

Blue Tee Corp.

Site Specific Health & Safety Plan

Remedial Design
Old American Zinc Plant Site
Fairmont City, Illinois

May 2015



Joni Culpepper
Designated H&S Plan Writer

Joni Culpepper
Designated H&S Plan Reviewer

Rick Kenter
Project Manager

**Site Specific Health & Safety
Plan**

Old American Zinc Plant Site
Fairmont City, Illinois

Prepared for:
Blue Tee Corp

Prepared by:
ARCADIS U.S., Inc.
4665 Cornell Road
Suite 350
Cincinnati
Ohio 45241
Tel 513.860.8700
Fax 513.860.8701

Our Ref.:
HA100254.0000

Date:
May 2015

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.

1. Emergency Contact Information and Procedures	4
Directions to Hospital:	4
2. Introduction	6
3. Project Site History and Requirements	7
3.1 Site Background	7
3.2 Site Description	7
3.3 List of Project Tasks and Scope of Work	10
4. ARCADIS Organization and Responsibilities	11
4.1 All Personnel	11
4.2 Project Manager/Task Manager	11
4.3 Site Safety Officer (SSO)	12
5. Project Hazards and Control Measures	13
5.1 Hazard Analysis	13
5.2 Job Safety Analyses (JSAs), H&S Standards and PPE	14
5.3 Field Health & Safety Handbook	14
6. Hazard Communication (HazCom)	16
7. Tailgate Meetings	18
8. Medical Surveillance	18
9. General Site Access and Control	18
9.1 Sanitation at Temporary Workplaces	19
9.1.1 Potable Water	19
9.1.2 Toilet Facilities	19
10. Emergency Action Plan (EAP)	19

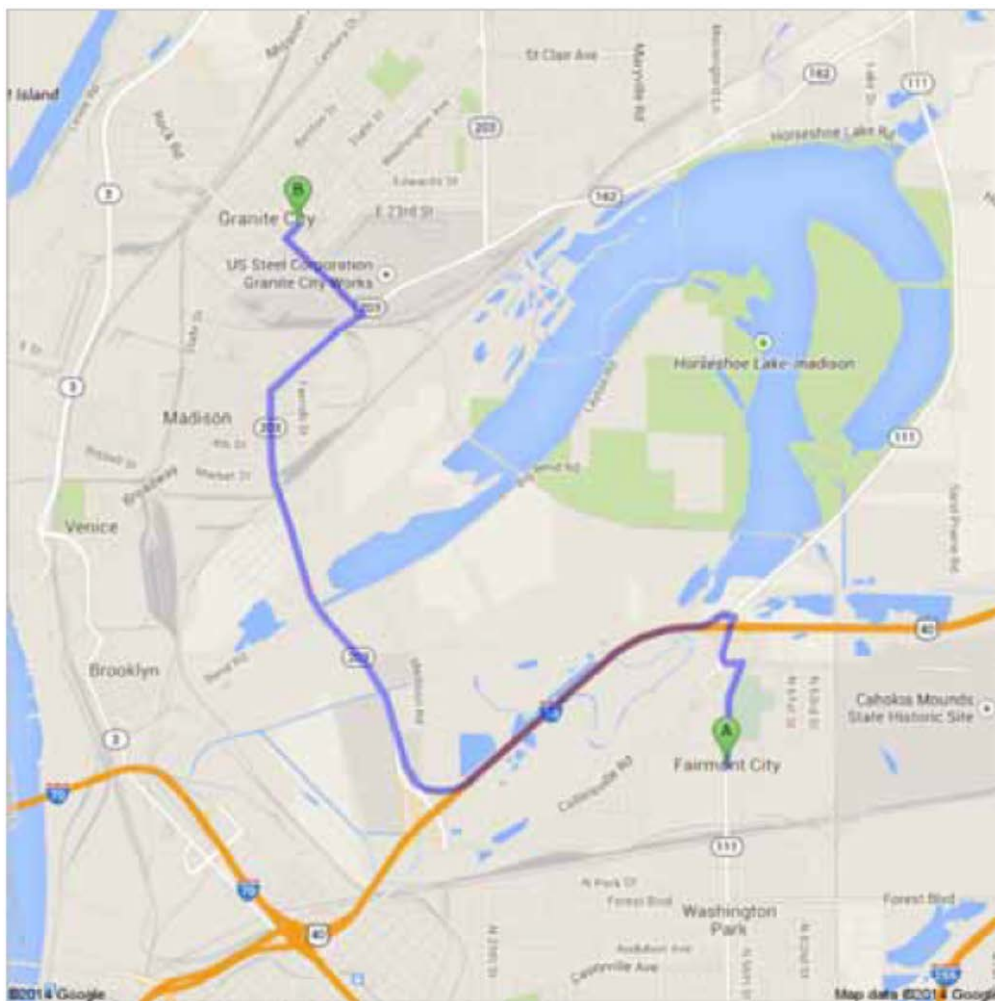
11. Ground or Air Shipments of Hazardous Materials (HazMat)	21
12. H&S ORIENTATION and TASK IMPROVEMENT PROCESS (TIPs)	21
13. Subcontractors	22
14. Project Personnel HASP Certification	22
15. Roadway Work Zone Safety	23

Tables

Table 1. Hazard Ranking Chart	8
-------------------------------	---

Appendices

A	HASP Addendum Pages and Log Table
B	JSAs
C	HASP Forms
D	PPE Equipment List
E	MSDSs
F	TCP/STAR Plan Template
G	Shipping Determination Form Template
H	ENTACT HASP



A Fairmont City, IL

1. Head west on Thomas Ave toward Kingshighway	go 26 ft total 26 ft
➡ 2. Turn right onto Kingshighway About 2 mins	go 0.7 mi total 0.7 mi
⬅ 3. Turn left onto Collinsville Rd	go 315 ft total 0.8 mi
🛣️ 4. Take the 1st right onto IL-111 N About 46 secs	go 0.4 mi total 1.1 mi
🛣️ 5. Turn left to merge onto I-55 S/I-70 W/US-40 W toward St Louis About 2 mins	go 2.1 mi total 3.3 mi
🛣️ 6. Take exit 4B to merge onto IL-203 N toward Granite City About 5 mins	go 3.2 mi total 6.4 mi
➡ 7. Slight right onto Edwardsville Rd About 1 min	go 0.8 mi total 7.2 mi
⬅ 8. Turn left onto E 20th St About 2 mins	go 0.7 mi total 7.9 mi
➡ 9. Turn right onto Madison Ave Destination will be on the right	go 0.1 mi total 8.0 mi
B 2100 Madison Ave, Granite City, IL 62040	

1. Emergency Contact Information and Procedures

Local Police – Fairmont City Police Department	911 and 618.874.0115
Local Ambulance – Fairmont City Fire Department	911 and 618.874.2101
Local Fire Department – Fairmont City Fire Department	911 and 618.874.2101
Local Hospital – Gateway Regional Medical Center	618-798-3000
Local Weather Data	Weather.com
Poison Control	800.332.3073
National Response Center (all spills in reportable quantities)	800.424.8802
U.S. Coast Guard (spills to water)	800.424.8802
ARCADIS Project Manager – Rick Kenter Charles McCulloch	513.659.8276 513.659.8924
ARCADIS H&S Manager – Sherry Lingle	864.331.9940
Client Contact – Dianna Tickner	314-347-7613
WorkCare	1-800-455-6155

Directions to Hospital:

Medical Facility: Gateway Regional Medical Center
 Address: 2100 Madison Ave, Granite City, IL 62040
 Phone Number: 618.798-3000



See map and directions on Page 1.

Emergency Notification Procedure for the project:

- Step 1:** Dial 911 (if necessary) and/or Work Care
800-455-6155
- Step 2:** Contact PIC/PM/TM
- Step 3:** Contact H&S
- Step 4:** Contact Client

Emergency Meeting Points:

- For on-site emergencies meet at the gate at the Kingshighway entrance.

Weather Emergency Shelter:

- Meet at vehicles in the event of weather emergencies. From vehicle meeting point determine if additional shelter should be sought off-site.

Emergency Supplies and Equipment List

Emergency Supplies and Equipment (check all that apply)	Location on Project Site
<input checked="" type="checkbox"/> First Aid Kit (type):	
<input checked="" type="checkbox"/> Fire Extinguisher	
<input checked="" type="checkbox"/> Mobile Phone <input type="checkbox"/> Satellite Phone	
<input type="checkbox"/> Traffic Cones	
<input type="checkbox"/> Walkie Talkies	
<input checked="" type="checkbox"/> Water or Other Fluid Replenishment	
<input type="checkbox"/> Eye Wash/Quick Drench Station	
<input checked="" type="checkbox"/> Eye Wash Bottle	
<input type="checkbox"/> Wash and Dry Towelettes	
<input checked="" type="checkbox"/> Sunscreen (SPF 15 or higher)	
<input type="checkbox"/> Insect Repellant	
<input type="checkbox"/> Chemical Spill Kit	
<input type="checkbox"/> Other (specify):	



DRAFT

**Site Specific Health &
Safety Plan**

**Old American Zinc Plant
Site
Fairmont City, Illinois**

2. Introduction

All work on this project will be carried out in compliance with ARCADIS' Health and Safety Standards, and the Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response regulation. The design of this health and safety plan (HASP) conforms to the requirements of the ARC HSFS010-H&S Plan Standard. Specific health and safety information for the project is contained in this HASP. All personnel working on hazardous operations or in the area of hazardous operations shall read and be familiar with this HASP before doing any work. All project personnel shall sign the certification page acknowledging that they have read and understand this HASP.

Changes in the scope of the project or introduction of new hazards to the project shall require revision of the HASP by the HASP writer and reviewer, and approval by the Project Manager. The HASP Addendum Form and log table are included as Appendix A.



DRAFT

3. Project Site History and Requirements

3.1 Site Background

The 132-acre Site is located at 2575 Kingshighway in Fairmont City, St. Clair County, Illinois. The Site is bordered by Kingshighway to the east, 45th Street to the west, Maryland Avenue to the north, Cargill (formerly Swift) to the southeast, and Rose Creek and the Penn Central and Baltimore/Ohio railroad corridor to the south. Residential properties surround the Site and commercial and industrial properties lie to the immediate east and west. Collinsville Road, a 4-lane highway, lies approximately 0.12 miles north of the Site to the immediate south of a wetland complex.

Prominent Site features are the waste piles that are present in the northern section of the Site. These include three large slag piles and a covered soil repository area. The slag pile wastes are associated with historic smelting operations and the covered soil repository area is from 2002 residential soil removal action. Waste disposal may have also occurred on a 4-acre area on the northern boundary of the Site.

All structures associated with historic smelter operations were razed prior to 1978. However, several structures are present on the eastern portion of the site where XTRA Intermodal, Inc., the current property owner, had operations until 2003.

In 1994, area residents complained of smelter slag dust blowing onto their properties. Numerous regulatory investigations have occurred since that time, as described in the Field Sampling Plan prepared by ARCADIS, dated September, 2014.

3.2 Site Description

Site Type: (Check as many as applicable)

	Active	<input checked="" type="checkbox"/>	Secure	<input checked="" type="checkbox"/>	Industrial		Landfill		Service station
<input checked="" type="checkbox"/>	Inactive		Unsecured		Commercial		Well field		Water work
			Uncontrolled		Residential		Railroad		Undeveloped
Other specify: former zinc smelter facility									

Pre-Design Investigations will be conducted on the former smelter area, known as the Facility Area, and at unsecured active and vacant residential, commercial and industrial properties surrounding the Facility Area.



