1175	Tin	6020A	Approved
WP Trace Elements	55025	1180	Titanium	6020A	Approved
WP & DMRQA Trace Elements	55024	1185	Vanadium	6020A	Approved
WP & DMRQA Trace Elements	55024	1190	Zinc	6020A	Approved
NPTA			Zirconium	6020A	Approved
WP Perchlorate	55116	1895	Perchlorate	6850	Approved
WP Hexavalent Chromium	55096	1045	Chromium VI	7196A	Approved
WP Hexavalent Chromium	55096	1045	Chromium VI	7199	Approved
WP & DMRQA Trace Elements	55024	1095	Mercury	7470A	Approved
Volatiles	PEO-120-3B	5180	1,2,3-Trichloropropane	8011	Approved
Volatiles	PEO-120-3B	4570	1,2-Dibromo-3-chloropropane (DBCP)	8011	Approved
Volatiles	PEO-120-3B	4585	1,2-Dibromomethane (EDB, Ethylene dibromide)	8011	Approved
Volatiles	PEO-010	9408	Gasoline Range Organics, C6-C10	8015B	Approved
			Motor Oil	8015B	Approved
Petroleum Hydrocarbons in Water	PEO-010	99990	Total Purgeable Hydrocarbons	8015B	Approved
Petroleum Hydrocarbons in Water	PEO-011	9369	Diesel Range Organics (C10-C28)	8015B	Approved
Volatiles	PEO-010	9408	Gasoline Range Organics, C6-C10	8015C	Approved
			Motor Oil	8015C	Approved
Petroleum Hydrocarbons in Water	PEO-010	99990	Total Purgeable Hydrocarbons	8015C	Approved
Petroleum Hydrocarbons in Water	PEO-011	9369	Diesel Range Organics (C10-C28)	8015C	Approved
Volatiles	PEO-010	9408	Gasoline Range Organics, C6-C10	8015D	Approved
			Motor Oil	8015D	Approved
Petroleum Hydrocarbons in Water	PEO-010	99990	Total Purgeable Hydrocarbons	8015D	Approved
Petroleum Hydrocarbons in Water	PEO-011	9369	Diesel Range Organics (C10-C28)	8015D	Approved
WP Pesticide Amp 2	38046	7250	Chlordane	8081A	Approved
WP Organochlorine Pesticides	38122	7810	4,4'-Methoxychlor	8081A	Approved
WP Organochlorine Pesticides	38122	7355	4,4'-DDD	8081A	Approved
WP Organochlorine Pesticides	38122	7360	4,4'-DDE	8081A	Approved
WP Organochlorine Pesticides	38122	7365	4,4'-DDT	8081A	Approved
WP Organochlorine Pesticides	38122	7110	a-BHC	8081A	Approved
WP Organochlorine Pesticides	38122	7240	a-Chlordane	8081A	Approved
WP Organochlorine Pesticides	38122	7025	Aldrin	8081A	Approved
WP Organochlorine Pesticides	38122	7115	b-BHC	8081A	Approved
WP Organochlorine Pesticides	38122	7105	d-BHC	8081A	Approved
WP Organochlorine Pesticides	38122	7470	Dieldrin	8081A	Approved
WP Organochlorine Pesticides	38122	7510	Endosulfan I	8081A	Approved
WP Organochlorine Pesticides	38122	7515	Endosulfan II	8081A	Approved
WP Organochlorine Pesticides	38122	7520	Endosulfan sulfate	8081A	Approved
WP Organochlorine Pesticides	38122	7540	Endrin	8081A	Approved
WP Organochlorine Pesticides	38122	7530	Endrin aldehyde	8081A	Approved
WP Organochlorine Pesticides	38122	7535	Endrin ketone	8081A	Approved
WP Organochlorine Pesticides	38122	7120	g-BHC (Lindane)	8081A	Approved
WP Organochlorine Pesticides	38122	7245	g-Chlordane	8081A	Approved
WP Organochlorine Pesticides	38122	7685	Heptachlor	8081A	Approved
WP Organochlorine Pesticides	38122	7690	Heptachlor epoxide	8081A	Approved
			Hexachlorobenzene	8081A	Approved
WP Toxaphene	38125	8250	Toxaphene	8081A	Approved
WP Pesticide Amp 2	38046	7250	Chlordane	8081B	Approved
WP Organochlorine Pesticides	38122	7810	4,4'-Methoxychlor	8081B	Approved
WP Organochlorine Pesticides	38122	7355	4,4'-DDD	8081B	Approved
WP Organochlorine Pesticides	38122	7360	4,4'-DDE	8081B	Approved
WP Organochlorine Pesticides	38122	7365	4,4'-DDT	8081B	Approved
WP Organochlorine Pesticides	38122	7110	a-BHC	8081B	Approved
WP Organochlorine Pesticides	38122	7240	a-Chlordane	8081B	Approved
WP Organochlorine Pesticides	38122	7025	Aldrin	8081B	Approved
WP Organochlorine Pesticides	38122	7115	b-BHC	8081B	Approved
WP Organochlorine Pesticides	38122	7105	d-BHC	8081B	Approved
WP Organochlorine Pesticides	38122	7470	Dieldrin	8081B	Approved
WP Organochlorine Pesticides	38122	7510	Endosulfan I	8081B	Approved
WP Organochlorine Pesticides	38122	7515	Endosulfan II	8081B	Approved
WP Organochlorine Pesticides	38122	7520	Endosulfan sulfate	8081B	Approved
WP Organochlorine Pesticides	38122	7540	Endrin	8081B	Approved
WP Organochlorine Pesticides	38122	7530	Endrin aldehyde	8081B	Approved
WP Organochlorine Pesticides	38122	7535	Endrin ketone	8081B	Approved
WP Organochlorine Pesticides	38122	7120	g-BHC (Lindane)	8081B	Approved
WP Organochlorine Pesticides	38122	7245	g-Chlordane	8081B	Approved
WP Organochlorine Pesticides	38122	7685	Heptachlor	8081B	Approved
WP Organochlorine Pesticides	38122	7690	Heptachlor epoxide	8081B	Approved
			Hexachlorobenzene	8081B	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.					
City/State :	Clovis, CA					
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results	
WP Toxaphene	38125	8250	Toxaphene	8081B	Approved	
WP PCBs in Water #2	38091	8880	Aroclor 1016	8082	Approved	
WP PCBs in Water #2	38091	8885	Aroclor 1221	8082	Approved	
WP PCBs in Water #2	38091	8890	Aroclor 1232	8082	Approved	
WP PCBs in Water #2	38091	8895	Aroclor 1242	8082	Approved	
WP PCBs in Water #2	38091	8900	Aroclor 1248	8082	Approved	
WP PCBs in Water #2	38091	8905	Aroclor 1254	8082	Approved	
WP PCBs in Water #2	38091	8910	Aroclor 1260	8082	Approved	
WP PCBs in Transformer Oil #2	38092	8880	PCB in Oil 1016 or 1242	8082	Approved	
WP PCBs in Transformer Oil #2	38092	100	PCB in Oil 1254	8082	Approved	
WP PCBs in Transformer Oil #2	38092	8910	PCB in Oil 1260	8082	Approved	
WP PCBs in Water #1	38094	8880	Aroclor 1016	8082	Approved	
WP PCBs in Water #1	38094	8885	Aroclor 1221	8082	Approved	
WP PCBs in Water #1	38094	8890	Aroclor 1232	8082	Approved	
WP PCBs in Water #1	38094	8895	Aroclor 1242	8082	Approved	
WP PCBs in Water #1	38094	8900	Aroclor 1248	8082	Approved	
WP PCBs in Water #1	38094	8905	Aroclor 1254	8082	Approved	
WP PCBs in Water #1	38094	8910	Aroclor 1260	8082	Approved	
WP PCBs in Water	38095	8880	PCB in Oil 1016 or 1242	8082	Approved	
WP PCBs in Water	38095	100	PCB in Oil 1254	8082	Approved	
WP PCBs in Water	38095	101	PCB in Oil 1260	8082	Approved	
WS PCBs in Water	38133	8880	Aroclor 1016	8082	Approved	
WS PCBs in Water	38133	8885	Aroclor 1221	8082	Approved	
WS PCBs in Water	38133	8890	Aroclor 1232	8082	Approved	
WS PCBs in Water	38133	8895	Aroclor 1242	8082	Approved	
WS PCBs in Water	38133	8900	Aroclor 1248	8082	Approved	
WS PCBs in Water	38133	8905	Aroclor 1254	8082	Approved	
WS PCBs in Water	38133	8910	Aroclor 1260	8082	Approved	
PCBs in Water	PEO-020	8912	Aroclor 1016/1242	8082	Approved	
PCBs in Water	PEO-020	8912	Aroclor 1016/1242	8082	Approved	
PCBs in Water	PEO-020	8880	Aroclor-1016 (PCB-1016)	8082	Approved	
PCBs in Water	PEO-020	8880	Aroclor-1016 (PCB-1016)	8082	Approved	
PCBs in Water	PEO-020	8885	Aroclor-1221 (PCB-1221)	8082	Approved	
PCBs in Water	PEO-020	8885	Aroclor-1221 (PCB-1221)	8082	Approved	
PCBs in Water	PEO-020	8890	Aroclor-1232 (PCB-1232)	8082	Approved	
PCBs in Water	PEO-020	8890	Aroclor-1232 (PCB-1232)	8082	Approved	
PCBs in Water	PEO-020	8895	Aroclor-1242 (PCB-1242)	8082	Approved	
PCBs in Water	PEO-020	8895	Aroclor-1242 (PCB-1242)	8082	Approved	
PCBs in Water	PEO-020	8900	Aroclor-1248 (PCB-1248)	8082	Approved	
PCBs in Water	PEO-020	8900	Aroclor-1248 (PCB-1248)	8082	Approved	
PCBs in Water	PEO-020	8905	Aroclor-1254 (PCB-1254)	8082	Approved	
PCBs in Water	PEO-020	8905	Aroclor-1254 (PCB-1254)	8082	Approved	
PCBs in Water	PEO-020	8910	Aroclor-1260 (PCB-1260)	8082	Approved	
PCBs in Water	PEO-020	8910	Aroclor-1260 (PCB-1260)	8082	Approved	
WP PCBs in Water #2	38091	8880	Aroclor 1016	8082A	Approved	
WP PCBs in Water #2	38091	8885	Aroclor 1221	8082A	Approved	
WP PCBs in Water #2	38091	8890	Aroclor 1232	8082A	Approved	
WP PCBs in Water #2	38091	8895	Aroclor 1242	8082A	Approved	
WP PCBs in Water #2	38091	8900	Aroclor 1248	8082A	Approved	
WP PCBs in Water #2	38091	8905	Aroclor 1254	8082A	Approved	
WP PCBs in Water #2	38091	8910	Aroclor 1260	8082A	Approved	
WP PCBs in Transformer Oil #2	38092	8880	PCB in Oil 1016 or 1242	8082A	Approved	
WP PCBs in Transformer Oil #2	38092	100	PCB in Oil 1254	8082A	Approved	
WP PCBs in Transformer Oil #2	38092	8910	PCB in Oil 1260	8082A	Approved	
WP PCBs in Water #1	38094	8880	Aroclor 1016	8082A	Approved	
WP PCBs in Water #1	38094	8885	Aroclor 1221	8082A	Approved	
WP PCBs in Water #1	38094	8890	Aroclor 1232	8082A	Approved	
WP PCBs in Water #1	38094	8895	Aroclor 1242	8082A	Approved	
WP PCBs in Water #1	38094	8900	Aroclor 1248	8082A	Approved	
WP PCBs in Water #1	38094	8905	Aroclor 1254	8082A	Approved	
WP PCBs in Water #1	38094	8910	Aroclor 1260	8082A	Approved	
WP PCBs in Water	38095	8880	PCB in Oil 1016 or 1242	8082A	Approved	
WP PCBs in Water	38095	100	PCB in Oil 1254	8082A	Approved	
WP PCBs in Water	38095	101	PCB in Oil 1260	8082A	Approved	
WS PCBs in Water	38133	8880	Aroclor 1016	8082A	Approved	
WS PCBs in Water	38133	8885	Aroclor 1221	8082A	Approved	
WS PCBs in Water	38133	8890	Aroclor 1232	8082A	Approved	
WS PCBs in Water	38133	8895	Aroclor 1242	8082A	Approved	
WS PCBs in Water	38133	8900	Aroclor 1248	8082A	Approved	
WS PCBs in Water	38133	8905	Aroclor 1254	8082A	Approved	
WS PCBs in Water	38133	8910	Aroclor 1260	8082A	Approved	
PCBs in Water	PEO-020	8912	Aroclor 1016/1242	8082A	Approved	
PCBs in Water	PEO-020	8912	Aroclor 1016/1242	8082A	Approved	
PCBs in Water	PEO-020	8880	Aroclor-1016 (PCB-1016)	8082A	Approved	

