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NAS CECIL FIELD, FL  
5090.3a

WORK PLAN REVISION FOR EXCAVATION OF CONTAMINATED SOIL AT OPERABLE UNIT  
5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA NAS CECIL FIELD FL  
2/16/2007  
CH2MHILL CONSTRUCTORS INC



# WORK PLAN REVISION

REVISION NO: 01

PROJECT NAME: Former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida CTO NO: 0057

SITE/TASK: In-situ Waste Characterization Sampling of 17 Excavation Areas at Site 15, Blue 10 Ordnance Disposal Area WORK PLAN DATE: November 2005

WORK PLAN NAME: Excavation of Contaminated Soil at Site 15, Blue 10 Ordnance Disposal Area, Former Naval Air Station Cecil Field, Jacksonville, Florida DATE OF REVISION 02/16/2007

REVISION PREPARED BY: Jeffery Marks

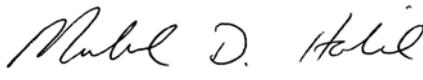
Modifications/Revisions:	
Item No.	Description of Modifications/Revisions
001	<p>CTO No. 0057 Work Plan Addendum No. 21, Revision 00 is being revised to include the procedures necessary to conduct in-situ waste characterization of 17 excavation areas while implementing Munitions and Explosives of Concern (MEC) avoidance support procedures at Site 15, Blue 10 Ordnance Disposal Area (Site 15). Site 15 is located in the southwest section of Yellow Water Weapons Area at Former NAS Cecil Field, Jacksonville, Florida. From the early 1940's through the mid 1950's, Site 15 was used as a skeet range. The former skeet range was approximately 1,000 feet by 2,400 feet in size. From the mid 1960's through 1977, Site 15 was used for ordnance disposal. This operation consisted of burning ordnance materials in a large metal chamber and static firing of rockets. The ordnance disposal structures were located west of the skeet range. The majority of ordnance disposed of at the site was burned and included small arms munitions up to 20 millimeters in size, parachute and distress flares, Mark IV signal cartridges, rocket igniters, cartridge activated devices, 2.75-inch rockets, and 5-inch rockets. Rocket propellant was reportedly placed on the ground and ignited in the area of the burn chamber. An estimated 350 tons of ordnance was disposed of at the site while in operation.</p> <p>MEC avoidance support procedures will be conducted concurrently with field locating the 17 soil excavation areas and performing soil sampling activities. Procedures to implement MEC avoidance support while performing in-situ waste characterization of the 17 excavation areas at Site 15 will include:</p> <ol style="list-style-type: none"> <li>1. <b>MEC Avoidance Support</b> - Avoidance support procedures will be implemented during soil sampling activities when performed within areas suspected of containing MEC. Avoidance support will be provided by one (1) unexploded ordnance (UXO) Technician III. Contact with MEC is PROHIBITED. <ul style="list-style-type: none"> <li>• Prior to soil sampling, the UXO Technician III will conduct a reconnaissance of the sampling area. The reconnaissance will include locating the designated sampling sites.</li> <li>• The access route to and the discrete sampling sites will be visually checked for Material Potentially Presenting an Explosive Hazard (MPPEH).</li> <li>• The access route to and the discrete sampling sites will be checked for anomalies utilizing a magnetometer or equivalent. All anomalies will be treated as MPPEH.</li> </ul> </li> </ol>

<p>001 (continued)</p>	<ul style="list-style-type: none"> <li>• The identification of MPPEH (including anomalies) will require that route to, and/or sampling points be changed.</li> <li>• MPPEH (including anomalies) locations will be recorded, flagged, and reported to the CH2M HILL Project Manager.</li> <li>• The access route at a minimum will be twice the width of the widest vehicle; and the excavation boundaries will be clearly marked to prevent personnel from straying into non-cleared areas. If surface MPPEH is encountered, the UXO III Technician will mark the location and divert the approach path around the MPPEH (including anomalies).</li> <li>• Contact with MPPEH is PROHIBITED.</li> </ul> <p><b>2. Field Location of Excavation Areas and Determination of Sample Locations</b></p> <ul style="list-style-type: none"> <li>• All excavation areas will be located using global positioning system (GPS) technology using the coordinates provided on attached Figures 1 through 6. When large enough, excavation areas will be subdivided into representative sections (characterization zones identified as 1, 2, 3, etc.) as shown on Figures 1 through 6 to determine the number and location for in-situ waste characterization samples. Prior to sample collection, MEC avoidance support procedures will be performed.</li> <li>• Attached Figures 1 through 6, Excavation Plans are a replacement to current Figure 2-4, Excavation Plan to reflect a change in the horizontal and vertical excavation limits provided by Tetra Tech NUS, Inc. (TtNUS) in the Site 15 Remedial Design.</li> </ul> <p><b>3. Sampling Procedures</b></p> <ul style="list-style-type: none"> <li>• Following the implementation of MEC avoidance support procedures and the sample locations have been cleared of MPPEH by the UXO Technician III, in-situ waste characterization samples will be collected to allow for direct load capabilities during future excavations. Samples will be collected at a frequency of one (1) waste characterization sample (a composite of five representative grab samples) per characterization zone (approximately 300 tons of proposed excavated material) as shown on Figures 1 through 6; and in accordance with Section 3.0, Sampling and Analysis Plan of the CTO No. 0057 Work Plan Addendum No. 21, Revision 00.</li> </ul>
<p>002</p>	<p>The Sampling and Analysis Plan of the CTO No. 0057 Work Plan Addendum No. 21, Revision 00 is being revised to include the following:</p> <ol style="list-style-type: none"> <li>1. Sampling and Analytical Summary is being revised with Table 3-2 Revision No. 01 (R1), Sampling and Analytical Table to reflect a change in the proposed waste characterization samples required to characterize the 17 excavation areas. Please include the attached Table 3-2 Revision No. 01, Sampling and Analytical Summary as an addendum to Table 3-2 found in the CTO No. 0057 Work Plan Addendum No. 21, Revision 00.</li> <li>2. Sample Area Summary is being revised with Table 3-3 Revision No. 01 (R1), to reflect a change in the proposed waste characterization samples required to characterize the 17 excavation areas. Please include the attached Table 3-3 Revision No. 01, Sample Area Summary as an addendum to Table 3-3 found in the CTO No. 0057 Work Plan Addendum No. 21, Revision 00.</li> </ol>
<p>003</p>	<p>The attached Health and Safety Plan has been revised to include implementing MEC avoidance support procedures while completing in-situ waste characterization of the 17 excavation areas at Site 15, and should be included as a task-specific Health and Safety Plan in the CTO No. 0057 Work Plan Addendum No. 21.</p>

**Reasons for the Modifications/Revisions:**

Item No.	Reasons for the Modifications/Revisions
001	This revision is prepared in response to revisions of the Site 15 Remedial Design, currently being prepared by TtNUS, and the addition of MEC avoidance to the scope of work to complete Excavation of Contaminated Soil at Site 15, Blue 10 Ordnance Disposal Area, Former Naval Air Station Cecil Field, Jacksonville, Florida

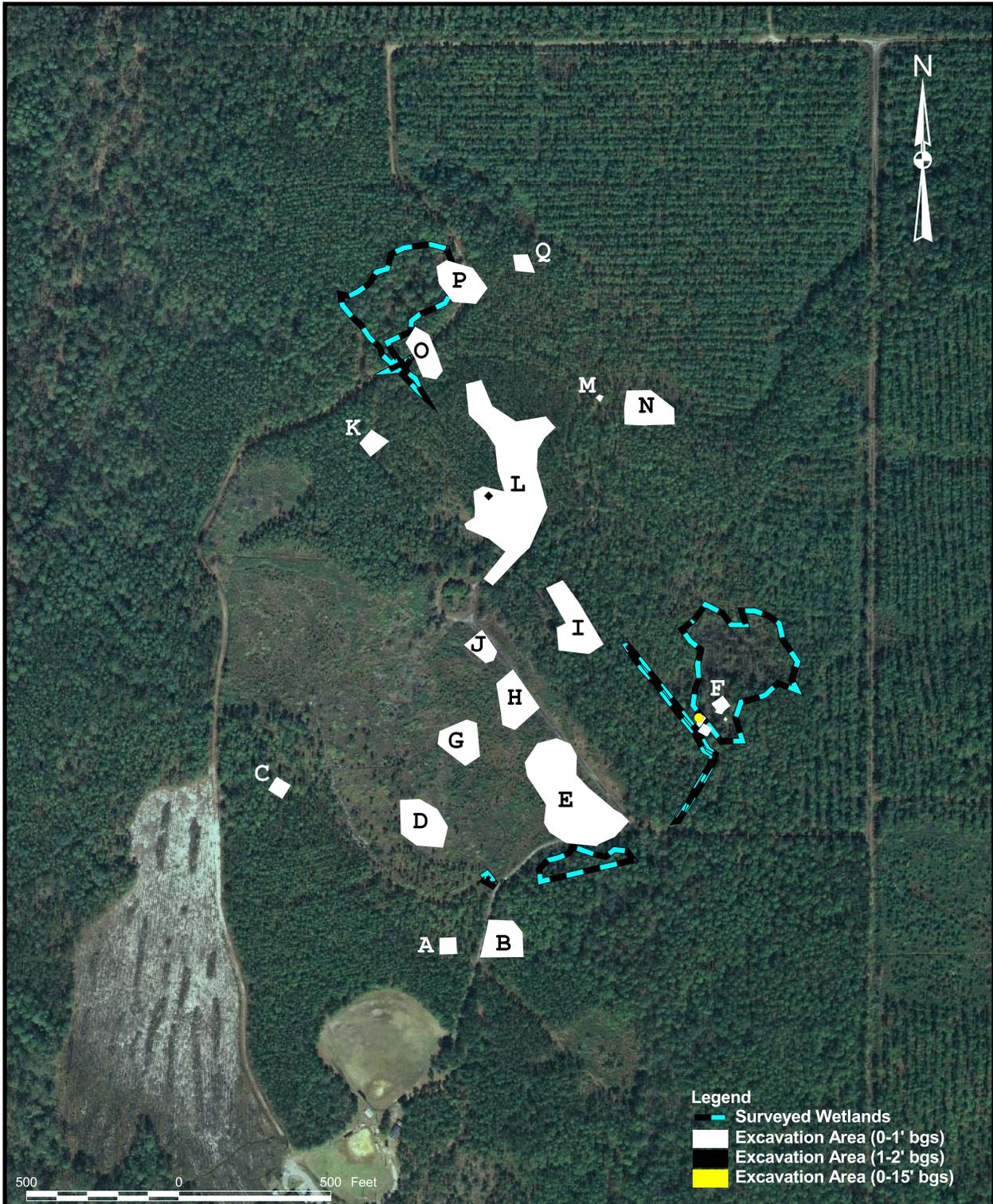
<p>Michael D. Halil CTO Project Manager</p>	 Signature	for 02/21/2007 Date
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<p>Sidney Allison Program Manager</p>	 Signature	for 02/21/2007 Date
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U.S. Navy Responsible Authority	Signature	Date
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**Document Control Distribution**

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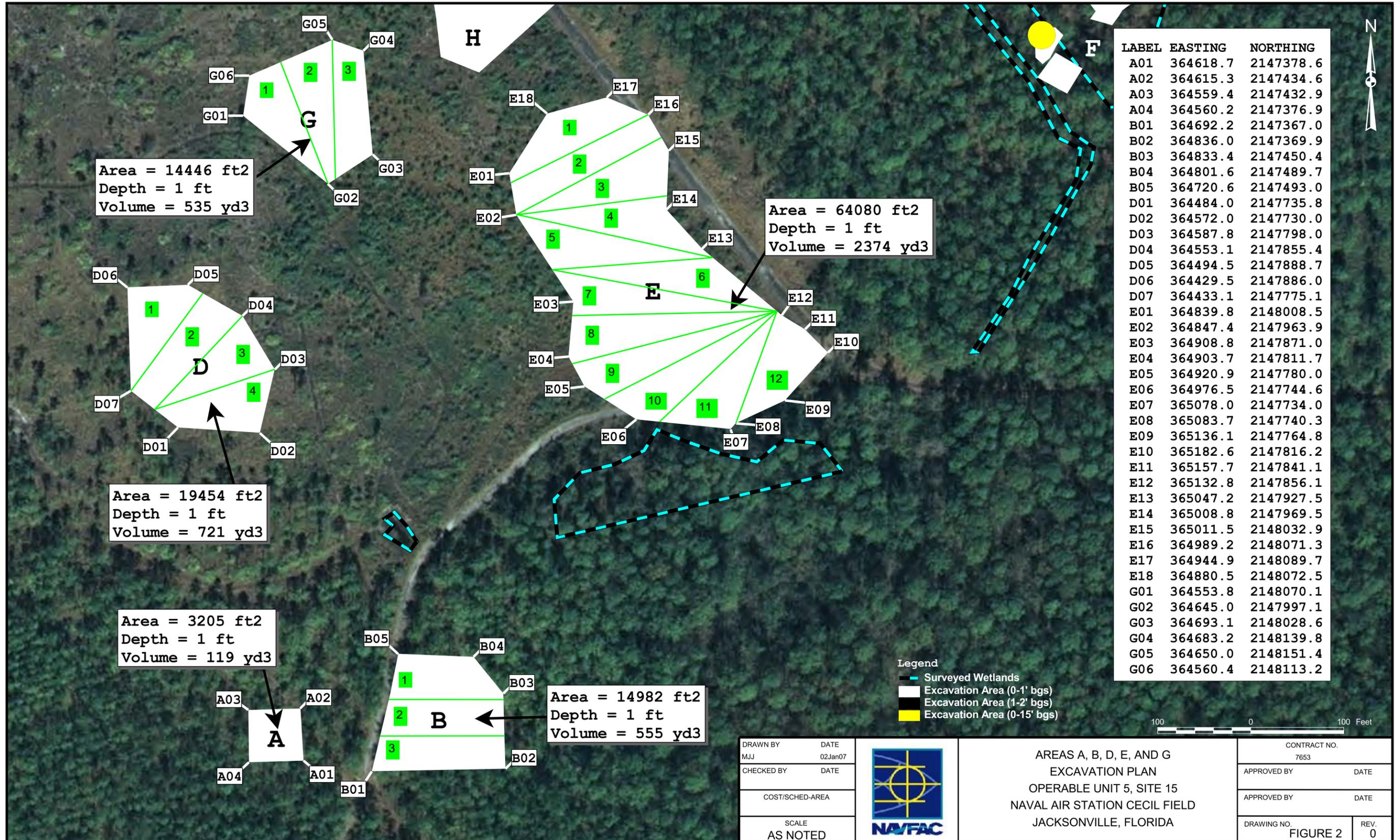


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EXCAVATION PLAN  
 OPERABLE UNIT 5, SITE 15  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER 7653	
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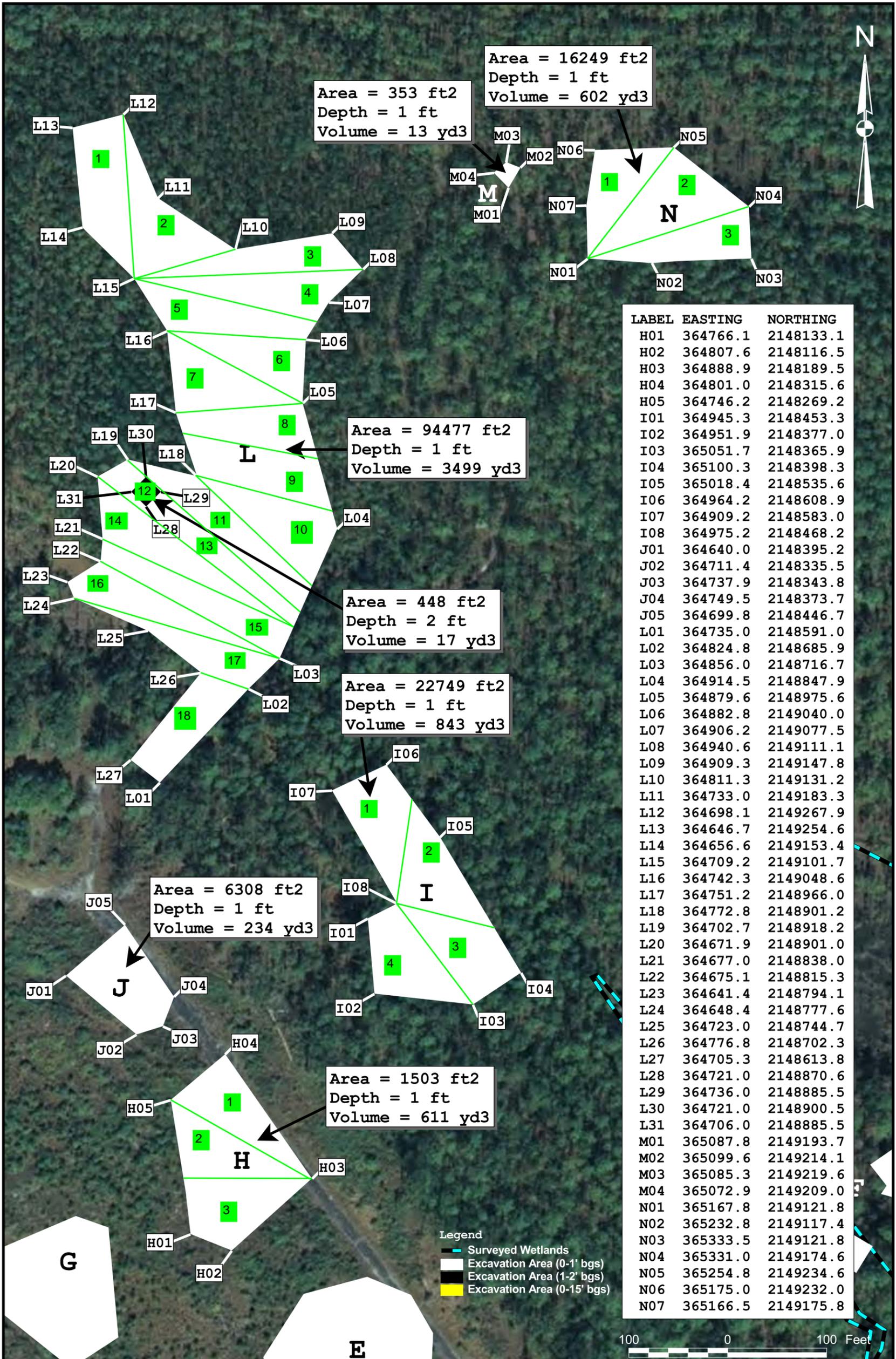


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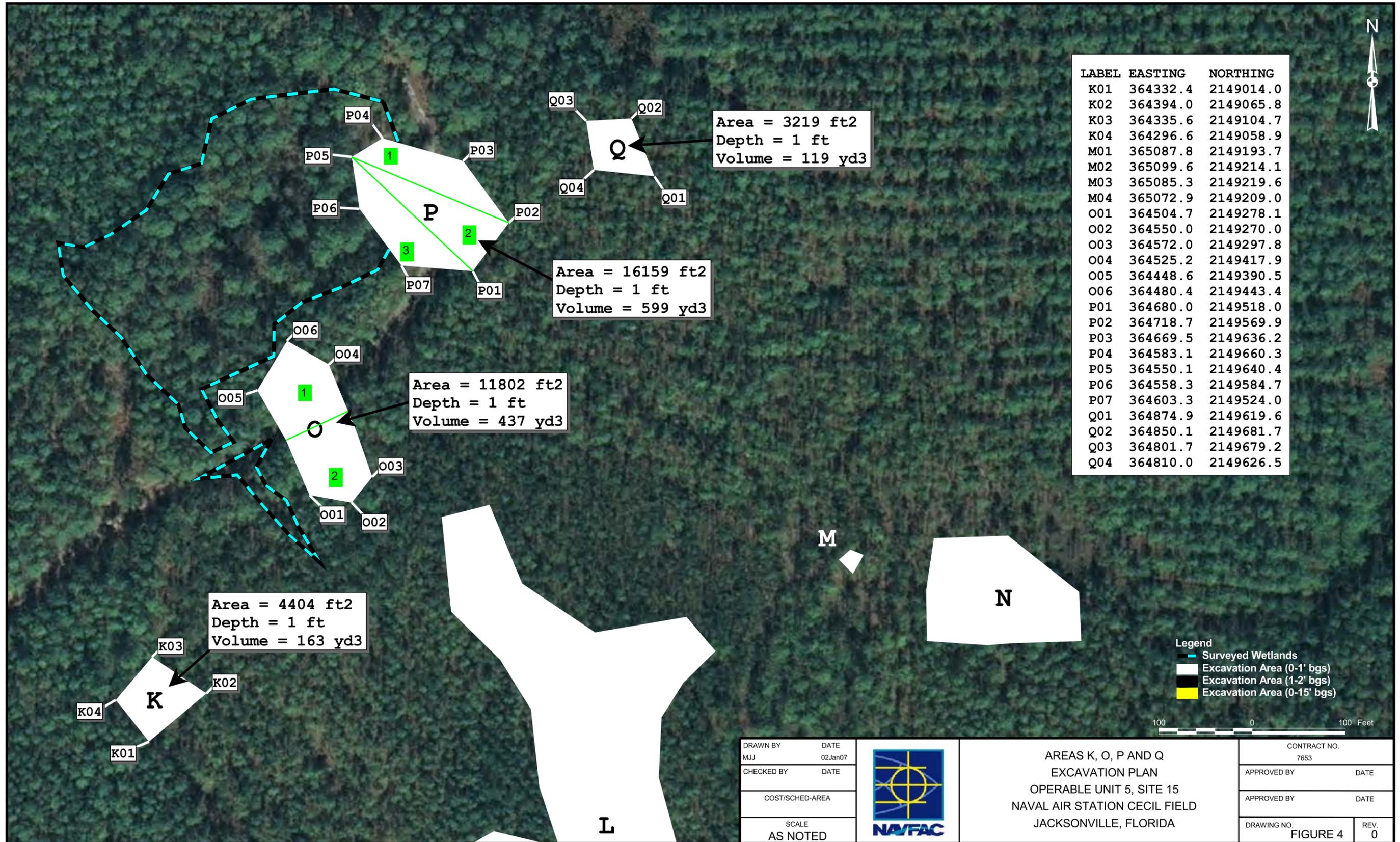