DRAFT

The primary Chemicals of Concern (CoCs) on this project are:

Known Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (ppm, mg/kg, mg/l)	
		Lowest	Highest
Arsenic	Soil/slag	ND	47,719
Cadmium	Soil/slag	ND	6,125.27
Copper	Soil/slag	ND	55,961.6
Lead	Soil/slag	ND	307,037.67
Zinc	Soil/slag	119	>100,000,000
Chromium	Soil/slag	13	480
Mercury	Soil/slag	0.03	540
Selenium	Soil/slag	ND	1.7
Silver	Soil/slag	ND	1.8
Barium	Soil/slag	13	380
Benzo(a)pyrene	Soil/slag	ND	340
Dibenzo(a,h)anthracene	Soil/slag	ND	81
Total Arsenic	Groundwater	0.12	0.014
Dissolved Arsenic	Groundwater	0.12	0.014
Total Cadmium	Groundwater	ND	3.4
Dissolved Cadmium	Groundwater	ND	3.2
Total Chromium	Groundwater	ND	0.0058
Dissolved Chromium	Groundwater	ND	0.0061
Total Copper	Groundwater	ND	0.040
Dissolved Copper	Groundwater	ND	0.0051
Total Lead	Groundwater	ND	0.038



DRAFT

Site Specific Health & Safety Plan

**Old American Zinc Plant Site
Fairmont City, Illinois**

Known Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (ppm, mg/kg, mg/l)	
		Lowest	Highest
Dissolved Lead	Groundwater	ND	0.0042
Total Manganese	Groundwater	ND	17
Dissolved Manganese	Groundwater	0.0032	16
Total Zinc	Groundwater	0.11	230
Dissolved Zinc	Groundwater	0.17	230
Benzene	Tarry Material	22	22
Toluene	Tarry Material	59	59
Ethylbenzene	Tarry Material	15	15
Xylenes (total)	Tarry Material	105	105
1,2,4-Trimethylbenzene	Tarry Material	57	57
Phenol	Tarry Material	2,300	2,300
2,4-dimethylphenol	Tarry Material	4,900	4,900
2-methylphenol	Tarry Material	1,700	1,700
4-methylphenol	Tarry Material	8,700	4,950
Acenaphthylene	Tarry Material	110	1,700
Fluorene	Tarry Material	1,700	11,000
Dibenzofurn	Tarry Material	770	770
Phenanatharene	Tarry Material	3,600	64,000
Fluoranthene	Tarry Material	1,000	47,000
Carbozol	Tarry Material	290	290
Pyrene	Tarry Material	1,100	42,000
Benzo(a)anthracene	Tarry Material	570	18,000
Chrysene	Tarry Material	440	18,000
Benzo(b)fluoranthene	Tarry Material	550	17,000



DRAFT

Known Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (ppm, mg/kg, mg/l)	
		Lowest	Highest
Benzo(k)fluoranthene	Tarry Material	250	11,000
Benzo(a)pyrene	Tarry Material	430	16,000
Indeno(1,2,3-cd)pyrene	Tarry Material	150	8,100
Dibenzo(a,h)anthracene	Tarry Material	46	2,600
Benzo(g,h,i)perylene	Tarry Material	130	8,800

3.3 List of Project Tasks and Scope of Work

- Task 1 – Mobilization--ARCADIS and ENTACT task
- Task 2 – Installation, development and sampling of monitoring wells
 - Groundwater samples from monitoring wells – ENTACT task
 - Surveying boring/well locations – ENTACT task
- Task 3 – Surface soil sampling of active and vacant, residential, commercial and industrial properties – ENTACT task
- Task 4 – Trenching, up to 6 ft in depth – ARCADIS task
 - Waste characterization sampling of tarry materials – ARCADIS task
 - Surveying locations of trenches – ARCADIS task
- Task 5 – Decontamination-- ARCADIS and ENTACT task
- Task 6 – Demobilization-- ARCADIS and ENTACT task

Activities performed by ENCTACT, and ENTACT employees, will be covered under the ENTACT HASP, included as Appendix H.



DRAFT

4. ARCADIS Organization and Responsibilities

4.1 All Personnel

Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner which conflicts with these procedures. Prior to initiating Site activities, all ARCADIS and subcontractor personnel will receive training in accordance with applicable regulations, and be familiar with the requirements and standards referenced in this HASP. In addition, all personnel will attend daily safety meetings (tailgate meetings) to discuss Site-specific hazards prior to beginning each day's work. Every ARCADIS employee, subcontractor, and client representative at the Site has the responsibility to stop the work of a coworker or subcontractor if the working conditions or behaviors are considered unsafe.

4.2 Project Manager/Task Manager

The Project Manager is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The Project Manager is responsible for confirming that the project has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project meet the requirements established by ARCADIS. It is also the responsibility of the Project Manager to:

- Review all applicable H&S Standards, and ensure that project activities conform to all requirements.
- Obtain client-specific health and safety information and communicate with the client on health and safety issues.
- Communicate with the Site Safety Officer (SSO) on health and safety issues.
- Allocate resources for correction of identified unsafe work conditions.
- Ensure ARCADIS Site workers have all training necessary for the project.
- Report all injuries, illnesses and near-misses to the client representative, lead incident investigations, and ensure that any recommendations made are implemented.



DRAFT

4.3 Site Safety Officer (SSO)

The SSO has overall responsibility for the technical health and safety aspects of the project. Inquiries regarding ARCADIS health and safety standards, project procedures, and other technical or regulatory issues should be addressed to this individual. It is also the responsibility of the SSO to:

- Review and work in accordance with the components of this HASP.
- Ensure that this HASP is available to and reviewed by all Site personnel including subcontractors.
- Ensure that necessary Site-specific training is performed (both initial and “tailgate” safety briefings).
- Ensure site visitors have been informed of the hazards related to ARCADIS work.
- Ensure that work is performed in a safe manner and has authority to stop work when necessary to protect workers and/or the public.
- Coordinate activities during emergency situations.
- Ensure that all necessary permits and safety information provided by the client is disseminated to other site personnel and is maintained in an organized manner.
- Communicate with the Certified Project Manager (CPM) or Technical Project Manager (TPM) on health and safety issues.
- Reports all injuries, illnesses and near-misses to the CPM or TPM
- Ensures that necessary safety equipment is maintained and used at the Site.



DRAFT

5. Project Hazards and Control Measures

5.1 Hazard Analysis

Rank the hazards in the table below using HIGH (H), MEDIUM (M) or LOW (L) based on current Site knowledge. For hazards that are not applicable, leave blank. Use results of this analysis to verify controls in Job Safety Analysis (JSA) or other supporting documents are adequate to mitigate task hazards. When in the field, use the Tailgate Safety Meeting Form for task specific evaluation of task hazards.

Table 1. Hazard Ranking Chart

	Consequence		Probability				
	Property Damage	Injury	Frequent	Likely	Occasional	Seldom	Unlikely
Severity	> \$100,000	Fatality	H	H	H	H	M
	> \$10,000	Injury Requiring Hospitalization	H	H	H	M	L
	> \$1000	Injury Requiring Medical Treatment Beyond First Aid	H	M	M	L	L
	< \$1000	Injury Requiring First Aid	M	L	L	L	L

Hazards are ranked using the ARCADIS HARC Process: *ARC HSMS002*

Biological		Mechanical		Chemical/Radiation	
L	Biting/stinging insects	H	Cuts on equipment/tools		Not applicable
	Biting animals	H	Pinch points on equipment		General
	Poisonous plants		Burns from equipment	L	Dusts, toxic
	Phys. damaging plants	M	Struck by equipment	L	Dusts, nuisance
					Chemicals, ARCADIS use
Driving		Motion		Chemicals, corrosive	
M	Night driving		Lifting/awkward body positions	Chemicals, explosive	
M	Off-road driving		Struck by vehicle/traffic	Chemicals, flammable	
M	Urban driving			Chemicals, oxidizing	
	All terrain vehicle	Personal Safety		Chemicals, toxic	
	Boat	L	Working late/night	Chemicals, reactive	
			Working alone	Radiation, ionizing	
			High crime area	Radiation, non-ionizing	
Electrical					
	Wet environments				
	Electrical panels	Pressure		Compound Specific	
	Electric utilities		Utilities (gas, water, etc)	Asbestos	
	Electric power tools		Compressed gas cylinders	Benzene	



DRAFT

			Compressed air/aerosols	H	Cadmium
Environment		M	Hydraulic systems		Hydrogen sulfide
M	Heat			H	Lead
M	Cold	Sound			Silica
M	Lightning	H	Equipment noise		
M	Inclement weather		Tool noise	Gravity	
	High wind		Traffic noise (vehicle/train/etc)	M	Slip, trip, fall
					Fall from height
					Ladders or scaffolds
				L	Struck by falling object

5.2 Job Safety Analyses (JSAs), H&S Standards and PPE

A JSA has been completed for each safety critical task, and are included in Appendix B. Hazards identified in the table above are addressed specifically in the JSAs as well as control methods to protect employees and property from hazards. The JSA also lists the type of personal protective equipment (PPE) required for the completion of the project. A detailed list of PPE for the project is located in Appendix D.

ARCADIS H&S Standards applicable to this project are listed below. These standards should be reviewed by the project manager, task manager and Site personnel. The Client H&S Resource should be contacted with any questions concerning the standards.

- ARC HSFS019 – Utility Location
- ARC HSCS005 – Excavation and Trenching
- ARC HSIH006 – Cadmium
- ARC HSFS007 - Lead

5.3 Field Health & Safety Handbook

The Field H&S Handbook (FHSHB) is an ARCADIS document containing information about topic-specific health and safety requirements for the field. This handbook contains relevant general topics and is used as part of the overall HASP process. To aid in the consistency of the HASP process the handbook will be used as an informational source in conjunction with this HASP.

The following handbook sections are required reading for this project:

- Section III, subsections
 - A: Daily Safety Meetings/Tailgates
 - B: DOT – Hazardous Materials Transportation/Dangerous Goods
 - C: First Aid/ CPR
 - D: Blood-borne Pathogens
 - E: General H&S Rules and Safe Work Permits
 - F: General Housekeeping, Personal Hygiene and Field Sanitation
 - G: Site Security, Work Zones and Decontamination
 - H: Personal Safety and Other Unique Site Conditions
 - I: Severe Weather
 - J: Fire Prevention
 - K: Hazard Communication
 - L: Noise
 - M: Heat and Cold Stress
 - N: Biological Hazards
 - O: Illumination
 - P: Medical Surveillance
 - R: Personal Protective Equipment
 - T: Vehicle Safety Inspection
 - U: Driving
 - CC: Hand and Power Tools
 - EE: Ergonomics
 - HH: Compressed Gas Cylinder Handling, Storage and Use
 - II: Drums and Materials Handling
 - LL: Traffic Control
 - MM: Utility Location

- Section IV, subsection D: Excavation/Trenching



DRAFT

**Site Specific Health &
Safety Plan**

**Old American Zinc Plant
Site
Fairmont City, Illinois**

6. Hazard Communication (HazCom)

All project required chemicals must be handled in accordance with the ARCADIS-HazCom Standard (ARC HSGE007), and the requirements outlined in the Field H&S Handbook. The table below lists all chemicals that will be brought, used, and/or stored on the site by ARCADIS or its subcontractors. Material Safety Data Sheets (MSDS) for chemicals brought on site are included in Appendix E.