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.				
City/State :	Clovis, CA				
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
PCBs in Water	PEO-020	8880	Aroclor-1016 (PCB-1016)	8082A	Approved
PCBs in Water	PEO-020	8885	Aroclor-1221 (PCB-1221)	8082A	Approved
PCBs in Water	PEO-020	8885	Aroclor-1221 (PCB-1221)	8082A	Approved
PCBs in Water	PEO-020	8890	Aroclor-1232 (PCB-1232)	8082A	Approved
PCBs in Water	PEO-020	8890	Aroclor-1232 (PCB-1232)	8082A	Approved
PCBs in Water	PEO-020	8895	Aroclor-1242 (PCB-1242)	8082A	Approved
PCBs in Water	PEO-020	8895	Aroclor-1242 (PCB-1242)	8082A	Approved
PCBs in Water	PEO-020	8900	Aroclor-1248 (PCB-1248)	8082A	Approved
PCBs in Water	PEO-020	8900	Aroclor-1248 (PCB-1248)	8082A	Approved
PCBs in Water	PEO-020	8905	Aroclor-1254 (PCB-1254)	8082A	Approved
PCBs in Water	PEO-020	8905	Aroclor-1254 (PCB-1254)	8082A	Approved
PCBs in Water	PEO-020	8910	Aroclor-1260 (PCB-1260)	8082A	Approved
PCBs in Water	PEO-020	8910	Aroclor-1260 (PCB-1260)	8082A	Approved
CWA Organophosphorous Pesticides	38135	7075	Azinphosmethyl	8141A	Approved
WP Organophosphorous Pesticides	38135	7075	Azinphosmethyl (Guthion)	8141A	Approved
CWA Organophosphorous Pesticides	38135	7300	Chlorpyrifos	8141A	Approved
WP Organophosphorous Pesticides	38135	7390	Demeton, (Mix of Isomers O:S [35%:56%])	8141A	Approved
CWA Organophosphorous Pesticides	38135	7390	Demeton, (Mix of Isomers O:S)	8141A	Approved
CWA Organophosphorous Pesticides	38135	7410	Diazinon	8141A	Approved
WP Organophosphorous Pesticides	38135	7410	Diazinon	8141A	Approved
CWA Organophosphorous Pesticides	38135	8610	Dichlorvos	8141A	Approved
CWA Organophosphorous Pesticides	38135	7475	Dimethoate	8141A	Approved
CWA Organophosphorous Pesticides	38135	8625	Disulfoton	8141A	Approved
WP Organophosphorous Pesticides	38135	8625	Disulfoton	8141A	Approved
CWA Organophosphorous Pesticides	38135	7565	Ethion	8141A	Approved
WP Organophosphorous Pesticides	38135	7565	Ethion	8141A	Approved
CWA Organophosphorous Pesticides	38135	7570	Ethoprop	8141A	Approved
CWA Organophosphorous Pesticides	38135	7770	Malathion	8141A	Approved
WP Organophosphorous Pesticides	38135	7770	Malathion	8141A	Approved
CWA Organophosphorous Pesticides	38135	7955	Parathion ethyl	8141A	Approved
CWA Organophosphorous Pesticides	38135	7825	Parathion methyl	8141A	Approved
CWA Organophosphorous Pesticides	38135	7985	Phorate	8141A	Approved
CWA Organophosphorous Pesticides	38135	8110	Ronnel	8141A	Approved
CWA Organophosphorous Pesticides	38135	8200	Stirophos	8141A	Approved
CWA Organophosphorous Pesticides	38135	7075	Azinphosmethyl	8141B	Approved
WP Organophosphorous Pesticides	38135	7075	Azinphosmethyl (Guthion)	8141B	Approved
CWA Organophosphorous Pesticides	38135	7300	Chlorpyrifos	8141B	Approved
WP Organophosphorous Pesticides	38135	7390	Demeton, (Mix of Isomers O:S [35%:56%])	8141B	Approved
CWA Organophosphorous Pesticides	38135	7390	Demeton, (Mix of Isomers O:S)	8141B	Approved
CWA Organophosphorous Pesticides	38135	7410	Diazinon	8141B	Approved
WP Organophosphorous Pesticides	38135	7410	Diazinon	8141B	Approved
CWA Organophosphorous Pesticides	38135	8610	Dichlorvos	8141B	Approved
CWA Organophosphorous Pesticides	38135	7475	Dimethoate	8141B	Approved
CWA Organophosphorous Pesticides	38135	8625	Disulfoton	8141B	Approved
WP Organophosphorous Pesticides	38135	8625	Disulfoton	8141B	Approved
CWA Organophosphorous Pesticides	38135	7565	Ethion	8141B	Approved
WP Organophosphorous Pesticides	38135	7565	Ethion	8141B	Approved
CWA Organophosphorous Pesticides	38135	7570	Ethoprop	8141B	Approved
CWA Organophosphorous Pesticides	38135	7770	Malathion	8141B	Approved
WP Organophosphorous Pesticides	38135	7770	Malathion	8141B	Approved
CWA Organophosphorous Pesticides	38135	7955	Parathion ethyl	8141B	Approved
CWA Organophosphorous Pesticides	38135	7825	Parathion methyl	8141B	Approved
CWA Organophosphorous Pesticides	38135	7985	Phorate	8141B	Approved
CWA Organophosphorous Pesticides	38135	8110	Ronnel	8141B	Approved
CWA Organophosphorous Pesticides	38135	8200	Stirophos	8141B	Approved
WP Herbicide Acid Mix #2	38136	8655	2,4,5-T	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8545	2,4-D (2,4-Dichlorophenoxyacetic acid)	8151A	Approved
WP Herbicide Acid Mix #2	38136	8560	2,4-DB	8151A	Approved
WP Herbicide Acid Mix #2	38136	8600	3,5-Dichlorobenzoic acid	8151A	Approved
WP Herbicide Acid Mix #2	38136	6500	4-Nitrophenol	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8505	Acifluorfen	8151A	Approved
WP Herbicide Acid Mix #2	38136	8530	Bentazon	8151A	Approved
WP Herbicide Acid Mix #2	38136	8540	Chloramben	8151A	Approved
WP Herbicide Acid Mix #2	38136	8550	Dacthal	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8555	Dalapon	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8595	Dicamba	8151A	Approved
WP Herbicide Acid Mix #2	38136	8605	Dichlorprop	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8620	Dinoseb (2-sec-Butyl-4,6-dinitrophenol)	8151A	Approved
NPTA			MCPA	8151A	Approved
NPTA			MCPP	8151A	Approved
WP Acrolein & Acrylonitrile	38126	6605	Pentachlorophenol	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8645	Picloram	8151A	Approved
WP Acrolein & Acrylonitrile	38126	8650	Silvex (2,4,5-TP)	8151A	Approved
Volatiles in Non-Portable Water	38083	5105	1,1,1,2-Tetrachloroethane	8260B	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.				
City/State :	Clovis, CA				
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
Volatiles in Non-Portable Water	38083	5160	1,1,1-Trichloroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	5110	1,1,2,2-Tetrachloroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	5165	1,1,2-Trichloroethane	8260B	Approved
WP Oxygenates	38157	5185	1,1,2-Trichlorotrifluoroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4630	1,1-Dichloroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4640	1,1-Dichloroethene	8260B	Approved
Volatiles in Non-Portable Water	38083	4670	1,1-Dichloropropene	8260B	Approved
Volatiles in Non-Portable Water	38083	5150	1,2,3-Trichlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	5180	1,2,3-Trichloropropane	8260B	Approved
Volatiles in Non-Portable Water	38083	5155	1,2,4-Trichlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	5210	1,2,4-Trimethylbenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4570	1,2-Dibromo-3-chloropropane	8260B	Approved
Volatiles in Non-Portable Water	38083	4585	1,2-Dibromoethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4610	1,2-Dichlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4635	1,2-Dichloroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4655	1,2-Dichloropropane	8260B	Approved
Volatiles in Non-Portable Water	38083	5215	1,3,5-Trimethylbenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4615	1,3-Dichlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4660	1,3-Dichloropropane	8260B	Approved
Volatiles in Non-Portable Water	38083	4620	1,4-Dichlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4665	2,2-Dichloropropane	8260B	Approved
WP Ketones	38134	4410	2-Butanone	8260B	Approved
WP Ketones	38134	4410	2-Butanone	8260B	Approved
WP 2-Chloroethyl vinyl ether	38128	4500	2-Chloroethyl vinyl ether	8260B	Approved
Volatiles in Non-Portable Water	38083	4535	2-Chlorotoluene	8260B	Approved
WP Ketones	38134	4860	2-Hexanone	8260B	Approved
WP Ketones	38134	4860	2-Hexanone	8260B	Approved
Volatiles in Non-Portable Water	38083	4540	4-Chlorotoluene	8260B	Approved
Volatiles in Non-Portable Water	38083	4995	4-methyl-2-pentanone	8260B	Approved
WP Ketones	38134	4995	4-Methyl-2-pentanone	8260B	Approved
WP Ketones	38134	4995	4-Methyl-2-pentanone	8260B	Approved
WP Ketones	38134	4315	Acetone	8260B	Approved
WP Ketones	38134	4315	Acetone	8260B	Approved
WP Acrolein & Acrylonitrile	38123	0150	Acrolein	8260B	Approved
WP Acrolein & Acrylonitrile	38123	4325	Acrolein	8260B	Approved
WP Acrolein & Acrylonitrile	38123	1051	Acrolein	8260B	Approved
WP Acrolein & Acrylonitrile	38123	1051	Acrylonitrile	8260B	Approved
Volatiles in Non-Portable Water	38083	4375	Benzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4385	Bromobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4390	Bromochloromethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4395	Bromodichloromethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4400	Bromoforn	8260B	Approved
Volatiles in Non-Portable Water	38083	4950	Bromomethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4450	Carbon disulphide	8260B	Approved
Volatiles in Non-Portable Water	38083	4455	Carbon tetrachloride	8260B	Approved
Volatiles in Non-Portable Water	38083	4475	Chlorobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4485	Chloroethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4505	Chloroform	8260B	Approved
Volatiles in Non-Portable Water	38083	4960	Chloromethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4645	cis-1,2-Dichloroethene	8260B	Approved
Volatiles in Non-Portable Water	38083	4680	cis-1,3-Dichloropropene	8260B	Approved
Volatiles in Non-Portable Water	38083	4575	Dibromochloromethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4595	Dibromomethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4625	Dichlorodifluoromethane	8260B	Approved
Volatiles in Non-Portable Water	38083	4765	Ethyl benzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4835	Hexachlorobutadiene	8260B	Approved
Volatiles in Non-Portable Water	38083	4840	Hexachloroethane	8260B	Approved
WP Oxygenates	38157	9375	Isopropyl ether (DIPE)	8260B	Approved
Volatiles in Non-Portable Water	38083	4900	Isopropylbenzene	8260B	Approved
NPTA			Methyl Ethyl Ketone	8260B	Approved
Volatiles in Non-Portable Water	38083	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
WP Oxygenates	38157	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
Volatiles in Non-Portable Water	38083	4975	Methylene chloride (Dichloromethane)	8260B	Approved
Volatiles in Non-Portable Water	38083	5005	Naphthalene	8260B	Approved
Volatiles in Non-Portable Water	38083	4435	n-Butyl benzene	8260B	Approved
Volatiles in Non-Portable Water	38083	5015	Nitrobenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	5090	n-Propylbenzene	8260B	Approved
WP Oxygenates	38157	5090	n-Propylbenzene	8260B	Approved
Volatiles in Non-Portable Water	38083	4440	sec-Butyl benzene	8260B	Approved
Volatiles in Non-Portable Water	38083	5100	Styrene	8260B	Approved
WP Oxygenates	38157	4370	tert-Amyl methyl ether (TAME)	8260B	Approved
WP Oxygenates	38157	4420	tert-Butyl alcohol (t-Butanol)	8260B	Approved
Volatiles in Non-Portable Water	38083	4445	tert-Butyl benzene	8260B	Approved
WP Oxygenates	38157	4770	tert-Butyl ethyl ether (ETBE)	8260B	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.					
City/State :	Clovis, CA					
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results	
Volatiles in Non-Portable Water	38083	5115	Tetrachloroethene	8260B	Approved	
Volatiles in Non-Portable Water	38083	5140	Toluene	8260B	Approved	
Volatiles in Non-Portable Water	38083	5260	Total Xylenes	8260B	Approved	
Volatiles in Non-Portable Water	38083	4700	trans-1,2-Dichloroethene	8260B	Approved	
Volatiles in Non-Portable Water	38083	4685	trans-1,3-Dichloropropene	8260B	Approved	
Volatiles in Non-Portable Water	38083	5170	Trichloroethene	8260B	Approved	
Volatiles in Non-Portable Water	38083	5175	Trichlorofluoromethane	8260B	Approved	
Volatiles in Non-Portable Water	38083	5235	Vinyl chloride	8260B	Approved	
NPTA			Cyclohexane	8260B	Approved	
NPTA			Methyl Acetate	8260B	Approved	
NPTA			Methylcyclohexane	8260B	Approved	
NPTA			m&p Xylenes	8260B	Approved	
NPTA			o-Xylene	8260B	Approved	
NPTA			p-isopropyltoluene	8260B	Approved	
NPTA			Vinyl Acetate	8260B	Approved	
Volatiles in Non-Portable Water	38083	5105	1,1,1,2-Tetrachloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	5160	1,1,1-Trichloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	5110	1,1,2,2-Tetrachloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	5165	1,1,2-Trichloroethane	8260C	Approved	
WP Oxygenates	38157	5185	1,1,2-Trichlorotrifluoroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4630	1,1-Dichloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4640	1,1-Dichloroethene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4670	1,1-Dichloropropene	8260C	Approved	
Volatiles in Non-Portable Water	38083	5150	1,2,3-Trichlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	5180	1,2,3-Trichloropropane	8260C	Approved	
Volatiles in Non-Portable Water	38083	5155	1,2,4-Trichlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	5210	1,2,4-Trimethylbenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4570	1,2-Dibromo-3-chloropropane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4585	1,2-Dibromoethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4610	1,2-Dichlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4635	1,2-Dichloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4655	1,2-Dichloropropane	8260C	Approved	
Volatiles in Non-Portable Water	38083	5215	1,3,5-Trimethylbenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4615	1,3-Dichlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4660	1,3-Dichloropropane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4620	1,4-Dichlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4665	2,2-Dichloropropane	8260C	Approved	
WP Ketones	38134	4410	2-Butanone	8260C	Approved	
WP 2-Chloroethyl vinyl ether	38128	4500	2-Chloroethyl vinyl ether	8260C	Approved	
Volatiles in Non-Portable Water	38083	4535	2-Chlorotoluene	8260C	Approved	
WP Ketones	38134	4860	2-Hexanone	8260C	Approved	
Volatiles in Non-Portable Water	38083	4540	4-Chlorotoluene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4995	4-methyl-2-pentanone	8260C	Approved	
WP Ketones	38134	4995	4-Methyl-2-pentanone	8260C	Approved	
WP Ketones	38134	4315	Acetone	8260C	Approved	
WP Acrolein & Acrylonitrile	38123	4325	Acrolein (Propenal)	8260C	Approved	
WP Acrolein & Acrylonitrile	38123	1051	Acrylonitrile	8260C	Approved	
Volatiles in Non-Portable Water	38083	4375	Benzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4385	Bromobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4390	Bromochloromethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4395	Bromodichloromethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4400	Bromoform	8260C	Approved	
Volatiles in Non-Portable Water	38083	4950	Bromomethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4450	Carbon disulphide	8260C	Approved	
Volatiles in Non-Portable Water	38083	4455	Carbon tetrachloride	8260C	Approved	
Volatiles in Non-Portable Water	38083	4475	Chlorobenzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4485	Chloroethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4505	Chloroform	8260C	Approved	
Volatiles in Non-Portable Water	38083	4960	Chloromethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4645	cis-1,2-Dichloroethene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4680	cis-1,3-Dichloropropene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4575	Dibromochloromethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4595	Dibromomethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4625	Dichlorodifluoromethane	8260C	Approved	
Volatiles in Non-Portable Water	38083	4765	Ethyl benzene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4835	Hexachlorobutadiene	8260C	Approved	
Volatiles in Non-Portable Water	38083	4840	Hexachloroethane	8260C	Approved	
WP Oxygenates	38157	9375	Isopropyl ether (DIPE)	8260C	Approved	
Volatiles in Non-Portable Water	38083	4900	Isopropylbenzene	8260C	Approved	
NPTA			Methyl Ethyl Ketone	8260C	Approved	
Volatiles in Non-Portable Water	38083	5000	Methyl tert-butyl ether (MTBE)	8260C	Approved	
WP Oxygenates	38157	5000	Methyl tert-butyl ether (MTBE)	8260C	Approved	
Volatiles in Non-Portable Water	38083	4975	Methylene chloride (Dichloromethane)	8260C	Approved	
Volatiles in Non-Portable Water	38083	5005	Naphthalene	8260C	Approved	