AREAS A, B, D, E, AND G  
EXCAVATION PLAN  
OPERABLE UNIT 5, SITE 15  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NO. 7653	
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DRAWN BY MJJ	DATE 02Jan07		AREAS H, I, J, L, M, AND N EXCAVATION PLAN OPERABLE UNIT 5, SITE 15 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653	
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LABEL	EASTING	NORTHING
K01	364332.4	2149014.0
K02	364394.0	2149065.8
K03	364335.6	2149104.7
K04	364296.6	2149058.9
M01	365087.8	2149193.7
M02	365099.6	2149214.1
M03	365085.3	2149219.6
M04	365072.9	2149209.0
O01	364504.7	2149278.1
O02	364550.0	2149270.0
O03	364572.0	2149297.8
O04	364525.2	2149417.9
O05	364448.6	2149390.5
O06	364480.4	2149443.4
P01	364680.0	2149518.0
P02	364718.7	2149569.9
P03	364669.5	2149636.2
P04	364583.1	2149660.3
P05	364550.1	2149640.4
P06	364558.3	2149584.7
P07	364603.3	2149524.0
Q01	364874.9	2149619.6
Q02	364850.1	2149681.7
Q03	364801.7	2149679.2
Q04	364810.0	2149626.5

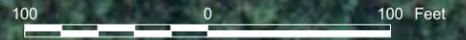
Area = 4404 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 163 yd<sup>3</sup>

Area = 11802 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 437 yd<sup>3</sup>

Area = 16159 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 599 yd<sup>3</sup>

Area = 3219 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 119 yd<sup>3</sup>

**Legend**  
 Surveied Wetlands  
 Excavation Area (0-1' bgs)  
 Excavation Area (1-2' bgs)  
 Excavation Area (0-15' bgs)



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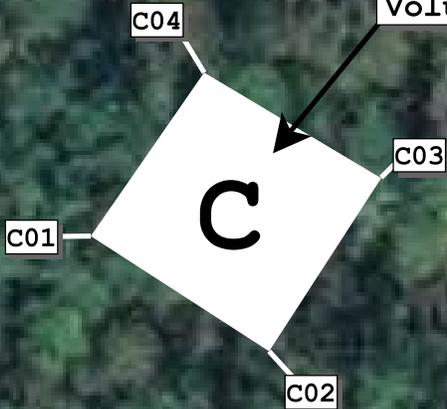
AREAS K, O, P AND Q  
 EXCAVATION PLAN  
 OPERABLE UNIT 5, SITE 15  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NO. 7653	
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LABEL	EASTING	NORTHING
C01	363995.5	2147919.8
C02	364042.2	2147889.6
C03	364071.6	2147935.0
C04	364025.3	2147962.6



Area = 2904 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 108 yd<sup>3</sup>



- Legend**
- Surveyed Wetlands
  - Excavation Area (0-1' bgs)
  - Excavation Area (1-2' bgs)
  - Excavation Area (0-15' bgs)

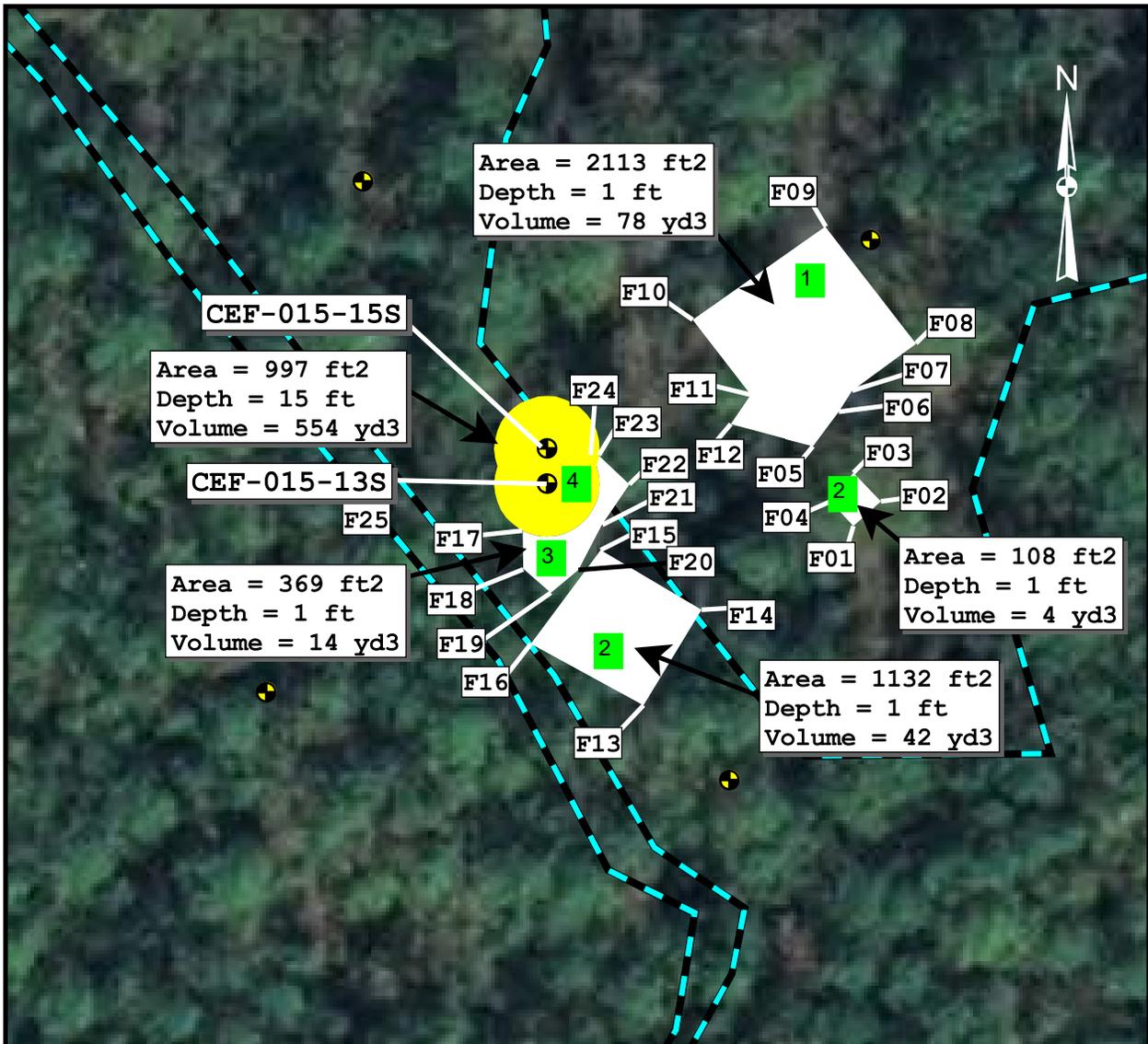


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AREA C  
 EXCAVATION PLAN  
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 JACKSONVILLE, FLORIDA

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Area = 2113 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 78 yd<sup>3</sup>

Area = 997 ft<sup>2</sup>  
 Depth = 15 ft  
 Volume = 554 yd<sup>3</sup>

Area = 369 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 14 yd<sup>3</sup>

Area = 108 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 4 yd<sup>3</sup>

Area = 1132 ft<sup>2</sup>  
 Depth = 1 ft  
 Volume = 42 yd<sup>3</sup>

**Legend**

- Surveyed Wetlands
- Excavation Area (0-1' bgs)
- Excavation Area (1-2' bgs)
- Excavation Area (0-15' bgs)
- Proposed Monitoring Well

Notes: 1) Existing monitoring wells CEF-015-13S and -15S will need to be abandoned prior to excavation.  
 2) The excavation around CEF-015-13S and -15S is based on a 15 feet radius.



LABEL	EASTING	NORTHING	LABEL	EASTING	NORTHING
F01	365499.3	2148144.6	F14	365456.2	2148120.9
F02	365507.1	2148151.7	F15	365427.4	2148137.9
F03	365499.3	2148159.9	F16	365407.6	2148111.1
F04	365492.8	2148151.7	F17	365405.2	2148143.4
F05	365487.8	2148167.3	F18	365405.5	2148132.4
F06	365495.2	2148177.1	F19	365413.3	2148125.7
F07	365498.9	2148183.2	F20	365421.1	2148132.1
F08	365517.1	2148196.6	F21	365427.9	2148145.0
F09	365491.4	2148229.8	F22	365435.7	2148156.5
F10	365453.6	2148203.4	F23	365426.9	2148164.9
F11	365470.2	2148182.0	F24	365424.7	2148164.9
F12	365464.4	2148173.7	F25	365412.2	2148156.7
F13	365439.6	2148093.7			

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AREA F  
 EXCAVATION PLAN  
 OPERABLE UNIT 5, SITE 15  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER 7653	
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DRAWING NO. FIGURE 6	REV 0

**TABLE 3-2 R1  
Sampling and Analytical Summary**

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
<b>Soil/Solids Characterization Sampling</b>													
Soil/Solids Characterization Sampling	Within Each of 17 Excavation Areas	Soil/Solids	One per 300 tons	66	Composite 5 random grabs into 1 sample	SS spoon, SS bowl	7 day	CCI Level B	TCLP Volatiles	1311/8260B	14 day TCLP extr; 14 day analysis	Cool to 4°C	(1) 4 oz amber glass
									TCLP Semi-Volatiles	1311/8270C	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Metals	1311/6010A/7470	6 month TCLP extr; 6 month analysis Hg: 28 day TCLP extr; 28 day analysis		
									TCLP Pesticides	1311/8081A	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Herbicides	1311/8151A	14 day TCLP extr; 7 day extr; 40 day analysis		
									PCBs	8082	14 day extr; 40 day analysis		
									Corrosivity	9045a	ASAP		
									Ignitability	1010/1020	ASAP		
<b>Liquid Characterization Sampling</b>													
Liquid Characterization Sampling (to include drummed liquid / plastic and decon water)	Drums	Water	Once	1	Grab	Drum thief or dip jar	7 days	CCI Level B	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
									TCL Semi-volatiles	8270C	7 days ext; 40 days analysis	Cool to 4°C	(3) 1L amber glass
									TCL Pesticides	8081A	7 days ext; 40 days analysis		
									TCL Herbicides	8151A	7 day extr; 40 day analysis		
									PCBs	8082	7 day extr; 40 day analysis		
									TAL Metals	6010B/7470A	180 days; Hg=28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
									Ignitability	1010	ASAP	Cool to 4°C	(1) 250 mL amber glass
									Corrosivity	9040B	ASAP		(1) 250 mL amber glass

Notes:  
1. Calendar days

**TABLE 3-2 R1**  
**Sampling and Analytical Summary**

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
<b>Backfill Characterization Sampling</b>													
Characterization of Backfill Material	Once per Off-Site Source	Soil	As necessary	2	Composite 5 random grabs into 1 sample ( Do not composite VOCs)	SS spoon, SS bowl, TerraCore samplers, (3) Prepared 40 ml vials (4 or 8 oz jar for stone)	7 days	CCI Level C	TCL Volatiles	5035/8260B	14 day	Methanol; Sodium Bisulfite; H2O; Cool to 4°C	TerraCore samplers, (3) Prepared 40 ml vials and 4 oz jar for stone
									TCL Semi-Volatiles	8270C	14 day extr; 40 day analysis		
									PAHs (including 1- and 2-Methylnaphthalene)	8270C (low-level)	14 day extr; 40 day analysis		
									TCL Pesticides	8081A	14 day extr; 40 day analysis		
									TCL Herbicides	8151A	14 day extr; 40 day analysis		
									PCBs	8082	14 day extr; 40 day analysis		
									TRPH	FL-PRO	14 day extr; 40 day analysis		
									TAL Metals	6010B/7471	6 month; Hg 28 days		
	pH	9045B	ASAP										
Trip Blank	Water	1 Per cooler containing volatile samples	2	Prepared by Lab	(2) 40 mL vials	7 days	CCI Level C	TCL Volatiles	8260B	14 day	HCl pH< 2; Cool to 4°C	(2) 40 mL vials	

Notes:

1. Calendar days

TABLE 3-3 R1  
Sample Area Summary

Area	Total Number of composite samples required	Depth of Excavation (feet bgs)	Number of samples/depth (feet bgs)	Characterization Zones per Area (1 Sample per Zone)
Area A	1	0' – 1'	1 = 0' – 1'	Zone A1
Area B	3	0' – 1'	1 = 0' – 1'	Zone B1 – B3
Area C	1	0' – 1'	1 = 0' – 1'	Zone C1
Area D	4	0' – 1'	1 = 0' – 1'	Zone D1 – D4
Area E	12	0' – 1'	1 = 0' – 1'	Zone E1 – E12
Area F (1)	3	0' – 15'	1 = 0' – 1', 1 = 3' – 4', 1 = 6' – 7'	Zone F5
Area F (2)	1	0' – 1'	1 = 0' – 1'	Zone F4
Area F (3)	1	0' – 1'	1 = 0' – 1'	Zone F3
Area F (4)	1	0' – 1'	1 = 0' – 1'	Zone F4
Area F (5)	1	0' – 1'	1 = 0' – 1'	Zone F5
Area G	3	0' – 1'	1 = 0' – 1'	Zone G1 – G3
Area H	3	0' – 1'	1 = 0' – 1'	Zone H1 – H3
Area I	4	0' – 1'	1 = 0' – 1'	Zone I1 – I4
Area J	1	0' – 1'	1 = 0' – 1'	Zone 1
Area K	1	0' – 1'	1 = 0' – 1'	Zone 1
Area L (1)	17	0' – 1'	1 = 0' – 1'	Zone L1 – L17
Area L (2)	1	1' – 2'	1 = 1' – 2'	Zone L18
Area M	1	0' – 1'	1 = 0' – 1'	Zone M1
Area N	3	0' – 1'	1 = 0' – 1'	Zone N1 – N3
Area O	2	0' – 1'	1 = 0' – 1'	Zone O1 – O2
Area P	3	0' – 1'	1 = 0' – 1'	Zone P1 – P3
Area Q	1	0' – 1'	1 = 0' – 1'	Zone Q1

**Health and Safety Plan  
Excavation of Contaminated Soil at Site 15,  
Blue 10 Ordnance Disposal Area**

**Former Naval Air Station Cecil Field  
Jacksonville, Florida**

**Contract No. N62467-98-D-0995  
Contract Task Order No. 0057  
Work Plan Addendum No. 21**

Revision No. 01

Submitted to:



**U.S. Naval Facilities  
Engineering Command  
Southern Division**

Prepared by:



115 Perimeter Center Place, N.E.  
Suite 700  
Atlanta, GA 30346

February 2007

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## Attachments

- 1 Employee Signoff Form – Field Safety Instructions
- 2 Project-Specific Chemical Product Hazard Communication Form
- 3 Chemical-Specific Training Form
- 4 Emergency Contacts
- 5 Project Activity Self-Assessment Checklists/Permits/Forms
- 6 Behavior Based Loss Prevention System Forms
- 7 Applicable Material Safety Data Sheets
- 8 Subcontractor H&S Plans/Procedures

# Acronyms

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°F	degrees Fahrenheit
AHA	Activity Hazard Analysis
ALARA	as low as reasonably achievable
APR	air-purifying respirator
ATL	Atlanta
BBLPS	Behavior Based Loss Prevention System
CH2M HILL	CH2M HILL Constructors, Inc.
CNS	central nervous system
CPR	cardiopulmonary resuscitation
CTO	Contract Task Order
dBA	decibel A-rated
DOT	Department of Transportation
FA	first aid
FID	flame ionization detector
GFCI	ground fault circuit interrupter
HAZCOM	hazard communication
HR	heart rate
HSM	Health and Safety Manager
HSP	Health and Safety Plan
IDLH	immediately dangerous to life and health
IDW	investigation-derived waste
IRF	Incident Report Form
lb	pound
LEL	lower explosive limit
LPO	Loss Prevention Observations
MEC	munitions or explosives of concern
mg/m <sup>3</sup>	milligrams per cubic meter
MPPEH	Material Potentially presenting an Explosive Hazard
MSDS	Material Safety Data Sheet
mW/cm <sup>2</sup>	milliwatt per square centimeter
NAS	Naval Air Station
NAVFAC EFD SOUTH	U.S. Navy Facilities Engineering Command, Southern Division
NDG	nuclear density gauge
NGVD	National Geodetic Vertical Datum
NLI	Near Loss Investigation
NS	Naval Station
NSC	National Safety Council
NTR	Navy Technical Representative
OSHA	Occupational Safety and Health Administration
PAHs	polynuclear aromatic hydrocarbons
PAPR	powered air-purifying respirator
PDF	personal flotation device
PID	photoionization detector

PPE	personal protective equipment
ppm	parts per million
PTSP	Pre-Task Safety Plan
RMSF	Rocky Mountain Spotted Fever
SAR	supplied-air respirator
SCBA	self-contained breathing apparatus
SHSS	Site Health and Safety Specialist
SOP	standard of practice
STEL	short-term exposure limit
SZ	support zone
T&D	transportation and disposal
TBD	to be determined
TMCC	truck-mounted crash cushion
TRPHs	total recoverable petroleum hydrocarbons
TSDF	treatment, storage, and disposal facility
UST	underground storage tank
VOCs	volatile organic compounds

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Site Health and Safety Specialist (SHSS) is to be familiar with these SOPs and the contents of this plan. CH2M HILL Constructors Inc.'s (CH2M HILL) personnel and subcontractors must sign Attachment 1.

# 1.0 Project Information and Description

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**CONTRACT TASK ORDER (CTO) No:** 0057

**CLIENT:** Southern Division, U.S. Navy Facilities Engineering Command (NAVFAC EFD SOUTH)

**PROJECT/SITE NAME:** Excavation of Contaminated Soil at Site 15/Blue 10 Ordnance Disposal Area (Revised to include removal of drum of unknown contents)

**SITE ADDRESS:** Former Naval Air Station Cecil Field, Jacksonville, Florida

**CH2M HILL PROJECT MANAGER:** Michael Halil

**CH2M HILL OFFICE:** Jacksonville, Florida

**DATE HEALTH AND SAFETY PLAN PREPARED:** November 2005 (Revision 00)

**DATE(S) OF SITE WORK:** June 2006 – December 2007

## **SITE BACKGROUND AND SETTING:**

Site 15 is located in the southwest section of Yellow Water Weapons Area. The area is approximately 85 acres with elevations ranging from approximately 79 feet National Geodetic Vertical Datum (NGVD) to 72 feet NGVD. The site is heavily forested, primarily with slash pine and understory vegetation. Several forest fires have occurred in the area designated as ‘Forest Burn Area’ located in the southwestern portion of the site.

From the early 1940s through the mid 1950s, the site was used as a skeet range. The former skeet range was approximately 1,000 feet by 2,400 feet in size. From the mid 1960s through 1977, Site 15 was used for ordnance disposal. This operation consisted of burning ordnance materials in a large metal chamber and static firing of rockets. The ordnance disposal structures were located west of the skeet range. The majority of ordnance disposed of at the site was burned and included small arms munitions up to 20 millimeters in size, parachute and distress flares, Mark IV signal cartridges, rocket igniters, cartridge activated devices, 2.75-inch rockets, and 5-inch rockets. Rocket propellant was reportedly placed on the ground and ignited in the area of the burn chamber. An estimated 350 tons of ordnance was disposed of at the site while in operation .

The ordnance burn chamber and static rocket firing pad are the only structures currently at the site. The burn chamber is a rounded, steel, tank-like container, approximately 10 feet in length and 4 feet in height. The chamber has a burn stack that rises approximately 3 feet above the body of the chamber. Access to the chamber is through a 2-foot by 2-foot hinged door. When full, the burn chamber can accommodate 1.5 cubic yards of material. The static rocket firing pad is an L-shaped concrete structure approximately 10 feet long by 4 feet wide by 6 feet high. Steel firing rods are seated into the concrete at 45-degree angles. Several concrete building foundations, remnants of buildings that supported skeet range activities, are located in the area surrounding the burn chamber and firing pad.