DRAFT

Site Specific Health & Safety Plan

**Old American Zinc Plant Site
Fairmont City, Illinois**

List the chemicals anticipated to be used by ARCADIS on this project subject to HazCom requirements.

Acids/Bases		Qty	Decontamination		Qty	Calibration		Qty.
<input type="checkbox"/>	Not applicable		<input type="checkbox"/>	Not applicable		<input type="checkbox"/>	Not applicable	
<input checked="" type="checkbox"/>	Hydrochloric acid	<500 ml	<input checked="" type="checkbox"/>	Alconox	≤ 5 lbs	<input checked="" type="checkbox"/>	Isobutylene/air	1 cyl
<input type="checkbox"/>	Nitric acid	<500 ml	<input type="checkbox"/>	Liquinox	≤ 1 gal	<input type="checkbox"/>	Methane/air	1 cyl
<input type="checkbox"/>	Sulfuric acid	<500 ml	<input type="checkbox"/>	Acetone	≤ 1 gal	<input type="checkbox"/>	Pentane/air	1 cyl
<input type="checkbox"/>	Sodium hydroxide	<500 ml	<input type="checkbox"/>	Methanol	≤ 1 gal	<input type="checkbox"/>	Hydrogen/air	1 cyl
<input type="checkbox"/>	Zinc acetate	<500 ml	<input type="checkbox"/>	Hexane	≤ 1 gal	<input type="checkbox"/>	Propane/air	1 cyl
<input type="checkbox"/>	Ascorbic acid	<500 ml	<input type="checkbox"/>	Isopropyl alcohol	≤ 4 gal	<input type="checkbox"/>	Hydrogen sulfide/air	1 cyl
<input type="checkbox"/>	Acetic acid	<500 ml	<input type="checkbox"/>	Nitric acid	≤ 1 L	<input type="checkbox"/>	Carbon monoxide/air	1 cyl
<input type="checkbox"/>	Other:		<input type="checkbox"/>	Other:		<input type="checkbox"/>	pH standards (4,7,10)	≤ 1 gal
						<input type="checkbox"/>	Conductivity standards	≤ 1 gal
						<input type="checkbox"/>	Other:	
Fuels		Qty.	Kits		Qty.			
<input checked="" type="checkbox"/>	Not applicable		<input checked="" type="checkbox"/>	Not applicable				
<input type="checkbox"/>	Gasoline	≤ 5 gal	<input type="checkbox"/>	Hach (specify):	1 kit			
<input type="checkbox"/>	Diesel	≤ 5 gal	<input type="checkbox"/>	DTECH (specify):	1 kit			
<input type="checkbox"/>	Kerosene	≤ 5 gal	<input type="checkbox"/>	EPA 5035 Soil (specify kit):	1 kit			
<input type="checkbox"/>	Propane	1 cyl	<input type="checkbox"/>	Other:				
<input type="checkbox"/>	Other:							
Remediation		Qty.	Other:		Qty.			
<input checked="" type="checkbox"/>	Not applicable		<input checked="" type="checkbox"/>	Not applicable				
<input type="checkbox"/>	Other:		<input type="checkbox"/>	Spray paint	≤ 6 cans			
<input type="checkbox"/>	Other:		<input type="checkbox"/>	WD-40	≤ 1 can			
<input type="checkbox"/>	Other:		<input type="checkbox"/>	Pipe cement	≤ 1 can			
<input type="checkbox"/>	Other:		<input type="checkbox"/>	Pipe primer	≤ 1 can			
<input type="checkbox"/>	Other:		<input type="checkbox"/>	Mineral spirits	≤ 1 gal			



DRAFT

Material safety data sheets (MSDSs) must be available to field staff. Manufacturer supplied MSDSs are preferred, however, if the manufacturer's MSDS cannot be located, use the source provided below. Indicate below how MSDS information will be provided:

- Not applicable
- Printed copy in company vehicle
- Printed copy in the project trailer/office
- Printed copy attached
- Electronic copy on field computer

Bulk quantities of the following materials will be stored:

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Find an MSDS	
Source:	www.hz.genium.com
Username:	arcadis_library
Password:	library1

7. Tailgate Meetings

Tailgate safety briefings must be conducted at least once daily and should be conducted twice daily (at the start of the job and after mid-day meal break), or as tasks/hazards change. Each tailgate safety briefing must be documented on the form included in Appendix C and maintained with the project files. The tailgate safety briefing will serve as a final review for hazard identification and controls to be utilized. JSAs and the ARCADIS FSHB controls should be reviewed as part of the briefing to ensure hazard controls are adequate for planned work.

8. Medical Surveillance

Medical surveillance requirements are outlined in the ARCADIS Medical Monitoring Program Standard ARCHSGE010. All medical surveillance requirements as indicated must be completed and site personnel medically cleared before being permitted on the project site.

9. General Site Access and Control

The SSO will coordinate access and control security at the work site. As the work dictates, the SSO will establish a work area perimeter. The size of the perimeter will be based on the daily task activities and will be discussed with all project personnel during the tailgate meeting and then documented on the tailgate meeting form. Control zones



DRAFT

for Level C or above will be demarcated by either visual or physical devices and will be monitored for effectiveness by the SSO.

Only authorized personnel will be allowed beyond the perimeter. Other Site workers and visitors to the Site should be kept out of the work area. If visitors need access to the Site, the SSO will escort the visitor at all times. All visitors will log in and out with the SSO. The visitor log sheet is included in Appendix C.

9.1 Sanitation at Temporary Workplaces

9.1.1 Potable Water

An adequate supply of potable water must be provided on the Site. Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers. Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

Potable water will be available and staged in field vehicles on-Site.

9.1.2 Toilet Facilities

Under temporary field conditions, the SSO will make provisions so that no less than one toilet facility is available. Use of a nearby toilet facility is an acceptable arrangement for mobile crews having transportation readily available.

Temporary toilet facilities will be available at the Site, and staged toward the southern portion of the Site.

10. Emergency Action Plan (EAP)

In the event that an injury, over-exposure or spill has occurred, an EAP will be implemented. All employees working on this project must be shown the location and proper use of all emergency equipment prior to beginning work on the project.



DRAFT

**Site Specific Health &
Safety Plan**

**Old American Zinc Plant
Site
Fairmont City, Illinois**

The EAP elements can be located in this HASP in the below referenced sections:

- Identification, location and route to the nearest hospital: Section 1
- On site medical assistance and first aid: Section 1, Section 5.3
- Emergency assembly areas: Section 1, Section 5.3
- Emergency communications: Section 1, Section 5.3



DRAFT

11. Ground or Air Shipments of Hazardous Materials (HazMat)

All samples, electronic equipment with batteries, powders, gases, liquids, magnetized materials or radioactive materials being shipped by air or ground transport will be evaluated using the ARCADIS Shipping Determination process to determine if the material or equipment being shipped is hazardous for transport. All materials identified as HazMat will be shipped according to applicable DOT and International Air Transport Association (IATA) regulations and requirements as prescribed by the ARCADIS DOT Program.

All employees collecting samples, preparing HazMat packages, or offering HazMat to a 3rd party carrier such as FedEx will have current HazMat training as prescribed by the ARCADIS DOT Program.

12. H&S ORIENTATION and TASK IMPROVEMENT PROCESS (TIPs)

As part of any project, no matter how simple or complex, TIPs should be conducted when practical and when able to integrate into normal business activities. TIPs should be scheduled based on the risk of the tasks being performed, and should be conducted for different tasks and at different times. Completion of TIPs should be documented on the tailgate meeting form.

The following table outlines the TIP plan for the project:

Identified Task for TIP	Schedule Date	Observer Name	Observee Name	Feedback Supervisor Name
Trenching	TBD	TBD	TBD	Charles McCulloch/ Rick Kenter



DRAFT

13. Subcontractors

A copy of this HASP is to be provided to all subcontractors prior to the start of work so that the subcontractor is informed of the hazards at the Site. While the ARCADIS HASP will be the minimum health and safety requirements for the work completed by ARCADIS and its subcontractors, each subcontractor, in coordination with ARCADIS health and safety personnel, is expected to perform its operations in accordance with its own HASP, policies and procedures unique to the subcontractor's work to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to ARCADIS for review prior to the start of on-site activities.

In the event that the subcontractor's procedures/requirements conflict with requirements specified in this HASP, the more stringent guidance will be adopted after discussion and agreement between the subcontractor and ARCADIS project health and safety personnel. Hazards not listed in this HASP, but known to the subcontractor or known to be associated with the subcontractor's services, must be identified and addressed to the ARCADIS project or task manager and SSO prior to beginning work operations.

If the subcontractor prefers to adopt this HASP, the **"Subcontractor Acknowledgement Memo" must be signed and dated by the subcontractor's management and placed in the project file.** Once the signed memo is received by the project manager, an electronic version of our HASP can be submitted to the subcontractor to use as their own. Subcontractors working at the site will need to have this plan with them, and will also need to sign the Subcontractor HASP receipt signature page of the ARCADIS HASP (Appendix C). Subcontractors are responsible for the H&S of their employees at all times, and have the authority to halt work if unsafe conditions arise.

The Project/Task Manager and SSO (or authorized representative) has the authority to halt the subcontractor's operations and to remove the subcontractor or subcontractor's employee(s) from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

14. Project Personnel HASP Certification

All Site project personnel will sign the certification signature page provided in Appendix C of this HASP.



DRAFT

**Site Specific Health &
Safety Plan**

**Old American Zinc Plant
Site
Fairmont City, Illinois**

15. Roadway Work Zone Safety

All project work performed in a public (ARC DOT-301) or private (ARC DOT-302) roadway, regardless of work duration, will require either a written Traffic Control Plan (TCP) or a Site Traffic Awareness and Response (STAR) Plan. Projects having work activities on both public and private roadways will operate under a TCP approved by an employee designated with Engineering Judgment.

ARCADIS

Appendix A

HASP Addendum Pages and Log
Table



Addendum Page

This form should be completed for new tasks associated with the project. The project manager and/or task manager should revise the Project Hazard Analysis Worksheet with the new task information and attach to this addendum sheet. JSAs should be developed for any new tasks and attached as well.

Review the addendum with all site staff, including subcontractors, during the daily tailgate briefing, and complete the tailgate briefing form as required. Attach a copy of the addendum to all copies of the HASP including the site copy, and log in the Addendum Log Table A-1 on the next page.

Addendum Number: _____ Project Number: _____

Date of Changed Conditions: _____ Date of Addendum: _____

Description of Change that Results in Modifications to HASP:

Signed: _____
Project Manager

Signed: _____
Site Safety Officer

Signed: _____
H&S Plan Writer

Signed: _____
H&S Plan Reviewer

Addendum Log Table


Addendums are to be added to every copy of the HASP, and logged on Table A-1 to verify that all copies of the HASP are current:

Table A-1 Addendum Log Table

Addendum Number	Date of Addendum	Reason for Addendum	Person Completing Addendum
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Appendix B

JSA's

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

EXECUTIVE SUMMARY

The hazards related to cadmium exposure are well-defined. It is the policy of ARCADIS to prevent and minimize occupational exposure to cadmium through the use of engineering and administrative controls, and personal protective equipment (PPE).

Cadmium can be encountered at ARCADIS projects as a contaminant in soils, groundwater, surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing cadmium are present. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites. This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, in all general industry and construction work where an employee may potentially be exposed to cadmium.