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.				
City/State :	Clovis, CA				
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
Volatiles in Non-Portable Water	38083	4435	n-Butyl benzene	8260C	Approved
Volatiles in Non-Portable Water	38083	5015	Nitrobenzene	8260C	Approved
Volatiles in Non-Portable Water	38083	5090	n-Propylbenzene	8260C	Approved
WP Oxygenates	38157	5090	n-Propylbenzene	8260C	Approved
Volatiles in Non-Portable Water	38083	4910	p-isopropyl toluene	8260C	Approved
Volatiles in Non-Portable Water	38083	4440	sec-Butyl benzene	8260C	Approved
Volatiles in Non-Portable Water	38083	5100	Styrene	8260C	Approved
WP Oxygenates	38157	4370	tert-Amyl methyl ether (TAME)	8260C	Approved
WP Oxygenates	38157	4420	tert-Butyl alcohol (t-Butanol)	8260C	Approved
Volatiles in Non-Portable Water	38083	4445	tert-Butyl benzene	8260C	Approved
WP Oxygenates	38157	4770	tert-Butyl ethyl ether (ETBE)	8260C	Approved
Volatiles in Non-Portable Water	38083	5115	Tetrachloroethene	8260C	Approved
Volatiles in Non-Portable Water	38083	5140	Toluene	8260C	Approved
Volatiles in Non-Portable Water	38083	5260	Total Xylenes	8260C	Approved
Volatiles in Non-Portable Water	38083	4700	trans-1,2-Dichloroethene	8260C	Approved
Volatiles in Non-Portable Water	38083	4685	trans-1,3-Dichloropropene	8260C	Approved
Volatiles in Non-Portable Water	38083	5170	Trichloroethene	8260C	Approved
Volatiles in Non-Portable Water	38083	5175	Trichlorofluoromethane	8260C	Approved
Volatiles in Non-Portable Water	38083	5235	Vinyl chloride	8260C	Approved
NPTA			Cyclohexane	8260C	Approved
NPTA			Methyl Acetate	8260C	Approved
NPTA			Methylcyclohexane	8260C	Approved
NPTA			m&p Xylenes	8260C	Approved
NPTA			o-Xylene	8260C	Approved
NPTA			p-isopropyltoluene	8260C	Approved
NPTA			Vinyl Acetate	8260C	Approved
Base/Neutrals	PEO-121-2A	5155	1,2,4-Trichlorobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	5155	1,2,4-Trichlorobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	4610	1,2-Dichlorobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	4615	1,3-Dichlorobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	4620	1,4-Dichlorobenzene	8270C	Approved
Acid Compounds	PEO-022	6735	2,3,4,6-Tetrachlorophenol	8270C	Approved
Acid Compounds	PEO-022	6835	2,4,5-Trichlorophenol	8270C	Approved
Acid Compounds	PEO-022	6840	2,4,6-Trichlorophenol	8270C	Approved
Acid Compounds	PEO-022	6000	2,4-Dichlorophenol	8270C	Approved
Acid Compounds	PEO-022	6130	2,4-Dimethylphenol	8270C	Approved
Acid Compounds	PEO-022	6175	2,4-Dinitrophenol	8270C	Approved
Base/Neutrals	PEO-121-2A	6185	2,4-Dinitrotoluene (2,4-DNT)	8270C	Approved
Acid Compounds	PEO-022	6005	2,6-Dichlorophenol	8270C	Approved
Base/Neutrals	PEO-121-2A	6190	2,6-Dinitrotoluene (2,6-DNT)	8270C	Approved
Base/Neutrals	PEO-121-2A	5795	2-Chloronaphthalene	8270C	Approved
Acid Compounds	PEO-022	5800	2-Chlorophenol	8270C	Approved
Acid Compounds	PEO-022	6360	2-Methyl-4,6-Dinitrophenol	8270C	Approved
Base/Neutrals	PEO-121-2A	6385	2-Methylnaphthalene	8270C	Approved
Acid Compounds	PEO-022	6400	2-Methylphenol	8270C	Approved
Base/Neutrals	PEO-121-2B	6460	2-Nitroaniline	8270C	Approved
Acid Compounds	PEO-022	6490	2-Nitrophenol	8270C	Approved
Base/Neutrals	PEO-121-2A	5945	3,3'-Dichlorobenzidine	8270C	Approved
Base/Neutrals	PEO-121-2B	6465	3-Nitroaniline	8270C	Approved
Acid Compounds	PEO-022	6410	3 & 4-Methylphenol	8270C	Approved
Base/Neutrals	PEO-121-2A	5660	4-Bromophenyl phenyl ether	8270C	Approved
Acid Compounds	PEO-022	5700	4-Chloro-3-methylphenol	8270C	Approved
Base/Neutrals	PEO-121-2B	5745	4-Chloroaniline	8270C	Approved
Base/Neutrals	PEO-121-2A	5825	4-Chlorophenyl-phenylether	8270C	Approved
Base/Neutrals	PEO-121-2B	6470	4-Nitroaniline	8270C	Approved
Acid Compounds	PEO-022	6500	4-Nitrophenol	8270C	Approved
Base/Neutrals	PEO-121-1	5500	Acenaphthene	8270C	Approved
Base/Neutrals	PEO-121-1	5505	Acenaphthylene	8270C	Approved
Base/Neutrals	PEO-121-2B	5545	Aniline	8270C	Approved
Base/Neutrals	PEO-121-1	5555	Anthracene	8270C	Approved
Base/Neutrals	PEO-121-2A	5595	Benzidine	8270C	Approved
Base/Neutrals	PEO-121-1	5575	Benzo(a)anthracene	8270C	Approved
Base/Neutrals	PEO-121-1	5580	Benzo(a)pyrene	8270C	Approved
Base/Neutrals	PEO-121-1	5585	Benzo(b)fluoranthene	8270C	Approved
Base/Neutrals	PEO-121-1	5601	Benzo(b+k)fluoranthene	8270C	Approved
Base/Neutrals	PEO-121-1	5590	Benzo(g,h,i)perylene	8270C	Approved
Base/Neutrals	PEO-121-1	5600	Benzo(k)fluoranthene	8270C	Approved
Acid Compounds	PEO-022	5610	Benzoic acid	8270C	Approved
Base/Neutrals	PEO-121-2B	5630	Benzyl alcohol	8270C	Approved
Base/Neutrals	PEO-121-2A	5670	Benzyl butyl phthalate	8270C	Approved
Base/Neutrals	PEO-121-2A	5760	bis(2-Chloroethoxy) methane	8270C	Approved
Base/Neutrals	PEO-121-2A	5765	bis(2-Chloroethyl) ether	8270C	Approved
Base/Neutrals	PEO-121-2A	5780	bis(2-Chloroisopropyl) ether	8270C	Approved
Base/Neutrals	PEO-121-2A	6255	bis(2-Ethylhexyl) phthalate	8270C	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.				
City/State :	Clovis, CA				
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
Base/Neutrals	PEO-121-2B	7180	Caprolactam	8270C	Approved
Base/Neutrals	PEO-121-2B	5680	Carbazole	8270C	Approved
Base/Neutrals	PEO-121-1	5855	Chrysene	8270C	Approved
Base/Neutrals	PEO-121-1	5895	Dibenz(a,h) anthracene	8270C	Approved
Base/Neutrals	PEO-121-2A	5905	Dibenzofuran	8270C	Approved
Base/Neutrals	PEO-121-2A	6070	Diethyl phthalate	8270C	Approved
Base/Neutrals	PEO-121-2A	6135	Dimethyl phthalate	8270C	Approved
Base/Neutrals	PEO-121-2A	5925	Di-n-butylphthalate	8270C	Approved
Base/Neutrals	PEO-121-2A	6200	Di-n-octylphthalate	8270C	Approved
Base/Neutrals	PEO-121-1	6265	Fluoranthene	8270C	Approved
Base/Neutrals	PEO-121-1	6270	Fluorene	8270C	Approved
Base/Neutrals	PEO-121-2A	6275	Hexachlorobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	4835	Hexachlorobutadiene	8270C	Approved
Base/Neutrals	PEO-121-2A	6285	Hexachlorocyclopentadiene	8270C	Approved
Base/Neutrals	PEO-121-2A	4840	Hexachloroethane	8270C	Approved
Base/Neutrals	PEO-121-1	6315	Indeno(1,2,3-cd) pyrene	8270C	Approved
Base/Neutrals	PEO-121-2A	6320	Isophorone	8270C	Approved
Base/Neutrals	PEO-121-1	5005	Naphthalene	8270C	Approved
Base/Neutrals	PEO-121-2A	5015	Nitrobenzene	8270C	Approved
Base/Neutrals	PEO-121-2A	6530	N-nitrosodimethylamine	8270C	Approved
Base/Neutrals	PEO-121-2A	6545	N-nitrosodi-n-propylamine	8270C	Approved
Base/Neutrals	PEO-121-2A	6535	N-nitrosodiphenylamine	8270C	Approved
Acid Compounds	PEO-022	6605	Pentachlorophenol	8270C	Approved
Base/Neutrals	PEO-121-1	6615	Phenanthrene	8270C	Approved
Acid Compounds	PEO-022	6625	Phenol	8270C	Approved
Base/Neutrals	PEO-121-1	6665	Pyrene	8270C	Approved
Base/Neutrals	PEO-121-2B	5095	Pyridine	8270C	Approved
Low Level PAHs	PEO-259	5500	Acenaphthene	8270C SIM	Approved
Low Level PAHs	PEO-259	5505	Acenaphthylene	8270C SIM	Approved
Low Level PAHs	PEO-259	5555	Anthracene	8270C SIM	Approved
Low Level PAHs	PEO-259	5575	Benzo(a)anthracene	8270C SIM	Approved
Low Level PAHs	PEO-259	5580	Benzo(a)pyrene	8270C SIM	Approved
Low Level PAHs	PEO-259	5585	Benzo(b)fluoranthene	8270C SIM	Approved
Low Level PAHs	PEO-259	5590	Benzo(g,h,i)perylene	8270C SIM	Approved
Low Level PAHs	PEO-259	5600	Benzo(k)fluoranthene	8270C SIM	Approved
Low Level PAHs	PEO-259	5855	Chrysene	8270C SIM	Approved
Low Level PAHs	PEO-259	5895	Dibenzo(a,h)anthracene	8270C SIM	Approved
Low Level PAHs	PEO-259	6265	Fluoranthene	8270C SIM	Approved
Low Level PAHs	PEO-259	6270	Fluorene	8270C SIM	Approved
Low Level PAHs	PEO-259	6315	Indeno(1,2,3-cd) pyrene	8270C SIM	Approved
Low Level PAHs	PEO-259	5005	Naphthalene	8270C SIM	Approved
Low Level PAHs	PEO-259	6615	Phenanthrene	8270C SIM	Approved
Low Level PAHs	PEO-259	6665	Pyrene	8270C SIM	Approved
Low Level PAHs			2-Methylnaphthalene	8270C SIM	Approved
Base/Neutrals	PEO-121-2A	5155	1,2,4-Trichlorobenzene	8270D	Approved
Base/Neutrals	PEO-121-2A	4610	1,2-Dichlorobenzene	8270D	Approved
Base/Neutrals	PEO-121-2A	4615	1,3-Dichlorobenzene	8270D	Approved
Base/Neutrals	PEO-121-2A	4620	1,4-Dichlorobenzene	8270D	Approved
Acid Compounds	PEO-022	6735	2,3,4,6-Tetrachlorophenol	8270D	Approved
Acid Compounds	PEO-022	6835	2,4,5-Trichlorophenol	8270D	Approved
Acid Compounds	PEO-022	6840	2,4,6-Trichlorophenol	8270D	Approved
Acid Compounds	PEO-022	6000	2,4-Dichlorophenol	8270D	Approved
Acid Compounds	PEO-022	6130	2,4-Dimethylphenol	8270D	Approved
Acid Compounds	PEO-022	6175	2,4-Dinitrophenol	8270D	Approved
Base/Neutrals	PEO-121-2A	6185	2,4-Dinitrotoluene (2,4-DNT)	8270D	Approved
Acid Compounds	PEO-022	6005	2,6-Dichlorophenol	8270D	Approved
Base/Neutrals	PEO-121-2A	6190	2,6-Dinitrotoluene (2,6-DNT)	8270D	Approved
Base/Neutrals	PEO-121-2A	5795	2-Chloronaphthalene	8270D	Approved
Acid Compounds	PEO-022	5800	2-Chlorophenol	8270D	Approved
Acid Compounds	PEO-022	6360	2-Methyl-4,6-Dinitrophenol	8270D	Approved
Base/Neutrals	PEO-121-2A	6385	2-Methylnaphthalene	8270D	Approved
Acid Compounds	PEO-022	6400	2-Methylphenol	8270D	Approved
Base/Neutrals	PEO-121-2B	6460	2-Nitroaniline	8270D	Approved
Acid Compounds	PEO-022	6490	2-Nitrophenol	8270D	Approved
Base/Neutrals	PEO-121-2A	5945	3,3'-Dichlorobenzidine	8270D	Approved
Base/Neutrals	PEO-121-2B	6465	3-Nitroaniline	8270D	Approved
Acid Compounds	PEO-022	6410	4 & 4-Methylphenol	8270D	Approved
Base/Neutrals	PEO-121-2A	5660	4-Bromophenyl phenyl ether	8270D	Approved
Acid Compounds	PEO-022	5700	4-Chloro-3-methylphenol	8270D	Approved
Base/Neutrals	PEO-121-2B	5745	4-Chloroaniline	8270D	Approved
Base/Neutrals	PEO-121-2A	5825	4-Chlorophenyl-phenylether	8270D	Approved
Base/Neutrals	PEO-121-2B	6470	4-Nitroaniline	8270D	Approved
Acid Compounds	PEO-022	6500	4-Nitrophenol	8270D	Approved
Base/Neutrals	PEO-121-2B	5545	Aniline	8270D	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :	APPL, Inc.					
City/State :	Clovis, CA					
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results	
Base/Neutrals	PEO-121-2A	5595	Benzidine	8270D	Approved	
Acid Compounds	PEO-022	5610	Benzoic acid	8270D	Approved	
Base/Neutrals	PEO-121-2B	5630	Benzyl alcohol	8270D	Approved	
Base/Neutrals	PEO-121-2A	5670	Benzyl butyl phthalate	8270D	Approved	
Base/Neutrals	PEO-121-2A	5760	bis(2-Chloroethoxy) methane	8270D	Approved	
Base/Neutrals	PEO-121-2A	5765	bis(2-Chloroethyl) ether	8270D	Approved	
Base/Neutrals	PEO-121-2A	5780	bis(2-Chloroisopropyl) ether	8270D	Approved	
Base/Neutrals	PEO-121-2A	6255	bis(2-Ethylhexyl) phthalate	8270D	Approved	
Base/Neutrals	PEO-121-2B	7180	Caprolactam	8270D	Approved	
Base/Neutrals	PEO-121-2B	5680	Carbazole	8270D	Approved	
Base/Neutrals	PEO-121-2A	5905	Dibenzofuran	8270D	Approved	
Base/Neutrals	PEO-121-2A	6070	Diethyl phthalate	8270D	Approved	
Base/Neutrals	PEO-121-2A	6135	Dimethyl phthalate	8270D	Approved	
Base/Neutrals	PEO-121-2A	5925	Di-n-butylphthalate	8270D	Approved	
Base/Neutrals	PEO-121-2A	6200	Di-n-octylphthalate	8270D	Approved	
Base/Neutrals	PEO-121-2A	6275	Hexachlorobenzene	8270D	Approved	
Base/Neutrals	PEO-121-2A	4835	Hexachlorobutadiene	8270D	Approved	
Base/Neutrals	PEO-121-2A	6285	Hexachlorocyclopentadiene	8270D	Approved	
Base/Neutrals	PEO-121-2A	4840	Hexachloroethane	8270D	Approved	
Base/Neutrals	PEO-121-2A	6320	Isophorone	8270D	Approved	
Base/Neutrals	PEO-121-2A	5015	Nitrobenzene	8270D	Approved	
Base/Neutrals	PEO-121-2A	6530	N-nitrosodimethylamine	8270D	Approved	
Base/Neutrals	PEO-121-2A	6545	N-nitrosodi-n-propylamine	8270D	Approved	
Base/Neutrals	PEO-121-2A	6535	N-nitrosodiphenylamine	8270D	Approved	
Acid Compounds	PEO-022	6605	Pentachlorophenol	8270D	Approved	
Acid Compounds	PEO-022	6625	Phenol	8270D	Approved	
Base/Neutrals	PEO-121-2B	5095	Pyridine	8270D	Approved	
Low Level PAHs	PEO-259	5500	Acenaphthene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5505	Acenaphthylene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5555	Anthracene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5575	Benzo(a)anthracene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5580	Benzo(a)pyrene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5585	Benzo(b)fluoranthene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5590	Benzo(g,h,i)perylene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5600	Benzo(k)fluoranthene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5855	Chrysene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5895	Dibenzo(a,h)anthracene	8270D SIM	Approved	
Low Level PAHs	PEO-259	6265	Fluoranthene	8270D SIM	Approved	
Low Level PAHs	PEO-259	6270	Fluorene	8270D SIM	Approved	
Low Level PAHs	PEO-259	6315	Indeno(1,2,3-cd) pyrene	8270D SIM	Approved	
Low Level PAHs	PEO-259	5005	Naphthalene	8270D SIM	Approved	
Low Level PAHs	PEO-259	6615	Penanthrene	8270D SIM	Approved	
Low Level PAHs	PEO-259	6665	Pyrene	8270D SIM	Approved	
			2-Methylnaphthalene	8270D SIM	Approved	
2,3,7,8-Tetrachlorodibenzo-p-dioxin	38186	9618	2,3,7,8-TCDD	8290	Approved	
Dioxin	PEO-258	9519	1,2,3,4,6,7,8,9-OCDD	8290	Approved	
Dioxin	PEO-258	9516	1,2,3,4,6,7,8,9-OCDF	8290	Approved	
Dioxin	PEO-258	9426	1,2,3,4,6,7,8-Hpcdd	8290	Approved	
Dioxin	PEO-258	9420	1,2,3,4,6,7,8-Hpcdf	8290	Approved	
Dioxin	PEO-258	9423	1,2,3,4,7,8,9-Hpcdf	8290	Approved	
Dioxin	PEO-258	9453	1,2,3,4,7,8-Hxcdd	8290	Approved	
Dioxin	PEO-258	9471	1,2,3,4,7,8-Hxcdf	8290	Approved	
Dioxin	PEO-258	9456	1,2,3,6,7,8-Hxcdd	8290	Approved	
Dioxin	PEO-258	9474	1,2,3,6,7,8-Hxcdf	8290	Approved	
Dioxin	PEO-258	9459	1,2,3,7,8,9-Hxcdd	8290	Approved	
Dioxin	PEO-258	9477	1,2,3,7,8,9-Hxcdf	8290	Approved	
Dioxin	PEO-258	9540	1,2,3,7,8-Pecdd	8290	Approved	
Dioxin	PEO-258	9543	1,2,3,7,8-Pecdf	8290	Approved	
Dioxin	PEO-258	9480	2,3,4,6,7,8-Hxcdf	8290	Approved	
Dioxin	PEO-258	9549	2,3,4,7,8-Pecdf	8290	Approved	
Dioxin	PEO-258	9606	2,3,7,8-TCDD	8290	Approved	
Dioxin	PEO-258	9612	2,3,7,8-TCDF	8290	Approved	
Dioxin	PEO-258	9438	Hpcdd, total	8290	Approved	
Dioxin	PEO-258	9444	Hpcdf, total	8290	Approved	
Dioxin	PEO-258	9468	Hxcdd, total	8290	Approved	
Dioxin	PEO-258	9483	Hxcdf, total	8290	Approved	
Dioxin	PEO-258	9556	PCDD + PCDF, total	8290	Approved	
Dioxin	PEO-258	9991	PCDD, total	8290	Approved	
Dioxin	PEO-258	9993	PCDF, total	8290	Approved	
Dioxin	PEO-258	9555	Pecdd, total	8290	Approved	
Dioxin	PEO-258	9552	Pecdf, total	8290	Approved	
Dioxin	PEO-258	9609	TCDD, total	8290	Approved	
Dioxin	PEO-258	9615	TCDF, total	8290	Approved	
WP Carbamates	38156	7710	3-Hydroxycarbofuran	8321A	Approved	

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

Lab Name :		APPL, Inc.			
City/State :		Clovis, CA			
PartName	PartNumber	NELACCCode	AnalyteName	EPA Method	PT results
WP Carbamates	38156	7010	Aldicarb	8321A	Approved
WP Carbamates	38156	7015	Aldicarb sulfone	8321A	Approved
WP Carbamates	38156	7020	Aldicarb sulfoxide	8321A	Approved
NPTA			Barban	8321A	Approved
NPTA			Bromacil	8321A	Approved
WP Carbamates	38156	7195	Carbaryl	8321A	Approved
WP Carbamates	38156	7205	Carbofuran	8321A	Approved
NPTA			Chloroxuron	8321A	Approved
WP Carbamates	38156	7505	Diuron	8321A	Approved
NPTA			Linuron	8321A	Approved
WP Carbamates	38156	7800	Methiocarb	8321A	Approved
WP Carbamates	38156	7805	Methomyl	8321A	Approved
WP Carbamates	38156	7940	Oxamyl	8321A	Approved
WP Carbamates	38156	8075	Propham	8321A	Approved
WP Carbamates	38156	8080	Propoxur (Baygon)	8321A	Approved
CWA Nitroaromatics in Water	38172	6885	1,3,5-Trinitrobenzene	8330A	Approved
CWA Nitroaromatics in Water	38172	6160	1,3-Dinitrobenzene	8330A	Approved
CWA Nitroaromatics in Water	38172	9651	2,4,6-Trinitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	6185	2,4-Dinitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	6190	2,6-Dinitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9303	2-Amino-4,6-dinitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9507	2-Nitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9510	3-Nitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9306	4-Amino-2,6-dinitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9513	4-Nitrotoluene	8330A	Approved
CWA Nitroaromatics in Water	38172	9522	HMX	8330A	Approved
CWA Nitroaromatics in Water	38172	5015	Nitrobenzene	8330A	Approved
NPTA			Nitroglycerin	8330A	Approved
NPTA			PETN	8330A	Approved
NPTA			PGDN	8330A	Approved
NPTA			Picric Acid	8330A	Approved
CWA Nitroaromatics in Water	38172	9432	RDX	8330A	Approved
CWA Nitroaromatics in Water	38172	6415	Tetryl	8330A	Approved
CWA Nitroaromatics in Water	38172	6885	1,3,5-Trinitrobenzene	8330B	Approved
CWA Nitroaromatics in Water	38172	6160	1,3-Dinitrobenzene	8330B	Approved
CWA Nitroaromatics in Water	38172	9651	2,4,6-Trinitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	6185	2,4-Dinitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	6190	2,6-Dinitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9303	2-Amino-4,6-dinitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9507	2-Nitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9510	3-Nitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9306	4-Amino-2,6-dinitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9513	4-Nitrotoluene	8330B	Approved
CWA Nitroaromatics in Water	38172	9522	HMX	8330B	Approved
CWA Nitroaromatics in Water	38172	5015	Nitrobenzene	8330B	Approved
NPTA			Nitroglycerin	8330B	Approved
NPTA			PGDN	8330B	Approved
NPTA			Picric Acid	8330B	Approved
CWA Nitroaromatics in Water	38172	9432	RDX	8330B	Approved
CWA Nitroaromatics in Water	38172	6415	Tetryl	8330B	Approved
Low Level Nit/Nit	PEO-251	6885	1,3,5-Trinitrobenzene (1,3,5-TNB)	8330B	Approved
Low Level Nit/Nit	PEO-251	6160	1,3-Dinitrobenzene (1,3-DNB)	8330B	Approved
Low Level Nit/Nit	PEO-251	9651	2,4,6-Trinitrotoluene (2,4,6-TNT)	8330B	Approved
Low Level Nit/Nit	PEO-251	6185	2,4-Dinitrotoluene (2,4-DNT)	8330B	Approved
Low Level Nit/Nit	PEO-251	6190	2,6-Dinitrotoluene (2,6-DNT)	8330B	Approved
Low Level Nit/Nit	PEO-251	9303	2-Amino-4,6-dinitrotoluene (2am-dnt)	8330B	Approved
Low Level Nit/Nit	PEO-251	9507	2-Nitrotoluene	8330B	Approved
Low Level Nit/Nit	PEO-251	9510	3-Nitrotoluene	8330B	Approved
Low Level Nit/Nit	PEO-251	9306	4-Amino-2,6-dinitrotoluene (4am-dnt)	8330B	Approved
Low Level Nit/Nit	PEO-251	9513	4-Nitrotoluene	8330B	Approved
Low Level Nit/Nit	PEO-251	9522	HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)	8330B	Approved
Low Level Nit/Nit	PEO-251	5015	Nitrobenzene	8330B	Approved
Low Level Nit/Nit	PEO-251	6485	Nitroglycerin	8330B	Approved
Low Level Nit/Nit	PEO-251	9432	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	8330B	Approved
Low Level Nit/Nit	PEO-251	6415	Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	8330B	Approved
Low Level Nit/Nit	PEO-252	9558	PETN	8330B	Approved
WP Cyanide, Total & Amenable	55132	1645	Total Cyanide	9010B	Approved
WP Cyanide, Total & Amenable	55132	1645	Total Cyanide	9010C & 9014	Approved
WP pH @ 25C	55061	1900	pH	9040B	Approved
WP pH @ 25C	55061	1900	pH	9040C	Approved
WP & DMRQA Nutrients	55035	1810	Nitrate as N	9056	Approved
WP & DMRQA Nutrients	55035	1870	Orthophosphate as P	9056	Approved
WP Nitrate & Nitrite	55130	1810	Nitrate as N	9056	Approved
WP Nitrate & Nitrite	55130	1820	Nitrite + Nitrate as N	9056	Approved

**Accredited Analytes/Methods  
WP Proficiency Testing Summary**

<b>Lab Name :</b>		<b>APPL, Inc.</b>				
<b>City/State :</b>		<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT results</b>	
WP Nitrate & Nitrite	55130	1840	Nitrite as N	9056	Approved	
SWA Anions	55131	1540	Bromide	9056	Approved	
WP Minerals #1	55144	1575	Chloride	9056	Approved	
WP Minerals #2	55145	1730	Fluoride	9056	Approved	
WP Minerals #2	55145	2000	Sulfate	9056	Approved	
WP & DMRQA Nutrients	55035	1810	Nitrate as N	9056A	Approved	
WP & DMRQA Nutrients	55035	1870	Orthophosphate as P	9056A	Approved	
WP Nitrate & Nitrite	55130	1810	Nitrate as N	9056A	Approved	
WP Nitrate & Nitrite	55130	1820	Nitrite + Nitrate as N	9056A	Approved	
WP Nitrate & Nitrite	55130	1840	Nitrite as N	9056A	Approved	
SWA Anions	55131	1540	Bromide	9056A	Approved	
WP Minerals #1	55144	1575	Chloride	9056A	Approved	
WP Minerals #2	55145	1730	Fluoride	9056A	Approved	
WP Minerals #2	55145	2000	Sulfate	9056A	Approved	
WP & DMRQA Demands	55055	2040	Total Organic Carbon	9060	Approved	
CWA UV 254 Absorbance/DOC	55088	1710	Dissolved Organic Carbon	9060	Approved	
WP & DMRQA Demands	55055	2040	Total Organic Carbon	9060A	Approved	
CWA UV 254 Absorbance/DOC	55088	1710	Dissolved Organic Carbon	9060A	Approved	
<del>Fluoride</del>	<del>4420</del>	<del>1730</del>	<del>Fluoride</del>	<del>9214</del>	Approved	
WP Minerals #2	55145	1505	Total Alkalinity (CaCO3)	SM 2320B	Approved	
Minerals	4050	1610	Conductivity	SM 2510B	Approved	
WP Conductance @ 25C	55026	1610	Specific Conductance	SM 2510B	Approved	
Solids (Total Solids, TSS & TDS)	55085	1955	Total Dissolved Solids (TDS)	SM 2540C	Approved	
WP Minerals #1	55144	1955	Total Dissolved Solids @ 180C	SM 2540C	Approved	
Sulphide	55042	2005	Sulphide	SM 4500-S2F	Approved	
Minerals	PEI-257	2005	Sulfide	SM 4500-S2F	Approved	
WP & DMRQA Demands	55055	2040	Total Organic Carbon	SM 5310B	Approved	
CWA UV 254 Absorbance/DOC	55088	1710	Dissolved Organic Carbon	SM 5310B	Approved	
Miscellaneous Analytes	PEI-029	1860	Oil & Grease	SM 5520B	Approved	
Total Petroleum Hydrocarbons (TPH) in Water	642	1935	TPH (Gravimetric)	SM 5520BF	Approved	
WP MBAS	55083	2025	MBAS	SM 5540C	Approved	
MBAS	55106	2025	MBAS	SM 5540C	Approved	
NPTA			Ethane, Ethene, Methane	RSK175	Approved	
Solids	4030	1960	Total Suspended Solids	SM 2540D	Approved	
Solids (Total Solids, TSS & TDS)	55085	1960	Non-Filterable Residue (TSS)	SM 2540D	Approved	