Review of aerial photographs from 1952, prior to the initiation of ordnance disposal on Site 15, show an active trap and skeet range facility located at the site. The area covered by the skeet range appears to be approximately 50 acres in size, and is centered over the area in which the burn chamber and firing pad were constructed.

An area of stressed vegetation, referred to as the forest burn area, is present in the southwestern portion of the site, approximately 900 feet southwest of the burn chamber and firing pad. Several slash pines are partially burned in this area. Controlled burns were commonly undertaken in this area to control undergrowth in the planted pine forests. This is an area where elevated polynuclear aromatic hydrocarbons (PAH) concentrations were detected.

The project objective is to excavate, transport, and dispose of approximately 11,600 cubic yards of contaminated soil from 20 areas in order to reduce human health risk and ecological risk and allow for the anticipated future land use as a Natural Resource and Recreation Corridor. The excavated areas will be backfilled with certified "clean" material and revegetated with all disturbed wetlands restored.

### **Unknown Drum Removal**

During a site visit conducted on April 17, 2006 to assess the potential to encounter munitions and explosives of concern (MEC) while conducting a planned excavation of contaminated soil from the site, CH2M HILL discovered an unlabeled drum that appeared to be full. The drum has a side primary bung and small top secondary bung and its contents are unknown. The chimes appear to be reinforced and solid, not typical of the basic 55-gallon drum. Photographs of the drum are included in Appendix D of the Work Plan Addendum.

NAVFAC EFD SOUTH was notified of the discovered drum on April 17, 2006 and the NAS Cecil Field Base Realignment and Closure Team was notified on April 18, 2006. NAVFAC EFD SOUTH notified FDEP, Northeast District on April 21, 2006. FDEP, Northeast District requested an additional notification once the drum had been removed. NAVFAC EFD SOUTH visited the site on April 24, 2006 to view the discovered drum. Technical Direction to remove the discovered drum was received from NAVFAC EFD SOUTH on May 5, 2006.

**DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED:** The activities associated with the scope of work at Site 15 are as follows:

- Mobilization and site preparation
- Backfill material certification
- Pre-excavation land survey
- Unknown drum sampling/disposal
- Tree felling, brush clearing, and grubbing
- In-situ waste disposal characterization of 20 contaminated soil excavation areas
- Excavation and backfill of 20 contaminated soil excavation areas
- Transportation and Disposal of approximately 11,600 cy of contaminated soil
- Post excavation land survey
- Site restoration
- Preparation and submittal of a Construction Completion Report

# 2.0 Tasks to be Performed Under this Plan

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Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Table 2-1) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin.

## 2.1 Hazwoper-Regulated Tasks

- Mobilization and Site Preparation
- Pre-excavation Confirmation Soil Screening, Sampling, and Analyses
- Unknown Drum Sampling/ Disposal
- Backfill Material Certification
- Pre-excavation Land Survey
- Tree felling, Brush Clearing, and Grubbing
- Excavation of Contaminated Soil and Backfilling
- Waste Characterization
- Site Restoration
- Transportation & Disposal of Contaminated Soil/Materials Decontamination
- Post-excavation Survey
- Demobilization

## 2.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

Tasks	Controls
<ul style="list-style-type: none"><li>• Preparation and Submittal of a Construction Completion Report</li></ul>	<ul style="list-style-type: none"><li>• Brief on hazards, limits of access, and emergency procedures</li><li>• Post contaminant areas as appropriate</li><li>• Sample and monitor as appropriate</li></ul>

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TABLE 2.1  
Hazard Analysis  
(Refer to Section 3 for hazard controls)

Potential Hazards	Project Activities									
	Unknown Drum Sampling/Disposal	Mobilization, Site setup, Pre-excavation Land Survey, Soil Sampling	Tree removal, Clearing and Grubbing	Excavation of Contaminated Soil and Backfilling	T&D of Contaminated/Uncontaminated Materials	Site Restoration	Decontamination	Post-Excavation Land Survey	Waste Characterization	Demobilization
Manual Lifting (HSE-112)		X	X	X	X	X	X	X	X	X
Fire Prevention (HSE-208)		X	X	X	X		X			X
Electrical Safety (HSE-206)		X					X			X
Lockout /Tagout (HES-310)										
Ladders & Stairs(HSE-214)										
Compressed Gas Cylinders (HS-63)	X									
Blast + pressure + fragmentation		X	X	X						
Buried Utilities		X	X	X						
Excavations (HSE-307)				X	X	X				
Fall Protection (HSE-308)										
Heavy Equipment ( HSE-306)	X		X	X	X	X				X
Confined Space Entry (HSE-203)										
Concrete & Masonry Work (HSE-302)										
Cranes and Hoisting (HSE-303)										
Demolition (HS-45)										
Scaffolding(HS-73)										
Steel erection (HS-62)										
Welding and cutting (HS-22)										
Aerial Lifts (HS-41)										
Hand & Power Tools (HSE-210)		X	X	X			X	X	X	X
Forklifts (HS-48)										
Drilling (HS_35)										
Noise (HS-39)	X	X	X	X	X	X	X	X		X
Pressurized Lines/Equipment	X									
Pressure Washing/Equip Decon				X	X		X			
Vacuum Truck/Pumping Operations										
Suspended Loads										
Vehicle Traffic		X	X	X	X	X	X	X		X
Haul Truck Operations			X	X	X					
Visible Lighting	X	X	X	X	X	X	X	X	X	X
Mechanical Guarding Hazards	X		X				X			
Arsenic Hazard (HSE-501)		X	X	X	X		X		X	
Lead Hazard (HSE-508)		X	X	X	X		X		X	
Chemical Hazard-Dermal/Inhalation	X	X	X	X	X		X		X	
Dust Hazard (Silica/Metals)										
Fire/Explosion Hazards	X	X	X	X						

## 3.0 Hazard Controls

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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 site or the particular hazard. 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 SHSS for clarification.

The health and safety hazards posed by field activities have been identified for each project activity and is provided in the Hazard Analysis Table (Table 2-1) in this section. Hazard control measures for project-specific and general H&S hazards are provided in 3.1 and 3.2 of this section.

Activity Hazard Analysis will be prepared before beginning each project activity posing H&S hazards to project personnel using the AHA form provided in the HSP Attachments as a guide. The AHA will identify the work tasks required to perform each activity, along with potential H&S hazards and recommended control measures for each work task. 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.

**AHAs will be submitted to the Navy Technical Representative (NTR) for review at least 15 days prior to the start of each project activity phase.**

**In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 5.** These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records.

Project-activity self-assessments checklist will be completed weekly by the SHSS during the course of the project, completing the applicable checklist depending on the work performed at the time on the project.

### 3.1 Project-Specific Hazards

#### 3.1.1 Unknown Drum Sampling & Disposal

Handling drums at hazardous waste sites is an inherently dangerous activity, physical hazards from manually handling drums to heavy equipment hazards exist as well as hazards such as radioactivity, fire, explosion, chemical burn, toxic gases and vapors may exist from the contents of the drums. The unusual construction of the drum discovered on April 17, 2006 and absence of markings as well as the prior use of the area in which this

drum was located demands use of extreme caution during handling and sampling of this container.

As stated in the SOW, this work is to be performed utilizing minimum of Level B PPE, see table 5.1 for minimum PPE requirements, upgrade or downgrade of PPE utilized require approval from Regional HSM. Drum is to be overpacked, handled, and punched utilizing remote handling/opening equipment equipped with blast shield(s) and/or appropriate splash protection.

The following are general guidelines for handling unknown drums. In addition to these procedures, the drum should be examined once it is fully exposed for any additional markings or features (i.e., additional markings, openings or valves) which may aid in identification or characteristics of contents. If there are signs that the drum may contain shock sensitive (labels or crystallized material) or air reactive materials (i.e., labels or valve for nitrogen addition), additional assessment may be required prior to overpacking and/or sampling.

- Prior to handling, drums should be visually inspected to gain as much information as possible about the identification and hazards of the contents as possible.
- Type of drum should be noted, open top for solids or closed top for liquids, steel and polyethylene drums are common, with poly drums generally used for corrosive and less volatile chemicals, other materials (stainless steel, nickel, etc.) are less commonly used and often indicate that the contents are higher hazard materials.
- Labels, symbols, words, or other markings on drums should be read and assessed.
- Integrity of drum should be assessed prior to moving - look for corrosion, rust, leaks, especially around chime and openings and damage from forklifts or tools, etc.
- Observe for signs of drum being pressurized, (distended, swollen or bulging), residue of contents around openings (stains, liquid/solid material, crystallization, etc.).

Handling of drum should be minimized as much as possible, however, when handling of drums is necessary to stage drums for sampling or storage, securing drums which are leaking or damaged or for other reasons, care should be taken and personnel involved should be aware of the hazards involved.

- Drums which may contain shock sensitive materials or materials which have become shock sensitive or unstable due to aging or environmental conditions such as high temperatures, drum handling equipment should be utilized which will provide smooth and efficient placement of drums while eliminating or minimizing sharp, jerking movements.
- Mechanical equipment should be utilized for moving drums whenever possible, appropriate drum grapplers, forklift with drum attachment, slings, etc. When not feasible, manual drum handling equipment (i.e., drum dollies, etc. may be used to minimize effort required for moving and lifting drums.)
- Any drums suspected of being explosive or reactive (from labeling, crystallization or other information such as site history or location) should be handled with extreme

caution, and safety precautions such as blast shields, remote opening devices, etc. used to help protect workers.

- Drums suspected of being pressurized require use of splash protection for workers when opening, this could consist of poly sheeting, splash or blast shield to deflect any spray and/or remote opening devices.
- Non-sparking tools should be used when opening drums containing potential flammable or combustible materials.
- Leaking, damaged, corroded, or otherwise deteriorated drums should be overpacked prior to moving or excessive handling.
- Monitoring for suspected chemical or radiological hazards should be performed continuously while opening and sampling drums using appropriate air monitoring instrumentation. See table 6.1 for minimum air monitoring criteria, additional monitoring may be performed as deemed necessary by site conditions or additional information obtained during investigation.

Local Fire Department and/or rescue personnel should be notified of time/date of drum handling activities as well as potential hazards.

### **3.1.2 Working around Material Handling Equipment**

- 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.
- Because heavy equipment may not be equipped with properly functioning reverse signal alarms, 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; 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.

### 3.1.2 Clearing and Grubbing

The following sections provide procedures associated with the clearing and grubbing activity.

The following rules apply to those using a chainsaw:

- Ensure an Activity Hazard Analysis is written for this task.
- Verify that the owner's manual is available to personnel using equipment.
- Verify operator has inspected equipment:
  - No leaks, wear or damage.
  - Throttle trigger, safety, throttle lock, and stop switches operate correctly.
  - Chain brake works properly.
  - Carburetor idle is adjusted properly.
- Verify that the person operating the saw has received training if task is new or unfamiliar to them.
- Prohibit smoking while fueling or operating the saw.
- Refuel the saw only after it has cooled, and require funnel use.
- Make sure the fuel cap is secured and any fuel spillage is cleaned up.
- Move at least 35 feet away from refueling area before restarting saw.
- Keep a fire extinguisher nearby.
- Transport and store fuel only in approved containers.
- Do not distract or disturb someone who is operating a chainsaw.
- Ensure persons who are using a chainsaw take breaks and drink plenty of water. If they become tired or overheated, ensure they are examined for heat stress – refer to Section 3.2.7 for heat stress information.
- Instruct equipment operators to clean chainsaw after work completion.
- Working from heights (ladder, aerial lift, back of trucks) requires additional planning and must be approved by the Health and Safety Manager.
- Review both the Tick and Poison Oak Fact Sheets contained in this document – refer to Sections 3.3.2 and 3.3.3.
- Utilize DEET to prevent against mosquito and tick bites.
- Personnel operating chain saws must wear a minimum of the following Personal Protective Equipment:
  - Long trousers, chainsaw chaps, and appropriate footwear.
  - Safety goggles or ANSI Z87 approved eyewear with a face shield.
  - A hardhat with the visor facing forward.

- Leather work gloves.
- Long-sleeved shirt.
- Ear muffs.
- To prevent injury from kickback, the chainsaw operator will:
  - Ensure the machine has a chain brake and that it is clean and functions properly.
  - Hold chainsaw firmly making sure that the left hand encircles top handle with the thumb underneath.
  - Avoid bringing the upper quadrant of the guide bar into contact with any foreign object.
  - Don't cut above shoulder height.
  - Never hold chainsaw with one hand or by the handle only.
  - Always begin the cut at peak saw RPMs.

The following rules apply to those using a wood chipper:

- Mechanical chippers must be maintained in accordance with the manufacturer's specifications:
  - The motor ignition will be locked out and the key removed from the ignition before any maintenance or service is performed, or when the chipper is left unattended.
  - The chipper drum will be blocked, and only authorized persons allowed to perform any service or maintenance.
  - On the drum or blades, retightening of chipper blade bolts will be done according to manufacturer's specifications.
- The chipper will be equipped with a workable "kill" switch of approved design, located at the in feed location.
- The chipper will have a curtain in place at all times (workable in all weather conditions) in order to prevent fly-back of material.
- Before the wood chipper is started, the apron and feed platform should be checked and cleared of any foreign objects.
- The front of the feed apron table will be a minimum of 1500 mm (60 inches) from the chipper blades.
- The following safety equipment is mandatory for personnel working with wood chippers:
  - Personal hearing protection.
  - Approved safety head gear.
  - Full face shield, in addition to safety eye wear.
  - Loose-fitting leather gloves will be worn by the person feeding the chipper.
  - One-piece coveralls will be worn (blaze color in areas where traffic may be present).
  - Non-slip approved safety footwear.

- Hands or feet will not be placed beyond the curtain guard while the blade is in operation.
- A push stick or brush will be used to force short or thorny brush into the chipper.
- Care will be exercised when chipping dead or frozen wood in order to avoid kickback.
- Maximum diameter of material to be fed into the chipper will be 150 mm (6 inches), unless manufacturer's specifications allow larger material size.
- Material from 75 mm to 150 mm (3 to 6 inches) diameter will not exceed 2.5 meters (8 feet) in length, unless manufacturer's specifications allow longer material length.
- The person feeding the chipper will stand to the side of the apron at the rear of material being fed into the machine.
- No person will be allowed to stand or sit on any part of the discharge chute while the brush chipper is in operation.
- No person will stand or sit on any part of the brush chipper while it is in operation or while it is being transported from one job site to another.
- The chipper apron is to be secured in the "up" position when being transported from one job site to another.

### 3.1.3 Survey Lasers

- Laser beams used in surveying may be hazardous to the eyes.
- The severity of the hazard depends on the type of laser and its power.
- Avoid direct eye contact with the beam.
- This is most important when wearing corrective eyeglasses, which can intensify the beam's focus on the retina.
- Lasers used in surveying are usually low power.
- Lasers must be posted with safety warning signs.

### 3.1.4 Excavation Activities

(Reference CH2M HILL, SOP HSE-307, *Excavations*)

- CH2M HILL personnel must notify and be granted authorization from the excavation competent person prior to entering any excavation. CH2M HILL personnel must follow all excavation requirements established by the competent person.
- The competent person must inspect the trench and/or excavation everyday and after everyday hazard increasing event. Documentation of this inspection must be maintained onsite at all times.
- Excavations must be protected from cave-ins by adequate protective systems unless the excavation is less than 5 feet in depth and a competent person determines there is no

indication of cave-in or the excavation is made entirely in stable rock that is not fractured.

- Prior to excavating at a location, buried utilities in the area must be identified; refer to Section 23.1.6 Procedures for Locating Buried Utilities.
- CH2M HILL personnel must not enter any excavation where protective systems are deficient at any time, for any reason. The competent person must be notified of such conditions.
- Refer to CH2M HILL SOP HS-32 “Excavations and Trenching” for more specific details on excavation requirements.

### 3.1.5 Operating Heavy Equipment

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

- CH2M HILL authorizes only those employees qualified by training or previous experience to operate material handling equipment.
- 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 will be corrected before the equipment is placed in service. Documentation of this inspection must be maintained onsite at all times.
- 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 will 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 from the power lines < 50 kV. Provide an additional 4 feet 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 Section 3.1.6 “Procedures for Locating Buried Utilities.”

- Operators loading/unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake will be set whenever equipment is parked, wheels must be chocked when parked on inclines.
- When not in operation, the blade/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/buckets landed and shift lever in neutral.
- Ladders, stairways or integral prefabricated scaffold ladders must be used to access the platform; scaffold crossbracing may not be used as a means of access.
- CH2M HILL personnel must have completed CH2M HILL's fall protection training when personal fall arrest systems (harness, lanyard, lines, etc.) are required to be used on scaffolding.
- Personnel working from suspended scaffolding are required to wear a full body harness with lanyard attached to an independent lifeline.

### 3.1.6 Procedures for Locating Buried Utilities

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SHSS should confirm that arrangement.

### 3.1.7 Exposure to Vehicular Traffic

(Reference CH2MHILL, 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 contractor.

- 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 – 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 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 away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.

### 3.1.8 Hand and Power Tools

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

- Tools will 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 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; and
- Portable power tools will be 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.).
- When using a knife or blade tool, stroke or cut away from the body with a smooth motion. Be careful not to use excessive force that could damage the tool, the material being cut, or unprotected hands.
- 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.
- Tools will be tested each day before use to see that safety devices are in proper working condition. The method of testing will be in accordance with the manufacturer's recommended procedure.
- Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment will be guarded if such parts are exposed to contact by employees or otherwise create a hazard.
- All liquid fuel-powered tools will be stopped while being refueled, serviced, or maintained.

### 3.1.9 Arsenic

(Reference CH2M HILL SOP HSE-501, *Arsenic*)

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Avoid skin and eye contact with liquid and particulate arsenic or arsenic trichloride.
- Arsenic is considered a “confirmed human carcinogen.”
- Arsenic particulates (inorganic metal dust) are odorless. Vapor and gaseous odor varies depending upon specific organic arsenic compound.
- Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.

### 3.1.10 Lead

(Reference CH2M HILL SOP HSE-508, *Lead*)

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Avoid skin and eye contact with soil contaminated with lead.
- Lead particulates (inorganic metal dust) are odorless. Vapor and gaseous odor varies depending upon specific organic lead compound.
- Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.

### 3.1.11 MEC (UXO)

(Reference CH2M HILL SOP HSE&Q 610, *Explosive Usage and Munitions Response (MR)*).

- Avoidance support procedures will be implemented during sampling activities when within areas suspected of containing Munitions and Explosives of Concern (MEC). Avoidance support will be provided by one UXO Technician III. Contact with MEC is PROHIBITED.
- Prior to sampling the UXO Technician will conduct a reconnaissance of the sampling area. The reconnaissance will include locating the designated sampling sites.
- The route to and the sampling site will be visually checked for Material Potentially Presenting an Explosive Hazard (MPPEH).

- The route to and the sampling site will be check for anomalies utilizing a magnetometer or equivalent. All anomalies will be treated as MPPEH.
- The identification of MPPEH (including anomalies) will require that route to, and/or sampling points be changed.
- MPPEH (including anomalies) locations will be recorded, flagged and reported to the Project Manager.
- The access route at a minimum will be twice the width of the widest vehicle and the boundaries will be clearly marked to prevent personnel from straying into non-cleared areas. If surface MEC is encountered, the UXO Technician will mark the location and divert the approach path around the MPPEH (including anomalies).
- Contact with MPPEH is PROHIBITED.

## 3.2 General Hazards

### 3.2.1 General Practices and Housekeeping

(Reference CH2M HILL- SOP HSE-209, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.
- 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, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies will 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 will be removed at regular intervals.
- All spills will be quickly cleaned up. Oil and grease will be cleaned from walking and working surfaces.

### 3.2.2 Hazard Communication

(Reference CH2M HILL-SOP HSE-107, *Hazard Communication*)

The SHSS is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- 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.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

### 3.2.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods*)

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. 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. Contact the HSM or the Equipment Coordinator for additional information.

### 3.2.4 Lifting

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

- Proper lifting techniques must be used when lifting any object.
- Plan storage and staging to minimize lifting or carrying distances.
- Split heavy loads into smaller loads.
- Use mechanical lifting aids whenever possible.
- Have someone assist with the lift -- especially for heavy or awkward loads.
- Make sure the path of travel is clear prior to the lift.

### 3.2.5 Fire Prevention

(Reference CH2M HILL- SOP HSE-208, *Fire Prevention*)

- Fire extinguishers will be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or

combustible liquid is being used, an extinguisher must be within 50 feet. 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 from any building.
  - Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
  - Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

### 3.2.6 Electrical

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

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- 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.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - equipped with third-wire grounding.
  - covered, elevated, or protected from damage when passing through work areas.
  - protected from pinching if routed through doorways.
  - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated 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 from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.

- Temporary lights will not be suspended by their electric cord unless designed for suspension. Lights will be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

### 3.2.7 Heat Stress

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

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink one to two cups every 20 minutes, for a total of 1 to 2 gallons per day. 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 yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- 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 shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SHSS to avoid progression of heat-related illness.

<b>Symptoms and Treatment of Heat Stress</b>					
	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	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.

Symptoms and Treatment of Heat Stress					
		sensations during heat exposure.	after work hours.	blood pressure; oral temperature normal or low	
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!

### Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress. The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, 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 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

### 3.2.8 Cold Stress

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

- 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 cool 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 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.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SHSS 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.

### 3.3 Biological Hazards and Controls

#### 3.3.1 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 a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention 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.

#### 3.3.2 Poison Ivy 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. Become familiar with the identity of these plants. 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.

#### 3.3.3 Ticks

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 in size. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permethrin and spray skin with only DEET; and check yourself frequently for ticks.

If bitten by a tick, grasp it at the point of attachment and carefully remove it. After removing the tick, wash your hands and disinfect and press the bite areas. Save the removed tick. Report the bite to human resources. Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash might appear that looks like a bullseye with a small welt

in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, seek medical attention.

### 3.3.4 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SHSS and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

### 3.3.5 Bloodborne Pathogens

(Reference CH2M HILL- SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

### 3.3.6 Mosquito Bites

Due to the recent detection of the West Nile Virus in the Southeastern 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 DEET since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35 percent DEET (N,N-diethyl-meta-toluamide). DEET in high concentrations (greater than 35 percent) provides no additional protection.
- Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands.
- 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.

Note: 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 3-15 days.
- If you have any questions or to report any suspicious symptoms, contact the project Health and Safety Manager.

## 3.4 Radiological Hazards and Controls

Refer to CH2M HILL's Corporate Health and Safety Program, Program and Training Manual, and Corporate Health and Safety Program, Radiation Protection Program Manual, for standards of practice in contaminated areas.

## 3.5 Contaminants of Concern

Contaminants of Concern are listed in Table 3-1.

TABLE 3-1  
Contaminants of Concern

Contaminant	Location and Maximum <sup>a</sup> Concentration	Exposure Limit <sup>b</sup>	IDLH <sup>c</sup>	Symptoms and Effects of Exposure	PIP <sup>d</sup> (eV)
Arsenic	SS: 36 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation.	NA
Lead	SS: 6500 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	100	Weakness lassitude, farcical pallor, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
TRPH	SS: 340 mg/m <sup>3</sup>	100 ppm	1000	Eye, skin, and nose irritation; headache; dizziness; vomiting; dermatitis, burning sensation, in chest, weakness, chemical pneumonia	UK
Unknown Chemical Drum	?	?	?	?	?
Footnotes: <sup>a</sup> Specify sample-designation and media: SS (Surface Soil). <sup>b</sup> Appropriate value of PEL, REL, or 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.					

## 3.6 Potential Routes of Exposure

**Dermal:** Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.

**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.

**Other:** 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).

# 4.0 Project Organization and Personnel

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## 4.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL- SOPs HS-01, *Medical Surveillance*, and HS-02, *Health and Safety Training*)

The employees listed meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SHSS" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SHSS with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. At least two FA-CPR trained employees must be available at each job site/operation. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL-SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SHSS/FA-CPR
Michael Halil	JAX	Project Manager	
Jeffrey Marks	JAX	Project Manager	SC-C, SC-HW; CPR-FA
Rich Rathnow	ORO	HSM	SC-C, SC-HW; CPR-FA
Greg Ramey	JAX	Superintendent	SC-HW; CPR-FA

## 4.2 Field Team Chain of Command and Communication Procedures

### 4.2.1 Client

Contact Name: Larry Blackburn, NTR/ROICC  
Phone: 904/542-8745 ext. 1116

### 4.2.2 CH2M HILL

Program Manager: Scott Smith/ATL 770/604-9095  
Project Manager: Michael Halil, JAX 904/777-4812 ext. 233  
Health and Safety Manager: Richard Rathnow/ATL 770/604-9095  
Field Team Leader: Greg Ramey  
Site Health and Safety Specialist: Greg Ramey

The CH2M HILL project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HS&E 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 SOP:

- Include standard terms and conditions, and contract-specific HS&E roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors)
- Select safe and competent subcontractors by:
- obtaining, reviewing and accepting or rejecting subcontractor pre-qualification questionnaires
- ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award
- including HS&E submittals checklist in subcontract agreements, and ensuring that appropriate site-specific safety procedures, training and medical monitoring records are reviewed and accepted prior to the start of subcontractor's field operations
- Maintain copies of subcontracts and subcontractor certificates of insurance (including CH2M HILL as named additional insured), bond, contractors license, training and medical monitoring records, and site-specific safety procedures in the project file accessible to site personnel
- Provide oversight of subcontractor HS&E practices per the site-specific safety plan
- Manage the site and interfacing with 3rd parties in a manner consistent with our contract and subcontract agreements and the applicable standard of reasonable care
- Ensure that the overall, job-specific, HS&E goals are fully and continuously implemented

The CH2M HILL HSM is responsible for:

- Review and accept or reject subcontractor pre-qualification questionnaires that fall outside the performance range delegated to the Contracts Administrator (KA)
- Review and accept or reject subcontractor training records and site-specific safety procedures prior to start of subcontractor's field operations
- Support the SHSS's oversight of subcontractor (and lower-tier subcontractors) HS&E practices and interfaces with on-site 3rd parties per the site-specific safety plan
- The SHSS is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:
- Verify this HSP remains current and amended when project activities or conditions change

- Verify CH2M HILL site personnel and subcontractor personnel read this HSP and sign Attachment 1 “Employee Signoff Form” prior to commencing field activities
- Verify CH2M HILL site personnel and subcontractor personnel have completed any required specialty training (e.g., fall protection, confined space entry) and medical surveillance as identified in Section 2
- Verify compliance with the requirements of this HSP and applicable subcontractor health and safety plan(s)
- Act as the project “Hazard Communication Coordinator” and perform the responsibilities outlined in Section 2.2.2
- Act as the project “Emergency Response Coordinator” and perform the responsibilities outlined in Section 4
- Post OSHA job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established; posters can be obtained by calling 800/548-4776 or 800/999-9111
- Verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (e.g., as tasks or hazards change)
- Verify that project H&S forms and permits, found in Attachment 5, are being used as outlined in Section 2
- Perform oversight and/or assessments of subcontractor HS&E practices per the site-specific safety plan and verify that project activity self-assessment checklists, found in Attachment 5, are being used as outlined in Section 2
- Verify that project files available to site personnel include copies of executed subcontracts and subcontractor certificates of insurance (including CH2M HILL as named additional insured), bond, contractors license, training and medical monitoring records, and site-specific safety procedures prior to start of subcontractor’s field operations
- Manage the site and interfacing with 3rd parties in a manner consistent with our contract/subcontract agreements and the applicable standard of reasonable care
- Coordinate with the HS&E manager regarding CH2M HILL and subcontractor operational performance, and 3rd party interfaces
- Ensure that the overall, job-specific, HS&E goals are fully and continuously implemented
- The training required for the SHSS is as follows:
  - SHSS 10 hour course
  - OSHA 10 hour course for Construction
  - First Aid and CPR

- Relevant Competent Person Courses (excavation, confined space, scaffold, fall protection, etc.)

The SHSS is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

### 4.2.3 Subcontractors

(Reference CH2M HILL- SOP HSE-215, *Subcontractor, Contractor, and Owner*)

Certain subcontractors (drilling, remedial and construction contractors) are required to be pre-qualified for safety by completing the Subcontractor Safety Performance Questionnaire. The subcontractors listed above are covered by this HSP. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work by following the Subcontractor Safety Procedure Criteria specific to their work.

Subcontractors are also required to prepare Activity Hazard Analysis before beginning each activity posing H&S hazards to their personnel using the AHA form provided in Attachment 6 as a guide. The AHA will identify the principle steps of the activity, potential H&S 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.

Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SHSS should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. 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. In addition to this level of observation, the SHSS is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in Attachment 5 are to be used by the SHSS to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief project team on the hazards and precautions related to their work.

- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

# 5.0 Personal Protective Equipment

(Reference CH2M HILL- SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*)

PPE Specifications are listed in Table 5-1.

TABLE 5-1  
PPE Specifications<sup>a</sup>

Task	Level	Body	Head	Respirator <sup>b</sup>
General site entry Oversight of remediation and construction Surveying Clearing and Grubbing	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat <sup>c</sup> Safety glasses Hearing protection <sup>d</sup>	None required
Pre-excavation Confirmation Soil Screening, Sampling, and Analyses Backfill Material Certification Pre-excavation Survey Waste Characterization T&D of contaminated/uncontaminat ed materials Site Restoration Post-excavation Survey Demobilization Sampling and Analyses	Modified D	Work clothes or cotton coveralls <b>Boots:</b> Steel-toe, chemical- resistant boots OR steel-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> Safety glasses Hearing protection <sup>d</sup>	None required
Excavation of Contaminated Soil and Backfilling Decontamination	Modified D	<b>Coveralls:</b> Uncoated Tyvek® <b>Boots:</b> Steel-toe, chemical- resistant boots OR steel-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> Safety glasses Hearing protection <sup>d</sup>	None required.
Tasks requiring upgrade	C	<b>Coveralls:</b> Polycoated Tyvek® <b>Boots:</b> Steel-toe, chemical- resistant boots OR steel-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> Hearing protection <sup>d</sup> Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent <sup>e</sup> .
<b>Tasks requiring upgrade Unknown Drum Remote Opening Unknown Drum Sampling</b>	<b>B (Minimum)</b>	Coveralls: <b>Saran Coated Tyvek and/or PVC Rainsuit for corrosives</b> Boots: <b>Steel-toe, chemical- resistant boots OR steel-toe, leather work boots with outer rubber boot covers</b> Gloves: <b>Inner surgical-style nitrile &amp; outer chemical- resistant nitrile or PVC gloves as necessary.</b>	<b>Hardhat<sup>c</sup> Splash shield<sup>c</sup> Ear protection<sup>d</sup> Spectacle inserts</b>	<b>Positive-pressure demand self- contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.</b>

TABLE 5-1  
PPE Specifications<sup>a</sup>

Task	Level	Body	Head	Respirator <sup>b</sup>
<b>Reasons for Upgrading or Downgrading Level of Protection</b>				
<b>Upgrade<sup>f</sup></b>		<b>Downgrade</b>		
<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 (Section 5) 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 decreases 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 SHSS.

<sup>d</sup> Hearing protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting (>85 dB(A)).

<sup>e</sup> Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

<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 HSM, and an SHSS qualified at that level is present.

# 6.0 Air Monitoring/Sampling

(Reference CH2M HILL- SOP HS-06, *Air Monitoring*)

## 6.1 Air Monitoring Specifications

Air Monitoring Specifications are listed in Table 6-1.

TABLE 6-1  
Air Monitoring Specifications

Instrument	Tasks	Action Levels <sup>a</sup>		Frequency <sup>b</sup>	Calibration
PID: OVM with 10.6eV lamp or equivalent	All intrusive operations	< 100ppm	Level D	Initially and periodically during task	Daily
		≥ 100 ppm, <1000 ppm	Level C; notify HSM		
		>1000 ppm	Level B: Contact HSM		
	Drum Opening/ Drum Sampling	0-1000 ppm	Level B	Continuously during task	
		>1000 ppm	Contact HSM		
CGI: MSA model 260 or 261 or equivalent	Drum Opening/ Drum Sampling	0-10% : 10-25% LEL: >25% LEL:	No explosion hazard Potential explosion hazard Explosion hazard; close drum, evacuate area until LEL subsides	Continuous during advancement of boring or trench  Continuous during drum opening/ sampling	Daily
H2S Single Gas Monitor	Drum Opening/ Drum Sampling	100 ppm	Level B - IDLH level – Defer to CGI % level above for action	Continuous during drum opening/ sampling	Daily
HCN Single Gas Monitor	Drum Opening/ Drum Sampling	< 4.7 ppm	Level B –	Continuous during drum opening/ sampling	Daily
		4.7-47 ppm	Level B with Teflon Suite		
		>47 ppm	Level A		
Dust Monitor Visual Assessment	Excavation  T&D of Soil  Other dust generation activities	No Visible Dust	Level D	Initially and periodically during tasks	Zero Daily
		Visible Dust:	Use dust suppression methods		
		<0.01 mg/m3  ≥ 0.01 mg/m3	Level C		
Noise-Level Monitor <sup>e</sup> :	As needed	<85 dB(A)	No action required	Initially and periodically during task	Daily
		85-120 dB(A)	Hearing protection required		
		120 dB(A)	Stop; re-evaluate		

<sup>a</sup> Action levels apply to sustained breathing-zone measurements above background.

<sup>b</sup> The exact frequency of monitoring depends on field conditions and is to be determined by the SHSS; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

<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 (refer to Section 2).

<sup>d</sup> Refer to SOP HS-10 for instructions and documentation on radiation monitoring and screening.

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

## 6.2 Calibration Specifications

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

Air Monitoring equipment calibration specifications are listed in Table 6-2

TABLE 6-2  
Air Monitoring Equipment Calibration Specifications

Instrument	Gas	Span	Reading	Method
<b>PID:</b> OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
<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> OVA	100 ppm methane	3.0 ± 1.5	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>H2S Monitor</b>	Per manufacturer Inst.			
<b>HCN Monitor</b>	Per manufacturer Inst.			
<b>Dust Monitor:</b> Miniram-PDM3	Dust-free air	Not applicable	0.00 mg/m <sup>3</sup> in "Measure" mode	Dust-free area OR Z-bag with HEPA filter

## 6.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

# 7.0 Decontamination

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(Reference CH2M HILL- SOP HSE-506, *Decontamination*)

The SHSS must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SHSS. The SHSS must ensure that procedures are established for disposing of materials generated on the site.

## 7.1 Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
<ul style="list-style-type: none"> <li>• Boot wash/rinse</li> <li>• Glove wash/rinse</li> <li>• Outer-glove removal</li> <li>• Body-suit removal</li> <li>• Inner-glove removal</li> <li>• Respirator removal</li> <li>• Hand wash/rinse</li> <li>• Face wash/rinse</li> <li>• Shower ASAP</li> <li>• Dispose of PPE in municipal trash, or contain for disposal</li> <li>• Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Wash/rinse equipment</li> <li>• Solvent-rinse equipment</li> <li>• Contain solvent waste for offsite disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Power wash</li> <li>• Steam clean</li> <li>• Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal</li> </ul>

## 7.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SHSS should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 7-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SHSS to accommodate task-specific requirements.

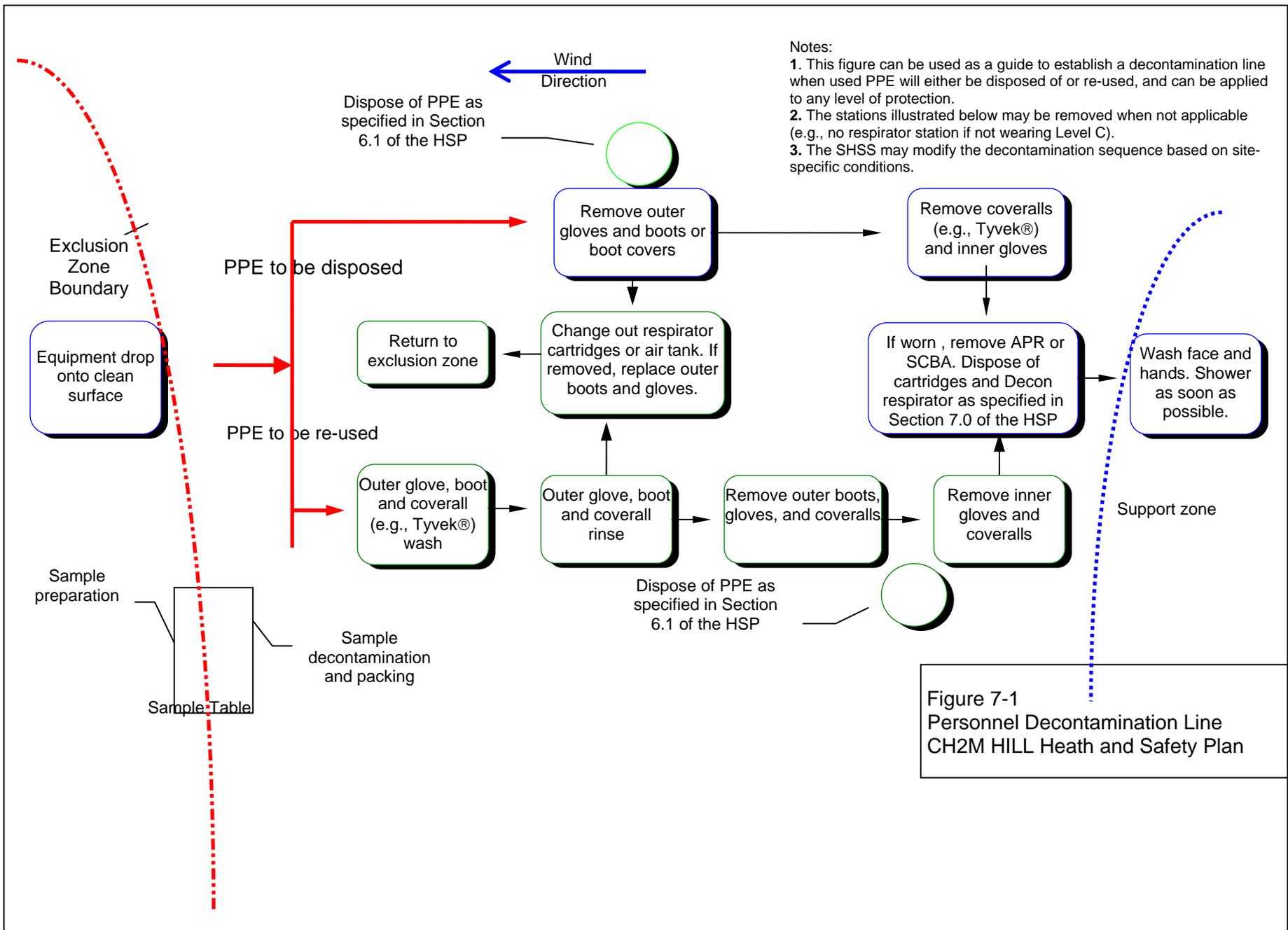


Figure 7-1  
Personnel Decontamination Line  
CH2M HILL Heath and Safety Plan

## 8.0 Spill-Containment Procedures

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Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

# 9.0 Site Control Plan

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## 9.1 Site Control Procedures

(Reference CH2M HILL- SOP HSE-510, *Site Control*)

- The SHSS will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SHSS records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL- SOP HS-71, OSHA Postings.
- Establish support, decontamination, 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
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”
- Initial air monitoring is conducted by the SHSS in appropriate level of protection.
- The SHSS is to conduct periodic inspections of work practices to determine the effectiveness of this plan (refer to Sections 2 and 3). Deficiencies are to be noted, reported to the HSM, and corrected.

## 9.2 Hazwoper Compliance Plan

(Reference CH2M HILL- SOP HS-19, *Site-Specific Written Safety Plans*)

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff are working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data.
- When non-Hazwoper-trained personnel are at risk of exposure, the SHSS must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hours of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

# 10.0 Emergency Response Plan

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

## 10.1 Pre-Emergency Planning

The SHSS 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.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- 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.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- 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, including driving route to hospital.
- Brief new workers on the emergency response plan.
- The SHSS will evaluate emergency response actions and initiate appropriate follow-up actions.

## 10.2 Emergency Equipment and Supplies

The SHSS should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 LB (or two 10-lb) fire extinguisher (A, B, and C classes)	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

## 10.3 Incident Reporting, Investigation and Response

For any accident meeting the definition of Recordable Occupational Injuries or Illnesses or Significant Accidents, the Southern Division, NAVFAC Contracting Officer and Navy Technical Representative (NTR) will be notified by the HSM or Program Manager soon as practical, but not later than four hours after occurrence. All other incidents must be reported to Southern Division, NAVFAC within 24 hours of incident occurrence.

Therefore in order for the incident to be assessed for reportability purposes it is imperative that according to CH2M HILL requirements, all personal injuries, near-misses, or property damage incidents involving CH2M HILL or subcontractor project personnel be reported IMMEDIATELY to the HSM Rich Rathnow/ORO, Program Manager Scott Newman/ATL, or CH2M HILL Corporate HSM Angelo Liberatore/ATL at the numbers identified in the emergency contact attachment contained in this plan.

The Site Manager or designee must report the following incident information to the HSM immediately after incident occurrence:

- Date and time of mishap
- Project name and project number
- Name and worker classification
- Extent of known injuries
- Level of medical attention
- Injury cause

A written incident investigation will be performed and submitted to the HSM within 24 hours of incident occurrence by the completing the Incident Report, Near Loss Investigation and Root Cause Analysis provided in the HSP Attachments.

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

Shut down CH2M HILL operations and evacuate the immediate work area.

Notify appropriate response personnel.

Account for personnel at the designated assembly area(s).

Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

## 10.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. CH2M HILL employee injuries and illnesses must be reported to the Human Resource contact in Attachment 4. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant, depending on whose employee is injured. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities (911).
- The SHSS 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.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 10.7.

## 10.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the SHSS before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SHSS 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 SHSS will account for all personnel in the onsite assembly area.

- A designated person will account for personnel at alternate assembly area(s).
- The SHSS will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

## 10.6 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.

## 10.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact the respective Human Resources contact listed in Attachment 4. For CH2M HILL incidents the HR administrator completes an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form (Attachment )and submit to the HSM.
- Notify and submit reports to client as required in contract.