Project Managers (PM), Associate Project Managers (APM), and Task Managers (TM) are responsible for determining if cadmium is or is potentially present on a project site in addition to determining client requirements with respect to the control of cadmium hazards. Project personnel are responsible for completing cadmium training as required and for following all hazard control processes described herein.

The following personal exposure limits are established for cadmium by inhalation:

- OSHA ACTION LEVEL
 - Time Weighted Average (TWA) - 2.5 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) cadmium in air averaged over an 8 hour period
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
 - TWA - 5 $\mu\text{g}/\text{m}^3$ cadmium in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)
 - TWA – 10 $\mu\text{g}/\text{m}^3$ cadmium in air averaged over an 8 hour period
 - TWA – 2 $\mu\text{g}/\text{m}^3$ cadmium-in-air averaged over an 8 hour period for the respirable fraction which are those particles that enter deep into the lung where gas exchange takes place. Consult the ACGIH TLV Guide Book for additional information


Exposure air monitoring shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate that employee exposure is below the OSHA Action Level.

Initial cadmium awareness training is required for all employees assigned to a work area suspected or known to contain cadmium. Annual cadmium awareness training is required for all employees actually or potentially exposed to Cadmium above the OSHA Action Level.

Initial and Annual Medical Surveillance is required if:

- If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year.
- If employee personal exposures are reasonably expected to exceed the PEL on a least 10 calendar days per year.

All exposure, medical and training records shall be kept for 30 years.

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

1. POLICY

ARCADIS understands the hazards of personal exposure to cadmium. Based on this understanding, ARCADIS will implement the appropriate controls to minimize or eliminate the hazards of cadmium. These controls will focus first on engineering controls to mitigate cadmium hazards where appropriate and practical. Administrative controls may also be implemented as appropriate and practical. Where it is not appropriate or practical to implement engineering and administrative controls, personal protective equipment (PPE) will be implemented to control cadmium hazards below known occupational exposure limits.

2. PURPOSE AND SCOPE

2.1 Purpose

2.1.1 Exposure to Cadmium

This policy and associated standards provides information to protect ARCADIS employees, subcontractors, and other effected personnel from exposures to cadmium while conducting work on ARCADIS projects.

2.1.2 OSHA Requirements

It meets the requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations including Title 29 Code of Federal Regulations (CFR) Part 1910.1027 and Part 1926.1127.

2.2 Scope

This policy and the associated standards apply to all projects where cadmium is known or thought to be present, and where ARCADIS employees, subcontractors and other effected personnel are or could be exposed to cadmium above the Action Level.

3. DEFINITIONS

Definitions related to this Cadmium Standard can be found in [Exhibit 1](#).


4. RESPONSIBILITIES

4.1 Project Managers

Project Managers are responsible, as part of the project hazard assessment, for determining if cadmium is or is potentially present on a project site. In addition, the project manager is responsible for determining client requirements with respect to the control of cadmium hazards. Project Managers notify health and safety staff when working on sites containing cadmium. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for cadmium prior to those staff beginning work. Project Managers are responsible for maintaining exposure monitoring records for a minimum of 30 years and submitting to corporate Health and Safety, as requested.

4.2 Corporate Health and Safety

Corporate Health and Safety is responsible for keeping this policy and standard up-to-date with current regulatory requirements and best practices. In addition, Corporate

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

Health and Safety oversees the medical surveillance program for cadmium, as applicable and provides a cadmium training package to for presentation to appropriate staff.

4.3 Project Health and Safety Staff

Project Health and Safety Staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control processes and techniques on specific projects based on the levels of cadmium expected to be encountered on project facilities.

4.4 Project Personnel

Project Personnel are responsible for completing cadmium awareness training as required by this policy and standard, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel believe that cadmium is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. PROCEDURE

5.1 Cadmium Hazards


The health effects of cadmium are based on the type of exposure encountered by workers.

- Acute - Indicates that metal fume fever may result from acute exposure with flu-like symptoms of weakness, fever, headache, chills, sweating and muscular pain. Acute pulmonary edema usually develops within 24 hours and reaches a maximum by three days. If death from asphyxia does not occur, symptoms may resolve within a week.
- Chronic - Identifies the most serious consequence of chronic cadmium poisoning is cancer (lung and prostate). The first observed chronic effect is generally kidney damage, manifested by excretion of excessive (low molecular weight) protein in the urine. Cadmium also is believed to cause pulmonary emphysema and bone disease (osteomalacia and osteoporosis). The latter has been observed in Japan ("itai-itai" disease) where residents were exposed to cadmium in rice crops irrigated with cadmium-contaminated water. Cadmium may also cause anemia, teeth discoloration (Cd forms CdS) and loss of smell (anosmia).

5.2 Exposure Limits and Regulated Areas

The following personal exposure limits are established for cadmium by inhalation:

- OSHA ACTION LEVEL
 - Time Weighted Average (TWA) - 2.5 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) cadmium in air averaged over an 8 hour period
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
 - TWA - 5 $\mu\text{g}/\text{m}^3$ cadmium in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

- TWA – 10 µg/m³ cadmium in air averaged over an 8 hour period
- TWA – 2 µg/m³ cadmium-in-air averaged over an 8 hour period for the respirable fraction which, are those particles that enter deep into the lung where gas exchange takes place


Personal exposure is the concentration of cadmium to which a person would be exposed if that person were not wearing respiratory protection. Personal exposures shall be measured over the exposure period in the breathing zone of the employee. Personal exposures should not be determined by area sampling.

5.3 Actions for Employee Exposures Greater Than or Equal to the OSHA Action Level but Less Than the PEL

- Training – Annual cadmium awareness training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.
- Exposure Air Monitoring (Section 5.5) – shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the employee exposure is below the OSHA Action Level.

5.4 Actions for Employee Exposures Greater Than OSHA PEL

- Respiratory Protection – a minimum of an air-purifying respirators equipped with HEPA filters shall be used in all regulated areas. ARCADIS shall provide employees with full facepiece respirators when they experience eye irritation. Respirators shall be worn, maintained and managed in accordance with the OSHA Respiratory Protection Standard (29 CFR 1910.134) and ARCADIS SOP ARC HSGE017 – Respiratory Protection. In addition, client requirements on project sites will be followed.
- Training – Annual cadmium awareness training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the PEL on a least 10 calendar days during the coming year.
- Written Program – A written program to reduce personal exposure is required detailing the methods to be used to reduce exposures below the PEL. These written programs will be in the form of the project HASP based on project-specific and client requirements. The HASP will indicate the schedule for the implementation of the any cadmium-related hazard control processes or methods. The HASP is reviewed periodically but at least annually per the ARCADIS SOP ARC HSFS010 – Health and Safety Plans. All project personnel have access to the project HASP at all times. See Section 5.7 for additional requirements for written programs.
- Exposure Air Monitoring (Section 5.5) – at least every 6 months until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL; then annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL Action Level.

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

- Areas that have air monitoring results exceeding the OSHA PEL must have a delineated regulated area as defined in Section 5.6.

5.5 Exposure Air Monitoring

- Representative personal exposure monitoring is required for each type of operation involving the handling of or potential exposure to cadmium.
- Initial monitoring can be omitted if there is documented data or industrial hygiene calculations to demonstrate that exposures are below the action level.
- Personal exposure monitoring shall utilize standard industrial hygiene sampling techniques and recordkeeping.

Employees who have been monitored for cadmium exposure shall be notified of the monitoring results within 15 working days of receipt of these results. If the PEL is exceeded, the notification must indicate the follow-up plans or corrective actions to be taken to reduce exposures to below the PEL.


- Personal TWA monitoring can be used for extended tasks, such as soil and sediment sampling, working on mine sites where cadmium is present, where clients require monitoring, etc.
- Area sampling can be used to determine regulated areas.
- Periodic Monitoring is required if exposures exceed the Action Level or PELs.

5.6 Requirements for Regulated Areas

- Posting: Regulated areas shall be indicated as such by barricades, barricade tape, painted demarcations, or other devices.
- A sign shall be posted at the access to the regulated area with the warning:

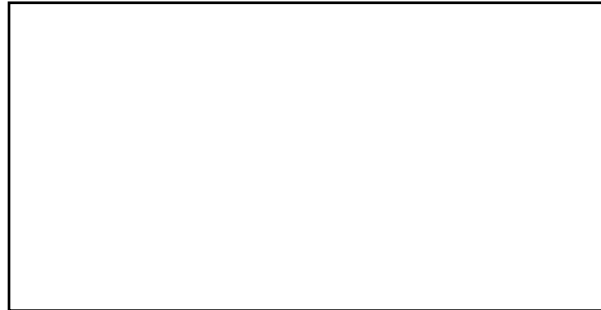


(Minimum lettering height: DANGER CADMIUM 4"; others 3")

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

- Respiratory Protection: Respirators shall be worn by all personnel when in a regulated area, regardless of the time period or over-all personal exposure measurement.
- Labeling

In addition to appropriate Hazard Communication labeling, containers or equipment containing cadmium or cadmium compounds must also be labeled as such:




- Eating, drinking, smoking, chewing any item, or applying cosmetics is strictly prohibited in a cadmium regulated area.

5.7 Exposure Reduction

5.7.1 Written Program

The Project Manager and the Project Health and Safety Staff will develop a written program and make a determination as to the initial exposure levels to be included in the project HASP for exposure reduction if there is a determination that employee exposures may exceed the OSHA Action Level. The HASP will be reviewed at least annually. The program must include:

- The locations and operations of potential cadmium exposure
- Means to achieve compliance
- Available air monitoring data or industrial hygiene estimates of airborne concentrations
- Schedule for implementing control procedures
- Exposure control processes
- Medical surveillance requirements
- Training requirements
- Emergency response
- The written program must list the corrective actions that will be taken to reduce employee exposure to at or below the OSHA Action Level:

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

- Identify regulated areas/tasks and the operations where cadmium may be encountered
- The specific means to achieve compliance with OSHA, client, and other applicable requirements
- Engineering controls
- Revised work practices
- Respiratory protection and protective clothing
- Schedule of development and implementation
- Spills and Emergencies

An emergency is any occurrence which may result in an unexpected significant release of cadmium or cadmium-containing compounds that may result in a significant inhalation. After an emergency, appropriate monitoring must be conducted to assure the ambient cadmium levels are back to normal; and conduct appropriate medical surveillance for affected employee(s).

5.7.2 Personal Protective Equipment

Additional protective clothing will be worn per the requirements of the client or the project HASP if concentrations of cadmium are above the OSHA Action Level, and will include at a minimum:


- Coveralls or similar full-body work clothing
- Gloves
- Hood
- Boots and boot covers
- Face shield (depending on operation)
- Goggles

5.7.3 Ventilation Systems

Where appropriate, ventilation systems will be utilized to control the level of airborne cadmium per the client and HASP requirements. These ventilation systems will be equipped with HEPA filtration and be maintained to ensure effective collection of the cadmium particulate. Personnel who maintain these systems and change the filters will be appropriately protected per this policy and standard to minimize exposure.

5.7.4 Personal Hygiene

Where cadmium is present at any level, project personnel handling such media containing cadmium will wear gloves to minimize exposure of cadmium to the skin that can then be transferred to the mouth. In all areas where cadmium is present, personnel will dutifully wash their hands and face before leaving the area to eat, drink, smoke, chew

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

or apply cosmetics. In situations as indicated in the project HASP, PPE will be worn to protect the skin from exposure. However, even where PPE is worn, hand and face washing is required.