**Accredited Analytes/Methods**

**WS Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
WS Minerals Mix #2	55123	1955	Total Filterable Residue	160.1	Approved
SDWA Solids (Total Solids, TSS & TDS)	55161	1955	Total Dissolved Solids	160.1	Approved
WS Chromium VI	55112	1045	Chromium VI	218.6	Approved
WS Inorganic Disinfection By-Products	55010	1540	Bromide	300.0	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1730	Fluoride	300.0	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1820	Nitrate and Nitrite as N	300.0	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1810	Nitrate as N	300.0	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1840	Nitrite as N	300.0	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1870	Orthophosphate as P	300.0	Approved
WS Sulphate/TOC	55070	2000	Sulfate	300.0	Approved
WS Minerals Mix #1	55122	1575	Chloride	300.0	Approved
WS Perchlorate	55099	1895	Perchlorate	314.0	Approved
SDWA Nutrients	55165	1515	Ammonia as N	350.1	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1820	Nitrate and Nitrite as N	353.2	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1810	Nitrate as N	353.2	Approved
WS NO3-, NO2-, F, PO4-3, and NO3- & NO2- as N	55011	1840	Nitrite as N	353.2	Approved
WS Perchlorate	55099	1895	Perchlorate	6850	Approved
WS pH @ 25C	55016	1900	pH @ 25	9040C	Approved
WS Minerals Mix #1	55122	1505	Alkalinity	SM 2320B	Approved
WS Minerals Mix #2	55123	1955	Total Filterable Residue	SM 2540C	Approved
SDWA Solids (Total Solids, TSS, & TDS)	55161	1955	Total Dissolved Solids	SM 2540C	Approved
WS Sulphate/TOC	55070	2040	TOC	SM 5310B	Approved
WS UV 254 Absorbance/DOC	55098	1710	Dissolved Organic Carbon (DOC)	SM 5310B	Approved
WS MBAS	55106	2025	MBAS	SM 5540C	Approved
Solids	5150	1960	Total Suspended Solids	SM 2540D	Approved
SDWA Solids (Total Solids, TSS, & TDS)	55161	1960	Non-Filterable Residue (TSS)	SM 2540D	Approved
Trace Metals	5070	1095	Mercury	EPA 245.1	Approved
WS Trace Elements Amp1	55012	1095	Mercury	EPA 245.1	Approved