# 11.0 Behavior Based Loss Prevention System

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A Behavior Based Loss Prevention System (BBLPS) is a system to prevent or reduce losses using behavior-based tools and proven management techniques to focus on behaviors or acts that could lead to losses.

The four basic Loss Prevention tools that will be used on EE&S CH2M HILL projects to implement the BBLPS include:

- Activity Hazard Analysis (AHA)
- Pre-Task Safety Plans (PTSP)
- Loss Prevention Observations (LPO)
- Loss and Near Loss Investigations (NLI)

The Site Supervisor serves as the Site Health and Safety Specialist (SHSS) and is responsible for implementing the BBLPS on the project site. When a separate individual is assigned as the SHSS, the SHSS is delegated authority from the Site Supervisor to implement the BBLPS on the project site, but the Site Supervisor remains accountable for its implementation. The Site Supervisor/Safety Coordinator will only oversee the subcontractor's implementation of their AHAs and PTSPs processes on the project.

## 11.1 Activity Hazard Analysis

An Activity Hazard Analysis (AHA) defines the activity being performed, the hazards posed and control measures required to perform the work safely. Workers are briefed on the AHA before doing 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.

Activity Hazard Analysis will be prepared before beginning each project activity posing H&S hazards to project personnel using the AHA form provided in Attachment 6. The AHA will identify the work tasks required to perform each activity, along with potential H&S hazards and recommended control measures for each work task. 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.

An AHA will be prepared for all field activities performed by CH2M HILL and subcontractor during the course of the project by the Site Supervisor/SHSS. The Project-Specific and General Hazards of the HSP, the Hazard Analysis Table (Table 2-1), and applicable CH2M HILL Standards of Practice (SOPs) should be used as a basis for preparing CH2M HILL AHAs.

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor will submit AHAs for their field activities, as defined in their work plan/scope of work, along with their project-specific HSP. Additions or changes in CH2M HILL or subcontractor field activities, equipment, tools or material to perform work or additional/different hazard encountered

that require additional/different hazard control measures requires either a new AHA to be prepared or an existing AHA to be revised.

## 11.2 Pre-Task Safety Plans

Daily safety meetings are held with all project personnel in attendance to review the hazards posed and required H&S procedures/AHAs, that apply for each day's project activities. The 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 in Attachment 6, 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 H&S procedures, as identified in the AHA. The use of PTSPs, better promotes worker participation in the hazard recognition and control process, while reinforcing the task-specific hazard and required H&S procedures with the crew each day. The use of PTSPs is a common safety practice in the construction industry.

## 11.3 Loss Prevention Observations

Loss Prevention Observations (LPOs) will be conducted by Site Supervisor/SHSS for specific work tasks or operations comparing the actual work process against established safe work procedures identified in the project-specific HSP and AHAs. LPOs 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. Site Supervisor/SHSS will perform at least one LPO each week for a tasks/operations addressed in the project-specific HSP or AHA. The Site Supervisor/SHSS will complete the LPO form in Attachment 6 for the task/operation being observed.

## 11.4 Loss/Near Loss Investigations

Loss/Near Loss Investigations will be performed for the all CH2M HILL and subcontractor incidents involving:

- Person injuries/illnesses and near miss injuries
- Equipment/property damage
- Spills, leaks, regulatory violations
- Motor vehicle accidents

The cause of loss and near loss incidents are similar, so by identifying and correcting the causes of near loss causes, future loss incidents may be prevented. The following is the Loss/Near Loss Investigation Process:

- Gather all relevant facts, focusing on fact-finding, not fault-finding, while answering the who, what, when, where and how questions.
- Draw conclusions, pitting facts together into a probable scenario.

- Determine incident root cause(s), which are basic causes on why an unsafe act/condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.
- Communicate incident as a Lesson Learned to all project personnel.
- Filed follow-up on implemented corrective active action to confirm solution is appropriate.

Site Supervisors/SHSS will perform an incident investigation, as soon as practical after incident occurrence during the day of the incident, for all Loss and Near Loss Incidents that occur on the project. Loss and Near Loss incident investigations will be performed using the following incident investigation forms provided in Attachment 6:

- Incident Report Form (IRF)
- Incident Investigation Form
- Root Cause Analysis Form

All Loss and Near Loss incident involving personal injury, property damage in excess of \$1,000 or near loss incidents that could have resulted in serious consequences will be investigated by completing the incident investigation forms and submitting them to the PM and HSM within 24 hours of incident occurrence. A preliminary Incident Investigation and Root Cause Analysis will be submitted to the Project Manager and HSM within 24 hours of incident occurs. The final Incident Investigation and Root Cause Analysis will be submitted after completing a comprehensive investigation of the incident.

# 12.0 Approval

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This site-specific Health and Safety Plan 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, purposes, dates, and personnel specified and must be amended if those conditions change.

## 12.1 Original Plan

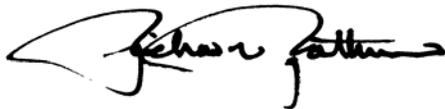
**Written By: Rich Rathnow**

**Date: 10-27-2005**

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**Approved By: Rich Rathnow**

**Date: 10-28-2005**



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## 12.2 Revisions

**Revisions Made By: Terry McElveen**

**Date: 5/19/06**

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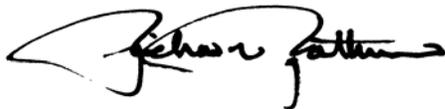
**Revisions to Plan:**

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**Revisions Approved By: Rich Rathnow**

**Date: 5/22/2006**

**Date: 2/9/2007**



## Attachment 1

### Employee Signoff Form



## Attachment 2

### Project-Specific Chemical Product Hazard Communication Form



## Attachment 3

### Chemical Specific Training Form

## CHEMICAL-SPECIFIC TRAINING FORM

Location: Site 15, Cecil Field SHSS:	Project #: 284587 Trainer:
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**TRAINING PARTICIPANTS:**

NAME	SIGNATURE	NAME	SIGNATURE

**REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:**


The HCC will 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 will 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 will be made available for employee review in the facility/project hazard communication file.

## Attachment 4

### Emergency Contacts

# Emergency Contacts-

## 24-hour CH2M HILL Emergency Beeper – 888/444-1226

### Medical Emergency – 911

Facility Medical Response #: 911  
Local Ambulance #: 911

### CH2M HILL- Medical Consultant

Dr. Jerry H. Berke, M.D., M.P.H.  
Health Resources  
600 West Cummings Park, Suite 3400  
Woburn, MA 01801-6350  
781/938-4653  
800/350-4511  
(After hours calls will be returned within 20 minutes)

### Fire/Spill Emergency -- 911

Facility Fire Response #: 911  
Local Fire Dept #: 911

### Local Occupational Physician

### Security & Police – 911

Facility Security #: 911  
Local Police #: 911

### Navy RAC Program Manager

Name: Sid Allison/ATL  
Phone: 770/604/9182

### Utilities Emergency

Water:  
Gas:  
Electric: 911

### Navy RAC Health and Safety Manager (HSM)

Name: Rich Rathnow/ORO  
Phone: 865/483-9005 (Office); 865/607-6734 (Cell)  
865/531-2933 (Home)

### Site Health and Safety Specialist (SHSS)

Name: Greg Ramey  
Phone: 904-777-4812

### CH2M HILL Human Resources Department

Name: Nancy Orr/COR  
Phone: 303/771-0952

### Project Manager

Name: Mike Halil  
Phone: 904-777-4812

### Corporate Human Resources Department

Name: John Monark/COR  
Phone: 303/771-0900

### Federal Express Dangerous Goods Shipping

Phone: 800/238-5355

### Emergency Number for Shipping Dangerous Goods

Phone: 800/255-3924

### CH2M HILL Worker's Compensation and Auto Claims

Sterling Administration Services  
Phone: 800/420-8926 After hours: 800/497-4566  
  
Report fatalities AND report vehicular accidents involving pedestrians, motorcycles, or more than two cars.

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

### Facility Alarms:

### Evacuation Assembly Area(s):

### Facility/Site Evacuation Route(s):

### Hospital Name/Address:

Baptist Medical Center

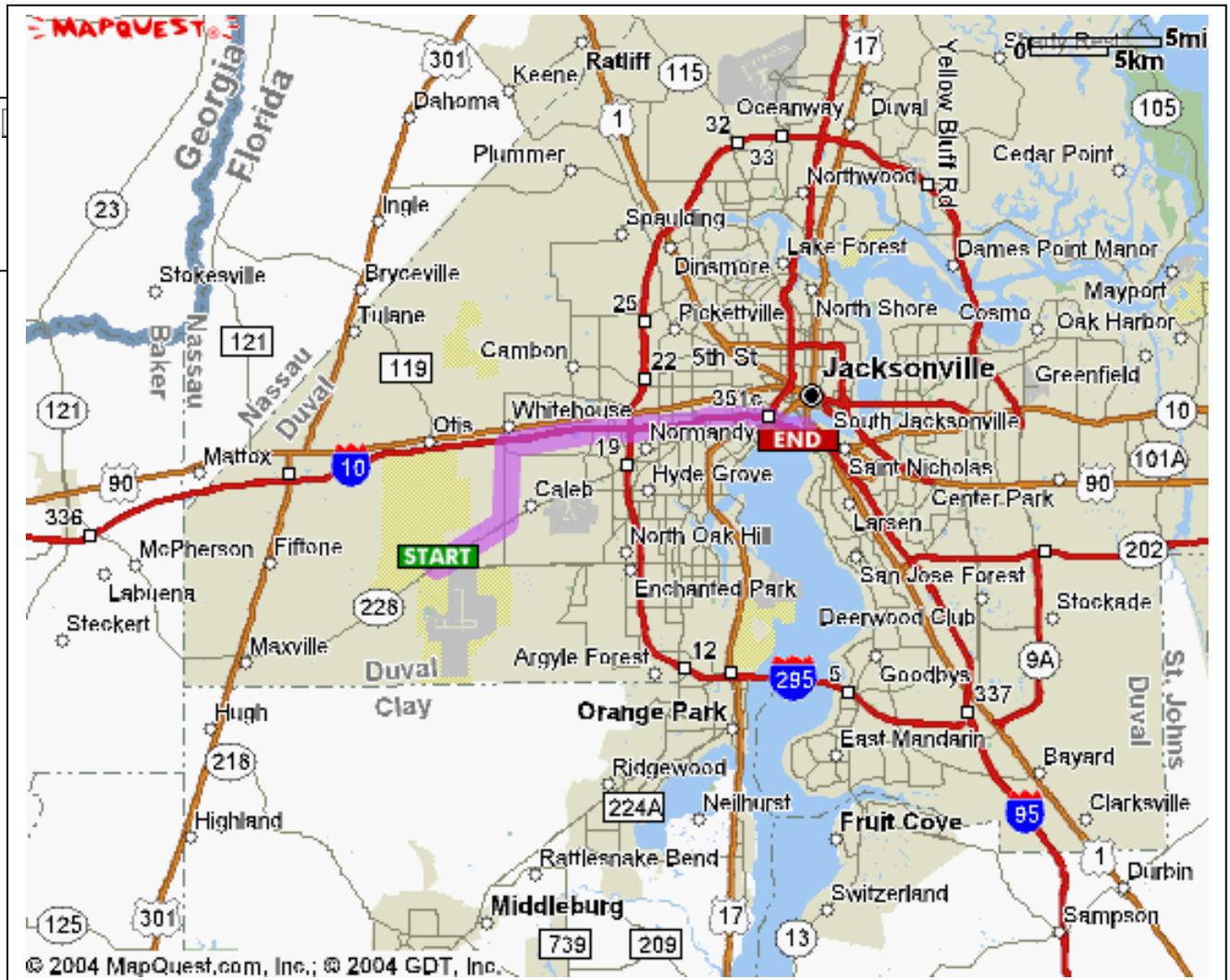
### Hospital Phone #: Hospital Phone #:

904-202-2000

## Directions to Hospital

See map

- 1: Start out going Northeast on NORMANDY BLVD/FL-228 E toward FL-134 W/103RD ST. 2.9 mi.
- 2: Turn LEFT onto CHAFFEE RD S/CR-115C. 2.7 miles
- 3: Merge onto I-10 E. 10.0 miles
- 4: Merge onto I-95 S toward JAX BEACHES/DAYTONA BEACH. 0.9 miles
- 5: Take the PALM AVE exit- exit number 350B- toward SAN MARCO BLVD. 0.4 miles
- 6: Turn LEFT onto PALM AVE. 0.1 miles
- 7: Turn LEFT onto PRUDENTIAL DR. 0.1 miles
- 8: End at 800 Prudential Dr Jacksonville FL



## Attachment 5

### Project Activity Self-Assessment Checklists/Permits

**Arsenic**

**Chainsaws**

**Earthmoving Equipment**

**Excavations**

**Hand and Power Tools**

**Lead**

**Traffic Control**

**Waste Characterization, Sampling, and Analysis**

**Hazardous Waste Management**

This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at the following locations: 1) where CH2M HILL employees are exposed to arsenic, or 2) CH2M HILL provides oversight of subcontractor personnel who are exposed to arsenic.

The SSC or DSC may consult with subcontractors when completing this checklist, but will not direct the means and methods of arsenic operations nor direct the details of corrective actions. Subcontractors will determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately, or all exposed personnel will be removed from the hazard until corrected.

Completed checklists will be sent to the HS&E Staff for review.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

- Evaluate CH2M HILL employee exposure to arsenic hazards
  - Evaluate a CH2M HILL subcontractor’s compliance with the arsenic standard and its requirements
- Subcontractors Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
- Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked “No.”
- Check “N/A” if an item is not applicable.
- Check “N/O” if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-65.

**SECTION 1**

**PERSONNEL SAFE WORK PRACTICES (3.1)**

	<b><u>Yes</u></b>	<b><u>No</u></b>	<b><u>N/A</u></b>	<b><u>N/O</u></b>
1. Areas that exceed the PEL have been designated as regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Personnel meet medical and training requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. No eating, drink, and/or smoking are allowed in the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Warning signs have been posted at all entrances to the regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Selection of PPE is based on most relevant exposure monitoring data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel working near arsenic-contaminated soil or material will use wet methods and work practices to control dust; wear disposable coveralls and exercise personal hygiene practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Contact lenses are not worn when working with arsenic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>SECTION 2</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
<b>EXPOSURE ASSESSMENTS (3.2.2)</b>				
8. Initial air monitoring conducted over full shift for each job classification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Air sampling conducted every six months when exposure limit (EL) ≥ AL but < PEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Air sampling of employees conducted quarterly when EL ≥ PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Additional air monitoring has been collected when there are any changes in operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>COMMUNICATION OF HAZARDS (3.2.3)</b>				
12. Training on the Hazard Communication Standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. CH2M HILL personnel have completed the Arsenic Training Module	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Employees have been informed of air monitoring results within 5 days after receipt of results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Where PEL is exceeded, affected employees have been notified of results and control measures to be utilized to reduce exposure below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Storage or shipping containers have been properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Written compliance program is available to all affected employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>CONTROL METHODS (3.2.4)</b>				
17. Engineering controls and work practices have been utilized to reduce exposures below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. When controls are unable to reduce exposures below the PEL, respiratory protection is utilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Regulated areas have been established and demarcated where exposures exceed the PEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Only authorized personnel with respiratory protection may enter regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Where EL ≥ PEL, a written compliance program is implemented prior to commencing work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. The compliance program is based on the most recent air monitoring/sampling results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. The compliance program is updated for new exposure monitoring data or every six months	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. All surfaces are free of accumulation of arsenic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Cleaning methods minimize airborne arsenic activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Where vacuuming is used, vacuums are used and emptied as to minimize airborne arsenic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. A written housekeeping and maintenance plan is in place and maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Compressed air not used to remove arsenic from surfaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Employees do not eat, drink, smoke, chew tobacco/gum, or apply cosmetics in regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Change areas provided where EL ≥ PEL or where employees are subject to eye or skin irritation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Employee not allowed to leave workplace wearing clothing worn during work shift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Shower facilities installed and used with cleaning agents and towels, where feasible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Hand washing facilities provided for use by employees prior to eating, drinking, smoking, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Eating facilities free of arsenic provided for employees working in regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PERSONAL PROTECTIVE EQUIPMENT (3.2.5)</b>				
23. Respirators are used in areas where EL ≥ PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Respirator cartridges are replaced at the end of shift or service life indicator, where available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. The selection of the appropriate respirator is based on the airborne arsenic concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. PAPRs are provided to employees who request such a respirator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. PPE is supplied at no cost to employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Employee exposed to arsenic tri-chloride wear impervious clothing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Clean and dry protective clothing is provided weekly. Daily if EL ≥ 100 µg/m <sup>3</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Protective clothing is repair or replaced if found to be ineffective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Contaminated protective clothing is removed from change areas at the end of the shift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. All clothing requiring laundering is packaged in sealed, labeled containers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Personnel or vendors who launder contaminated clothing are formally informed of the hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are operating chainsaws, and/or 2) CH2M HILL is providing oversight of a subcontractor operating a chainsaw.

Safety Coordinators may consult with chainsaw subcontractors when completing this checklist, but will not direct the means and methods of chainsaw operations nor direct the details of corrective actions. Chainsaw subcontractors will determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

- Evaluate CH2M HILL employee exposures to chainsaw hazards
  - Evaluate a CH2M HILL subcontractor’s compliance with chainsaw HS&E requirements
- Subcontractor Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
- Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the excavation subcontractor. Section 2 must be completed for all items checked “No.”
- Check “N/A” if an item is not applicable.
- Check “N/O” if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-49.

### SECTION 1

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
<b>SAFETY EQUIPMENT (2.3)</b>				
1. Chainsaw equipped with spark arrestor and fully functioning chain brake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Chainsaw operator’s manual readily available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Fully stocked first aid kit and multipurpose fire extinguisher available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Appropriate personal protective equipment available and worn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Clothing free of loose edges that could become entangled in the saw	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PLANNING ACTIVITIES (2.5)</b>				
6. Operators have read the chainsaw operator’s manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. If aerial lifts to be used, aerial lift training completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Daily safety briefing/meeting conducted with project personnel to discuss planned work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Immediate area surrounding operation cleared of obstructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Companion maintained within calling distance of the chainsaw operator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u><b>SECTION 1 (Continued)</b></u>	<u><b>Yes</b></u>	<u><b>No</b></u>	<u><b>N/A</b></u>	<u><b>N/O</b></u>
<b>INSPECTION (3.1.1)</b>				
11. Chain tension, sharpness, condition, and guide gap checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Chainsaw components checked for physical damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Chain does not rotate at idle with chain brake off	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Chain brake and stop switch operating correctly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Throttle trigger can not be engaged until throttle trigger lock out pressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>STARTING THE ENGINE (3.1.2)</b>				
16. Chainsaw operator’s manual consulted for proper starting procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Saw placed on level ground with guide bar and chain off the ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Saw is not drop-started	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SAFE OPERATION (3.1.3)</b>				
19. Chainsaw handles kept dry, clean, and free of oil or fuel mixture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Chainsaws held firmly with both hands and used right-handed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Operator standing to the left of the saw out of the plane of the chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Saw used between the waist and mid-chest level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Full throttle maintained while cutting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Operator aware of position of guide bar tip, does not contact tip with anything being cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Bumper spikes maintained as close to the object as possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Operator aware of what is in the saw’s downward path after the cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. No attempt to made to cut material that is larger than the guide bar of the saw	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Cuts avoided that will cause chain to jam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Non-metallic wedges used to prevent compression cuts from jamming the blade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Bystanders and helpers kept at a safe distance from operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Chainsaw not operated when fatigued	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Fire extinguisher present when operating the chainsaw in forest or brushy areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>ELECTRICAL CHAINSAW PRECAUTIONS (3.1.3)</b>				
33. Extension cords approved for outdoor use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Electrical cords equipped with third-wire grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Ground fault circuit interrupter (GFCI) used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Electrical cord positioned carefully to avoiding cutting with saw or trip hazard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Saw switched to the off position before completing electrical connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Saw unplugged before making adjustments and when not in use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>REFUELING THE ENGINE (3.1.4)</b>				
39. Fuel mixed in accordance with the manufacturer's recommendations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Fuel stored and transported in an approved safety container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Engine shut off and allowed to cool before refueling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Fire extinguisher present during fueling and refueling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Area around refueling site free from combustible materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Smoking around fueling or refueling operations prohibited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Funnel/flexible nozzle used to avoid spilling fuel on the engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>TRANSPORT AND STORAGE (3.1.5)</b>				
46. Chainsaws carried with engine off and guide bar pointing to rear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Chain guard attached or placed in carrying case prior to transporting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Fuel tank drained and spark plug disconnected for long-term storage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Chainsaw placed in scabbard or secured to platform prior to transporting in aerial lift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u><b>SECTION 1 (Continued)</b></u>				
	<u><b>Yes</b></u>	<u><b>No</b></u>	<u><b>N/A</b></u>	<u><b>N/O</b></u>
<b>TOPPING UTILITY POLES (3.2.1)</b>				
50. CH2M HILL only topping utility poles from an aerial lift platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Aerial lifts operated safely (use aerial lift checklist in HS-41)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Maximum length of pole section cut at one time does not exceed 2'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Pole tested for stray voltage with foreign voltage detector prior to cutting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Wiring, staples, nails, and other hardware removed within 4" of cut path	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Saw handled between chest and waist level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Personnel below pole safe distance from the fall area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Cutting stopped leaving approximately one half inch of pole uncut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Pole section removed manually by pulling cut section towards body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Cut pole sections lowered by rope or placed in aerial lift platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Rough edges hammered over after last cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>TREE FELLING (3.2.2)</b>				
61. CH2M HILL not felling trees beyond scope of SOP HS-49	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Power company contacted prior to felling trees within two tree lengths of power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Underground services checked that could be damaged when tree strikes the ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Danger zone created two tree lengths from public areas, public removed from danger zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Personnel maintain a distance equal to two tree lengths of the tree being felled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66. Intended direction of fall determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Suitable escape path determined and maintained clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68. Equipment needed to prevent tree from sitting back on the saw determined and readily available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69. Undercut notch cut on side of the tree in the direction of the fall line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70. Back cut started 1-2" inches above the undercut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71. As tree starts to fall, saw shut off and operator steps into the escape path	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>LIMBING STANDING TREES (3.2.3)</b>				
72. CH2M HILL not operating chainsaws where overhead electrical power lines may be contacted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73. Only subcontractors with special training permitted to work around electrical power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74. Branches/limbs not cut above shoulder height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75. If climbing from a ladder, ladder secured in position and operator independently secured	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76. Chainsaws not used from rope and harness unless operator has received specific training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>LIMBING FALLEN TREES (3.2.4)</b>				
77. No dead branches/other debris hanging above work that may fall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78. Personnel do not attempt to manually pull over elevated trees, mechanical equipment used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
79. Springpoles cut safely, avoiding springback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80. Small-size brush and saplings cut with hand saws or other cutting tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
82. Cuts made with operator standing on the opposite side of the tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83. Operator keeping sight of saw tip, avoiding kickback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84. Debris removed periodically to maintain clear vision and movement around tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>BUCKING TREES (3.2.5)</b>				
85. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86. Working from small end to larger to improve stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87. If tree on level ground, cutting from upper side and avoiding running chain into ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88. If tree supported at one end, cutting from lower side one-third, then upper side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89. If tree supported at both ends, cutting from upper side one-third, then lower side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to the hazards of earthmoving equipment operations, 2) CH2M HILL employees are operating earthmoving equipment, and/or 3) CH2M HILL provides oversight of a subcontractor operating earthmoving equipment.