5.8 Medical Surveillance

Initial medical surveillance is required:

- If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year; or
- If employee personal exposures are reasonably expected to exceed the PEL on a least 10 calendar days per year.

Periodic exams are required on an annual basis for employees who continue to meet the criteria listed above. Annual exams may be discontinued after the exam conducted the year after personal exposures fall below the limits stated above in this section.

The specific medical exam requirements are explained in detail in ARCADIS SOP ARC HSGE010 - Medical Surveillance.

The physician must be supplied a copy of the OSHA cadmium regulation 29 CFR 1910.1027 and a description of the employee's cadmium exposure.

For employees exposed to cadmium from an emergency, ARCADIS will immediately call WorkCare and follow all instructions for treatment and testing.


6. TRAINING

Initial cadmium awareness training is required for all employees assigned to a work area suspected or known to contain cadmium. This training can be accomplished at the project orientation prior to the initiation of site work.

Annual cadmium training is required at a minimum for all employees actually or potentially exposed to greater than the Action Level.

Initial and annual training shall consist of:

- The operations that involve cadmium exposure.
- The methods/observations that can be used to detect the presence or release of cadmium
- The physical and health hazards of cadmium.
- Methods used to protect against the hazards of cadmium including PPE and respiratory protection.
- The proper use of personal protective equipment in emergency situations.
- The meaning of a regulated area and how such are demarcated.
- A review of the applicable standard and where copies can be found.

	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

- An explanation of the medical surveillance program and an employee's right to access medical and exposure records.

7. REFERENCES

[OSHA 29 CFR 1910.1027 – Cadmium](#)

[OSHA 29 DFR 1926.1127 – Cadmium](#)

ARCADIS Medical Surveillance SOP – ARC HSGE006

ARCADIS Respiratory Protection SOP – ARC HSGE017

8. RECORDS

All exposure, medical, and training records shall be kept for 30 years. These records are maintained by WorkCare on behalf of ARCADIS.

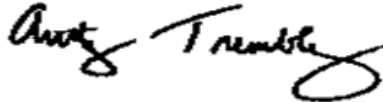
Training records are maintained by the ARCADIS Training Team.


All exposure and medical records shall be made available to appropriate regulatory agencies upon written request.

Employees who have been monitored for cadmium exposure shall be notified of the monitoring results within 15 working days of receipt of these results; a written request is not required.

9. APPROVALS AND HISTORY OF CHANGE

Approved by: Tony Tremblay, CSP – Corporate H&S, Director of Technical Programs



	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

History of Change

Revision Date	Revision Number	Standard Developed/Reviewed By or Revised By	Reason for change
26 March 2007	01	Mike Thomas/Tony Tremblay-	Original document
6 September 2007	02	Camille Carollo/Tony Tremblay	Changing over to new template format
26 February 2008	03	Camille Carollo/Tony Tremblay	Template Change
19 December 2013		Grant Sprick/Tony Tremblay	Executive Summary Added; Clarified respirator selection and specified training and other actions are triggered from OSHA Action Level and PEL


	<u>ARCADIS HS Standard Name</u> Cadmium	<u>Revision Number</u> 04
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSIH006	<u>Revision Date</u> 19 December 2013

EXHIBIT 1 – DEFINITIONS

Action Level is the airborne concentration established by OSHA that triggers certain regulatory requirements (2.5 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) cadmium in air 8-hour time weighted average).

Authorized person means any person authorized by ARCADIS and required by work duties to be present in cadmium regulated areas.

Cadmium is a natural element in the earth's crust. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide).

All soils and rocks, including coal and mineral fertilizers, contain some cadmium. Most cadmium used in the United States is extracted during the production of other metals like zinc, lead, and copper. Cadmium does not corrode easily and has many uses, including batteries, pigments, metal coatings, and plastics.

Cadmium is encountered on ARCADIS projects as a contaminant in soils, ground and surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing cadmium are present. Personnel may also encounter cadmium in other forms at certain client facilities at which ARCADIS works. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites.

High-Efficiency Particulate Air [HEPA] filter means a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter.


Permissible Exposure Limit (PEL) is an average airborne concentration regulatory limit established by OSHA above which requires control to protect people from adverse health effects ($5 \mu\text{g}/\text{m}^3$ cadmium in air averaged over an 8 hour period).

Regulated Area – An area where the cadmium exposure does or can be expected to exceed the PELs. Since it may be difficult to determine the exposure time for employees working in areas with concentrations that exceed PEL values, the facility/location may wish to regulate any area that exceeds the 8-hour TWA PEL. Only Authorized Persons are permitted to enter regulated areas.

Short Term Exposure Limit (STEL) is a PEL or TLV established as a limit of exposure measured over a designated period of time less than 8 hours.

Threshold Limit Value is a recommended average airborne concentration limit established by ACGIH. The TLVs are reviewed and updated as appropriate annually.

Time Weighted Average (TWA) is a measurement of airborne exposure to a chemical compound measured and averaged over a designated period of time for comparison to an STEL or an 8-hour PEL or TLV.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

EXECUTIVE SUMMARY

This Standard sets forth the accepted practice for and establishes the requirements for workplace safety near excavations and trenches and employee and subcontractor entry into such.

It is ARCADIS' policy that ARCADIS staff will not enter excavations and trenches unless it is absolutely necessary and that an OSHA-defined Excavation Competent Person is on-site for all excavation work under ARCADIS contractual control. The competent person will be provided by the entity on site responsible for performing the excavation work unless otherwise required by the client. Thus, if an ARCADIS subcontractor is conducting the excavation work, that subcontractor will provide the competent person. If ARCADIS is self-performing the excavation services, then ARCADIS will provide a competent person whether a specialized subcontractor or authorized employee.

An excavation Competent Person must be involved in the excavation/trenching hazard assessment process. This will assist in determining the need for an engineering opinion when excavating near or adjacent to structures and determining the need and timing of inspections.

Prior to excavation, all underground installations (water, electric, telephone, gas, etc.) must be located and documented in accordance with ARCADIS Utility Clearance Policy and Standard ARC HSFS019.

All excavations over four feet in depth (or less than 4 feet in depth if deemed necessary by the Competent Person) shall be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel.

Water must not be allowed to accumulate in open excavations where employees are working. When necessary, means such as diverting natural drainage around the excavation or actively pumping water must be used to prevent or control water accumulation.


Excavated materials (spoil) must be placed no closer than 2 feet from the edge of an open excavation, and otherwise retained to prevent loose material from falling into the excavation.

Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades *when the excavations are not readily seen because of plant growth or other visual barrier.*

Any excavation over 5 feet in depth into which employees will enter that is not entirely in stable rock as defined in this Standard requires use of a protective system.

All excavations over 20 feet in depth must be designed by a registered professional engineer regardless of whether personnel will enter it or not.

All excavations over 4 feet in depth must be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous contaminants or oxygen deficiency. Excavations less than 4 feet in depth must be evaluated by the competent person and at the competent person's discretion be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous contaminants or oxygen deficiency.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

1. POLICY

It is ARCADIS US policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. To those means, any work involving trenching and excavation that is under the control or direction of ARCADIS or an ARCADIS subcontractor will be accomplished following, at a minimum, this Standard.

It is ARCADIS' policy that ARCADIS staff will not enter excavations and trenches unless it is absolutely necessary. If there are no suitable alternatives and it becomes necessary to enter excavations or trenches, this standard, at a minimum will be strictly followed.

It is also the policy of ARCADIS to ensure an OSHA-defined Excavation Competent Person is on-site for all excavation work under ARCADIS contractual control. The competent person will be provided by the entity on site responsible for performing the excavation work unless otherwise required by the client. Thus, if an ARCADIS subcontractor is conducting the excavation work, that subcontractor will provide the competent person. If ARCADIS is self-performing the excavation services, then ARCADIS will provide a competent person whether a specialized subcontractor or authorized employee.

2. PURPOSE AND SCOPE

2.1 Purpose

To effectively control or eliminate the hazards presented by working near or entry into excavations or trenches, this Standard sets forth the accepted practice for and establishes the requirements for workplace safety near excavations and trenches and employee and subcontractor entry into such.

2.2 Scope

This standard along with associated checklists and the Utility Location Standard (ARC HSFS019) apply to all employees of ARCADIS-US. Only trained and authorized personnel are permitted to work near or enter excavations and trenches, perform rescue services, or act as the excavation competent person.


3. DEFINITIONS

Exhibit 1 includes relevant definitions to this Standard including that for competent person qualifications.

4. RESPONSIBILITIES

4.1 Corporate H&S with Division and Practice Experts

- On a routine basis, review and update, as necessary, this standard.
- As requested by Operations Leadership, review cancelled checklists periodically to ensure conformance to this standard.
- Coordinate with the Training Group to ensure that the excavation competent person qualifications and training/retraining requirements are met.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- Conduct excavation competent person evaluations for nominated individuals as necessary, in order to approve and designate them as competent.
- Recommend qualified training provider for excavation awareness training for employees working in or around excavation/trenching operations.
- Provide technical assistance regarding excavation and trench protocol, atmospheric testing equipment, PPE, hazard assessment and research information on unusual hazards.
- Audit project-specific excavation sites for compliance with this standard.

4.2 Principal in Charge (PIC), Project Manager (PM), and/or Task Manager (TM)

- Verify that excavation and trench protocols are properly identified and addressed within the project work plan, project health & safety plan, and/or other project-related documents.
- Verify that their divisional or project team employees have received the proper training provided by Corporate Health & Safety or qualified training source prior to conducting excavation/trenching entry activities.
- Verify that any ARCADIS employee acting as the Excavation Competent person has been designated and authorized to do so per the requirements specified in section 4.4 of this standard.
- Verify that the proper entry equipment, including personal protective equipment (PPE), atmospheric testing equipment and safety equipment, is available for use by their divisional employees.
- Verify that copies of the completed checklists are available for Corporate Health and Safety review and retained with the project files.
- Request that Corporate Health and Safety review cancelled checklists as necessary and appropriate

4.3 Health and Safety Plan Writers and Reviewers


Use this standard as guidance to ensure the appropriate identification, assessment and control of excavation and trenching hazards for documentation in project HASPs and development of task specific Job Safety Analysis (JSA).

4.4 Competent Person

Competent Person responsibilities include:


- Anticipation, identification and control of excavation and trenching hazards, as well as the signs and symptoms of exposure to the hazard(s), and the Authority to implement all corrective actions including Stopping Work.

Note: An excavation Competent Person must be involved in the excavation/trenching hazard assessment process. This will assist in

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

determining the need for an engineering opinion when excavating near or adjacent to structures and determining the need and timing of inspections.