## Accredited Analytes/Methods

### UST: Water Proficiency Testing Summary

<b>Lab Name :</b>		<b>APPL, Inc.</b>			
<b>City/State :</b>		<b>Clovis, CA</b>			
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
Petroleum Hydrocarbons in Water	PEO-010	102	Gasoline Range Organics, C6-C10	EPA 8015B	Approved
Petroleum Hydrocarbons in Water	PEO-010	9408	Gasoline Range Organics, C6-C10	EPA 8015C	Approved
Petroleum Hydrocarbons in Water	PEO-010	9408	Gasoline Range Organics, C6-C10	EPA 8015D	Approved
Petroleum Hydrocarbons in Wastewater	PEO-011	9369	Diesel Range Organics (DRO)	EPA 8015B	Approved
Petroleum Hydrocarbons in Wastewater	PEO-011	9369	Diesel range organics, C10-C28	EPA 8015B	Approved
GRO/BTEX in Water	PEO-114AK	4375	Benzene	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	4765	Ethylbenzene	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	5240	m+p-Xylene	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	5000	MTBE	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	5250	o-Xylene	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	5140	Toluene	EPA 8260B	Approved
GRO/BTEX in Water	PEO-114AK	5260	Xylene, total	EPA 8260B	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
PCB Congeners in Soil	SPE-068	9070	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	1668A	Approved
PCB Congeners in Soil	SPE-068	9025	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	1668A	Approved
PCB Congeners in Soil	SPE-068	9040	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)	1668A	Approved
PCB Congeners in Soil	SPE-068	8980	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	1668A	Approved
PCB Congeners in Soil	SPE-068	8955	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	1668A	Approved
PCB Congeners in Soil	SPE-068	9085	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)	1668A	Approved
PCB Congeners in Soil	SPE-068	9050	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)	1668A	Approved
PCB Congeners in Soil	SPE-068	9045	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)	1668A	Approved
PCB Congeners in Soil	SPE-068	8985	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	1668A	Approved
PCB Congeners in Soil	SPE-068	9055	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)	1668A	Approved
PCB Congeners in Soil	SPE-068	9005	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)	1668A	Approved
PCB Congeners in Soil	SPE-068	8995	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	1668A	Approved
PCB Congeners in Soil	SPE-068	9000	2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)	1668A	Approved
PCB Congeners in Soil	SPE-068	8936	2,4,4'-Trichlorobiphenyl (PCB 28)	1668A	Approved
PCB Congeners in Soil	SPE-068	9060	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)	1668A	Approved
PCB Congeners in Soil	SPE-068	9015	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)	1668A	Approved
PCB Congeners in Soil	SPE-068	8965	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)	1668A	Approved
PCB Congeners in Soil	SPE-068	8970	3,4,4',5-Tetrachlorobiphenyl (PCB 81)	1668A	Approved
PCB Congeners in Soil	SPE-068	9025	PCB (129)+(138)+(163)	1668A	Approved
PCB Congeners in Soil	SPE-068	9040	PCB (153)+(168)	1668A	Approved
PCB Congeners in Soil	SPE-068	9046	PCB (156)+(157)	1668A	Approved
PCB Congeners in Soil	SPE-068	9070	PCB (180)+(193)	1668A	Approved
PCB Congeners in Soil	SPE-068	8936	PCB (20)+(28)	1668A	Approved
PCB Congeners in Soil	SPE-068	8980	PCB (90)+(101)+(113)	1668A	Approved
PCB Congeners in Soil	SPE-068	8870	PCBs, total	1668A	Approved
RCRA Anions	55141	1540	Bromide (Br)	300.0	Approved
RCRA Anions	55141	1575	Chloride (Cl)	300.0	Approved
RCRA Anions	55141	1730	Fluoride (F)	300.0	Approved
RCRA Anions	55141	1810	Nitrate as N (NO3- as N)	300.0	Approved
RCRA Anions	55141	1870	Phosphate as P (PO43- as P)	300.0	Approved
RCRA Anions	55141	2000	Sulfate (SO42-)	300.0	Approved
RCRA Hexavalent Chromium	55104	1045	Chromium VI	3060A	Approved
RCRA Perchlorate	55143	1895	Perchlorate	314.0	Approved
RCRA Nutrients	55142	1515	Ammonia as N	350.1	Approved
RCRA Nutrients	55142	1795	Total Kjeldhal Nitrogen	351.2	Approved
RCRA Anions	55141	1810	Nitrate as N (NO3 as N)	353.2	Approved
RCRA Metals in Soil #2	55103	1000	Aluminum	6010B	Approved
RCRA Metals in Soil #1	55102	1005	Antimony	6010B	Approved
TCLP Metals	SPE-005	1005	Antimony, Sb	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1005	Antimony, Sb	6010B	Approved
RCRA Metals in Soil #1	55102	1010	Arsenic	6010B	Approved
TCLP Metals	SPE-005	1010	Arsenic, As	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1010	Arsenic, As	6010B	Approved
RCRA Metals in Soil #1	55102	1015	Barium	6010B	Approved
TCLP Metals	SPE-005	1015	Barium, Ba	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1015	Barium, Ba	6010B	Approved
RCRA Metals in Soil #1	55102	1020	Beryllium	6010B	Approved
TCLP Metals	SPE-005	1020	Beryllium, Be	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1020	Beryllium, Be	6010B	Approved
RCRA Metals in Soil #1	55102	1025	Boron	6010B	Approved
RCRA Metals in Soil #1	55102	1030	Cadmium	6010B	Approved
TCLP Metals	SPE-005	1030	Cadmium, Cd	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1030	Cadmium, Cd	6010B	Approved
RCRA Metals in Soil #2	55103	1035	Calcium	6010B	Approved
RCRA Metals in Soil #1	55102	1040	Chromium	6010B	Approved
TCLP Metals	SPE-005	1040	Chromium, Cr (total)	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1040	Chromium, Cr (total)	6010B	Approved
RCRA Metals in Soil #1	55102	1050	Cobalt	6010B	Approved
TCLP Metals	SPE-005	1050	Cobalt, Co	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1050	Cobalt, Co	6010B	Approved
RCRA Metals in Soil #1	55102	1055	Copper	6010B	Approved
TCLP Metals	SPE-005	1055	Copper, Cu	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1055	Copper, Cu	6010B	Approved
RCRA Metals in Soil #2	55103	1070	Iron	6010B	Approved
RCRA Metals in Soil #1	55102	1075	Lead	6010B	Approved
TCLP Metals	SPE-005	1075	Lead, Pb	6010B	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
TCLP Metals in Soil - CA WET	SPE-006	1075	Lead, Pb	6010B	Approved
RCRA Metals in Soil #2	55103	1085	Magnesium	6010B	Approved
RCRA Metals in Soil #1	55102	1090	Manganese	6010B	Approved
RCRA Metals in Soil #1	55102	1100	Molybdenum	6010B	Approved
TCLP Metals	SPE-005	1100	Molybdenum, Mo	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1100	Molybdenum, Mo	6010B	Approved
RCRA Metals in Soil #1	55102	1105	Nickel	6010B	Approved
TCLP Metals	SPE-005	1105	Nickel, Ni	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1105	Nickel, Ni	6010B	Approved
RCRA Metals in Soil #2	55103	1125	Potassium	6010B	Approved
RCRA Metals in Soil #1	55102	1140	Selenium	6010B	Approved
TCLP Metals	SPE-005	1140	Selenium, Se	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1140	Selenium, Se	6010B	Approved
RCRA Metals in Soil #1	55102	1150	Silver	6010B	Approved
TCLP Metals	SPE-005	1150	Silver, Ag	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1150	Silver, Ag	6010B	Approved
RCRA Metals in Soil #2	55103	1155	Sodium	6010B	Approved
RCRA Metals in Soil #1	55102	1160	Strontium	6010B	Approved
RCRA Metals in Soil #1	55102	1165	Thallium	6010B	Approved
TCLP Metals	SPE-005	1165	Thallium, Tl	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1165	Thallium, Tl	6010B	Approved
RCRA Metals in Soil #1	55102	1175	Tin	6010B	Approved
RCRA Metals in Soil #1	55102	1180	Titanium	6010B	Approved
RCRA Nutrients	55142	1910	Total Phosphorus	6010B	Approved
RCRA Metals in Soil #1	55102	1185	Vanadium	6010B	Approved
TCLP Metals	SPE-005	1185	Vanadium, V	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1185	Vanadium, V	6010B	Approved
RCRA Metals in Soil #1	55102	1190	Zinc	6010B	Approved
TCLP Metals	SPE-005	1190	Zinc, Zn	6010B	Approved
TCLP Metals in Soil - CA WET	SPE-006	1190	Zinc, Zn	6010B	Approved
RCRA Metals in Soil #2	55103	1000	Aluminum	6010C	Approved
RCRA Metals in Soil #1	55102	1005	Antimony	6010C	Approved
RCRA Metals in Soil #1	55102	1010	Arsenic	6010C	Approved
RCRA Metals in Soil #1	55102	1015	Barium	6010C	Approved
RCRA Metals in Soil #1	55102	1020	Beryllium	6010C	Approved
RCRA Metals in Soil #1	55102	1025	Boron	6010C	Approved
RCRA Metals in Soil #1	55102	1030	Cadmium	6010C	Approved
RCRA Metals in Soil #2	55103	1035	Calcium	6010C	Approved
RCRA Metals in Soil #1	55102	1040	Chromium	6010C	Approved
RCRA Metals in Soil #1	55102	1050	Cobalt	6010C	Approved
RCRA Metals in Soil #1	55102	1055	Copper	6010C	Approved
RCRA Metals in Soil #2	55103	1070	Iron	6010C	Approved
RCRA Metals in Soil #1	55102	1075	Lead	6010C	Approved
RCRA Metals in Soil #2	55103	1085	Magnesium	6010C	Approved
RCRA Metals in Soil #1	55102	1090	Manganese	6010C	Approved
RCRA Metals in Soil #1	55102	1100	Molybdenum	6010C	Approved
RCRA Metals in Soil #1	55102	1105	Nickel	6010C	Approved
RCRA Metals in Soil #2	55103	1125	Potassium	6010C	Approved
RCRA Metals in Soil #1	55102	1140	Selenium	6010C	Approved
RCRA Metals in Soil #1	55102	1150	Silver	6010C	Approved
RCRA Metals in Soil #2	55103	1155	Sodium	6010C	Approved
RCRA Metals in Soil #1	55102	1160	Strontium	6010C	Approved
RCRA Metals in Soil #1	55102	1165	Thallium	6010C	Approved
RCRA Metals in Soil #1	55102	1175	Tin	6010C	Approved
RCRA Metals in Soil #1	55102	1180	Titanium	6010C	Approved
			Total Phosphorus	6010C	Approved
RCRA Metals in Soil #1	55102	1185	Vanadium	6010C	Approved
RCRA Metals in Soil #1	55102	1190	Zinc	6010C	Approved
NPTA			Zirconium	6010C	Approved
RCRA Metals in Soil #2	55103	1000	Aluminum	6020	Approved
RCRA Metals in Soil #1	55102	1005	Antimony	6020	Approved
RCRA Metals in Soil #1	55102	1010	Arsenic	6020	Approved
RCRA Metals in Soil #1	55102	1015	Barium	6020	Approved
RCRA Metals in Soil #1	55102	1020	Beryllium	6020	Approved
RCRA Metals in Soil #1	55102	1025	Boron	6020	Approved
RCRA Metals in Soil #1	55102	1030	Cadmium	6020	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
RCRA Metals in Soil #2	55103	1035	Calcium	6020	Approved
RCRA Metals in Soil #1	55102	1040	Chromium	6020	Approved
RCRA Metals in Soil #1	55102	1050	Cobalt	6020	Approved
RCRA Metals in Soil #1	55102	1055	Copper	6020	Approved
RCRA Metals in Soil #2	55103	1070	Iron	6020	Approved
RCRA Metals in Soil #1	55102	1075	Lead	6020	Approved
RCRA Metals in Soil #2	55103	1085	Magnesium	6020	Approved
RCRA Metals in Soil #1	55102	1090	Manganese	6020	Approved
RCRA Metals in Soil #1	55102	1100	Molybdenum	6020	Approved
RCRA Metals in Soil #1	55102	1105	Nickel	6020	Approved
RCRA Metals in Soil #2	55103	1125	Potassium	6020	Approved
RCRA Metals in Soil #1	55102	1140	Selenium	6020	Approved
RCRA Metals in Soil #1	55102	1150	Silver	6020	Approved
RCRA Metals in Soil #2	55103	1155	Sodium	6020	Approved
RCRA Metals in Soil #1	55102	1160	Strontium	6020	Approved
RCRA Metals in Soil #1	55102	1165	Thallium	6020	Approved
RCRA Metals in Soil #1	55102	1175	Tin	6020	Approved
RCRA Metals in Soil #1	55102	1180	Titanium	6020	Approved
RCRA Metals in Soil #1	55102	1185	Vanadium	6020	Approved
RCRA Metals in Soil #1	55102	1190	Zinc	6020	Approved
NPTA			Zirconium	6020	Approved
RCRA Metals in Soil #2	55103	1000	Aluminum	6020A	Approved
RCRA Metals in Soil #1	55102	1005	Antimony	6020A	Approved
RCRA Metals in Soil #1	55102	1010	Arsenic	6020A	Approved
RCRA Metals in Soil #1	55102	1015	Barium	6020A	Approved
RCRA Metals in Soil #1	55102	1020	Beryllium	6020A	Approved
RCRA Metals in Soil #1	55102	1025	Boron	6020A	Approved
RCRA Metals in Soil #1	55102	1030	Cadmium	6020A	Approved
RCRA Metals in Soil #2	55103	1035	Calcium	6020A	Approved
RCRA Metals in Soil #1	55102	1040	Chromium	6020A	Approved
RCRA Metals in Soil #1	55102	1050	Cobalt	6020A	Approved
RCRA Metals in Soil #1	55102	1055	Copper	6020A	Approved
RCRA Metals in Soil #2	55103	1070	Iron	6020A	Approved
RCRA Metals in Soil #1	55102	1075	Lead	6020A	Approved
RCRA Metals in Soil #2	55103	1085	Magnesium	6020A	Approved
RCRA Metals in Soil #1	55102	1090	Manganese	6020A	Approved
RCRA Metals in Soil #1	55102	1100	Molybdenum	6020A	Approved
RCRA Metals in Soil #1	55102	1105	Nickel	6020A	Approved
RCRA Metals in Soil #2	55103	1125	Potassium	6020A	Approved
RCRA Metals in Soil #1	55102	1140	Selenium	6020A	Approved
RCRA Metals in Soil #1	55102	1150	Silver	6020A	Approved
RCRA Metals in Soil #2	55103	1155	Sodium	6020A	Approved
RCRA Metals in Soil #1	55102	1160	Strontium	6020A	Approved
RCRA Metals in Soil #1	55102	1165	Thallium	6020A	Approved
RCRA Metals in Soil #1	55102	1175	Tin	6020A	Approved
RCRA Metals in Soil #1	55102	1180	Titanium	6020A	Approved
RCRA Metals in Soil #1	55102	1185	Vanadium	6020A	Approved
RCRA Metals in Soil #1	55102	1190	Zinc	6020A	Approved
NPTA			Zirconium	6020A	Approved
RCRA Perchlorate	55143	1895	Perchlorate	6850	Approved
RCRA Hexavalent Chromium	55104	1045	Chromium VI	7196A	Approved
RCRA Hexavalent Chromium	55104	1045	Chromium VI	7199	Approved
TCLP Metals	SPE-005	1095	Mercury, Hg	7470A	Approved
TCLP Metals in Soil - CA WET	SPE-006	1095	Mercury, Hg	7470A	Approved
RCRA Metals in Soil #1	55102	1095	Mercury	7471B	Approved
Petroleum Hydrocarbons in Soil	SPE-007	9369	Diesel Range Organics C10-C28	8015B	Approved
Petroleum Hydrocarbons in Soil	SPE-007	9369	Diesel Range Organics C10-C28	8015C	Approved
Petroleum Hydrocarbons in Soil	SPE-007	9369	Diesel Range Organics C10-C28	8015D	Approved
Petroleum Hydrocarbons in Soil	SPE-008	101	Gasoline Range Organics, C6-C10	8015B	Approved
Petroleum Hydrocarbons in Soil	SPE-008	101	Total Purgeable Hydrocarbons	8015B	Approved
Petroleum Hydrocarbons in Soil	SPE-008	9408	Gasoline Range Organics, C6-C10	8015C	Approved
Petroleum Hydrocarbons in Soil	SPE-008	99990	Total Purgeable Hydrocarbons	8015C	Approved
Petroleum Hydrocarbons in Soil	SPE-008	9408	Gasoline Range Organics, C6-C10	8015D	Approved
Petroleum Hydrocarbons in Soil	SPE-008	99990	Total Purgeable Hydrocarbons	8015D	Approved
Toxaphene in Soil	38066	8250	Toxaphene	8081A	Approved
Chlorinated Pesticides in Soil	38101	7355	4,4'-DDD	8081A	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
Chlorinated Pesticides in Soil	38101	7360	4,4'-DDE	8081A	Approved
Chlorinated Pesticides in Soil	38101	7365	4,4'-DDT	8081A	Approved
Chlorinated Pesticides in Soil	38101	7110	a-BHC	8081A	Approved
Chlorinated Pesticides in Soil	38101	7240	a-Chlordane	8081A	Approved
Chlorinated Pesticides in Soil	38101	7025	Aldrin	8081A	Approved
Chlorinated Pesticides in Soil	38101	7115	b-BHC	8081A	Approved
Chlorinated Pesticides in Soil	38101	7105	d-BHC	8081A	Approved
Chlorinated Pesticides in Soil	38101	7470	Dieldrin	8081A	Approved
Chlorinated Pesticides in Soil	38101	7510	Endosulfan I	8081A	Approved
Chlorinated Pesticides in Soil	38101	7515	Endosulfan II	8081A	Approved
Chlorinated Pesticides in Soil	38101	7520	Endosulfan sulfate	8081A	Approved
Chlorinated Pesticides in Soil	38101	7540	Endrin	8081A	Approved
Chlorinated Pesticides in Soil	38101	7530	Endrin aldehyde	8081A	Approved
Chlorinated Pesticides in Soil	38101	7535	Endrin ketone	8081A	Approved
Chlorinated Pesticides in Soil	38101	7120	g-BHC (Lindane)	8081A	Approved
Chlorinated Pesticides in Soil	38101	7245	g-Chlordane	8081A	Approved
Chlorinated Pesticides in Soil	38101	7685	Heptachlor	8081A	Approved
Chlorinated Pesticides in Soil	38101	7690	Heptachlor epoxide	8081A	Approved
Chlorinated Pesticides in Soil	38101	7810	Methoxychlor	8081A	Approved
Chlordane in Soil	38141	7250	Chlordane	8081A	Approved
Toxaphene in Soil	38066	8250	Toxaphene	8081B	Approved
Chlorinated Pesticides in Soil	38101	7355	4,4'-DDD	8081B	Approved
Chlorinated Pesticides in Soil	38101	7360	4,4'-DDE	8081B	Approved
Chlorinated Pesticides in Soil	38101	7365	4,4'-DDT	8081B	Approved
Chlorinated Pesticides in Soil	38101	7110	a-BHC	8081B	Approved
Chlorinated Pesticides in Soil	38101	7240	a-Chlordane	8081B	Approved
Chlorinated Pesticides in Soil	38101	7025	Aldrin	8081B	Approved
Chlorinated Pesticides in Soil	38101	7115	b-BHC	8081B	Approved
Chlorinated Pesticides in Soil	38101	7105	d-BHC	8081B	Approved
Chlorinated Pesticides in Soil	38101	7470	Dieldrin	8081B	Approved
Chlorinated Pesticides in Soil	38101	7510	Endosulfan I	8081B	Approved
Chlorinated Pesticides in Soil	38101	7515	Endosulfan II	8081B	Approved
Chlorinated Pesticides in Soil	38101	7520	Endosulfan sulfate	8081B	Approved
Chlorinated Pesticides in Soil	38101	7540	Endrin	8081B	Approved
Chlorinated Pesticides in Soil	38101	7530	Endrin aldehyde	8081B	Approved
Chlorinated Pesticides in Soil	38101	7535	Endrin ketone	8081B	Approved
Chlorinated Pesticides in Soil	38101	7120	g-BHC (Lindane)	8081B	Approved
Chlorinated Pesticides in Soil	38101	7245	g-Chlordane	8081B	Approved
Chlorinated Pesticides in Soil	38101	7685	Heptachlor	8081B	Approved
Chlorinated Pesticides in Soil	38101	7690	Heptachlor epoxide	8081B	Approved
Chlorinated Pesticides in Soil	38101	7810	Methoxychlor	8081B	Approved
Chlordane in Soil	38141	7250	Chlordane	8081B	Approved
PCBs in Transformer Oil #2	38092	8880	PCB in Oil 1016	8082	Approved
PCBs in Transformer Oil #2	38092	8895	PCB in Oil 1242	8082	Approved
PCBs in Transformer Oil #2	38092	8905	PCB in Oil 1254	8082	Approved
PCBs in Transformer Oil #2	38092	8910	PCB in Oil 1260	8082	Approved
PCBs in Transformer Oil #2	38095	8880	PCB in Oil 1016	8082	Approved
PCBs in Transformer Oil #2	38095	8895	PCB in Oil 1242	8082	Approved
PCBs in Transformer Oil #2	38095	8905	PCB in Oil 1254	8082	Approved
PCBs in Transformer Oil #2	38095	8910	PCB in Oil 1260	8082	Approved
Aroclor in Soil	38142	8880	Aroclor 1016	8082	Approved
Aroclor in Soil	38142	8885	Aroclor 1221	8082	Approved
Aroclor in Soil	38142	8890	Aroclor 1232	8082	Approved
Aroclor in Soil	38142	8895	Aroclor 1242	8082	Approved
Aroclor in Soil	38142	8900	Aroclor 1248	8082	Approved
Aroclor in Soil	38142	8905	Aroclor 1254	8082	Approved
Aroclor in Soil	38142	8910	Aroclor 1260	8082	Approved
PCB in Soil	SPE-010	8912	Aroclor 1016/1242	8082	Approved
PCB in Soil	SPE-010	8880	Aroclor-1016 (PCB-1016)	8082	Approved
PCB in Soil	SPE-010	8885	Aroclor-1221 (PCB-1221)	8082	Approved
PCB in Soil	SPE-010	8890	Aroclor-1232 (PCB-1232)	8082	Approved
PCB in Soil	SPE-010	8895	Aroclor-1242 (PCB-1242)	8082	Approved
PCB in Soil	SPE-010	8900	Aroclor-1248 (PCB-1248)	8082	Approved
PCB in Soil	SPE-010	8905	Aroclor-1254 (PCB-1254)	8082	Approved
PCB in Soil	SPE-010	8910	Aroclor-1260 (PCB-1260)	8082	Approved
PCB in Soil	SPE-010	8912	Aroclor 1016/1242	8082	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
PCB in Soil	SPE-010	8880	Aroclor-1016 (PCB-1016)	8082	Approved
PCB in Soil	SPE-010	8885	Aroclor-1221 (PCB-1221)	8082	Approved
PCB in Soil	SPE-010	8890	Aroclor-1232 (PCB-1232)	8082	Approved
PCB in Soil	SPE-010	8895	Aroclor-1242 (PCB-1242)	8082	Approved
PCB in Soil	SPE-010	8900	Aroclor-1248 (PCB-1248)	8082	Approved
PCB in Soil	SPE-010	8905	Aroclor-1254 (PCB-1254)	8082	Approved
PCB in Soil	SPE-010	8910	Aroclor-1260 (PCB-1260)	8082	Approved
PCBs in Transformer Oil #2	38092	8880	PCB in Oil 1016	8082A	Approved
PCBs in Transformer Oil #2	38092	8895	PCB in Oil 1242	8082A	Approved
PCBs in Transformer Oil #2	38092	8905	PCB in Oil 1254	8082A	Approved
PCBs in Transformer Oil #2	38092	8910	PCB in Oil 1260	8082A	Approved
PCBs in Transformer Oil #2	38095	8880	PCB in Oil 1016	8082A	Approved
PCBs in Transformer Oil #2	38095	8895	PCB in Oil 1242	8082A	Approved
PCBs in Transformer Oil #2	38095	8905	PCB in Oil 1254	8082A	Approved
PCBs in Transformer Oil #2	38095	8910	PCB in Oil 1260	8082A	Approved
Aroclor in Soil	38142	8880	Aroclor 1016	8082A	Approved
Aroclor in Soil	38142	8885	Aroclor 1221	8082A	Approved
Aroclor in Soil	38142	8890	Aroclor 1232	8082A	Approved
Aroclor in Soil	38142	8895	Aroclor 1242	8082A	Approved
Aroclor in Soil	38142	8900	Aroclor 1248	8082A	Approved
Aroclor in Soil	38142	8905	Aroclor 1254	8082A	Approved
Aroclor in Soil	38142	8910	Aroclor 1260	8082A	Approved
PCB in Soil	SPE-010	8912	Aroclor 1016/1242	8082A	Approved
PCB in Soil	SPE-010	8880	Aroclor-1016 (PCB-1016)	8082A	Approved
PCB in Soil	SPE-010	8885	Aroclor-1221 (PCB-1221)	8082A	Approved
PCB in Soil	SPE-010	8890	Aroclor-1232 (PCB-1232)	8082A	Approved
PCB in Soil	SPE-010	8895	Aroclor-1242 (PCB-1242)	8082A	Approved
PCB in Soil	SPE-010	8900	Aroclor-1248 (PCB-1248)	8082A	Approved
PCB in Soil	SPE-010	8905	Aroclor-1254 (PCB-1254)	8082A	Approved
PCB in Soil	SPE-010	8910	Aroclor-1260 (PCB-1260)	8082A	Approved
PCB in Soil	SPE-010	8912	Aroclor 1016/1242	8082A	Approved
PCB in Soil	SPE-010	8880	Aroclor-1016 (PCB-1016)	8082A	Approved
PCB in Soil	SPE-010	8885	Aroclor-1221 (PCB-1221)	8082A	Approved
PCB in Soil	SPE-010	8890	Aroclor-1232 (PCB-1232)	8082A	Approved
PCB in Soil	SPE-010	8895	Aroclor-1242 (PCB-1242)	8082A	Approved
PCB in Soil	SPE-010	8900	Aroclor-1248 (PCB-1248)	8082A	Approved
PCB in Soil	SPE-010	8905	Aroclor-1254 (PCB-1254)	8082A	Approved
PCB in Soil	SPE-010	8910	Aroclor-1260 (PCB-1260)	8082A	Approved
OrganoPhosphorus Pesticides	38151	7075	Azinphosmethyl	8141A	Approved
OrganoPhosphorus Pesticides	38151	7390	Demeton, (Mix of Isomers O:S)	8141A	Approved
OrganoPhosphorus Pesticides	38151	7410	Diazinon	8141A	Approved
OrganoPhosphorus Pesticides	38151	8625	Disulfoton	8141A	Approved
OrganoPhosphorus Pesticides	38151	8110	Fenchlorphos (Ronnel)	8141A	Approved
OrganoPhosphorus Pesticides	38151	7770	Malathion	8141A	Approved
OrganoPhosphorus Pesticides	38151	7955	Parathion ethyl	8141A	Approved
OrganoPhosphorus Pesticides	38151	7825	Parathion methyl	8141A	Approved
OrganoPhosphorus Pesticides	38151	7985	Phorate	8141A	Approved
OrganoPhosphorus Pesticides	38151	8200	Tetrachlorvinphos (Stirophos)	8141A	Approved
OrganoPhosphorus Pesticides	38151	7075	Azinphosmethyl	8141B	Approved
OrganoPhosphorus Pesticides	38151	7390	Demeton, (Mix of Isomers O:S)	8141B	Approved
OrganoPhosphorus Pesticides	38151	7410	Diazinon	8141B	Approved
OrganoPhosphorus Pesticides	38151	8625	Disulfoton	8141B	Approved
OrganoPhosphorus Pesticides	38151	8110	Fenchlorphos (Ronnel)	8141B	Approved
OrganoPhosphorus Pesticides	38151	7770	Malathion	8141B	Approved
OrganoPhosphorus Pesticides	38151	7955	Parathion ethyl	8141B	Approved
OrganoPhosphorus Pesticides	38151	7825	Parathion methyl	8141B	Approved
OrganoPhosphorus Pesticides	38151	7985	Phorate	8141B	Approved
OrganoPhosphorus Pesticides	38151	8200	Tetrachlorvinphos (Stirophos)	8141B	Approved
Herbicide Acids in Soil	38146	8655	2,4,5-T	8151A	Approved
Herbicide Acids in Soil	38146	8650	2,4,5-TP	8151A	Approved
Herbicide Acids in Soil	38146	8545	2,4-D	8151A	Approved
Herbicide Acids in Soil	38146	8560	2,4-DB	8151A	Approved
Herbicide Acids in Soil	38146	8555	Dalapon	8151A	Approved
Herbicide Acids in Soil	38146	8595	Dicamba	8151A	Approved
Herbicide Acids in Soil	38146	8620	Dinoseb	8151A	Approved
Herbicide Acids in Soil	38146	6605	Pentachlorophenol	8151A	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
NPTA			Dichlorprop (2,4-DP)	8151A	Approved
NPTA			MCPA	8151A	Approved
NPTA			MSPP	8151A	Approved
Volatiles in Soil	38084	5105	1,1,1,2-Tetrachloroethane	8260B	Approved
Volatiles in Soil	38084	5160	1,1,1-Trichloroethane	8260B	Approved
Volatiles in Soil	38084	5110	1,1,2,2-Tetrachloroethane	8260B	Approved
Volatiles in Soil	38084	5165	1,1,2-Trichloroethane	8260B	Approved
Volatiles in Soil	38084	4630	1,1-Dichloroethane	8260B	Approved
Volatiles in Soil	38084	4640	1,1-Dichloroethene	8260B	Approved
Volatiles in Soil	38084	4670	1,1-Dichloropropene	8260B	Approved
Volatiles in Soil	38084	5150	1,2,3-Trichlorobenzene	8260B	Approved
Volatiles in Soil	38084	5180	1,2,3-Trichloropropane	8260B	Approved
Volatiles in Soil	38084	5155	1,2,4-Trichlorobenzene	8260B	Approved
Volatiles in Soil	38084	5210	1,2,4-Trimethylbenzene	8260B	Approved
Volatiles in Soil	38084	4570	1,2-Dibromo-3-chloropropane	8260B	Approved
Volatiles in Soil	38084	4585	1,2-Dibromoethane	8260B	Approved
Volatiles in Soil	38084	4610	1,2-Dichlorobenzene	8260B	Approved
Volatiles in Soil	38084	4635	1,2-Dichloroethane	8260B	Approved
Volatiles in Soil	38084	4655	1,2-Dichloropropane	8260B	Approved
Volatiles in Soil	38084	5215	1,3,5-Trimethylbenzene	8260B	Approved
Volatiles in Soil	38084	4615	1,3-Dichlorobenzene	8260B	Approved
Volatiles in Soil	38084	4660	1,3-Dichloropropane	8260B	Approved
Volatiles in Soil	38084	4620	1,4-Dichlorobenzene	8260B	Approved
Volatiles in Soil	38084	4665	2,2-Dichloropropane	8260B	Approved
Volatiles in Soil	38084	4535	2-Chlorotoluene	8260B	Approved
Volatiles in Soil	38084	4540	4-Chlorotoluene	8260B	Approved
Volatiles in Soil	38084	4995	4-Methyl-2-pentanone	8260B	Approved
Volatiles in Soil	38084	4375	Benzene	8260B	Approved
Volatiles in Soil	38084	4385	Bromobenzene	8260B	Approved
Volatiles in Soil	38084	4390	Bromochloromethane	8260B	Approved
Volatiles in Soil	38084	4395	Bromodichloromethane	8260B	Approved
Volatiles in Soil	38084	4400	Bromoform	8260B	Approved
Volatiles in Soil	38084	4950	Bromomethane	8260B	Approved
Volatiles in Soil	38084	4450	Carbon disulphide	8260B	Approved
Volatiles in Soil	38084	4455	Carbon tetrachloride	8260B	Approved
Volatiles in Soil	38084	4475	Chlorobenzene	8260B	Approved
Volatiles in Soil	38084	4485	Chloroethane	8260B	Approved
Volatiles in Soil	38084	4505	Chloroform	8260B	Approved
Volatiles in Soil	38084	4960	Chloromethane	8260B	Approved
Volatiles in Soil	38084	4645	cis-1,2-Dichloroethene	8260B	Approved
Volatiles in Soil	38084	4680	cis-1,3-Dichloropropene	8260B	Approved
Volatiles in Soil	38084	4575	Dibromochloromethane	8260B	Approved
Volatiles in Soil	38084	4595	Dibromomethane	8260B	Approved
Volatiles in Soil	38084	4625	Dichlorodifluoromethane	8260B	Approved
Volatiles in Soil	38084	4765	Ethyl benzene	8260B	Approved
Volatiles in Soil	38084	4835	Hexachlorobutadiene	8260B	Approved
Volatiles in Soil	38084	4840	Hexachloroethane	8260B	Approved
Volatiles in Soil	38084	4900	Isopropylbenzene	8260B	Approved
Volatiles in Soil	38084	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
Volatiles in Soil	38084	4975	Methylene chloride	8260B	Approved
Volatiles in Soil	38084	5005	Naphthalene	8260B	Approved
Volatiles in Soil	38084	4435	n-Butyl benzene	8260B	Approved
Volatiles in Soil	38084	5090	n-Propylbenzene	8260B	Approved