The CH2M HILL Safety Coordinator may consult with subcontractors operating earthmoving equipment when completing this checklist, but will not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors will determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

Evaluate CH2M HILL employee exposures to earthmoving equipment hazards (complete Section 1).  
 Evaluate CH2M HILL employees operating earthmoving equipment (complete entire checklist).  
 Evaluate CH2M HILL subcontractor's compliance with earthmoving equipment safety requirements (complete entire checklist). Subcontractors Name: \_\_\_\_\_

- Check "Yes" if an assessment item is complete/correct.
  - Check "No" if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
  - Check "N/A" if an item is not applicable.
  - Check "N/O" if an item is applicable but was not observed during the assessment.
- Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-27.

<b>SAFE WORK PRACTICES (3.1)</b>	<b><u>SECTION 1</u></b>	<b><u>Yes</u></b>	<b><u>No</u></b>	<b><u>N/A</u></b>	<b><u>N/O</u></b>
1. Personnel maintaining safe distance from operating equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Positioning personnel in close proximity to operating equipment is avoided		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel wearing high-visibility and/or reflective vests when close to operating equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Personnel approach operating equipment safely		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Personnel riding only in seats of equipment cab and using seat belts		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel not positioned under elevated portions of equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Personnel not positioned under hoisted loads		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Personnel not hoisted by equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Personnel do not to approach equipment that has become electrically energized		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Personnel wearing appropriate PPE, per HSP/FSI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>EQUIPMENT SAFETY REQUIREMENTS PRIOR TO OPERATING EQUIPMENT (3.2.1)</b>	<b><u>SECTION 2</u></b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>N/O</b>
11. Only qualified and authorized personnel operating equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Daily safety briefing/meeting conducted with equipment operators		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Daily inspection of equipment conducted and documented		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Modifications and attachments used approved by equipment manufacturer		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Backup alarm or spotter used when backing equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Operational horn provided on bi-directional equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Seat belts are provided and used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Rollover protective structures (ROPS) provided		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Braking system capable of stopping full payload		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Headlights and taillights operable when additional light required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Brake lights in operable condition		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Cab glass provides no visible distortion to the operator		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. All machine guards are in place		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Hauling equipment (dump trucks) provided with cab shield or canopy		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Dump truck beds provided with positive means of support during maintenance or inspection		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Dump truck operating levers provided with latch to prevent accidental dumping		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Air monitoring conducted per HSP/FSI for hazardous atmospheres		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EQUIPMENT PLACEMENT (3.2.2)</b>					
28. Equipment position on firm/level surface, outriggers used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Location of underground utilities identified		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Safe clearance distance maintained while working under overhead power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Safe distance is maintained while traveling under power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Warning system used to remind operator of excavation edge		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Unattended equipment visibly marked at night		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Tools lowered/parking brake set when not in use, wheels chocked when parked on incline		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EQUIPMENT OPERATION (3.2.3)</b>					
35. Equipment operated on safe roadways and grades		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Equipment operated at safe speed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Operators maintain unobstructed view of travel path		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Equipment not operated during inclement weather, lightning storms		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Equipment started and moved safely		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Operators keep body parts inside cab during operation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Vehicle occupants in safe position while loading/unloading		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Signal person visible to operator when required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Equipment used for hoisting done according to equipment manufacturer specifications		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Lifting and hauling capacities are not exceeded		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EQUIPMENT MAINTENANCE (3.2.4)</b>					
45. Defective components repaired immediately		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Suspended equipment or attachments supported prior to work under or between		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Lockout/tagout procedures used prior to maintenance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Tires on split rims removed using safety tire rack or cage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Good housekeeping maintained on and around equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATING AT HAZARDOUS WASTE SITES (3.2.5)</b>					
50. Waste disposed of according to HSP/FSI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Appropriate decontamination procedures being followed, per HSP/FSI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees enter excavations (complete Sections 1 and 3), and/or (2) CH2M HILL oversight of an excavation subcontractor is required (complete entire checklist).

SC may consult with excavation subcontractors when completing this checklist, but will not direct the means and methods of excavation operations nor direct the details of corrective actions. Excavation subcontractors will determine how to correct deficiencies and we must carefully rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazardous area until corrected.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

- Evaluate CH2M HILL employee exposures to excavation hazards
  - Evaluate a CH2M HILL subcontractor’s compliance with excavation HS&E requirements
- Subcontractor Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
- Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the excavation subcontractor. Section 3 must be completed for all items checked “No.”
- Check “N/A” if an item is not applicable.
- Check “N/O” if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-32.

**SECTION 1**

**Yes   No   N/A   N/O**

**EXCAVATION ENTRY REQUIREMENTS (4.1)**

1. Personnel have completed excavation safety training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Competent person has completed daily inspection and has authorized entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel are aware of entry requirements established by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Protective systems are free from damage and in stable condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Surface objects/structures secured from falling into excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Potential hazardous atmospheres have been tested and found to be at safe levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Precautions have been taken to prevent cave-in from water accumulation in the excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Personnel wearing appropriate PPE, per HSP/FSI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>SECTION 2</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
<b>GENERAL (4.2.1)</b>				
9. Daily safety briefing/meeting conducted with personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Excavation and protective systems adequately inspected by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Defective protective systems or other unsafe conditions corrected before entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Guardrails provided on walkways over excavation 6' (1.8m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Barriers provided at excavations 6' or deeper when excavation not readily visible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Barriers or covers provided for wells, pits, shafts, or similar excavation 6' (1.8 m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Earthmoving equipment operated safely (use earthmoving equipment checklist in HS-27)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PRIOR TO EXCAVATING (4.2.2)</b>				
16. Dig permit obtained where required by client/facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Location of underground utilities and installations identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Excavation area evaluated for OE/UXO hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Soils characterized prior to excavation where contamination may be present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. USDA (or local equivalent) soil permit obtained for soil transport, where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Excavation area checked for wetlands, endangered species, cultural/historic resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. ACOE/CWA 404 (or local equivalent) permit obtained for wetlands, where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Stockpile management plan prepared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Waste discharge/NPDES (or local equivalent) permit obtained for excavation dewatering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Storm water pollution prevention or erosion & sediment control plan prepared, where required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATING ACTIVITIES (4.2.3)</b>				
26. Rocks, trees, and other unstable surface objects removed or supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Exposed underground utility lines supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Undermined surface structures supported or determined to be in safe condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Warning system used to remind equipment operators of excavation edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Stockpile, excavation covers, liners, silt fences in place, where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Fugitive dust suppressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATION ENTRY (4.2.4)</b>				
32. Trenches > 4' (1.2 m) deep provided with safe means of egress within 25' (7.6 m)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Structure ramps designed and approved by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Potential hazardous atmospheres tested prior to entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Rescue equipment provided where potential for hazardous atmospheres exists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Ventilation used to control hazardous atmospheres and air tested frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Appropriate respiratory protection used when ventilation does not control hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Precautions taken to prevent cave-in from water accumulation in excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Precautions taken to prevent surface water from entering excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Protection provided from falling/rolling material from excavation face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Spoil piles, equipment, materials restrained or kept at least 2' (61 cm) from excavation edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATION PROTECTIVE SYSTEMS (4.2.5)</b>				
42. Protective systems used for excavations 5' (1.5 m) or deeper, unless stable rock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Protective systems for excavation deeper than 20' (6.1 m) designed by registered PE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. If soil unclassified, maximum allowable slope is 34 degrees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Protective systems free from damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Protective system used according to manufacturer's recommendations and not subjected to loads exceeding design limits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Protective system components securely connected to prevent movement or failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Cave-in protection provided while entering/exiting shielding systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Personnel removed from shielding systems when installed, removed, or vertical movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>SECTION 2 (Continued)</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
<b>PROTECTIVE SYSTEM REMOVAL AND BACKFILLING (4.2.6)</b>				
50. Protective system removal starts and progresses from excavation bottom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Protective systems removed slowly and cautiously	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Temporary structure supports used if failure of remaining components observed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Backfilling taking place immediately after protective system removal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Backfill certified clean when required by client or local regulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATING AT HAZARDOUS WASTE SITES (4.2.7)</b>				
55. Waste disposed of according to HSP and RCRA regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Appropriate decontamination procedures being followed, per HSP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>EXCAVATING AT POTENTIAL ORDNANCE EXPLOSIVES SITES (4.2.8)</b>				
57. OE plan prepared and approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. OE/UXO avoidance provided, routes and boundaries cleared and marked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Personnel remain inside the marked boundary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Earthmoving equipment does not excavate closer than 1' (30.5 cm) to anomalies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are exposed to hand and power tool hazards and/or 2) CH2M HILL provides oversight of subcontractor personnel who are exposed to hand and power tool hazards.

SSC or DSC may consult with subcontractors when completing this checklist, but will not direct the means and methods of hand and power tool use nor direct the details of corrective actions. Subcontractors will determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Completed checklists will be sent to the HS&E Staff for review.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

Evaluate CH2M HILL employee exposure to hand and power tool hazards.  
 Evaluate a CH2M HILL subcontractor’s compliance with hand and power tool requirements.  
 Subcontractors Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
  - Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked “No.”
  - Check “N/A” if an item is not applicable.
  - Check “N/O” if an item is applicable but was not observed during the assessment.
- Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-50.

<u><b>SECTION 1</b></u>		<u><b>Yes</b></u>	<u><b>No</b></u>	<u><b>N/A</b></u>	<u><b>N/O</b></u>
<b>SAFE WORK PRACTICES (3.1)</b>					
1.	All tools operated according to manufacturer’s instructions and design limitations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	All hand and power tools maintained in a safe condition and inspected and tested before use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Defective tools are tagged and removed from service until repaired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	PPE is selected and used according to tool-specific hazards anticipated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Power tools are not carried or lowered by their cord or hose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Tools are disconnected from energy sources when not in use, servicing, cleaning, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Safety guards remain installed or are promptly replaced after repair.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Tools are stored properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Cordless tools and recharging units both conform to electrical standards and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Tools used in explosive environments are rated for such use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Knife or blade hand tools are used with the proper precautions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stressors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 2**

**Yes No N/A N/O**

**GENERAL (3.2.1)**

- 13. PPE is selected and used according to tool-specific hazards anticipated.
- 14. Tools are tested daily to assure safety devices are operating properly.
- 15. Damaged tools are removed from service until repaired.
- 16. Power operated tools designed to accommodate guards have guards installed.
- 17. Rotating or moving parts on tools are properly guarded.
- 18. Machines designed for fixed locations are secured or anchored.
- 19. Floor and bench-mounted grinders are provided with properly positioned work rests.
- 20. Guards are provided at point of operation, nip points, rotating parts, etc.
- 21. Fluid used in hydraulic-powered tools is approved fire-resistant fluid.

**ELECTRIC-POWERED TOOLS (3.2.2)**

- 22. Electric tools are approved double insulated or grounded and used according to SOP HS-23.
- 23. Electric cords are not used for hoisting or lowering tools.
- 24. Electric tools are used in damp/ wet locations are approved for such locations or GFCI installed.
- 25. Hand-held tools are equipped with appropriate on/off controls appropriate for the tool.
- 26. Portable, power-driven circular saws are equipped with proper guards.

**ABRASIVE WHEEL TOOLS (3.2.3)**

- 27. All employees using abrasive wheel tools are wearing eye protection.
- 28. All grinding machines are supplied with sufficient power to maintain spindle speed.
- 29. Abrasive wheels are closely inspected and ring-tested before use.
- 30. Grinding wheels are properly installed.
- 31. Cup-type wheels for external grinding are protected by the proper guard or flanges.
- 32. Portable abrasive wheels used for internal grinding are protected by safety flanges.
- 33. Safety flanges are used only with wheels designed to fit the flanges.
- 34. Safety guards on abrasive wheel tools are mounted properly and of sufficient strength.

**PNEUMATIC-POWERED TOOLS (3.2.4)**

- 35. Tools are secured to hoses or whip by positive means to prevent disconnection.
- 36. Safety clips or retainers are installed to prevent attachments being expelled.
- 37. Safety devices are installed on automatic fastener feed tools as required.
- 38. Compressed air is not used for cleaning unless reduced to < 30 psi, with PPE, and guarded.
- 39. Manufacturer’s safe operating pressure for hoses, pipes, valves, etc. are not exceeded.
- 40. Hoses are not used for hoisting or lowering tools.
- 41. All hoses >1/2-inch diameter have safety device at source to reduce pressure upon hose failure.
- 42. Airless spray guns have required safety devices installed.
- 43. Blast cleaning nozzles are equipped with operating valves, which are held open manually.
- 44. Supports are provided for mounting nozzles when not in use.
- 45. Air receiver drains, handholds, and manholes are easily accessible.
- 46. Air receivers are equipped with drainpipes and valves for removal of accumulated oil and water.
- 47. Air receivers are completely drained at required intervals.
- 48. Air receivers are equipped with indicating pressure gauges.
- 49. Safety, indicating, and controlling devices are installed as required.
- 50. Safety valves are tested frequently and at regular intervals to assure good operating condition.

**SECTION 2 (continued)**

**Yes No N/A N/O**

**LIQUID FUEL-POWERED TOOLS (3.2.5)**

- 51. Liquid fuel-powered tools are stopped when refueling, servicing, or maintaining.
- 52. Liquid fuels are stored, handled, and transported in accordance with SOP HS-21
- 53. Liquid fuel-powered tools are used in confined spaces in accordance with SOP HS-17.
- 54. Safe operating pressures of hoses, valves, pipes, filters, and other fittings are not exceeded.

**POWDER-ACTUATED TOOLS (3.2.6)**

- 55. Only trained employee operates powder-actuated tools.
- 56. Powder-actuated tools are not loaded until just prior to intended firing time.
- 57. Tools are not pointed at any employee at any time.
- 58. Hands are kept clear of open barrel end.
- 59. Loaded tools are not left unattended.
- 60. Fasteners are not driven into very hard or brittle materials.
- 61. Fasteners are not driven into easily penetrated materials unless suitable backing is provided.
- 62. Fasteners are not driven into spalled areas.
- 63. Powder-actuated tools are not used in an explosive or flammable atmosphere.
- 64. All tools are used with correct shields, guards, or attachments recommended by manufacturer.

**JACKING TOOLS (3.2.7)**

- 65. Rated capacities are legibly marked on jacks and not exceeded.
- 66. Jacks have a positive stop to prevent over-travel.
- 67. The base of jacks are blocked or cribbed to provide a firm foundation, when required.
- 68. Wood blocks are place between the cap and load to prevent slippage, when required.
- 69. After load is raised, it is cribbed, blocked, or otherwise secured immediately.
- 70. Antifreeze is used when hydraulic jacks are exposed to freezing temperatures.
- 71. All jacks are properly lubricated.
- 72. Jacks are inspected as required.
- 73. Repair or replacement parts are examined for possible defects.
- 74. Jacks not working properly are removed from service and repaired or replaced.

**HAND TOOLS (3.2.8)**

- 75. Wrenches are not used when jaws are sprung to the point of slippage.
- 76. Impact tools are kept free of mushroomed heads.
- 77. Wooden handles of tools are kept free of splinters or cracks and are tightly fitted in tool.



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are exposed to lead operations and/or 2) CH2M HILL provides oversight of subcontractor personnel who are exposed to lead operations.

SSC or DSC may consult with subcontractors when completing this checklist, but will not direct the means and methods of lead operations nor direct the details of corrective actions. Subcontractors will determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Completed checklists will be sent to the HS&E Staff for review.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_

Location: \_\_\_\_\_ PM: \_\_\_\_\_

Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

Evaluate CH2M HILL employee exposure to lead hazards

Evaluate a CH2M HILL subcontractor’s compliance with the lead standard and its requirements

Subcontractors Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
  - Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked “No.”
  - Check “N/A” if an item is not applicable.
  - Check “N/O” if an item is applicable but was not observed during the assessment.
- Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-57.

<b><u>SECTION 1</u></b>		<b><u>Yes</u></b>	<b><u>No</u></b>	<b><u>N/A</u></b>	<b><u>N/O</u></b>
<b>PERSONNEL SAFE WORK PRACTICES (3.1)</b>					
1. Work activities identified where there is a potential for lead exposure.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Surfaces tested where lead may be present.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Regulated areas have been identified and marked.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Personnel entering into regulated areas have been trained and medically qualified.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. No eating, drinking, smoking, chewing, or applying cosmetics in regulated areas.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Respiratory protection and other controls selected as per direction of competent person.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Work progresses from areas of less contamination to more		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Water is added to soil prior to and during ground intrusive work to minimize dust generation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Personnel in vicinity of ground intrusive activities are wearing disposable coveralls or equal		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Personnel exercising enhanced personal hygiene near contaminated soil operations		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 2**

**Yes No N/A N/O**

**EXPOSURE ASSESSMENTS (3.2.2)**

- 11. The exposure assessment has been completed.  Yes  No  N/A  N/O
- 12. Air monitoring data supporting the exposure data is available.  Yes  No  N/A  N/O
- 13. PPE is appropriate for the type of activity and concentration.  Yes  No  N/A  N/O
- 14. Personnel have been provided PPE, hygiene facilities, biological monitoring, and training during initial exposure determination.  Yes  No  N/A  N/O
- 15. An assessment has been conducted for each process, personnel, or control.  Yes  No  N/A  N/O
- 16. New assessment conducted when a change occurs in process, personnel, or controls.  Yes  No  N/A  N/O
- 17. Air monitoring results above the AL but below the PEL have been sampled in the last 6 months.  Yes  No  N/A  N/O
- 18. Air monitoring results above the PEL have been sampled in the last 3 months.  Yes  No  N/A  N/O
- 19. The exposure assessment based on theoretical calculations, historical data, or other information has been verified.  Yes  No  N/A  N/O

**COMMUNICATION OF HAZARDS (3.2.3)**

- 20. Training on the Hazard Communication Standard has been met.  Yes  No  N/A  N/O
- 21. The Written Compliance Program is available.  Yes  No  N/A  N/O
- 22. Warning Signs have been posted in areas above the PEL  Yes  No  N/A  N/O
- 23. Notification of owners, tenants, and contractors has been made.  Yes  No  N/A  N/O

**CONTROL METHODS (3.2.4)**

- 24. Engineering and work practices are implemented in areas at or above the PEL.  Yes  No  N/A  N/O
- 25. The mechanical ventilation has been assessed to control lead exposures.  Yes  No  N/A  N/O
- 26. Where administrative controls are used, a job rotation schedule has been implemented.  Yes  No  N/A  N/O
- 27. A written compliance program is established and implemented.  Yes  No  N/A  N/O
- 28. All surfaces are clean of lead dust accumulation.  Yes  No  N/A  N/O
- 29. Vacuums are equipped with HEPA filters.  Yes  No  N/A  N/O
- 30. Compressed air is not used to remove lead or control lead dust.  Yes  No  N/A  N/O
- 31. Employees not allowed to eat, drink, or smoke in regulated areas.  Yes  No  N/A  N/O
- 32. Change areas are available when regulated areas are in use.  Yes  No  N/A  N/O
- 33. PPE used in lead operations not worn by employees off the worksite.  Yes  No  N/A  N/O
- 34. Personal hygiene facilities (showers and wash facilities) are available in areas above the PEL.  Yes  No  N/A  N/O
- 35. Employees required to wash hands and face at end of shift and prior to eating, smoking, etc.  Yes  No  N/A  N/O
- 36. Eating facilities, free of lead contamination, provided and readily accessible.  Yes  No  N/A  N/O

**PERSONAL PROTECTIVE EQUIPMENT (3.2.5)**

- 37. Respirators are used in areas at or above the PEL.  Yes  No  N/A  N/O
- 38. The selection of the appropriate respirator is based on the airborne lead concentration.  Yes  No  N/A  N/O
- 39. All other required PPE (coveralls, gloves, goggles, etc) and equipment provided to employees.  Yes  No  N/A  N/O
- 40. PAPRs have been made available to employees who request them.  Yes  No  N/A  N/O
- 41. Clean & dry protective clothing provided weekly; daily to employees exposed over 200 µg/m<sup>3</sup>  Yes  No  N/A  N/O
- 42. Clothing to be laundered is labeled with "Caution" signs.  Yes  No  N/A  N/O
- 43. Businesses and personnel laundering contaminated clothing have been informed of lead hazard.  Yes  No  N/A  N/O



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are exposed to traffic hazards and/or 2) CH2M HILL provides oversight of subcontractor personnel who are exposed to traffic hazards.