- Review existing soil sampling data (if any) or other pertinent hazard characterization information recorded by the client.
- Investigate the client's excavation/trenching protocol, to verify that any identified hazards and previous experience with earthwork at the site is properly communicated.
- Coordinate entry operations with the client's employees when both client and ARCADIS employees will be working in or near an excavation/trench.
- Offer all entrants an opportunity to review the applicable control measures and testing results and an opportunity to request a reevaluation as necessary.
- Design of structural ramps that are used solely by employees as a means of access or egress from excavations.
- Monitoring of water removal equipment and operations, if water is controlled or prevented from accumulating by the use of water removal equipment,
- Inspection of excavations subject to runoff from heavy rains.
- Daily inspections of excavations, the adjacent areas, and protective systems when required.
- If evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions are present, the Competent Person is responsible for ensuring that exposed employees are removed from the hazardous area until the necessary precautions have been taken to ensure their safety.
- Examining material or equipment used for protective systems that is damaged to evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.
- For excavations less than 5 feet (1.52 m) in depth, in which employees will be entering, a Competent Person must examine the ground to determine if there are indications of a potential cave-in hazard. If there are potential indicators of a cave-in hazard, the Competent Person will require some form of cave-in protection be implemented before employees can enter.
- Classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits.
- Soil and rock deposits shall be classified by a Competent Person as Stable Rock, Type A, Type B, or Type C based on the results of at least one visual and at least one manual analysis.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a Competent Person. The deposit shall be reclassified as necessary to reflect the changed circumstances.
- When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved.
- Order evacuation of the excavation/trench if an uncontrolled hazard develops, either within or outside the space, or upon observing a behavioral effect of hazard exposure among excavation/trench entrants.
- Verify that all tests and precautionary measures identified on the Daily/Periodic Inspection Checklist located in Exhibit 2 and the ARCADIS Utility Location Policy and Standard ARC HSFS019 has been performed prior to authorizing subsurface work or entry into an excavation or trench.


ARCADIS employees must meet the following requirements to be a designated and approved Competent Person:

- Attend an Excavation Competent Person training course approved by Corporate Health and Safety or have equivalent training; and
- Approval by Corporate Health and Safety through demonstration of practical field experience and/or knowledge of the subject matter.
 - Documentation of the evaluation and approval of each excavation competent person will be completed using the form provided in Exhibit 3.
 - This documentation and a listing of the approved ARCADIS excavation competent person will be maintained by the Training Group; and
- If on an Environmental project where HAZWOPER training is required by ARCADIS, the Competent Person must also have completed the 40 Hour HAZWOPER training, be current on their annual 8 Hour HAZWOPER refresher and it is recommended, but not required, that the Competent Person completed the HAZWOPER Supervisor training course.

4.5 Site Safety Officer (SSO)

When ARCADIS and/or our subcontractor is in control of an excavation project, the SSO will be responsible for the following:


- Interface with the client representative and Competent Person to identify and understand hazards associated with the client's excavation and trenching and/or work permit programs.
- Implement the ARCADIS Utility Clearance Policy and Procedure and complete the Daily/Periodic Excavation Inspection Checklist, when the excavation project is under the control of ARCADIS.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- Verify adequate training and experience of those ARCADIS employees working in and around excavations.
- Verify that the safety procedures identified in this Standard, the site specific HASP, and applicable regulatory requirements are used when required to protect employees during excavation activities.
- Verify that the client takes the necessary precautions in notifying their employees that our employees will be installing an excavation or trench.
- Review the lockout/tagout and isolation measures implemented by ARCADIS, our subcontractor and/or the client as necessary based on proximity of utilities or other energy sources in the area of the excavation/trench.
- Immediately report any unusual or unplanned excavation or trenching hazards to both the Competent Person and the Project Manager or Task Manager.
- Keep unauthorized persons away from the excavation area.
- Confirm that the ARCADIS Utility Location Policy and Standard ARC HSFS019 has been performed prior to authorizing subsurface work or entry into an excavation or trench.
- Issue, authorize, and have the Utility Clearance and Daily/Periodic Inspection forms readily available for review
- Verify that copies of the completed clearance forms and checklists are properly disseminated to Corporate Health and Safety and retained with the project files, as specified in Section 8.0 – Records.

4.6 Employees

- Notify the PIC, PM, TM or SSO if they have not received appropriate training.
- Review the site specific HASP, task specific JSAs, and other written plans that are associated with their work.
- Use the TRACK process regularly and frequently to recognize the hazards which may be faced during work around or in excavation/trenches, as well as to understand the signs and symptoms of exposure to airborne hazard(s).
- Never enter an excavation/trench without verifying that the required Utility Location Procedure, Daily/Periodic Inspection Checklist and required air monitoring is conducted.
- Use Stop Work Authority if excavation/trenching hazard(s) have not been appropriately addressed. Immediately consult with SSO, Competent Person and ARCADIS Project/Task Manager.
- Use the PPE, air monitoring and testing equipment that has been provided or have access to the information documenting that results are within the defined Action Levels established within the HASP.


	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- Maintain an awareness of all required hazard controls and consult with the Competent Person as necessary.
- If unexpected conditions arise during entry, immediately notify other entrants, evacuate the space and inform the designated Competent Person
- Obey evacuation orders given by the Competent Person, SSO, automatic alarm activation, or when self-perceived.
- At least one person on site must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).


5. PROCEDURE

5.1 General Safety Requirements for all Excavations

- If excavation work encounters unanticipated groundwater contamination, soil contamination or other unanticipated contaminants, ARCADIS staff will Stop Work and notify the Project Manager. An appropriate work plan to sample the suspected contaminants shall be developed, samples collected by HAZWOPER trained personnel, the HASP modified and a contaminant management plan developed, as necessary.
- All surface obstructions must be moved or supported so as to protect employees and equipment.
- Prior to excavation, all underground installations (water, electric, telephone, gas, etc.) must be located and documented in accordance with ARCADIS Utility Clearance Policy and Standard ARC HSFS019.
- When excavating in areas near underground installations, proper precautions must be taken to determine the exact location of the installations and to adequately protect and support them. While an excavation is open, underground installations shall be protected, supported or removed as necessary to protect employees.
- Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person.
- Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
- Ladders must extend at least 36" (3 feet) above the landing surface.
- All excavations over four feet in depth shall be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel. As deemed necessary by the competent person, excavations less than 4 feet in depth will be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- If personnel are working in a location exposed to vehicular traffic they must be provided with and be required to wear reflective safety vests. Adequate, signs, barriers or other equivalent traffic controls must be used to protect employees.
- Personnel are not permitted to be beneath elevated loads handled by equipment or be in excavations when heavy equipment is digging in or near the excavation.
- Mobile equipment located near open excavations must be adequately protected from falling or rolling into excavations by the use of barricades or warning devices.
- Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
- Water must not be allowed to accumulate in open excavations where employees are working. When necessary, means such as diverting natural drainage around the excavation or actively pumping water must be used to prevent or control water accumulation.
- Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.
- All structures adjacent to an open excavation must be supported, or a registered professional engineer (PE) must determine that the structure will not be affected by the excavation activities.
- Excavated materials (spoil) must be placed no closer than 2 feet from the edge of an open excavation, and otherwise retained to prevent loose material from falling into the excavation.
- Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier.
- Employees at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.
- Work tasks will be designed to limit the number of personnel required to enter any excavation. All tasks that can be completed remotely from outside the excavation (such as soil sampling) will be conducted in such a manner.
- Personnel will not be allowed to enter any excavation unless required protective systems and procedures are used to prevent accidents and injury.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013


Best Management Practice: In some instances, an excavation will not have any protective systems in place when employees will not be entering into the excavation. Even if employees are not entering into this type of excavation, a competent person should be consulted to establish a safe zone distance away from the edge of any open excavation to minimize the hazard of falling into this type of excavation. Standing at the edge of an excavation places an employee at risk of falling into the excavation, thereby subjecting themselves to the hazard of excavation/trench collapse, which then triggers the requirement for protective system use as defined in this standard. General guidance would be for employees to remain 6 feet or more away from the edge of any excavation.

- Dust control measures will be implemented during excavation and soil-moving activities as required by the Health and Safety Plan (HASP). As necessary, dust control measures will also be used to manage soil located in temporary storage areas or stockpile areas. Specific dust control measures will be detailed in the HASP. The Competent Person must be consulted prior to initiating “wet” dust control measures to discuss limits/impact to protective systems.
- Excavations cut through a firewall or containment berm/bund shall provide alternate means of containment while the job is progressing. A specific containment procedure or diversion procedure will be included as a supplement to the HASP or defined in the Remedial Work Plan.
- Excavating in archeological sites requires special consideration and compliance with local legal requirements and shall be avoided wherever possible. Archaeological investigations on federal and state lands have additional requirements. For example, permit provisions are established in federal (specifically the federal Archaeological Resources Protection Act) and some state statutes. If an artifact or archeological feature is unearthed during excavation, ARCADIS shall stop work and consult with client, regulatory agencies and professional archaeologist, as necessary.

5.2 Excavations Requiring Protective Systems

This section defines excavations that require protective systems.

- All excavations into which employees will enter, regardless of depth, where the potential for cave-in exists.
- Any excavation over 5 feet in depth into which employees will enter that is not entirely in stable rock as defined in this Standard.
- Any excavation near a structure, (e.g. foundations, piers, footers, walls, sidewalks, tanks, roadways, etc.), as required by the registered professional engineer reviewing the stability of the excavation and the structure.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- All excavations over 20 feet in depth must be designed by a registered professional engineer regardless of whether personnel will enter it or not.
- All excavations that could potentially impact adjacent structures shall be reviewed by a registered professional engineer to determine if the stability of the structure will be affected by the excavation.
- Support systems for an adjacent structure must be designed by a registered professional engineer.

5.3 Selection and Use of Protective Systems

5.3.1 Shoring or Shielding

If shoring or shielding is selected as the protective system for an excavation, soil classification in accordance with 1926 Subpart P Appendix A is required.

One of the following options must be used for excavations which will be shored or shielded.

- Timber shoring as specified in 1926 Subpart P Appendix C must be utilized
- Hydraulic shoring, trench jacks, air shores, or shields as required in 1926.652 (c)(2) must be utilized following the system manufacturer's data
- A system which follows other tabulated data (approved by a registered professional engineer) must be utilized
- The excavation must be designed by a registered professional engineer

5.3.2 Sloping


If sloping is selected as the protective system for an excavation, the excavation sides must be sloped at a maximum of 34 degrees (1.5 Horizontal: 1 Vertical), unless the procedure listed above is followed.

Soil classification is required for all excavations with sides which will be sloped greater than 34° (1.5 Horizontal: 1 Vertical). If it will be sloped greater than 34°, the one of the following options must be utilized:

- Option 1 - assume Type C and slope 1.5/1 - default sloping classification
- Option 2 - classify soil according to the standard and use Type A/B sloping requirements
- Option 3 – use other tabulated data with PE approval
- Option 4 – PE approval of sloping/benching design

5.4 Atmospheric Testing for Entry

All excavations over 4 feet in depth must be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

contaminants or oxygen deficiency. Excavations less than 4 feet in depth must be evaluated by the competent person and at the competent person's discretion be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous contaminants or oxygen deficiency.


Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

The site designated "Competent Person" and/or SSO will document initial and periodic air monitoring results for all activities requiring entry into the excavation. All atmospheric testing of excavations must be conducted in the following sequence and meet the following air quality criteria.

- Oxygen content must be between 19.5% to 23.5%
- Combustible gas or vapor less than (<) or equal to 5% of its lower explosive limit (LEL): Level D. Continue to monitor atmospheric conditions as detailed in project specific Health and Safety Plan.
- Combustible gas or vapor levels greater than (>) 5%, but < 10% of its LEL: Continuous atmospheric monitoring required; review use/implementation of engineering controls (ventilation, etc.) and PPE; evaluate potential source(s) of ignition and where feasible, remove from the area; fire extinguisher must be available; and use TRACK to assess condition/controls and proceed with caution.
- Combustible gas or vapor levels > or equal to 10% of its LEL: Stop Work; evacuate the excavation/trench; contact the Competent Person and SSO; and re-evaluate source/controls of combustible gas,
- Carbon monoxide levels must not exceed 25 ppm as an 8-hour Time Weighted Average (TWA).
- Hydrogen sulfide must not exceed 5 ppm as a Short-Term Exposure Limit (STEL) value or 1 ppm as an 8-hour TWA.
- Toxic air contaminant levels must not exceed 50% of the PEL or the TLV for the specific contaminant (whichever is lower).