Volatiles in Soil	38084	4910	p-Isopropyl toluene	8260B	Approved
Volatiles in Soil	38084	4440	sec-Butyl benzene	8260B	Approved
Volatiles in Soil	38084	5100	Styrene	8260B	Approved
Volatiles in Soil	38084	4445	tert-Butyl benzene	8260B	Approved
Volatiles in Soil	38084	5140	Toluene	8260B	Approved
Volatiles in Soil	38084	5260	Total Xylenes	8260B	Approved
Volatiles in Soil	38084	4700	trans-1,2-Dichloroethene	8260B	Approved
Volatiles in Soil	38084	5170	Trichloroethene	8260B	Approved
Volatiles in Soil	38084	5175	Trichlorofluoromethane	8260B	Approved
Volatiles in Soil	38084	5235	Vinyl chloride	8260B	Approved
RCRA BTEX & MTBE	38161	4375	Benzene	8260B	Approved
RCRA BTEX & MTBE	38161	4765	Ethyl benzene	8260B	Approved
RCRA BTEX & MTBE	38161	5140	Toluene	8260B	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
RCRA BTEX & MTBE	38161	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
RCRA BTEX & MTBE	38161	5260	Total Xylenes	8260B	Approved
RCRA Ketones in Soil	38167	4410	2-Butanone (Methyl ethyl ketone)	8260B	Approved
RCRA Ketones in Soil	38167	4860	2-Hexanone	8260B	Approved
RCRA Ketones in Soil	38167	4995	4-Methyl-2-pentanone	8260B	Approved
RCRA Ketones in Soil	38167	4315	Acetone	8260B	Approved
RCRA Oxygenates	38169	5185	1,1,2-Trichlorotrifluoroethane	8260B	Approved
RCRA Oxygenates	38169	4770	Ethyl tert-butyl ether	8260B	Approved
RCRA Oxygenates	38169	9375	Isopropyl ether	8260B	Approved
RCRA Oxygenates	38169	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
RCRA Oxygenates	38169	5090	n-Propylbenzene	8260B	Approved
RCRA Oxygenates	38169	4370	tert-Amyl methyl ether	8260B	Approved
RCRA Oxygenates	38169	4420	tert-Butyl alcohol (t-Butanol)	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5105	1,1,1,2-Tetrachloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5160	1,1,1-Trichloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5110	1,1,2,2-Tetrachloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5165	1,1,2-Trichloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4630	1,1-Dichloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4640	1,1-Dichloroethene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5180	1,2,3-Trichloropropane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5155	1,2,4-Trichlorobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4570	1,2-Dibromo-3-chloropropane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4585	1,2-Dibromoethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4610	1,2-Dichlorobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4635	1,2-Dichloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4655	1,2-Dichloropropane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4615	1,3-Dichlorobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4620	1,4-Dichlorobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4410	2-Butanone (Methyl ethyl ketone)	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4860	2-Hexanone	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4995	4-Methyl-2-pentanone	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4315	Acetone	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4375	Benzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4385	Bromobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4395	Bromodichloromethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4400	Bromoform	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4950	Bromomethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4455	Carbon tetrachloride	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4475	Chlorobenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4485	Chloroethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4505	Chloroform	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4960	Chloromethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4645	cis-1,2-Dichloroethene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4680	cis-1,3-Dichloropropene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4575	Dibromochloromethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4595	Dibromomethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4625	Dichlorodifluoromethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4765	Ethyl benzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4900	Isopropylbenzene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5000	Methyl tert-butyl ether (MTBE)	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4975	Methylene chloride	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5005	Naphthalene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5100	Styrene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5115	Tetrachloroethene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5140	Toluene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4700	trans-1,2-Dichloroethene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	4685	trans-1,3-Dichloropropene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5170	Trichloroethene	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5175	Trichlorofluoromethane	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5235	Vinyl chloride	8260B	Approved
RCRA Medium Level Volatiles in Soil	38199	5260	Xylenes, total	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	4375	Benzene	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	4765	Ethylbenzene	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	5240	m+p-Xylene	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	5000	MTBE	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	5250	o-Xylene	8260B	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
GRO/BTEX in Soil	SPE-025AK	5140	Toluene	8260B	Approved
GRO/BTEX in Soil	SPE-025AK	5260	Xylene, total	8260B	Approved
NPTA			Cyclohexane	8260B	Approved
NPTA			Methyl Acetate	8260B	Approved
NPTA			Methylcyclohexane	8260B	Approved
NPTA			m&p Xylenes	8260B	Approved
NPTA			o-Xylene	8260B	Approved
NPTA			p-isopropyltoluene	8260B	Approved
NPTA			Vinyl Acetate	8260B	Approved
Volatiles in Soil	38084	5105	1,1,1,2-Tetrachloroethane	8260C	Approved
Volatiles in Soil	38084	5160	1,1,1-Trichloroethane	8260C	Approved
Volatiles in Soil	38084	5110	1,1,2,2-Tetrachloroethane	8260C	Approved
Volatiles in Soil	38084	5165	1,1,2-Trichloroethane	8260C	Approved
Volatiles in Soil	38084	4630	1,1-Dichloroethane	8260C	Approved
Volatiles in Soil	38084	4640	1,1-Dichloroethene	8260C	Approved
Volatiles in Soil	38084	4670	1,1-Dichloropropene	8260C	Approved
Volatiles in Soil	38084	5150	1,2,3-Trichlorobenzene	8260C	Approved
Volatiles in Soil	38084	5180	1,2,3-Trichloropropane	8260C	Approved
Volatiles in Soil	38084	5155	1,2,4-Trichlorobenzene	8260C	Approved
Volatiles in Soil	38084	5210	1,2,4-Trimethylbenzene	8260C	Approved
Volatiles in Soil	38084	4570	1,2-Dibromo-3-chloropropane	8260C	Approved
Volatiles in Soil	38084	4585	1,2-Dibromoethane	8260C	Approved
Volatiles in Soil	38084	4610	1,2-Dichlorobenzene	8260C	Approved
Volatiles in Soil	38084	4635	1,2-Dichloroethane	8260C	Approved
Volatiles in Soil	38084	4655	1,2-Dichloropropane	8260C	Approved
Volatiles in Soil	38084	5215	1,3,5-Trimethylbenzene	8260C	Approved
Volatiles in Soil	38084	4615	1,3-Dichlorobenzene	8260C	Approved
Volatiles in Soil	38084	4660	1,3-Dichloropropane	8260C	Approved
Volatiles in Soil	38084	4620	1,4-Dichlorobenzene	8260C	Approved
Volatiles in Soil	38084	4665	2,2-Dichloropropane	8260C	Approved
Volatiles in Soil	38084	4535	2-Chlorotoluene	8260C	Approved
Volatiles in Soil	38084	4540	4-Chlorotoluene	8260C	Approved
Volatiles in Soil	38084	4995	4-Methyl-2-pentanone	8260C	Approved
Volatiles in Soil	38084	4375	Benzene	8260C	Approved
Volatiles in Soil	38084	4385	Bromobenzene	8260C	Approved
Volatiles in Soil	38084	4390	Bromochloromethane	8260C	Approved
Volatiles in Soil	38084	4395	Bromodichloromethane	8260C	Approved
Volatiles in Soil	38084	4400	Bromoform	8260C	Approved
Volatiles in Soil	38084	4950	Bromomethane	8260C	Approved
Volatiles in Soil	38084	4450	Carbon disulphide	8260C	Approved
Volatiles in Soil	38084	4455	Carbon tetrachloride	8260C	Approved
Volatiles in Soil	38084	4475	Chlorobenzene	8260C	Approved
Volatiles in Soil	38084	4485	Chloroethane	8260C	Approved
Volatiles in Soil	38084	4505	Chloroform	8260C	Approved
Volatiles in Soil	38084	4960	Chloromethane	8260C	Approved
Volatiles in Soil	38084	4645	cis-1,2-Dichloroethene	8260C	Approved
Volatiles in Soil	38084	4680	cis-1,3-Dichloropropene	8260C	Approved
Volatiles in Soil	38084	4575	Dibromochloromethane	8260C	Approved
Volatiles in Soil	38084	4595	Dibromomethane	8260C	Approved
Volatiles in Soil	38084	4625	Dichlorodifluoromethane	8260C	Approved
Volatiles in Soil	38084	4765	Ethyl benzene	8260C	Approved
Volatiles in Soil	38084	4835	Hexachlorobutadiene	8260C	Approved
Volatiles in Soil	38084	4840	Hexachloroethane	8260C	Approved
Volatiles in Soil	38084	4900	Isopropylbenzene	8260C	Approved
Volatiles in Soil	38084	5000	Methyl tert-butyl ether (MTBE)	8260C	Approved
Volatiles in Soil	38084	4975	Methylene chloride	8260C	Approved
Volatiles in Soil	38084	5005	Naphthalene	8260C	Approved
Volatiles in Soil	38084	4435	n-Butyl benzene	8260C	Approved
Volatiles in Soil	38084	5090	n-Propylbenzene	8260C	Approved
Volatiles in Soil	38084	4910	p-Isopropyl toluene	8260C	Approved
Volatiles in Soil	38084	4440	sec-Butyl benzene	8260C	Approved
Volatiles in Soil	38084	5100	Styrene	8260C	Approved
Volatiles in Soil	38084	4445	tert-Butyl benzene	8260C	Approved
Volatiles in Soil	38084	5140	Toluene	8260C	Approved
Volatiles in Soil	38084	5260	Total Xylenes	8260C	Approved
Volatiles in Soil	38084	4700	trans-1,2-Dichloroethene	8260C	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
Volatiles in Soil	38084	5170	Trichloroethene	8260C	Approved
Volatiles in Soil	38084	5175	Trichlorofluoromethane	8260C	Approved
Volatiles in Soil	38084	5235	Vinyl chloride	8260C	Approved
RCRA BTEX & MTBE	38161	4375	Benzene	8260C	Approved
RCRA BTEX & MTBE	38161	4765	Ethyl benzene	8260C	Approved
RCRA BTEX & MTBE	38161	5140	Toluene	8260C	Approved
RCRA BTEX & MTBE	38161	5000	Methyl tert-butyl ether (MTBE)	8260C	Approved
RCRA BTEX & MTBE	38161	5260	Total Xylenes	8260C	Approved
RCRA Ketones in Soil	38167	4410	2-Butanone (Methyl ethyl ketone)	8260C	Approved
RCRA Ketones in Soil	38167	4860	2-Hexanone	8260C	Approved
RCRA Ketones in Soil	38167	4995	4-Methyl-2-pentanone	8260C	Approved
RCRA Ketones in Soil	38167	4315	Acetone	8260C	Approved
RCRA Oxygenates	38169	5185	1,1,2-Trichlorotrifluoroethane	8260C	Approved
RCRA Oxygenates	38169	4770	Ethyl tert-butyl ether	8260C	Approved
RCRA Oxygenates	38169	9375	Isopropyl ether	8260C	Approved
RCRA Oxygenates	38169	5000	Methyl tert-butyl ether (MTBE)	8260C	Approved
RCRA Oxygenates	38169	5090	n-Propylbenzene	8260C	Approved
RCRA Oxygenates	38169	4370	tert-Amyl methyl ether	8260C	Approved
RCRA Oxygenates	38169	4420	tert-Butyl alcohol (t-Butanol)	8260C	Approved
NPTA			Cyclohexane	8260C	Approved
NPTA			Methyl Acetate	8260C	Approved
NPTA			Methylcyclohexane	8260C	Approved
NPTA			m&p Xylenes	8260C	Approved
NPTA			o-Xylene	8260C	Approved
NPTA			p-isopropyltoluene	8260C	Approved
NPTA			Vinyl Acetate	8260C	Approved
Acenaphthylene in Soils	SPE-003	5505	Acenaphthylene	8270C	Approved
BNAs in Soil	SPE-003	5155	1,2,4-Trichlorobenzene	8270C	Approved
BNAs in Soil	SPE-003	4610	1,2-Dichlorobenzene	8270C	Approved
BNAs in Soil	SPE-003	4615	1,3-Dichlorobenzene	8270C	Approved
BNAs in Soil	SPE-003	4620	1,4-Dichlorobenzene	8270C	Approved
BNAs in Soil	SPE-003	6835	2,4,5-Trichlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6840	2,4,6-Trichlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6000	2,4-Dichlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6130	2,4-Dimethylphenol	8270C	Approved
BNAs in Soil	SPE-003	6175	2,4-Dinitrophenol	8270C	Approved
BNAs in Soil	SPE-003	6185	2,4-Dinitrotoluene (2,4-DNT)	8270C	Approved
BNAs in Soil	SPE-003	6005	2,6-Dichlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6190	2,6-Dinitrotoluene (2,6-DNT)	8270C	Approved
BNAs in Soil	SPE-003	5795	2-Chloronaphthalene	8270C	Approved
BNAs in Soil	SPE-003	5800	2-Chlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6360	2-Methyl-4,6-dinitrophenol	8270C	Approved
BNAs in Soil	SPE-003	6385	2-Methylnaphthalene	8270C	Approved
BNAs in Soil	SPE-003	6400	2-Methylphenol (o-Cresol)	8270C	Approved
BNAs in Soil	SPE-003	6460	2-Nitroaniline	8270C	Approved
BNAs in Soil	SPE-003	6490	2-Nitrophenol	8270C	Approved
BNAs in Soil	SPE-003	5945	3,3'-Dichlorobenzidine	8270C	Approved
BNAs in Soil	SPE-003	6410	3+4-Methylphenol (m+p-Cresol)	8270C	Approved
BNAs in Soil	SPE-003	6405	3-Methylphenol (m-Cresol)	8270C	Approved
BNAs in Soil	SPE-003	6465	3-Nitroaniline	8270C	Approved
BNAs in Soil	SPE-003	5660	4-Bromophenyl phenyl ether	8270C	Approved
BNAs in Soil	SPE-003	5700	4-Chloro-3-methylphenol	8270C	Approved
BNAs in Soil	SPE-003	5745	4-Chloroaniline	8270C	Approved
BNAs in Soil	SPE-003	5825	4-Chlorophenyl phenylether	8270C	Approved
BNAs in Soil	SPE-003	6410	4-Methylphenol (p-Cresol)	8270C	Approved
BNAs in Soil	SPE-003	6470	4-Nitroaniline	8270C	Approved
BNAs in Soil	SPE-003	6500	4-Nitrophenol	8270C	Approved
BNAs in Soil	SPE-003	5500	Acenaphthene	8270C	Approved
BNAs in Soil	SPE-003	5505	Acenaphthylene	8270C	Approved
BNAs in Soil	SPE-003	5545	Aniline	8270C	Approved
BNAs in Soil	SPE-003	5555	Anthracene	8270C	Approved
BNAs in Soil	SPE-003	5595	Benzidine	8270C	Approved
BNAs in Soil	SPE-003	5575	Benzo(a)anthracene	8270C	Approved
BNAs in Soil	SPE-003	5580	Benzo(a)pyrene	8270C	Approved
BNAs in Soil	SPE-003	5585	Benzo(b)fluoranthene	8270C	Approved
BNAs in Soil	SPE-003	5590	Benzo(g,h,i)perylene	8270C	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
BNAs in Soil	SPE-003	5600	Benzo(k)fluoranthene	8270C	Approved
BNAs in Soil	SPE-003	5610	Benzoic acid	8270C	Approved
BNAs in Soil	SPE-003	5630	Benzyl alcohol	8270C	Approved
BNAs in Soil	SPE-003	5760	bis(2-Chloroethoxy)methane	8270C	Approved
BNAs in Soil	SPE-003	5765	bis(2-Chloroethyl) ether	8270C	Approved
BNAs in Soil	SPE-003	5780	bis(2-Chloroisopropyl) ether	8270C	Approved
BNAs in Soil	SPE-003	6255	bis(2-Ethylhexyl) phthalate (DEHP)	8270C	Approved
BNAs in Soil	SPE-003	5670	Butyl benzyl phthalate	8270C	Approved
BNAs in Soil	SPE-003	5680	Carbazole	8270C	Approved
BNAs in Soil	SPE-003	5855	Chrysene	8270C	Approved
BNAs in Soil	SPE-003	5895	Dibenz(a,h) anthracene	8270C	Approved
BNAs in Soil	SPE-003	5905	Dibenzofuran	8270C	Approved
BNAs in Soil	SPE-003	6070	Diethyl phthalate	8270C	Approved
BNAs in Soil	SPE-003	6135	Dimethyl phthalate	8270C	Approved
BNAs in Soil	SPE-003	5925	Di-n-butyl phthalate	8270C	Approved
BNAs in Soil	SPE-003	6200	Di-n-octyl phthalate	8270C	Approved
BNAs in Soil	SPE-003	6265	Fluoranthene	8270C	Approved
BNAs in Soil	SPE-003	6270	Fluorene	8270C	Approved
BNAs in Soil	SPE-003	6275	Hexachlorobenzene	8270C	Approved
BNAs in Soil	SPE-003	4835	Hexachlorobutadiene	8270C	Approved
BNAs in Soil	SPE-003	6285	Hexachlorocyclopentadiene	8270C	Approved
BNAs in Soil	SPE-003	4840	Hexachloroethane	8270C	Approved
BNAs in Soil	SPE-003	6315	Indeno(1,2,3-cd) pyrene	8270C	Approved
BNAs in Soil	SPE-003	6320	Isophorone	8270C	Approved
BNAs in Soil	SPE-003	5005	Naphthalene	8270C	Approved
BNAs in Soil	SPE-003	5015	Nitrobenzene	8270C	Approved
BNAs in Soil	SPE-003	6530	n-Nitrosodimethylamine	8270C	Approved
BNAs in Soil	SPE-003	6545	n-Nitroso-di-n-propylamine	8270C	Approved
BNAs in Soil	SPE-003	6535	n-Nitrosodiphenylamine	8270C	Approved
BNAs in Soil	SPE-003	6605	Pentachlorophenol	8270C	Approved
BNAs in Soil	SPE-003	6615	Phenanthrene	8270C	Approved
BNAs in Soil	SPE-003	6625	Phenol	8270C	Approved
BNAs in Soil	SPE-003	6665	Pyrene	8270C	Approved
BNAs in Soil	SPE-003	5095	Pyridine	8270C	Approved
Low-Level PAHs in Soil	722	6665	Pyrene	8270CSIM	Approved
PAHs - Solids	SPE-017	5005	Naphthalene	8270CSIM	Approved
PAHs - Solids	SPE-017	5500	Acenaphthene	8270CSIM	Approved
PAHs - Solids	SPE-017	5505	Acenaphthylene	8270CSIM	Approved
PAHs - Solids	SPE-017	5555	Anthracene	8270CSIM	Approved
PAHs - Solids	SPE-017	5575	Benzo(a)anthracene	8270CSIM	Approved
PAHs - Solids	SPE-017	5580	Benzo(a)pyrene	8270CSIM	Approved
PAHs - Solids	SPE-017	5585	Benzo(b)fluoranthene	8270CSIM	Approved
PAHs - Solids	SPE-017	5590	Benzo(g,h,i)perylene	8270CSIM	Approved
PAHs - Solids	SPE-017	5600	Benzo(k)fluoranthene	8270CSIM	Approved
PAHs - Solids	SPE-017	5855	Chrysene	8270CSIM	Approved
PAHs - Solids	SPE-017	5895	Dibenzo(a,h)anthracene	8270CSIM	Approved
PAHs - Solids	SPE-017	6265	Fluoranthene	8270CSIM	Approved
PAHs - Solids	SPE-017	6270	Fluorene	8270CSIM	Approved
PAHs - Solids	SPE-017	6315	Indeno(1,2,3-cd) pyrene	8270CSIM	Approved
PAHs - Solids	SPE-017	6385	2-Methylnaphthalene	8270CSIM	Approved
PAHs - Solids	SPE-017	6615	Phenanthrene	8270CSIM	Approved
PAHs - Solids	SPE-017	6665	Pyrene	8270CSIM	Approved
BNAs in Soil	SPE-003	5155	1,2,4-Trichlorobenzene	8270D	Approved
BNAs in Soil	SPE-003	4610	1,2-Dichlorobenzene	8270D	Approved
BNAs in Soil	SPE-003	4615	1,3-Dichlorobenzene	8270D	Approved
BNAs in Soil	SPE-003	4620	1,4-Dichlorobenzene	8270D	Approved
BNAs in Soil	SPE-003	6835	2,4,5-Trichlorophenol	8270D	Approved
BNAs in Soil	SPE-003	6840	2,4,6-Trichlorophenol	8270D	Approved
BNAs in Soil	SPE-003	6000	2,4-Dichlorophenol	8270D	Approved
BNAs in Soil	SPE-003	6130	2,4-Dimethylphenol	8270D	Approved
BNAs in Soil	SPE-003	6175	2,4-Dinitrophenol	8270D	Approved
BNAs in Soil	SPE-003	6185	2,4-Dinitrotoluene (2,4-DNT)	8270D	Approved
BNAs in Soil	SPE-003	6005	2,6-Dichlorophenol	8270D	Approved
BNAs in Soil	SPE-003	6190	2,6-Dinitrotoluene (2,6-DNT)	8270D	Approved
BNAs in Soil	SPE-003	5795	2-Chloronaphthalene	8270D	Approved
BNAs in Soil	SPE-003	5800	2-Chlorophenol	8270D	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
BNAs in Soil	SPE-003	6360	2-Methyl-4,6-dinitrophenol	8270D	Approved
BNAs in Soil	SPE-003	6385	2-Methylnaphthalene	8270D	Approved
BNAs in Soil	SPE-003	6400	2-Methylphenol (o-Cresol)	8270D	Approved
BNAs in Soil	SPE-003	6460	2-Nitroaniline	8270D	Approved
BNAs in Soil	SPE-003	6490	2-Nitrophenol	8270D	Approved
BNAs in Soil	SPE-003	5945	3,3'-Dichlorobenzidine	8270D	Approved
BNAs in Soil	SPE-003	6410	3+4-Methylphenol (m+p-Cresol)	8270D	Approved
BNAs in Soil	SPE-003	6405	3-Methylphenol (m-Cresol)	8270D	Approved
BNAs in Soil	SPE-003	6465	3-Nitroaniline	8270D	Approved
BNAs in Soil	SPE-003	5660	4-Bromophenyl phenyl ether	8270D	Approved
BNAs in Soil	SPE-003	5700	4-Chloro-3-methylphenol	8270D	Approved
BNAs in Soil	SPE-003	5745	4-Chloroaniline	8270D	Approved
BNAs in Soil	SPE-003	5825	4-Chlorophenyl phenylether	8270D	Approved
BNAs in Soil	SPE-003	6410	4-Methylphenol (p-Cresol)	8270D	Approved
BNAs in Soil	SPE-003	6470	4-Nitroaniline	8270D	Approved
BNAs in Soil	SPE-003	6500	4-Nitrophenol	8270D	Approved
BNAs in Soil	SPE-003	5500	Acenaphthene	8270D	Approved
BNAs in Soil	SPE-003	5505	Acenaphthylene	8270D	Approved
BNAs in Soil	SPE-003	5545	Aniline	8270D	Approved
BNAs in Soil	SPE-003	5555	Anthracene	8270D	Approved
BNAs in Soil	SPE-003	5595	Benzidine	8270D	Approved
BNAs in Soil	SPE-003	5575	Benzo(a)anthracene	8270D	Approved
BNAs in Soil	SPE-003	5580	Benzo(a)pyrene	8270D	Approved
BNAs in Soil	SPE-003	5585	Benzo(b)fluoranthene	8270D	Approved
BNAs in Soil	SPE-003	5590	Benzo(g,h,i)perylene	8270D	Approved
BNAs in Soil	SPE-003	5600	Benzo(k)fluoranthene	8270D	Approved
BNAs in Soil	SPE-003	5610	Benzoic acid	8270D	Approved
BNAs in Soil	SPE-003	5630	Benzyl alcohol	8270D	Approved
BNAs in Soil	SPE-003	5760	bis(2-Chloroethoxy)methane	8270D	Approved
BNAs in Soil	SPE-003	5765	bis(2-Chloroethyl) ether	8270D	Approved
BNAs in Soil	SPE-003	5780	bis(2-Chloroisopropyl) ether	8270D	Approved
BNAs in Soil	SPE-003	6255	bis(2-Ethylhexyl) phthalate (DEHP)	8270D	Approved
BNAs in Soil	SPE-003	5670	Butyl benzyl phthalate	8270D	Approved
BNAs in Soil	SPE-003	5680	Carbazole	8270D	Approved
BNAs in Soil	SPE-003	5855	Chrysene	8270D	Approved
BNAs in Soil	SPE-003	5895	Dibenz(a,h) anthracene	8270D	Approved
BNAs in Soil	SPE-003	5905	Dibenzofuran	8270D	Approved
BNAs in Soil	SPE-003	6070	Diethyl phthalate	8270D	Approved
BNAs in Soil	SPE-003	6135	Dimethyl phthalate	8270D	Approved
BNAs in Soil	SPE-003	5925	Di-n-butyl phthalate	8270D	Approved
BNAs in Soil	SPE-003	6200	Di-n-octyl phthalate	8270D	Approved
BNAs in Soil	SPE-003	6265	Fluoranthene	8270D	Approved
BNAs in Soil	SPE-003	6270	Fluorene	8270D	Approved
BNAs in Soil	SPE-003	6275	Hexachlorobenzene	8270D	Approved
BNAs in Soil	SPE-003	4835	Hexachlorobutadiene	8270D	Approved
BNAs in Soil	SPE-003	6285	Hexachlorocyclopentadiene	8270D	Approved
BNAs in Soil	SPE-003	4840	Hexachloroethane	8270D	Approved
BNAs in Soil	SPE-003	6315	Indeno(1,2,3-cd) pyrene	8270D	Approved
BNAs in Soil	SPE-003	6320	Isophorone	8270D	Approved
BNAs in Soil	SPE-003	5005	Naphthalene	8270D	Approved
BNAs in Soil	SPE-003	5015	Nitrobenzene	8270D	Approved
BNAs in Soil	SPE-003	6530	n-Nitrosodimethylamine	8270D	Approved
BNAs in Soil	SPE-003	6545	n-Nitroso-di-n-propylamine	8270D	Approved
BNAs in Soil	SPE-003	6535	n-Nitrosodiphenylamine	8270D	Approved
BNAs in Soil	SPE-003	6605	Pentachlorophenol	8270D	Approved
BNAs in Soil	SPE-003	6615	Phenanthrene	8270D	Approved
BNAs in Soil	SPE-003	6625	Phenol	8270D	Approved
BNAs in Soil	SPE-003	6665	Pyrene	8270D	Approved
BNAs in Soil	SPE-003	5095	Pyridine	8270D	Approved
PAHs - Solids	SPE-017	5005	Naphthalene	8270DSIM	Approved
PAHs - Solids	SPE-017	5500	Acenaphthene	8270DSIM	Approved
PAHs - Solids	SPE-017	5505	Acenaphthylene	8270DSIM	Approved
PAHs - Solids	SPE-017	5555	Anthracene	8270DSIM	Approved
PAHs - Solids	SPE-017	5575	Benzo(a)anthracene	8270DSIM	Approved
PAHs - Solids	SPE-017	5580	Benzo(a)pyrene	8270DSIM	Approved
PAHs - Solids	SPE-017	5585	Benzo(b)fluoranthene	8270DSIM	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
PAHs - Solids	SPE-017	5590	Benzo(g,h,i)perylene	8270DSIM	Approved
PAHs - Solids	SPE-017	5600	Benzo(k)fluoranthene	8270DSIM	Approved
PAHs - Solids	SPE-017	5855	Chrysene	8270DSIM	Approved
PAHs - Solids	SPE-017	5895	Dibenzo(a,h)anthracene	8270DSIM	Approved
PAHs - Solids	SPE-017	6265	Fluoranthene	8270DSIM	Approved
PAHs - Solids	SPE-017	6270	Fluorene	8270DSIM	Approved
PAHs - Solids	SPE-017	6315	Indeno(1,2,3-cd) pyrene	8270DSIM	Approved
PAHs - Solids	SPE-017	6385	2-Methylnaphthalene	8270DSIM	Approved
PAHs - Solids	SPE-017	6615	Phenanthrene	8270DSIM	Approved
PAHs - Solids	SPE-017	6665	Pyrene	8270DSIM	Approved
Dioxins and Furans in Soil	SPE-016	9612	2,3,7,8-TCDD	8290	Approved
Dioxins and Furans in Soil	SPE-016	9606	PCDD + PCDF, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9992	PCDD, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9615	TCDD, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9519	1,2,3,4,6,7,8,9-OCDD	8290	Approved
Dioxins and Furans in Soil	SPE-016	9516	1,2,3,4,6,7,8,9-OCDF	8290	Approved
Dioxins and Furans in Soil	SPE-016	9426	1,2,3,4,6,7,8-Hpccd	8290	Approved
Dioxins and Furans in Soil	SPE-016	9420	1,2,3,4,6,7,8-Hpcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9423	1,2,3,4,7,8,9-Hpcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9453	1,2,3,4,7,8-Hxcd	8290	Approved
Dioxins and Furans in Soil	SPE-016	9471	1,2,3,4,7,8-Hxcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9456	1,2,3,6,7,8-Hxcd	8290	Approved
Dioxins and Furans in Soil	SPE-016	9474	1,2,3,6,7,8-Hxcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9459	1,2,3,7,8,9-Hxcd	8290	Approved
Dioxins and Furans in Soil	SPE-016	9477	1,2,3,7,8,9-Hxcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9540	1,2,3,7,8-Pecdd	8290	Approved
Dioxins and Furans in Soil	SPE-016	9543	1,2,3,7,8-Pecdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9480	2,3,4,6,7,8-Hxcdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9549	2,3,4,7,8-Pecdf	8290	Approved
Dioxins and Furans in Soil	SPE-016	9606	2,3,7,8-TCDD	8290	Approved
Dioxins and Furans in Soil	SPE-016	9989	2,3,7,8-TCDF	8290	Approved
Dioxins and Furans in Soil	SPE-016	9438	Hpccd, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9444	Hpcdf, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9468	Hxcd, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9483	Hxcdf, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9992	PCDD + PCDF, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9991	PCDD, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9993	PCDF, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9555	Pecdd, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9552	Pecdf, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9989	TCDD, total	8290	Approved
Dioxins and Furans in Soil	SPE-016	9991	TCDF, total	8290	Approved
RCRA Carbamates	38158	7710	3-Hydroxycarbofuran	8321A	Approved
RCRA Carbamates	38158	7010	Aldicarb	8321A	Approved
RCRA Carbamates	38158	7015	Aldicarb sulfone	8321A	Approved
RCRA Carbamates	38158	7020	Aldicarb sulfoxide	8321A	Approved
RCRA Carbamates	38158	8080	Baygon (Propoxur)	8321A	Approved
RCRA Carbamates	38158	7195	Carbaryl	8321A	Approved
RCRA Carbamates	38158	7205	Carbofuran	8321A	Approved
RCRA Carbamates	38158	9384	Dioxacarb	8321A	Approved
RCRA Carbamates	38158	7505	Diuron	8321A	Approved
RCRA Carbamates	38158	7800	Methiocarb	8321A	Approved
RCRA Carbamates	38158	7805	Methomyl	8321A	Approved
RCRA Carbamates	38158	8025	Promecarb	8321A	Approved
RCRA Nitroaromatics in Soil	38155	6885	1,3,5-Trinitrobenzene	8330	Approved
RCRA Nitroaromatics in Soil	38155	6160	1,3-Dinitrobenzene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9651	2,4,6-Trinitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	6185	2,4-Dinitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	6190	2,6-Dinitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9303	2-Amino-4,6-dinitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9507	2-Nitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9510	3-Nitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9306	4-Amino-2,6-dinitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9513	4-Nitrotoluene	8330	Approved
RCRA Nitroaromatics in Soil	38155	9522	HMX	8330	Approved
RCRA Nitroaromatics in Soil	38155	5015	Nitrobenzene	8330	Approved