SSC or DSC may consult with subcontractors when completing this checklist, but will not direct the means and methods of traffic control operations nor direct the details of corrective actions. Subcontractors will determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Completed checklists will be sent to the HS&E Staff for review.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Auditor: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

This specific checklist has been completed to:

- Evaluate CH2M HILL employee exposure to traffic hazards.
- Evaluate a CH2M HILL subcontractor’s compliance with traffic control requirements.  
 Subcontractors Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
- Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked “No.”
- Check “N/A” if an item is not applicable.
- Check “N/O” if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-24.

**SECTION 1**

**SAFE WORK PRACTICES (3.1)**

**Yes No N/A N/O**

1. Personnel working on/adjacent to active roadways or in control zones are wearing safety vests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Traffic control plan (TCP) is consistent with roadway, traffic, and working conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. TCP has been approved by regulatory or contractual authority prior to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. TCP considers all factors that may influence traffic related hazards and controls.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Work areas are protected by rigid barriers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Lookouts are used when applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Vehicles are parked 40 feet away from work zone or are equipped with hazard beacon/strobe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. TMCC or TMA vehicle is used where appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All CH2M HILL traffic control devices conform to MUTCD standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Traffic control devices are inspected continuously.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Flagging is only used when other means of traffic control are inadequate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Additional traffic control zone controls have been implemented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Cranes do not swing loads/booms over nor do workers enter/cross live roadways (as defined).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 2**

**Yes No N/A N/O**

**GENERAL (3.2.1)**

- 14. Lane closings are performed when required by this SOP.
- 15. Traffic control configurations are based on an engineering study of the location.
- 16. If no study, traffic control is performed with approval of the authority having jurisdiction.
- 17. TCP has been prepared and understood by all responsible parties prior to work.
- 18. Special preparation/coordination with external parties has been conducted where applicable.
- 19. All contractor traffic control devices conform to MUTCD standards.
- 20. Traffic movement and flow are inhibited or disrupted as little as possible.
- 21. Supplemental equipment and activities do not interfere with traffic.
- 22. Drivers and pedestrians are considered when entering and traversing traffic control zone.

**TRAFFIC CONTROL ZONES (3.2.2)**

- 23. Traffic control zones are divided into the necessary five areas.
- 24. Advances warning area is designed based on conditions of speed, roadways, and driver needs.
- 25. Advanced warning signage is spaced according to roadway type and conditions.
- 26. Transition areas are used to channelize traffic around the work area.
- 27. Buffer areas are used to provide a margin of safety for traffic and workers.
- 28. The buffer area is free of equipment, workers, materials, and worker vehicles.
- 29. The length of the buffer area is two times the posted speed limit in feet.
- 30. All work is contained in the work area and is closed to all traffic.
- 31. A termination area is used to provide traffic to return to normal lanes.
- 32. A downstream taper is installed in the termination area.

**DEVICE INSTALLATION AND REMOVAL (3.2.3)**

- 33. All vehicles involved with device installation/removal have hazard beacons/strobes.
- 34. Devices are installed according to the order established by this SOP.
- 35. Devices are removed in the opposite order of installation.
- 36. Tapers are used to move traffic out of its normal path.
- 37. Tapers are created using channelizing devices.
- 38. The length of taper is determined by posted speed and width of lane to be closed (see formula).
- 39. Local police or highway patrol assist during taper installation and removal.
- 40. TMCC/ TMA vehicles are used to protect personnel during installation and removal of devices.
- 41. Cone trucks are equipped with platforms and railings.
- 42. Cones are the appropriate height for the specific roadway and are reflectorized.
- 43. Temporary sign supports are secured using sandbags to prevent movement.
- 44. Arrow panels are used on lane closures where required.
- 45. Concrete barriers are used where required.
- 46. Barrels, crash cushions, or energy absorbing terminals are used to protect traffic as required.
- 47. Changeable message signs (CMS) are used as required.
- 48. CMS are not used to replace required signage.
- 49. No more than two message panels are used in any message cycle on CMS.

**FLAGGING (3.2.4)**

- 50. Flagging is used only when other traffic control methods are inadequate.
- 51. Only approved personnel with current certification are allowed to be used as flaggers.
- 52. Flaggers are located off the traveled portion of the roadway.
- 53. A communication system is established when more than one flagger is used.
- 54. Hand signaling by flaggers is by means of red flags, sign paddles, or red lights.
- 55. Flaggers are alert, positioned close enough to warn work crews, and easily identified from crew.
- 56. An escape plan is established by crew and flaggers prior to traffic control set up.
- 57. Signs indicating a flagger is present are used and removed as required.

**SECTION 2****Yes   No   N/A   N/O****INSPECTION AND MAINTENANCE (3.2.5)**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 58. Traffic control zones are monitored to determine their effectiveness under varying conditions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Traffic control devices are inspected at the beginning and continuously during work shift.     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Traffic control devices are restored to their proper position immediately and continuously.    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Damaged, old, or ineffective devices are removed and replaced immediately and continuously.    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Devices using reflected light for illumination are cleaned and monitored continuously.         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



This checklist will be used by CH2M HILL personnel **only** and will be completed at the frequency specified in the project’s HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees will be managing wastes generated on project sites and/or 2) CH2M HILL provides oversight of subcontractor personnel who are managing wastes generated at project sites.

The Safety Coordinator (SC) may consult with subcontractors when completing this checklist, but will not direct the means and methods of waste characterization, sampling and analysis operations nor direct the details of corrective actions. Subcontractors will determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) will be corrected immediately or all exposed personnel will be removed from the hazard until corrected.

Completed checklists will be sent to the HS&E Staff for review.

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ PM: \_\_\_\_\_  
 Person filling out checklist: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_  
 This specific checklist has been completed to:

Evaluate CH2M HILL compliance with its waste characterization, sampling and analysis standard (SOP-79).  
 Evaluate a CH2M HILL subcontractor’s compliance with the waste characterization, sampling and analysis standard and its requirements  
 Subcontractors Name: \_\_\_\_\_

- Check “Yes” if an assessment item is complete/correct.
  - Check “No” if an item is incomplete/deficient. Deficiencies will be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked “No.”
  - Check “N/A” if an item is not applicable.
  - Check “N/O” if an item is applicable but was not observed during the assessment.
- Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-42.

	<u>Yes</u>	<u>No</u>	<u>N/A</u>
<b><u>N/O</u></b>			
<b>GENERAL WASTE CHARACTERIZATION INFORMATION (6.0)</b>			
1. Personnel told not to sign waste documentation (e.g., manifests) unless specifically authorized by the client in writing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Waste Management Plan developed and available to all project personnel (see HSE-78).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Waste characterized before it is generated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Waste characterized by Client using generator information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Waste volumes estimated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Disposal facility sampling and analytical requirements identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Disposal facility evaluated (see HSE-78).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Waste stream characterization documented in project file.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>IDENTIFY ANALYTICAL TEST METHODS (7.1)</b>			
9. Nature and quantity of the waste determined.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Analyses required for transport, treatment, and disposal determined.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Detection limits identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Provide disposal facility with analytical results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Analytical test methods identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SAMPLING (7.2)**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 14. Developed a sampling plan.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Field activities recorded in a logbook.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Exceptions to sampling plan documented in field logbook.  |                          |                          |                          |                          |
| 17. Each container labeled with the project name, number, sample ID number, date and time,  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. The label on the container is covered with clear tape to prevent loss.<br>collected sampler's name, sample preserves, analysis to be performed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**CHAIN OF CUSTODY (COC)**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 19. Sample shipping containers sealed with two custody seals.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Custody seals placed over the left and rights sides of the container's cover (cooler).  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Each seal signed and dated (with time).   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Seals are covered with clear tape to prevent loss.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Custody seals placed on sample container immediately after collection.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Custody seals must be placed in a manner that they must be broken to open sample container.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. The sample is in custody ( in view or physical possession, it has not been tampered with, it is retained in a secured area with restricted access, it is placed in a container and secured with an official seal such that it cannot be reached without breaking the seal). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**CHAIN OF CUSTODY FORM INSTRUCTIONS (7.2.5)**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 26. Chain of Custody form completed per instructions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|--------------------------|

**RECORDS (7.2.6)**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 27. Original COC submitted to the lab along with final data packages.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Official copy of COC form sent to the project chemist and lab with sample shipment.         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Changes to analytical requests on COC form or the PO made in writing to the lab.            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. A copy of written change sent to PM, lab, and placed in project files.                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Reasons for change are included in sample log and project file.                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Sample logbooks, sample logs, and COC forms sent to PM at completion of project activities. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



## Attachment 6

### Behavior Based Loss Prevention System Forms

**Activity Hazard Analysis**  
**Pre-Task Safety Plans**  
**Loss Prevention Observation**  
**Incident Report and Investigation**







PRINT

SIGNATURE

Supervisor Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Safety Officer Name:

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Employee Name(s):

\_\_\_\_\_

\_\_\_\_\_

Date/Time: \_\_\_\_\_

Project: \_\_\_\_\_ Location: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Emergency Number(s): \_\_\_\_\_

**Brief Job Descriptions:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**List Specific Tasks for the Jobs (Match number from above).**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Tools/Equipment required for Tasks, (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools)match number from above:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Potential H&S Hazards, including chemical, physical, safety, biological and environmental (Check all that apply and review exposures as they will be encountered in the tasks above):**

<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'	<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

**Other Potential Hazards (Describe):**

\_\_\_\_\_

Hazard Control Measures (Check all that apply):

<p>PPE</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Thermal/lined</li> <li><input type="checkbox"/> Eye</li> <li><input type="checkbox"/> Dermal/hand</li> <li><input type="checkbox"/> Hearing</li> <li><input type="checkbox"/> Respiratory</li> <li><input type="checkbox"/> Reflective vests</li> <li><input type="checkbox"/> Flotation device</li> </ul>	<p>Protective Systems</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sloping</li> <li><input type="checkbox"/> Shoring</li> <li><input type="checkbox"/> Trench box</li> <li><input type="checkbox"/> Barricades</li> <li><input type="checkbox"/> Competent person</li> <li><input type="checkbox"/> Locate buried utilities</li> <li><input type="checkbox"/> Daily inspections</li> </ul>	<p>Fire Protection</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Fire extinguishers</li> <li><input type="checkbox"/> Fire watch</li> <li><input type="checkbox"/> Non-spark tools</li> <li><input type="checkbox"/> Grounding/bonding</li> <li><input type="checkbox"/> Intrinsically safe equipment</li> </ul>	<p>Electrical</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lockout/tagout</li> <li><input type="checkbox"/> Grounded</li> <li><input type="checkbox"/> Panels covered</li> <li><input type="checkbox"/> GFCI/extension cords</li> <li><input type="checkbox"/> Power tools/cord inspected</li> </ul>
<p>Fall Protection</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Harness/lanyards</li> <li><input type="checkbox"/> Adequate anchorage</li> <li><input type="checkbox"/> Guardrail system</li> <li><input type="checkbox"/> Covered opening</li> <li><input type="checkbox"/> Fixed barricades</li> <li><input type="checkbox"/> Warning system</li> </ul>	<p>Air Monitoring</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> PID/FID</li> <li><input type="checkbox"/> Detector tubes</li> <li><input type="checkbox"/> Radiation</li> <li><input type="checkbox"/> Personnel sampling</li> <li><input type="checkbox"/> LEL/O2</li> <li><input type="checkbox"/> Other</li> </ul>	<p>Proper Equipment</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aerial lift/ladders/scaffolds</li> <li><input type="checkbox"/> Forklift/ Heavy equipment</li> <li><input type="checkbox"/> Backup alarms</li> <li><input type="checkbox"/> Hand/power tools</li> <li><input type="checkbox"/> Crane w/current inspection</li> <li><input type="checkbox"/> Proper rigging</li> <li><input type="checkbox"/> Operator qualified</li> </ul>	<p>Welding &amp; Cutting</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cylinders secured/capped</li> <li><input type="checkbox"/> Cylinders separated/upright</li> <li><input type="checkbox"/> Flash-back arrestors</li> <li><input type="checkbox"/> No cylinders in CSE</li> <li><input type="checkbox"/> Flame retardant clothing</li> <li><input type="checkbox"/> Appropriate goggles</li> </ul>
<p>Confined Space Entry</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Isolation</li> <li><input type="checkbox"/> Air monitoring</li> <li><input type="checkbox"/> Trained personnel</li> <li><input type="checkbox"/> Permit completed</li> <li><input type="checkbox"/> Rescue</li> </ul>	<p>Medical/ER</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> First-aid kit</li> <li><input type="checkbox"/> Eye wash</li> <li><input type="checkbox"/> FA-CPR trained personnel</li> <li><input type="checkbox"/> Route to hospital</li> </ul>	<p>Heat/Cold Stress</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Work/rest regime</li> <li><input type="checkbox"/> Rest area</li> <li><input type="checkbox"/> Liquids available</li> <li><input type="checkbox"/> Monitoring</li> <li><input type="checkbox"/> Training</li> </ul>	<p>Vehicle/Traffic</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Traffic control</li> <li><input type="checkbox"/> Barricades</li> <li><input type="checkbox"/> Flags</li> <li><input type="checkbox"/> Signs</li> </ul>
<p>Permits</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Hot work</li> <li><input type="checkbox"/> Confined space</li> <li><input type="checkbox"/> Lockout/tagout</li> <li><input type="checkbox"/> Excavation</li> <li><input type="checkbox"/> Demolition</li> <li><input type="checkbox"/> Energized work</li> </ul>	<p>Demolition</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pre-demolition survey</li> <li><input type="checkbox"/> Structure condition</li> <li><input type="checkbox"/> Isolate area/utilities</li> <li><input type="checkbox"/> Competent person</li> <li><input type="checkbox"/> Hazmat present</li> </ul>	<p>Inspections:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ladders/aerial lifts</li> <li><input type="checkbox"/> Lanyards/harness</li> <li><input type="checkbox"/> Scaffolds</li> <li><input type="checkbox"/> Heavy equipment</li> <li><input type="checkbox"/> Cranes and rigging</li> </ul>	<p>Training:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Hazwaste</li> <li><input type="checkbox"/> Construction</li> <li><input type="checkbox"/> Competent person</li> <li><input type="checkbox"/> Task-specific (THA)</li> <li><input type="checkbox"/> Hazcom</li> </ul>

FieldNotes: \_\_\_\_\_  
 \_\_\_\_\_

Supervisor signature: \_\_\_\_\_

Date: \_\_\_\_\_



Project: _____	Supervisor: _____	Date: _____
Task/Operation Observed: _____ _____ _____		Job Title of Worker Observed: _____ _____
Background Information/comments: _____ _____ _____		Task Hazard Analysis completed for task (Y/N): _____
Positive Observations/Safe Work Procedures 1. _____ 2. _____ 3. _____ 4. _____		
Questionable Activity/Unsafe Condition Observed 1. _____ 2. _____ 3. _____		
Observed Worker's Comment(s) 1. _____ 2. _____ 3. _____ 4. _____		
Supervisor's Corrective Actions Taken: 1. _____ 2. _____ 3. _____ 4. _____		

# CH2MHILL

## Loss Investigation Report Form

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### Employer Information

Company Name: \_\_\_\_\_

Project Name: \_\_\_\_\_ Project Number: \_\_\_\_\_

Project Location: \_\_\_\_\_

CHIL Project? Yes  No

Task Location: \_\_\_\_\_

Job Assignment: \_\_\_\_\_ Business Group: \_\_\_\_\_

Preparer's Name: \_\_\_\_\_ Preparer's Employee Number: \_\_\_\_\_

### Near Loss Incident Specific Information

Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_ a.m./p.m.

Location of incident:

Company premises

Field

In Transit

Other: \_\_\_\_\_

Address where the incident occurred: \_\_\_\_\_

Equipment Malfunction : Yes  No

Activity was a Routine Task: Yes  No

Describe any property damage: \_\_\_\_\_

Specific activity the employee was engaged in when the incident occurred: \_\_\_\_\_

All equipment, materials, or chemicals the employee was using when the incident occurred: \_\_\_\_\_

Describe the specific incident and how it occurred:

---

---

---

---

Describe how this incident may have been prevented:

---

---

---

Contributing Factors (Describe in detail why incident occurred):

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---

---

Date employer notified of incident: \_\_\_\_\_ To whom reported: \_\_\_\_\_

**Witness Information (First Witness)**

Name: \_\_\_\_\_  
Employee Number (for CH2M HILL employees): \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code : \_\_\_\_\_  
Phone: \_\_\_\_\_

**Witness Information (Second Witness)**

Name: \_\_\_\_\_  
Employee Number (for CH2M HILL employees): \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Phone : \_\_\_\_\_  
Additional information or comments: \_\_\_\_\_

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**COMPLETE ROOT CAUSE ANALYSIS FORM**

# Root Cause Analysis Form

**Root Cause Analysis (RCA)**

Lack of skill or knowledge Lack of or inadequate operational procedures or work standards Inadequate communication of expectations regarding procedures or work standards Inadequate tools or equipment	Correct way takes more time and/or requires more effort Short cutting standard procedures is positively reinforced or tolerated Person thinks there is no personal benefit to always doing the job according to standards Uncontrollable
--	---

RCA #	Solution(s): How to Prevent Loss From Occurring	RC <sup>1</sup>	CF <sup>2</sup>	Corrective Action Lead	Due Date	Completion Date	Date Verified

<sup>1</sup> RC = Root Cause; <sup>2</sup> CF = Contributing Factors (check which applies)

**Investigation Team Members**

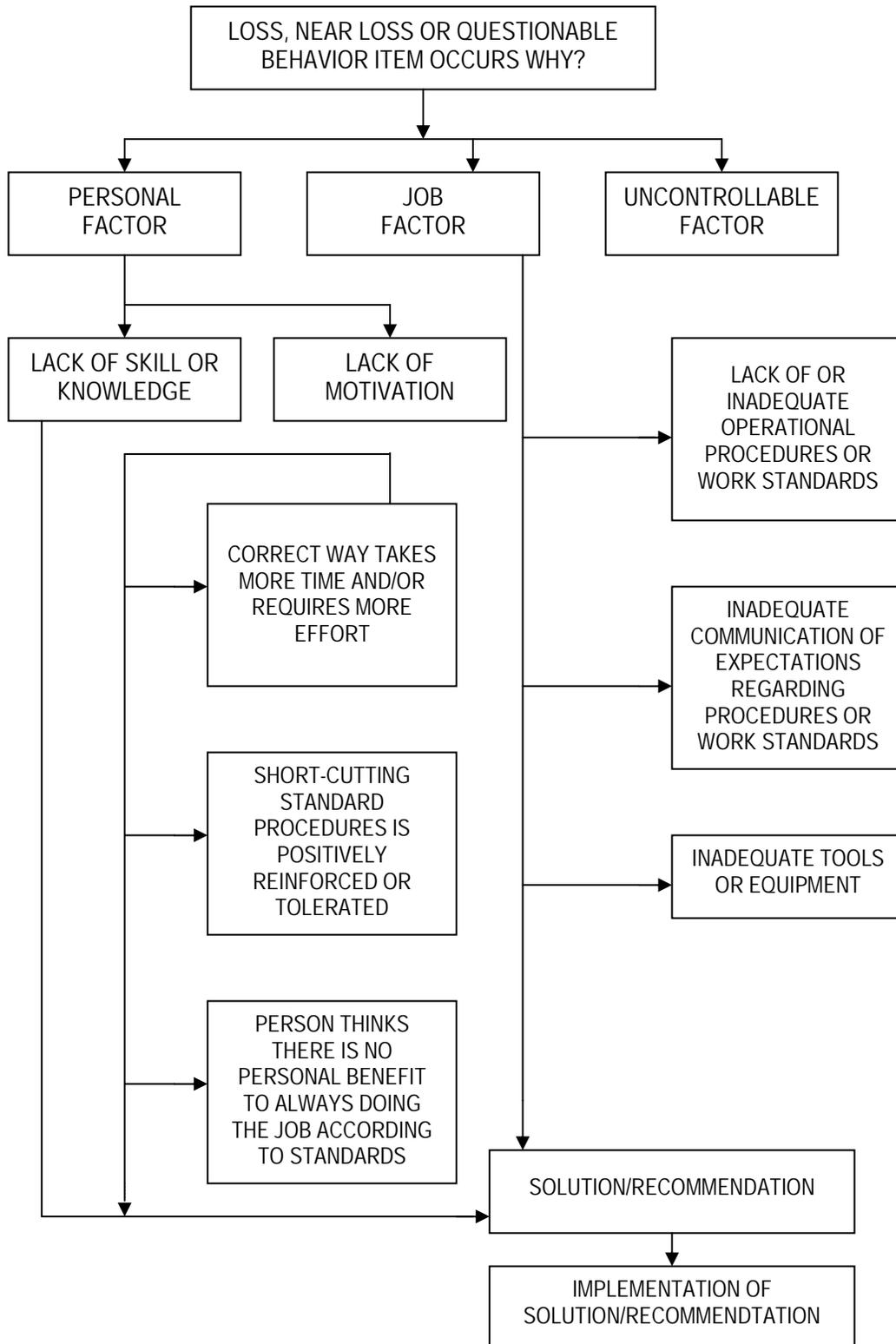
Name	Job Title	Date

**Results of Solution Verification and Validation**


**Reviewed By**

Name	Job Title	Date

# Root Cause Analysis Flow Chart



## Determination of Root Cause(s)

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, to determine the root cause, and to 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 use the Root Cause Analysis Flow Chart 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

Lack of skill or knowledge

Correct way takes more time and/or requires more effort

Short-cutting standard procedures is positively reinforced or tolerated

Person thinks that there is no personal benefit to always doing the job according to standards

### Job Factors

Lack of or inadequate operational procedures or work standards.