5.5 Location of Underground/Overhead Utilities

- The competent person and the project manager shall both verify that local underground facilities location/protection agencies are notified within the required time frame prior to the initiation of excavation activities and meet all requirements in the ARCADIS Utility Location Policy and Standard ARC HSFS019.
- Prior to initiation of excavation or trenching operations the competent person shall verify that all utilities have been located.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

5.6 Daily/Periodic Inspections

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a Competent Person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the Competent Person:

- Prior to initiation of daily excavation or trenching operations the competent person shall complete a daily inspection of the excavation.
- During excavation or trenching operations the competent person shall complete a periodic inspection after any event (e.g., thunderstorm, vibration, excessive drying) that may affect excavation stability.

Note: In order to correctly ascertain the soil types, the competent person must identify the locations and the limits of each type of soil, and must conduct visual and all appropriate manual tests to classify the initial (opening) soil types observed.

Note: These inspections are only required when employee exposure can be reasonably anticipated. Not just in-trench exposure, but also ANY hazardous condition in the area that an employee could be exposed to.

The competent person shall complete the daily/periodic inspection checklist (A copy of the checklist is attached to this Policy as Exhibit A) – Subcontractors must complete the ARCADIS checklist or an equivalent inspection form for each inspection of excavation and trenching activities.

5.7 Soil Classification for Selection of Protective Systems

5.7.1 Soil Classification

This section describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. This section contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.


This section applies when a sloping, benching or shoring system is utilized as a method of protection for employees from cave-ins.

5.7.2 Soil Classification Definitions

5.7.2.1 Types/Classes of Soil

5.7.2.1.1 Type Class A Soils

Type/Class A Soils are cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are: Clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if the following apply.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- The soil is fissured;
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects;
- The soil has been previously disturbed;
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or greater;
- The material is subject to other factors that would require it to be classified as a less stable material

5.7.2.1.2 *Type Class B Soils*

Type/Class B Soils are:

- Cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- Granular cohesion-less soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam
- Previously disturbed soils except those which would otherwise be classed as Type C soil
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration
- Dry rock that is not stable
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4 Horizontal:1 Vertical), but only if the material would otherwise be classified as Type B


5.7.2.1.3 *Type/Class C Soils*

Type/Class C Soils are:

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less
- Granular soils including gravel, sand, and loamy sand
- Submerged soil or soil from which water is freely seeping
- Submerged rock that is not stable
- Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or steeper

5.7.2.2 *Methods for Classifying Soils*

Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in this section. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis conducted by a competent person using tests described below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

The visual and manual analyses, such as those noted as being acceptable in this section, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.


Observe the following:

- Samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine grained material is cohesive material. Soil composed primarily of coarse grained sand or gravel is granular material.
- Soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.
- The side of the open excavation and the surface area adjacent to the excavation. Crack like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.
- The area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.
- The open side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.
- The area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.
- The area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

5.7.2.3 Classifications

- *Plasticity.* Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8 inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8 inch thread can be held on one end without tearing, the soil is cohesive.
- *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt).

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

- *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.
- *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand operated shearvane.
- *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:
 1. If the sample develops cracks as it dries, significant fissures are indicated.
 2. Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined by using the thumb penetration or other test.

5.7.2.4 Cohesive with Fissures vs Granular


If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

5.7.2.5 Layered system

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.

5.7.2.6 Reclassifying Soils

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013


In most instances the ARCADIS designated Excavation/Trenching Competent person will assume Type C soil, unless they have conclusive data to validate Type A or B.

5.7.2.7 Excavation Construction Based on Soil Type

The maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short-term exposure means a period of time less than or equal to 24 hours that an excavation is open. Soil and rock deposits must be classified in accordance with Appendix A to Subpart P of Part 1926. The maximum allowable slope for a soil or rock deposit must be determined from the table provided below. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 1926.651(l). Configurations of sloping and benching systems must be in accordance with 29 CFR 1926 Subpart P, Appendix B.

EXCAVATION SLOPE INFORMATION FROM 29 CFR 1926 SUBPART P APPENDIX B MAXIMUM ALLOWABLE SLOPES	
Soil or Rock Type	Maximum Allowable Slopes (H:V)¹ for Excavations Less Than 20 Feet Deep²
Stable Rock	Vertical (90 degrees)
Type A ³	¾:1 (53 degrees)
Type B	1:1 (45 degrees)
Type C	1½:1 (34 degrees)

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal (H). Angles have been rounded off.
2. Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.
3. A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth must be 3/4H:1V (53 degrees).

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

6. TRAINING

6.1 Project - Specific Orientation

All staff working on a site where trenching and excavation activities are being conducted by ARCADIS or its subcontractors will be provided with site orientation on excavation projects and participate in daily safety meetings that include a discussion of the following:

- Site excavation hazards and procedures;
- Requirements for conducting activities remotely whenever possible;
- Client requirements and procedures for excavation activities;
- Review of applicable federal, state and/or local excavation requirements; and
- This Excavation and Trenching Standard, as appropriate

6.2 Employee Training

Besides site orientation training, additional training will be provided as follows based on the employee's activities:


- All employees who work in the area of potential excavation/trenching sites will receive awareness level training as provided and/or approved by ARCADIS Corporate H&S in order to recognize and to understand the hazards associated with trenching/excavation work.
- On an as needed basis, employees will receive site specific instruction regarding the excavation/trenching operation from the Competent Person and/or the SSO.

6.3 Competent Person Training

Competent Persons will be provided training as follows:

In order for ARCADIS employees to be assigned duties as a competent person, with respect to excavation and trenching, in addition to the criteria noted in section 4.4, personnel must attend an Excavation Competent Person training course approved by Corporate Health and Safety or have equivalent training. The course shall include, but is not limited to the following:

- Introduction to and definition of trenches and excavations.
- General requirements of OSHA 29 CFR 1926 Subpart P.
- Responsibilities and requirements of a competent person.
- Hazards associated with trenches/excavations and Identification and Assessment of these hazards.
- Hazard controls

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- Soil analysis and testing (visual and manual);
- Protective systems;
- Personal protective equipment;
- Utility location;
- Atmospheric testing;
- Water drainage and pumping;
- Site housekeeping and management;
- Communications;
- Access and egress
- Emergency Procedures.
- Inspections.

All training provided must be reviewed and approved by Corporate Health & Safety and will be managed through the Training Team.

Documentation of training certification received by attendance at any training course including externally provided training courses will be kept by the employee with copies provided to the Training Team.

7. REFERENCES

ARCADIS Health and Safety Standard ARC HSFS010– Health and Safety Planning


ARCADIS Health and Safety Standard ARC HSFS004 – Control of Hazardous Energy (Lockout/Tagout)

ARCADIS Utility Clearance Policy and Standard ARC HSF019

OSHA 29 CFR Part 1926 Subpart P - Excavations

8. RECORDS

- 8.1** Training records will be kept by the individual employee with copies of such certificates kept by the Training Team. Training dates and times will be kept by the Training Team.
- 8.2** Completed clearance forms and checklists will be kept in the project files with copies available for Corporate H&S review.
- 8.3** Copies of all HASPs that document excavation trenching procedures will be kept in the project files.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013


9. APPROVALS AND HISTORY OF CHANGE

Approved By: Anthony Tremblay, CSP, CIAQP



History of Change

Revision Date	Revision Number	Standard Developed/Reviewed By or Revised By	Reason for change
12 May 2008	01	Greg Ertel	Original document
13 June 2008	02		Modified Section 5.1 – 4 th bullet related to structural ramps. Modified Section 5.2 to designate a 6x factor for structural integrity of structures near the excavation. Revised Exhibit 1 to modify the definition of a Competent person
9 January 2009	03		Cleaned up definitions, deleted training requirements from Section 5.0 and moved them to Section 6.0, modified purpose statement
31 March 2011	04		Updated Competent Person training and qualification requirements in section 4.6, section 6.2 and definition in Exhibit 1.
27 March 2012	05	Tremblay	Section 4 competent person, SSO and employee responsibilities revised; Confined Space references eliminated; Training requirements clarified; use of ladders detailed; Fall prevention requirements clarified in section 5.1; depth of protective system requirement corrected to 5 feet; spoils pile must be minimum 2 feet from edge of excavation; Atmospheric Monitoring Action Levels revised; Employee Awareness Training and Competent Person Training requirements clarified

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 08
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

Revision Date	Revision Number	Standard Developed/Reviewed By or Revised By	Reason for change
4 June 2012	06	Tremblay	Section 4.4 typo corrected; 8-hour HAZWOPER Supervisor course for competent person was made a recommended practice instead of a requirement; Section 4.5 SSO responsibilities revised to eliminate those responsibilities that belong with the Competent Person; Section 5 Best Management Guidance to maintain safe distance from the edge of excavation; checklists hyperlinked
18 September 2013	07	Tremblay	Tracking table format updated; Section 5.1 revised to include information about encountering unanticipated contaminants, implementing dust control measures, instituting containment measures when breaching a containment berm and avoiding excavating in archeological sites
26 September 2013	08	Tremblay	Section 5.7.2.7 Maximum Allowable Slope Table had a typo in Type C soil line H:V ratio (corrected the ratio to read 1 ½ : 1). The value of 34 degrees is correct; Header format update and pages renumbered


	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 07
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

Exhibit 1 – Definitions

Attendant is a trained qualified individual stationed outside the excavation whose duty is to monitor authorized entrants inside the excavation or trench and have a means of communication with the designated rescue services.

Benching/Benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sides, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Competent person means one who, through education, training, and/or experience, is capable of identifying existing and predictable hazards or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.

Dry soil means soil that does not exhibit visible signs of moisture content.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal into which a person can bodily enter.

Entry constitutes the act by which an employee proceeds into an excavation or trench. Consideration of hazards, especially cave-ins and fall protection must still be considered and accounted for when equipment or personnel are near an excavation or trench, even if personnel will not be entering.


Entrants are employee's who are trained and authorized to enter a trench or excavation. Entrants must have attended a Qualified Excavation Training course offered or approved by Corporate Health and Safety.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Hazardous Atmosphere is an atmosphere which exposes employees to a risk of death, incapacitation, injury, or acute illness from one or more of the following:

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 07
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

- An atmospheric concentration of any substance in excess of 50% of its established permissible exposure limit (PEL); or its assigned threshold limit value (TLV) or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent, whichever is lower.
- A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL).
- An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less.
- An atmospheric oxygen concentration below 19.5% (oxygen-deficient atmosphere) or above 23.5% (oxygen-enriched atmosphere).
- An atmosphere which is immediately dangerous to life and health.

Immediately Dangerous to Life and Health (IDLH) means any condition which poses an immediate threat to loss of life; may result in irreversible or immediate-severe health effects; may result in eye damage, irritation, or other conditions which could impair escape from the space.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems and other systems that provide protection.


Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce. To oversee an excavation/trench activity the PE must have experience with and expertise in excavation, soil and stability considerations.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shield can be either pre-manufactured or job-built in accordance with 1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 07
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Soil classification system means, for the purpose of this procedure, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.


Submerged soil means soil which is underwater or is free seeping.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.