**Accredited Analytes/Methods**  
**SOIL Proficiency Testing Summary**

<b>Lab Name :</b>	<b>APPL, Inc.</b>				
<b>City/State :</b>	<b>Clovis, CA</b>				
<b>PartName</b>	<b>PartNumber</b>	<b>NELACCode</b>	<b>AnalyteName</b>	<b>EPA Method</b>	<b>PT Results</b>
NPTA			Nitroglycerin	8330	Approved
NPTA			PGDN	8330	Approved
NPTA			Picric Acid	8330	Approved
NPTA			PETN	8330	Approved
RCRA Nitroaromatics in Soil	38155	9432	RDX	8330	Approved
RCRA Nitroaromatics in Soil	38155	6415	Tetryl	8330	Approved
RCRA Nitroaromatics in Soil	38155	6885	1,3,5-Trinitrobenzene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	6160	1,3-Dinitrobenzene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9651	2,4,6-Trinitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	6185	2,4-Dinitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	6190	2,6-Dinitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9303	2-Amino-4,6-dinitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9507	2-Nitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9510	3-Nitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9306	4-Amino-2,6-dinitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9513	4-Nitrotoluene	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9522	HMX	8330A	Approved
RCRA Nitroaromatics in Soil	38155	5015	Nitrobenzene	8330A	Approved
NPTA			Nitroglycerin	8330A	Approved
NPTA			PGDN	8330A	Approved
NPTA			Picric Acid	8330A	Approved
NPTA			PETN	8330A	Approved
RCRA Nitroaromatics in Soil	38155	9432	RDX	8330A	Approved
RCRA Nitroaromatics in Soil	38155	6415	Tetryl	8330A	Approved
RCRA Nitroaromatics in Soil	38155	6885	1,3,5-Trinitrobenzene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	6160	1,3-Dinitrobenzene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9651	2,4,6-Trinitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9185	2,4-Dinitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	6190	2,6-Dinitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9303	2-Amino-4,6-dinitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9507	2-Nitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9510	3-Nitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9306	4-Amino-2,6-dinitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9513	4-Nitrotoluene	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9522	HMX	8330B	Approved
RCRA Nitroaromatics in Soil	38155	5015	Nitrobenzene	8330B	Approved
NPTA			Nitroglycerin	8330B	Approved
NPTA			PGDN	8330B	Approved
NPTA			Picric Acid	8330B	Approved
NPTA			PETN	8330B	Approved
RCRA Nitroaromatics in Soil	38155	9432	RDX	8330B	Approved
RCRA Nitroaromatics in Soil	38155	6415	Tetryl	8330B	Approved
RCRA Cyanide	55105	1645	Cyanide	9010B	Approved
RCRA Cyanide	55105	1645	Cyanide	9010C	Approved
RCRA Cyanide	55105	1645	Cyanide	9014	Approved
RCRA Corrosivity - pH Determination	55127	1625	Corrosivity	9045C	Approved
RCRA Corrosivity - pH Determination	55127	1625	Corrosivity	9045D	Approved
RCRA Anions	55141	1541	Bromide (Br)	9056	Approved
RCRA Anions	55141	1576	Chloride (Cl)	9056	Approved
RCRA Anions	55141	1731	Fluoride (F)	9056	Approved
RCRA Anions	55141	1811	Nitrate as N (NO3- as N)	9056	Approved
RCRA Anions	55141	1871	Phosphate as P (PO43- as P)	9056	Approved
RCRA Anions	55141	2001	Sulfate (SO42-)	9056	Approved
RCRA Anions	55141	1540	Bromide (Br)	9056A	Approved
RCRA Anions	55141	1575	Chloride (Cl)	9056A	Approved
RCRA Anions	55141	1730	Fluoride (F)	9056A	Approved
RCRA Anions	55141	1810	Nitrate as N (NO3- as N)	9056A	Approved
RCRA Anions	55141	1870	Phosphate as P (PO43- as P)	9056A	Approved
RCRA Anions	55141	2000	Sulfate (SO42-)	9056A	Approved
RCRA Nutrients	55142	2040	TOC	Walkley Black	Approved
Nutrients	PEO-014	2040	TOC	Walkley Black	Approved

**Appendix E**  
**Standard Operating Procedures**

---

# Preparing Field Log Books

---

## I. Purpose

To provide general guidelines for entering field data into log books during site field activities.

## II. Scope

This is a general description of data requirements and format for field log books. Log books are needed to properly document all field activities in support of data evaluation and possible legal activities.

## III. Equipment and Materials

- Log book
- Indelible pen

## IV. Procedures and Guidelines

Properly completed field log books are a requirement of much of the work performed under the Navy CLEAN contract. Log books are legal documents and, as such, must be prepared following specific procedures and must contain required information to ensure their integrity and legitimacy. This SOP describes the basic requirements for field log book entries.

### A. PROCEDURES FOR COMPLETING FIELD LOG BOOKS

1. Field notes commonly are kept in bound, orange-covered logbooks used by surveyors and produced, for example, by Peninsular Publishing Company and SESCO, Inc. Pages should be water-resistant and notes should be taken only with water-proof, non-erasable permanent ink, such as that provided in Sanford Sharpie® permanent markers.
2. On the inside cover of the log book the following information should be included:
  - Company name and address
  - Log-holders name if log book was assigned specifically to that person
  - Activity or location

- Project name
  - Project manager's name
  - Phone numbers of the company, supervisors, emergency response, etc.
3. All lines of all pages should be used to prevent later additions of text, which could later be questioned. Any line not used should be marked through with a line and initialed and dated. Any pages not used should be marked through with a line, the author's initials, the date, and the note "Intentionally Left Blank."
  4. If errors are made in the log book, cross a single line through the error and enter the correct information. All corrections shall be initialed and dated by the personnel performing the correction. If possible, all corrections should be made by the individual who made the error.
  5. Daily entries will be made chronologically.
  6. Information will be recorded directly in the field log book during the work activity. Information will not be written on a separate sheet and then later transcribed into the log book.
  7. Each page of the log book will have the date of the work and the note takers initials.
  8. The final page of each day's notes will include the note-takers signature as well as the date.
  9. Only information relevant to the subject project will be added to the log book.
  10. The field notes will be copied and the copies sent to the Project Manager or designee in a timely manner (at least by the end of each week of work being performed).

B. INFORMATION TO BE INCLUDED IN FIELD LOG BOOKS

1. Entries into the log book should be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. Entries must be legible and complete.
2. General project information will be recorded at the beginning of each field project. This will include the project title, the project number, and project staff.
3. Scope: Describe the general scope of work to be performed each day.
4. Weather: Record the weather conditions and any significant changes in the weather during the day.
5. Tail Gate Safety Meetings: Record time and location of meeting, who was present, topics discussed, issues/problems/concerns identified,

and corrective actions or adjustments made to address concerns/problems, and other pertinent information.

6. Standard Health and Safety Procedures: Record level of personal protection being used (e.g., level D PPE), if required - record air monitoring data on a regular basis and note where data were recording (e.g., reading in borehole, reading in breathing zone, etc). Also record other required health and safety procedures as specified in the project specific health and safety plan.
7. Instrument Calibration: Record calibration information for each piece of health and safety and/or field equipment.
8. Personnel: Record names of all personnel present during field activities and list their roles and their affiliation. Record when personnel and visitors enter and leave a project site and their level of personal protection.
9. Communications: Record communications with project manager, subcontractors, regulators, facility personnel, and others that impact performance of the project.
10. Time: Keep a running time log explaining field activities as they occur chronologically throughout the day.
11. Deviations from the Work Plan: Record any deviations from the work plan and document why these were required and any communications authorizing these deviations.
12. Health and Safety Incidents: Record any health and safety incidents and immediately report any incidents to the Project Manager.
13. Subcontractor Information: Record name of company, record names and roles of subcontractor personnel, list type of equipment being used and general scope of work. List times of starting and stopping work and quantities of consumable equipment used if it is to be billed to the project.
14. Problems and Corrective Actions: Clearly describe any problems encountered during the field work and the corrective actions taken to address these problems.
15. Technical and Project Information: Describe the details of the work being performed. The technical information recorded will vary significantly between projects. The project work plan will describe the specific activities to be performed and may also list requirements for note taking. Discuss note-taking expectations with the Project Manager prior to beginning the field work.
16. Any conditions that might adversely affect the work or any data obtained.
17. Sampling Information; Specific information that will be relevant to

most sampling jobs includes the following:

- Description of the general sampling area – site name, buildings and streets in the area, etc.
- Station/Location identifier
- Description of the sample location – estimate location in comparison to two fixed points – draw a diagram in the field log book indicating sample location relative to these fixed points – include distances in feet.
- Sample matrix and type
- Sample date and time
- Sample identifier
- Draw a box around the sample ID so that it stands out in the field notes
- Information on how the sample was collected – distinguish between “grab,” “composite,” and “discrete” samples
- Number and type of sample containers collected
- Record of any field measurements taken (i.e. pH, turbidity)
- Parameters to be analyzed for, if appropriate
- Descriptions of soil samples

C. SUGGESTED FORMAT FOR RECORDING FIELD DATA

1. Use the left side border to record times and the remainder of the page to record information.
2. Use tables to record sampling information and field data from multiple samples.
3. Sketch sampling locations and other pertinent information.