Inadequate communication of expectations regarding procedures or standards

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.

# Incident Report Form

## **Type of Incident** (Select at least one)

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Injury/Illness             | <input type="checkbox"/> Property Damage | <input type="checkbox"/> Spill/Release |
| <input type="checkbox"/> Environmental/Permit Issue | <input type="checkbox"/> Near Miss       | <input type="checkbox"/> Other         |

## **General Information** (Complete for all incident types)

Preparer's Name: \_\_\_\_\_ Preparer's Employee Number: \_\_\_\_\_  
Date of Report: \_\_\_\_\_ Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_ am/pm

## **Type of Activity** (Provide activity being performed that resulted in the incident)

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Asbestos Work                     | <input type="checkbox"/> Excavation Trench-Haz Waste | <input type="checkbox"/> Other (Specify) _____     |
| <input type="checkbox"/> Confined Space Entry              | <input type="checkbox"/> Excavation Trench-Non Haz   |  |
| <input type="checkbox"/> Construction Mgmt- Haz Waste      | <input type="checkbox"/> Facility Walk Through       | <input type="checkbox"/> Process Safety Management |
| <input type="checkbox"/> Construction Mgmt - Non-Haz Waste | <input type="checkbox"/> General Office Work         | <input type="checkbox"/> Tunneling                 |
| <input type="checkbox"/> Démolition                        | <input type="checkbox"/> Keyboard Work               | <input type="checkbox"/> Welding                   |
| <input type="checkbox"/> Drilling-Haz Waste                | <input type="checkbox"/> Laboratory                  | <input type="checkbox"/> Wetlands Survey           |
| <input type="checkbox"/> Drilling-Non Haz Waste            | <input type="checkbox"/> Lead Abatement              | <input type="checkbox"/> Working from Heights      |
| <input type="checkbox"/> Drum Handling                     | <input type="checkbox"/> Motor Vehicle Operation     | <input type="checkbox"/> Working in Roadways       |
| <input type="checkbox"/> Electrical Work                   | <input type="checkbox"/> Moving Heavy Object         | <input type="checkbox"/> WWTP Operation            |

## **Location of Incident** (Select one)

- |  |
|--|
| <input type="checkbox"/> Company Premises (CH2M HILL Office: _____)                      |
| <input type="checkbox"/> Field (Project #: _____ Project/Site Name: _____ Client: _____) |
| <input type="checkbox"/> In Transit (Traveling from: _____ Traveling to: _____)          |
| <input type="checkbox"/> At Home   |

## **Geographic Location of Incident** (Select region where the incident occurred)

- |                                    |                                    |   |
|------------------------------------|------------------------------------|---|
| <input type="checkbox"/> Northeast | <input type="checkbox"/> Southwest | <input type="checkbox"/> Asia Pacific       |
| <input type="checkbox"/> Southeast | <input type="checkbox"/> Corporate | <input type="checkbox"/> Europe Middle East |
| <input type="checkbox"/> Northwest | <input type="checkbox"/> Canadian  | <input type="checkbox"/> Latin America      |

If a CH2M HILL subcontractor was involved in the incident, provide their company name and phone number: \_\_\_\_\_

Describe the Incident (Provide a brief description of the incident): \_\_\_\_\_

---

---

## **Injured Employee Data** (Complete for Injury/Illness incidents only)

### **If CH2M HILL employee injured**

Employee Name: \_\_\_\_\_ Employee Number: \_\_\_\_\_

### **If CH2M HILL Subcontractor employee injured**

Employee Name: \_\_\_\_\_ Company: \_\_\_\_\_

#### **Injury Type**

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Allergic Reaction         | <input type="checkbox"/> Burn/Scald (Heat) | <input type="checkbox"/> Dermatitis          |
| <input type="checkbox"/> Amputation                | <input type="checkbox"/> Cancer            | <input type="checkbox"/> Dislocation         |
| <input type="checkbox"/> Asphyxia                  | <input type="checkbox"/> Carpal Tunnel     | <input type="checkbox"/> Electric Shock      |
| <input type="checkbox"/> Bruise/Contusion/Abrasion | <input type="checkbox"/> Concussion        | <input type="checkbox"/> Foreign Body in eye |
| <input type="checkbox"/> Burn (Chemical)           | <input type="checkbox"/> Cut/Laceration    | <input type="checkbox"/> Fracture            |

- Freezing/Frost Bite
- Headache
- Hearing Loss
- Heat Exhaustion
- Hernia
- Infection
- Irritation to eye

- Ligament Damage
- Multiple (Specify) \_\_\_\_\_
- Muscle Spasms
- Other (Specify) \_\_\_\_\_

- Poisoning (Systemic)
- Puncture
- Radiation Effects
- Strain/Sprain
- Tendonitis
- Wrist Pain

**Part of Body Injured**

- Abdomen
- Ankle(s)
- Arms (Multiple)
- Back
- Blood
- Body System
- Buttocks
- Chest/Ribs
- Ear(s)
- Elbow(s)
- Eye(s)
- Face
- Finger(s)
- Foot/Feet

- Hand(s)
- Head
- Hip(s)
- Kidney
- Knee(s)
- Leg(s)
- Liver
- Lower (arms)
- Lower (legs)
- Lung
- Mind
- Multiple (Specify) \_\_\_\_\_

- Neck
- Nervous System
- Nose
- Other (Specify) \_\_\_\_\_
- Reproductive System
- Shoulder(s)
- Throat
- Toe(s)
- Upper Arm(s)
- Upper Leg(s)
- Wrist(s)

**Nature of Injury**

- Absorption
- Bite/Sting/Scratch
- Cardio-Vascular/Respiratory System Failure
- Caught In or Between
- Fall (From Elevation)
- Fall (Same Level)
- Ingestion

- Inhalation
- Lifting
- Mental Stress
- Motor Vehicle Accident
- Multiple (Specify) \_\_\_\_\_
- Other (Specify) \_\_\_\_\_

- Overexertion
- Repeated Motion/Pressure
- Rubbed/Abraded
- Shock
- Struck Against
- Struck By
- Work Place Violence

Initial Diagnosis/Treatment Date: \_\_\_\_\_

**Type of Treatment**

- Admission to hospital/medical facility
- Application of bandages
- Cold/Heat Compression/Multiple Treatment
- Cold/Heat Compression/One Treatment
- First Degree Burn Treatment
- Heat Therapy/Multiple treatment
- Multiple (Specify) \_\_\_\_\_

- Heat Therapy/One Treatment
- Non-Prescriptive medicine
- None
- Observation
- Other (Specify) \_\_\_\_\_

- Prescription- Multiple dose

- Prescription- Single dose
- Removal of foreign bodies
- Skin Removal
- Soaking therapy- Multiple Treatment
- Soaking Therapy- One Treatment
- Stitches/Sutures
- Tetanus
- Treatment for infection
- Treatment of 2<sup>nd</sup> /3<sup>rd</sup> degree burns
- Use of Antiseptics - multiple treatment
- Use of Antiseptics - single treatment
- Whirlpool bath therapy/multiple treatment
- Whirlpool therapy/single treatment
- X-rays negative
- X-rays positive/treatment of fracture

Number of days doctor required employee to be off work: \_\_\_\_\_

Number of days doctor restricted employee's work activity: \_\_\_\_\_

Equipment Malfunction : Yes  No  Activity was a Routine Task: Yes  No

Describe how you may have prevented this injury: \_\_\_\_\_

Physician Information

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Phone: \_\_\_\_\_

Hospital Information

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Phone: \_\_\_\_\_

**Property Damage** (Complete for Property Damage incidents only)

Property Damaged: \_\_\_\_\_ Property Owner: \_\_\_\_\_  
Damage Description: \_\_\_\_\_  
Estimated Amount: \$ \_\_\_\_\_

**Spill or Release** (Complete for Spill/Release incidents only)

Substance (attach MSDS): \_\_\_\_\_ Estimated Quantity: \_\_\_\_\_  
Facility Name, Address, Phone No.: \_\_\_\_\_  
Did the spill/release move off the property where work was performed?: \_\_\_\_\_  
Spill/Release From: \_\_\_\_\_ Spill/Release To: \_\_\_\_\_

**Environmental/Permit Issue** (Complete for Environmental/Permit Issue incidents only)

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: \_\_\_\_\_

**Verbal Notification** (Complete for all incident types)(Provide names, dates and times)

CH2M HILL Personnel Notified: \_\_\_\_\_  
Client Notified: \_\_\_\_\_

**Witnesses** (Complete for all incident types)

Witness Information (First Witness)

Name: \_\_\_\_\_  
Employee Number (CH2M HILL): \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Phone: \_\_\_\_\_

Witness Information (Second Witness)

Name: \_\_\_\_\_  
Employee Number (CH2M HILL): \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Phone : \_\_\_\_\_

Additional Comments:

\_\_\_\_\_  
\_\_\_\_\_

# NEAR LOSS INVESTIGATION FORM

## Employer Information

Company Name: \_\_\_\_\_

Project Name: \_\_\_\_\_ Project Number: \_\_\_\_\_

Project Location: \_\_\_\_\_

CHIL Project? Yes  No

Task Location: \_\_\_\_\_

Job Assignment: \_\_\_\_\_ Business Group: \_\_\_\_\_

Preparer's Name: \_\_\_\_\_ Preparer's Employee Number: \_\_\_\_\_

## Near Loss Incident Specific Information

Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_ a.m./p.m.

Location of incident:

Company premises  Field  In Transit  Other: \_\_\_\_\_

Address where the incident occurred: \_\_\_\_\_

Equipment Malfunction : Yes  No  Activity was a Routine Task: Yes  No

Describe any property damage: \_\_\_\_\_

Specific activity the employee was engaged in when the incident occurred:

\_\_\_\_\_  
\_\_\_\_\_

All equipment, materials, or chemicals the employee was using when the incident occurred:

\_\_\_\_\_  
\_\_\_\_\_

Describe the specific incident and how it occurred:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe how this incident may have been prevented:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Contributing Factors (Describe in detail why incident occurred):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date employer notified of incident: \_\_\_\_\_ To whom reported: \_\_\_\_\_

**NEAR LOSS INVESTIGATION FORM**

**Witness Information (First Witness)**

Name: \_\_\_\_\_

Employee Number (for CH2M HILL employees): \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

Zip Code : \_\_\_\_\_

Phone: \_\_\_\_\_

**Witness Information (Second Witness)**

Name: \_\_\_\_\_

Employee Number (for CH2M HILL employees): \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

Zip Code: \_\_\_\_\_

Phone : \_\_\_\_\_

Additional information or

comments: \_\_\_\_\_

\_\_\_\_\_

**Attachment 7**

**Applicable Material Safety Data Sheets  
(available onsite)**

## Attachment 8

### Subcontractor H&S Plans/Procedures

## Attachment 9

### Lead and Arsenic Awareness Fact Sheets

# Lead Exposure Training Instructions

This module was designed for employees who work in areas with percent levels of inorganic lead or areas where there is a potential lead exposure above the action level of 30  $\mu\text{g}/\text{m}^3$ .

## Lead Exposure Training Program

The OSHA lead standard (29 CFR 1910.1025), requires employers to provide lead training for those employees who may be exposed to inorganic lead above the action level of 30  $\mu\text{g}/\text{m}^3$ . This training program satisfies this OSHA requirement and is provided to assist employees in recognizing lead exposure hazards and understanding the procedures to be followed to minimize exposure.

## Objectives

- Inform employees of the possible adverse health effects of lead exposure
- Inform employees of the regulatory requirements when working with or around lead
- Identify how lead exposures could occur on CH2M HILL projects

## How to complete this training

Employees are required to read the training materials that follow and complete a short quiz. The training materials must be read thoroughly and understood before completing the quiz; you will have only one chance at answering each question.

Quiz scores will automatically be sent to the Health and Safety Training Administrator. A minimum score of 70% must be obtained to receive credit for this training. If a passing score is obtained, the H&S Training Administrator will issue you a certificate of completion. If a passing score is not obtained, you are required to contact your regional health and safety program manager to discuss the training material directly.

# Lead Exposure Training

## 1. Uses And Occurrences

Lead is a well-known naturally-occurring metal found in the earth's crust, often associated with silver and zinc. It has had a variety of uses since antiquity, but its greatest use today is in car batteries. It was formerly used in gasoline, water pipes, pottery glazes, paint, solder, and as metal alloy. It currently has a variety of other uses such as radiation shielding, as vibration dampening material, in explosives, bullets, magnets, and in electronic equipment. It is also a common contaminant at hazardous waste sites.

## 2. Physical Characteristics

Lead exist as the familiar soft, dull gray metal, as a white or red solid as lead oxide, a gray or black solid as lead sulfide (galena), a white solid as lead sulfate, all which are insoluble in water. There are numerous other forms of inorganic lead. The organic forms, tetraethyl lead and tetramethyl lead, used in the past in fuels, are flammable colorless liquids also insoluble in water.

## 3. Toxicity And Hazards

Lead is a highly toxic substance that has a variety of adverse health effects from both chronic and acute exposure. An acute exposure to high levels of lead can cause a brain condition known as encephalopathy which can lead to death in a few days. The more common chronic exposure can also cause brain damage, blood disorders (anemia), kidney damage, damage to the reproductive system of both men and women and toxic effects to fetuses. Lead is stored in the bones and eliminated from the body very slowly. Consequently, exposures to low levels over many years can cause these adverse health effects. Lead is toxic by inhalation and ingestion, but is not absorbed through the skin. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in mouth, anxiety, insomnia and muscle and joint pain or soreness.

## 4. Regulations

Inorganic lead has been specifically regulated in general industry by OSHA since 1981(29 CFR 1910.1025) and in construction (29 CFR 1926.62 )since 1994. The 8-hour permissible exposure limit is 50 µg/M<sup>3</sup>. There is no short term exposure limit. OSHA also specifies an action level of 30µg/M<sup>3</sup>. These limits apply to both general industry and construction. Initial air monitoring must be done whenever there are indications of lead exposure above the action level. If the action level is not exceeded, air monitoring can cease. If the action level is exceeded, initial blood lead level monitoring must be made available. If exposed above the action level for more than 30 days in a year, medical surveillance must be provided which includes further blood lead level monitoring and a medical examination. If specified blood levels are exceeded, the employee must be removed from the job or task where lead exposure occurs. Training must also be provided. If the PEL is exceeded, engineering controls must be implemented to reduce exposure. If engineering controls are not feasible or ineffective, respirators must be provided and worn. Air-purifying respirators with high-efficiency (HEPA) filters can be worn when airborne levels are as high as 500 µg/M<sup>3</sup>. If levels exceed this amount, supplied air respirators must be worn. In addition, if

the PEL is exceeded, OSHA requires the establishment of regulated areas, showers, change rooms, separate clean lunchrooms and warning signs. Regulated areas are demarcated from the rest of the workplace to limit access to authorized personnel who have received lead training. To enter a regulated area you must also wear protective clothing. Tetraethyl and tetramethyl lead each have separate PELs of 100 µg/M<sup>3</sup> and 150 µg/M<sup>3</sup> respectively, and are not covered under the inorganic lead regulation.

## **5. How Exposures Can Occur At Ch2m Hill Projects**

Exposure to lead can occur at hazardous waste sites where lead is found in soil or groundwater and at old mining sites or former smelter sites. Exposure to lead-containing dust could occur during drilling, heavy equipment movement or other soil-disturbing activities. Dust formation can be minimized by wetting soils. Exposure could also occur during lead paint removal activities, during welding on metal surfaces with lead-containing paint, or in project work in smelters, battery recycling or manufacturing plants or at some mines.

## **6. Additional Information**

Persons working at hazardous waste sites with known high amounts in soils ( 3% or 30,000 ppm) should have blood lead draws taken before and after site work. Air sampling should be done during soil disturbing activities at the site. Person working at non-hazardous waste site who have information or suspect they have been exposed to lead above the action level should contact a health and safety manager to determine if medical monitoring is needed or other regulatory requirements apply.

## Arsenic

### Standard of Practice HSE-501

## Arsenic Fact Sheet

### Uses and Occurrences

The manufacture and transportation of arsenic compounds; use in the manufacture of herbicide, pesticide, fungicides, and defoliants; use in the manufacture and handling of calcium arsenate; use in the manufacture of electrical semiconductors, diodes, and solar batteries; as an additive for food and drinking water for animals; use as a preharvest desiccant, sugarcane ripener, soil sterilant, or for timber thinning; use as a bronzing or decolorizing addition in glass manufacturing; use in the production of opal glass and enamels; use as an addition to alloys to increase hardening and heat resistance; during smelting of ores; during the cleanup of soil contaminated with arsenic; military applications; and general handling, storage, and use of arsenic.

### Physical Characteristics

Appearance: Gray metal or white powder

Odor: Garlic-like when heated

Flammable: None

Flash Point: None

Flammable Range: None

Specific gravity: 5.73 for arsenic metal, 2.16 for arsenic trioxide

Stability: Stable

Incompatibilities: Heat, hydrogen gas, and oxidizing agents

Melting Point: Sublimes at 613°C; -8.5°C for arsenic trioxide

Boiling Point: Sublimes at 613°C; 130°C for arsenic trioxide

### Signs and Symptoms of Exposure

Short term (Acute): Nausea, vomiting, diarrhea, weakness, loss of appetite, cough, chest pain, giddiness, headache, and breathing difficulty.

Long term (Chronic): Numbness and weakness in the legs and feet, skin and eye irritation, hyperpigmentation, thickening of palms and soles

(hyperkeratosis), contact dermatitis, skin sensitization, warts,

ulceration and perforation of the nasal septum

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HSE-501 A3, VERSION 1.2

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### Modes of Exposure

Inhalation: Dusts and Vapors

Absorption: Liquid

Ingestion: Dusts and Liquid

### Exposure Limits

Action level 5 µg/m<sup>3</sup>

PEL 10 µg/m<sup>3</sup>

STEL None

TLV 10 µg/m<sup>3</sup>

### Exposure Level vs. Regulatory Requirements

#### **EXPOSURE LEVEL (EL) REGULATORY REQUIREMENTS**

EL < AL Maintain exposure as low as reasonably achievable

AL > EL, EL < PEL Implement portions of the OSHA Arsenic standard and

### Training

EL > PEL Implement all portions of the OSHA Arsenic Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

### PPE

Eye: Safety Glasses; contact lenses should **not** be worn

Skin: Chemical protective gloves and body protection

Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure

### First Aid

Inhalation: Move to fresh air; seek medical attention promptly

Skin: Quick drenching with water; wash skin with soap and water; seek medical attention promptly

Eyes Flush with water for 15 minutes, lifting the lower and upper lids occasionally; seek medical attention promptly

Ingestion: Seek medical attention promptly

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