# Multi-Increment Sampling

---

## I. Purpose

The Multi-Increment (MI) sampling of surface soil samples is performed to minimize any bias of sample representativeness introduced by compositional and distribution heterogeneity of constituents within the sample. This procedure should only be used when sampling surface soils for explosive residuals and metals.

## II. Scope

Standard techniques for surface soil MI sampling for the analysis of explosives residuals and metals, and required equipment are provided in this SOP. These procedures do not apply to aliquots collected for VOCs, SVOCs, pesticides/herbicides, PCBs, or field GC screening (samples for these analyses should NOT be collected using MI sampling).

## III. Equipment and Materials

MI sampling will be performed with clean hardened plastic or metal scoops, spoons, or coring tools depending on the cohesiveness of the soil. Sample containers will consist of two clean 16 ounce wide mouth glass jars for 1 kg samples and two clean 32 ounce wide mouth glass jars for 2 kg samples as required by the applicable analytical method. Soil will be homogenized in a clean stainless steel pan or bowl. Individual laboratory sample bottles will be required for Method 8330 (explosives residues) and metals analysis, per analytical method requirements. Method 8330B samples will be shipped to the contract laboratory in a mass of not less than 3 kg in sample containers supplied by the laboratory.

## IV. Procedures and Guidelines

Surface soil composite samples will be collected from each designated controlled detonation/ blow-in-place (BIP) location for analysis of explosives residues and total metals. A summary of sampling activities will be recorded in a field book.

Multi-increment composite surface soil samples will be collected both inside the BIP crater and outside the crater using a systematic sampling pattern with a random starting point. At least 30 aliquots should be collected per sample. Samples will be collected by walking from one corner of the grid systematically back and forth across the entire grid area, collecting an increment of soil every so many paces, depending on the grid size and number of aliquots to be collected. The sample aliquots will be approximately equal in the amount of soil, which will be collected from depths of 0-2 inches bgs.

The individual aliquot samples will then be composited into a single sample following the *Homogenization of Soil and Sediment Samples* SOP, prior to being transferred to the appropriate sample containers. One duplicate sample should be collected from each site and the duplicate sample will be collected using the same method as the original sample.

Samples will be stored on ice in clean plastic bags or clean large mouth glass bottles and submitted for laboratory analysis by one or more of the following analytical methods: EPA SW-846 Method 8330, Method 8330B, Method 6850, Methods 6010C and 7471B, and the appropriate project specific analytical methods for metals. Method 8330B uses an air drying and mechanical grinding process. Mechanical grinding will not be conducted for samples submitted for metals analysis. A minimum of 1 kg of soil will be collected per MI sample.

The sampling tools will not need to be cleaned between aliquots since each individual aliquot will be part of the same sample, but tools will be cleaned between each MI sample. The decontamination process involves first removing all adhering soil, then rinsing the sampling head and pan/bowl with deionized water, concluding with an acetone rinse.

## V. Key Checks and Items

- Composite surface soil samples (1 inside the crater, 1 outside the crater, and one duplicate sample from outside the crater) will be collected at each controlled detonation/BIP location
- Aliquot samples should be homogenized in the field in a clean, stainless steel pan/bowl. Sampling method is only applicable to explosives residues and metals.
- Number of aliquots should be 30, depending on the size of the area.
- Check that decontamination of equipment is thorough.

**Appendix F**  
**Environmental Protection Plan**

---

# Environmental Protection Plan

---

This EPP is a supplement to the MCIEAST – MCB CAMLEJ Master EPP (Section 7 of the MRP MPPs (CH2M HILL, 2008b) and provides additional site-specific details related to the environmental protection procedures to be implemented at Lot 202. Only additional details, modifications, or additions to the information provided in the EPP from the MRP Master Project Plans are discussed herein.

## 1.1 Regional Ecological Summary

A summary of the regional ecology is provided in Section 7.1 of the MRP MPPs (CH2M HILL, 2008b).

## 1.2 Endangered/Threatened Species within the Project Site

Many protected species have been sighted at and in the vicinity of MCIEAST – MCB CAMLEJ, such as American alligator, green sea turtle, loggerhead sea turtle, piping plover, red-cockaded woodpecker, seabeach amaranth, and rough-leaf loosestrife (U.S. Marine Corps, 2006). **Table 1** lists the species that could occur at or adjacent to MCIEAST – MCB CAMLEJ that are listed as threatened, endangered, or of special concern by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act of 1973, as amended. Based on the environmental reviews completed in preparation for the Integrated Natural Resources Management Plan, none of the species listed on **Table 1** are expected at Lot 202; therefore, no adverse impacts to listed species are expected to result from the proposed field work. If any of the listed species are encountered at the site, operations will stop and the CH2M HILL PM and Environmental Manager (EM) will be notified. Operations will not resume until it is known whether the species is protected and, if so, what actions must be taken to remain in compliance.

## 1.3 Migratory Birds within the Project Site

The federal Migratory Bird Treaty Act (MBTA) protects listed birds, as well as their eggs and active nests (nests containing eggs or non-fledged young). Although it is unlikely that migratory birds will be present at Lot 202, North Carolina is located in the Atlantic Migratory Flyway and migratory birds could be present at any time. Destruction of the birds, nests, or eggs by site operations is prohibited by the MBTA. If nesting birds, nests (active or inactive), or eggs are encountered at the site, operations will stop and the CH2M HILL PM and EM will be notified. Operations will not resume until it is known whether the bird is protected and, if so, what actions must be taken to remain in compliance.

## 1.4 Wetlands within the Project Site

According to the wetland information in the MCIEAST - MCB CAMLEJ geographical information system database, no jurisdictional wetlands are located on or adjacent to Lot 202. If work is required in areas found to be jurisdictional wetlands, the EM will be notified and asked to provide guidance regarding the substantive requirements related to the work.

## 1.5 Cultural and Archaeological Resources within the Project Site

The probability that any significant cultural or archeological resources will be affected by the field investigation is low. If any unmapped cultural or archaeological materials or resources are discovered within the project investigation area, the EM will be notified and asked to provide guidance on performing further work in the area.

## **1.6 Water Resources within the Project Site**

Lot 202 does not encompass, nor is it bounded or bordered by, surface water bodies. Wallace Creek is located approximately 0.3 mile north of the project site. No water resources are expected to be affected by the project.

## **1.7 Vegetation to be Removed within the Project Site**

Vegetation clearance is not required at Lot 202. The site consists of an open, gravel covered lot. In the event that plant species are encountered that are listed by the USFWS as threatened or endangered, the EM will be notified and asked to provide guidance on performing further work in the area.

## **1.8 Existing Waste Disposal Sites within the Project Site**

The project site was historically used for disposal and storage of waste and supplies, including pesticides, transformers containing PCBs, solvents, electrolytes, and waste oils (Rhea, 2010). The lot is currently used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies. If unknown or potentially hazardous waste is encountered during site activities, the EM will be notified and asked to provide guidance.

## **1.9 Compliance with Applicable or Relevant and Appropriate Requirements**

CH2M HILL will follow all applicable regulations concerning environmental protection, pollution control, and abatement for the proposed project work as described in Section 7.3 of the MPPs (CH2M HILL, 2008b). No required permits have been identified for the proposed work.

## **1.10 Spill Prevention and Control**

Procedures and controls regarding spills can be found in the Accident Prevention Plan. The CH2M HILL Site Manager will report any release of any potentially hazardous waste, chemical, or material to the CH2M HILL PM and EM or their designated representative. All spills will also be reported to the Base, according to the direction given by the EM and the PM. The definition of release includes any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed containers) of any potentially hazardous chemical, substance, and/or material.

## **1.11 Detailed Procedures and Methods to Protect and/or Mitigate the Resources/Sites Identified**

During the proposed work, a general survey of the project area will be conducted by the field personnel to identify obvious environmental concerns. The PM and EM, in conjunction with an ecologist, will provide instructions to field personnel regarding the protection of onsite environmental resources. Such protective measures will include the following:

- Should a federally protected plant species be identified within the project area, specimens will be flagged for easy relocation and verification
- Should cultural or archaeological material or resources be discovered within the project area, the MCIEAST – MCB CAMLEJ archaeologist will be notified to provide guidance on performing further work in the area
- The PM and/or EM will seek the guidance of an ecologist to develop appropriate mitigation measures in the event that work activities impact an environmental resource

TABLE 1

Species Potentially Occurring on or Adjacent to MCIEAST-MCB CAMLEJ, in Onslow County, Listed as Threatened, Endangered, or of Special Concern by USFWS

*Site-Specific Work Plan*

*Lot 202*

*MCIEAST-MCB CAMLEJ, North Carolina*

Scientific Name	Common Name	Federal Status	Habitat
<i>Anguilla rostrata</i>	American eel	FSC	The American eel is catadromous; it spawns in oceanic waters but uses freshwater and brackish and estuarine systems for most of its developmental life. Migrates in autumn to the Sargasso Sea to spawn. Occurs usually in permanent streams with continuous flow. Hides during the day in undercut banks and in deep pools near logs and boulders.
<i>Chelonia mydas</i>	Green sea turtle	T	Green turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting.
<i>Caretta caretta</i>	Loggerhead sea turtle	T	The loggerhead is widely distributed within its range. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers.
<i>Dermochelys coriacea</i>	Leatherback sea turtle	E	An open-ocean species, it sometimes moves into shallow bays, estuaries, and even river mouths.
<i>Trichechus manatus</i>	West Indian manatee	E	Manatees inhabit both salt and fresh water of sufficient depth (1.5 meters to usually less than 6 meters) throughout their range.
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	Rivers, swamps, estuaries, lakes, and marshes
<i>Charadrius melodus</i>	Piping plover	T	Open, sandy beaches close to the primary dune of the barrier islands and coastlines of the Atlantic for breeding. They prefer sparsely vegetated open sand, gravel, or cobble for a nest site. They forage along the rack line where the tide washes up onto the beach.
<i>Aimophila aestivalis</i>	Bachman's sparrow	FSC	Occurs only in pine forests of the southeastern United States.
<i>Haliaeetus leucocephalus</i>	American bald eagle	T	A single bald eagle's nest is found on MCIEAST-MCB CAMLEJ - at the junction of Sneads Creek and the New River near the back gate. Three protective buffers have been established at approximately 750 feet, 1,000 feet, and 1,500 feet from the nest site.
<i>Laterallus jamaicensis</i>	Black rail	FSC	Marsh and wetlands; The "Eastern" black rail can be found in appropriate saltmarsh habitat along the eastern seaboard from Connecticut to Florida and along the Gulf Coast.
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	E	Sturgeon inhabit the lower sections of larger rivers and coastal waters along the Atlantic coast. They may spend most of the year in brackish or salt water and move into fresh water only to spawn. The fish feeds on invertebrates (shrimp, worms, and so forth) and stems and leaves of macrophytes.
<i>Rana capito capito</i>	Carolina crawfish frog	FSC	Carolina crawfish frogs live primarily in the sandhills and pine barrens of the North Carolina Coastal Plain. Crawfish frogs are more terrestrial than most frogs, generally only coming to the water to breed. They are also nocturnal, spending daylight hours underground in burrows.
<i>Passerina ciris ciris</i>	Eastern painted bunting	FSC*	Found mainly in southern states and Mexico, where the brushy, weedy shrub-scrub habitat that this bird prefers abounds.
<i>Ammodramus henslowii</i>	Eastern Henslow's sparrow	FSC	A species of tallgrass prairies, agricultural grasslands, and pine savannas of the eastern United States; the species migrates south to spend the non-breeding season in the native pine savanna habitats of the southeastern United States.
<i>Ophisaurus mimicus</i>	Mimic glass lizard	FSC	This species is found in the southeastern Coastal Plain and is most common in pine flatwoods and open woodlands.

TABLE 1

Species Potentially Occurring on or Adjacent to MCIEAST-MCB CAMLEJ, in Onslow County, Listed as Threatened, Endangered, or of Special Concern by USFWS

*Site-Specific Work Plan*

*Lot 202*

*MCIEAST-MCB CAMLEJ, North Carolina*

Scientific Name	Common Name	Federal Status	Habitat
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	For nesting and roosting habitat, open stands of pine containing trees 60 years old and older. Red-cockaded woodpeckers need live, older pines in which to excavate their cavities. Longleaf pines ( <i>Pinus palustris</i> ) are most commonly used, but other species of southern pine are also acceptable. Dense stands (stands that are primarily hardwoods, or that have a dense hardwood understory) are avoided. Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches or larger in diameter. In good, moderately stocked pine habitat, sufficient foraging substrate can be provided on 80 to 125 acres.
<i>Heterodon simus</i>	Southern hognose snake	FSC	These snakes are found in sandy fields and woods of the Coastal Plain, particularly in the Sandhills region.
<i>Agrotis buchholzi</i>	Buchholz's dart moth	FSC	Found in forested wetlands, scrub-shrub wetlands, shrubland and chaparral, and coniferous woodlands. This moth is mostly found in recently burned habitats. Populations can persist up to about a decade or rarely two without fire, until litter accumulates sufficiently to cover food plants. In most cases, habitat is probably suboptimal beginning about 5 years after a fire.
<i>Atrytonopsis sp.</i>	Skipper	FSC	One species, the dusteds, are fairly rare at the coast but found throughout North Carolina ( <i>A. hianna</i> ). An assumption is made that the genus is generally defined.
<i>Isoetes microvela</i>	Quillwort	FSC	Quillworts are usually restricted to areas of clean water where other plants are absent. Occasionally, quillwort may grow partly or entirely out of the water.
<i>Rhexia aristosa</i>	Awed meadowbeauty	FSC	Found in a variety of wet habitats in the Coastal Plain from New Jersey to Alabama.
<i>Lobelia boykinii</i>	Boykin's lobelia	FSC	Grows in swamps and cypress ponds from the coastal plain of Delaware to Florida. The lower portion is often immersed in water, at least seasonally.
<i>Parnassia caroliniana</i>	Carolina grass-of-parnassus	FSC	Found in bogs, freshwater habitats, and grasslands.
<i>Trillium pusillum var. pusillum</i>	Carolina trillium	FSC	Grows in alluvial woods, pocosin borders, and savannas.
<i>Asplenium heteroresiliens</i>	Carolina (wagner) spleenwort	FSC	Grows in rock outcrops.
<i>Rhynchospora pleiantha</i>	Coastal beaksedge	FSC	Extremely rare; found at fewer than 25 sites throughout its North Carolina-to-Alabama range.
<i>Solidago villosicarpa</i>	Coastal goldenrod	FSC	Known to occur in only five populations in three counties in eastern North Carolina. Three of these populations occur on MCIEAST-MCB CAMLEJ. The other sites are in Pender and Brunswick counties. Currently, the North Carolina Natural Heritage Program is conducting a survey of likely habitat to look for coastal goldenrod.
<i>Thalictrum cooleyi</i>	Cooley's meadowrue	E	Cooley's meadowrue occurs in moist to wet bogs and savannas. It grows along fireflow lines, roadside ditches, woodland clearings, and powerline rights-of-way and needs some type of disturbance to maintain its open habitat.
<i>Carex lutea</i>	Golden sedge	E	Biologists have located golden sedge in only eight locations, all in coastal savannas in Onslow and Pender counties that are underlain by calcareous, or chalk, deposits.
<i>Sagittaria weatherbiana</i>	Grassleaf arrowhead	FSC	Found in shallow water of brackish swamps.

TABLE 1

Species Potentially Occurring on or Adjacent to MCIEAST-MCB CAMLEJ, in Onslow County, Listed as Threatened, Endangered, or of Special Concern by USFWS

*Site-Specific Work Plan*

*Lot 202*

*MCIEAST-MCB CAMLEJ, North Carolina*

Scientific Name	Common Name	Federal Status	Habitat
<i>Dichanthelium sp.</i>	Hirst's panic grass	FSC	Worldwide, Hirst's panic grass occurs in four extant populations. Historically, it was found in coastal plain habitats in New Jersey, Delaware, North Carolina, and Georgia. Currently, Hirst's panic grass is known to exist in one site in Delaware and two known sites in North Carolina, both of which are on MCIEAST-MCB CAMLEJ.
<i>Myriophyllum laxum</i>	Loose watermilfoil	FSC	Found in riparian habitats.
<i>Calopogon multiflorus</i>	Many-flower grass-pink	FSC	Found in grasslands and pinelands, typically in wet areas.
<i>Plantago sparsiflora</i>	Pineland plantain	FSC	Found in savannas, roadsides, and ditches.
<i>Lindera melissifolia</i>	Pondberry	E	Associated with wetland habitats such as bottomland and hardwoods in the interior areas, and the margins of sinks, ponds and other depressions in the more coastal sites. The plants generally grow in shaded areas but may also be found in full sun.
<i>Litsea aestivalis</i>	Pondspice	FSC	Occurs in freshwater habitats.
<i>Lysimachia asperulaefolia</i>	Rough-leaved loosestrife	E	Species generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins (areas of dense shrub and vine growth usually on a wet, peaty, poorly drained soil), on moist to seasonally saturated sands and on shallow organic soils overlaying sand. Rough-leaved loosestrife has also been found on deep peat in the low shrub community of large Carolina bays.
<i>Amaranthus pumilus</i>	Seabeach amaranth	T	Occurs on barrier island beaches.
<i>Allium sp.</i>	Savanna onion	FSC	Occurs in wet savannas.
<i>Scleria sp.</i>	Smooth-seeded hairy nutrush	FSC	Found in dry woods, pineland, and savannas ( <i>S. triglomerata</i> )
<i>Rhynchospora decurrens</i>	Swamp forest beakrush	FSC	Occurs in swamp forests, but very rare.
<i>Solidago verna</i>	Spring-flowering goldenrod	FSC	The only spring-flowering goldenrod that occurs in the Sandhills and Coastal Plain of the Carolinas. It can be found in a wide array of habitats, including pine savannas, pocosins, and pine barrens.
<i>Rhynchospora thornei</i>	Thorne's beaksedge	FSC	Found in bogs, freshwater habitats, and pinelands.
<i>Dionea muscipula</i>	Venus flytrap	FSC	Found in bogs and pinelands.

E = Endangered—A taxon in danger of extinction throughout all or a significant portion of its range.

T = Threatened—A taxon likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

FSC = Federal species of special concern—species may or may not be listed in the future.

T(S/A)—Threatened due to similarity of appearance (such as the American alligator)—a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.

\*Historical record—the species was last observed in the county more than 50 years ago.