Trench means a narrow excavation (in relation to its length) made below the surface of the ground to which a person can bodily enter. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 meters) or less (measured at the bottom of the excavation), the excavation is considered to be a trench.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 07
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

[Exhibit 2 – Daily / Periodic Excavation Inspection Checklist](#)

	<u>ARCADIS HS Standard Name</u> Excavation and Trenching	<u>Revision Number</u> 07
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Standard No.</u> ARC HSCS005	<u>Revision Date</u> 26 September 2013

[Exhibit 3 – Competent Person Evaluation Form for Excavation / Trenching](#)

Job Safety Analysis

General

JSA ID	7395	Status	(3) Completed
Job Name	Construction-Excavation and trenching	Created Date	4/25/2012
Task Description	Trenching	Completed Date	05/04/2012
Template	False	Auto Closed	False

Client / Project

Client	ASHLAND, INC.
Project Number	OH005000SC05
Project Name	GREENVILLE, SC - ASHLAND
PIC	REID, JAMES
Project Manager	SHIRLEY, PATRICK

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Franz, Jeremy	5/9/2012	4/25/2012	Rhine, Elizabeth	<input checked="" type="checkbox"/>
HASP Reviewer	Cameron, Anya	5/9/2012	5/4/2012	Edwards, Lauren	<input type="checkbox"/>
Quality Reviewer	Ferree, Robert	5/8/2012	5/8/2012	Lagowski, Jason	<input type="checkbox"/>
Reviewer	Hays, Timothy	5/9/2012	4/26/2012	Rhine, Elizabeth	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Site preparation	1 Unauthorised personnel entering the work area.	Establish good work zones via fencing or baracade and protect all excavations at all times to ensure site personnel, visitors, or unauthorised personnel do not enter without permission or fall into the trench.	H&S Handbook IV-D, III-DD
		2 Improper utility clearance may result in utility/equipment damage or injury.	Perform utility clearance with a minimum of 3 lines of evidence. document utility clearance for reference including any ticket numbers or phone numbers of utilities.	
		3 Clearing vegetation may result in impact hazards.	Stand at least 25 ft from clearing operations using manual or mechanized methods. Larger vegetation like trees may be under stress and may break and wood parts may fly in any direction.	
		4 Slip trip and fall hazards from walkover activities (vegetation, uneven surfaces, etc and applies to all job steps in this JLA)	Plan route and focus on the task at hand (walking). Do not walk while looking at utility maps/drawings or talking on cell phones.	
2	Excavation and backfilling	1 Struck by equipment during excavation.	Stay at least 10 feet beyond the reach of excavation equipment unless establishing communication with operator. Wear PPE required by this JSA for increased visibility. Keep unnecessary workers away from the excavation area.	H&S Standard IV-D
		2 Equipment/worker falls into excavations from edge collapse	Stand at least 6 ft from edge of excavation. Competent person to oversee sloping, benching, bracing excavation to ensure stability.	
		3 Worker entrapment/suffocation/chemical overexposure/engulfment in excavation	Entry into excavations are prohibited unless approved by a Competent Person. Keep spoil piles at least 2 ft from excavation edge. Ensure proper slope/bench/shielding is in place prior to entry. Air monitor for toxic vapors and oxygen deficiency. Ensure proper means of access and egress.	
		4 Chemical exposure to site contaminants.	Wear protective clothing specified in this JSA, avoid skin contact with soil materials or any liquids in the excavation. Use air monitoring to ensure TLVs are not exceeded. Wash hands and face prior to eating, drinking or consuming tobacco.	

2	Excavation and backfilling	5	Potential leaks of fluids and lubricants from excavating equipment and/or support equipment.	All authorized personnel including subcontractors must inspect equipment daily or as needed for leaks, cracked hoses and loose fittings. Promptly and properly repair all leaks.	
		6	Noise from excavation equipment	Keep distance from equipment to reduce noise levels. If levels cannot be controlled wear hearing protection appropriate for the hazard.	
3	Excavation equipment decontamination	1	Slips and falls on wet surfaces.	Wear footwear appropriate for wet environments. Reduce amount of pressure washing required by removing soils using dry methods to extent practical	
		2	Flying particles from cleaning activities.	Wear eye and skin protection during decontamination activities. Use face shield if overspray or flying debris is a persistent problem. Avoid cleaning (pressure washing) in direction of other nearby workers, keep unnecessary workers clear of decontamination activity.	

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Eye Protection	faceshield	During decontamination (per SSO)	Required
	safety glasses		Required
Foot Protection	rubber boots	Wet environments per SSO	Recommended
	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile when handling impacted soils	Required
	work gloves (specify type)	leather or equivalent (per SSO)	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III	Class II	Required

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
	walkie talkie	For communication with equipment operator	Recommended
Miscellaneous	fire extinguisher	ABC 10 pound minimum	Required
	first aid kit		Required
Personal	eye wash (specify type)	Bottle	Required
	insect repellent		Recommended
	sunscreen		Recommended

Review Comments		
Reviewer	Comments	
Employee: Cameron, Anya Role HASP Reviewer Review Type Approve Completed Date 5/4/2012		
Employee: Hays, Timothy Role Reviewer Review Type Approve Completed Date 4/26/2012	Good JSA with references. This will help us in the field.	
Employee: Ferree, Robert Role Quality Reviewer Review Type NA Completed Date 5/8/2012	Very thorough JSA.	

Job Safety Analysis

General

JSA ID	11551	Status	(3) Completed
Job Name	Environmental-Groundwater Sampling and free product recovery	Created Date	8/22/2014
Task Description	Groundwater sampling	Completed Date	08/22/2014
Template	False	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Capell, Cynthia	9/12/2014	8/22/2014	Stamm, Hadley	<input checked="" type="checkbox"/>
HASP Reviewer	Capell, Cynthia	9/5/2014	8/22/2014	Stamm, Hadley	<input checked="" type="checkbox"/>

Job Steps


Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Stage at pre-determined sampling location and set up work zone and sampling equipment	1 Personnel could be hit by vehicular traffic	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely possible.	
		2 Sampling equipment, tools and monitoring well covers can cause tripping hazard	Keep equipment picked up and use TRACK to assess changes.	
2	Open wells to equilibrate and gauge wells	1 When squatting, personnel can be difficult to see by vehicular traffic.	Wear class II traffic vest if wells are located proximal to vehicular traffic. Use tall cones and the buddy system if practicable.	
		2 Pinchpoints on well vault can pinch or lacerate fingers	Use correct tools to open well vault/cap. Wear leather gloves when removing well vault lids, and chemical protective gloves while gauging. Wear proper PPE including safety boots, knee pads and safety glasses.	
		3 Lifting sampling equipment can cause muscle strain	Unload as close to work area as safely possible; use proper lifting and reaching techniques and body positioning; don't carry more than you can handle, and get help moving heavy or awkward objects.	
		4 Pressure can build up inside well causing cap to release under pressure	Keep head away from well cap when removing. If pressure relief valves are on well use prior to opening well	
3	Begin Purging Well and Collecting Parameter Measurements	1 Electrical shock can occur when connecting/disconnecting pump from the battery.	Make sure equipment is turned off when connecting/disconnecting. Wear leather gloves. Use GFCIs when using powered tools and pumps. Do not use in the rain or run electrical cords through wet areas.	
		2 Purge water can spill or leak from equipment	Stop purging activities immediately, stop leakage and block any drainage grate with absorbent pads. Call PM to notify them of any reportable spill.	
		3 Water spilling on the ground can cause muddy/slippery conditions	Be careful walking in work area when using plastic around well to protect from spillage	
		4 Lacerations can occur when cutting materials such as plastic tubing	When cutting tubing, use tubing cutter. No open fixed blades should ever be used. When possible wear work gloves, leather type.	
		5 Purge water can splash into eyes	Pour water slowly into buckets/drums to minimize splashing. Wear safety glasses.	
4	Collect GW or Free Product Sample	1 Working with bailer rope can cause rope burns on hands.	Slowly raise and lower the rope or string for the bailer. Wear appropriate gloves for the task.	

4	Collect GW or Free Product Sample	2	Sample containers could break or leak preservative	Discard any broken sampleware or glass properly. Do not overtighten sample containers. Wear chemical protective gloves.	
5	Recovery of Free Product from well	1	Exposure to free product	Additional chemical protection may be necessary based on the type of product. Additionally, safety goggles, a faceshield, or respiratory protection may be required. Verify in the HASP.	
6	Staging of Well Purge water and/or Free Product	1	Muscle strains can occur when moving purge water or drums	If using buckets, do not fill buckets up to the top. Always keep lid on buckets when traveling or moving them to another location. Only half fill buckets so when dumping the buckets weigh less. See drum handling JSA for movement of drums.	Drum handling JSA

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Recommended
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Recommended
Miscellaneous PPE	other	Knee pads	Required

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	alconox, DI water, spray bottle	Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
	flashlight		Required
Personal	eye wash (specify type)	bottle	Required
	insect repellent		Recommended
	sunscreen		Recommended
Traffic Control	barricades		Recommended
	traffic cones		Required

Review Comments		
Reviewer	Comments	
Employee: Role Review Type Completed Date	Capell, Cynthia HASP Reviewer Approve 8/22/2014	

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 1 of 9	<u>Approver</u> P. Vollertsen

1. POLICY

An Incident is defined as “a sudden and unplanned event or chain of events, which has, or could have caused, injury or illness and/or damage to assets”.

It is ARCADIS US’ policy that:

- All incidents are reported. This includes near losses.
- Reporting of incidents is every employee’s responsibility
- Incidents involving injury are reported to WorkCare first to ensure proper medical care and management if they are non-emergency in nature
- All incidents are investigated
- Incident investigation is the supervisor’s responsibility to initiate and lead
- The level of investigation is based on the severity of the outcome or the potential outcomes of the incident
- All incident investigations result in learning that is communicated to appropriate staff

2. PURPOSE AND SCOPE


2.1 Purpose

The purpose of reporting and investigating incidents is to prevent similar or more serious incidents from recurring. This is completed by determining the contributing factors to the incident and the root causes of those factors using the Root Cause Analysis standard (ARC HSMS011).

2.2 Scope

The types of incidents reported and investigated under the ARCADIS H&S program include:

- Work-related injuries and illnesses
 - fatality/permanent disability
 - lost time
 - restricted duty
 - medical treatment
 - first aid
- Near losses

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 2 of 9	<u>Approver</u> P. Vollertsen

- Motor vehicle accidents
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies or losses

This standard is also followed for any of the above-listed incidents incurred by subcontractors providing services to ARCADIS. The investigation team will include subcontractor workers and a subcontractor supervisor. ARCADIS personnel may also participate on the investigation team to provide knowledge of the project site and to facilitate the proper use of the process.


Additional client-specific and contract requirements may also be required and implemented.

3. DEFINITIONS

See Exhibit A of ARC HSMS000 – ARCADIS US HS Management System.

4. RESPONSIBILITIES


	All Personnel (Field and office employees)	Supervisor	H&S Professional	PM, PIC, Area Manager or Department Manager	Senior Leadership
Incident Occurs	<p>If a non-emergency work-related injury or illness, call Work Care first for proper medical care</p> <p>Notify supervisor and stop operation until it is determined safe to resume operations.</p> <p>Co-workers are considered authorized to accompany the employee to the medical care facility as appropriate.</p>	<p>Complete initial verbal reporting of incident to H&S professional; evaluate risk of incident reoccurrence.</p> <p>If Motor Vehicle Accident or damage, notify Corporate H&S and Corporate Insurance coordinator</p>	<p>Ensure that the ARCADIS Workers Compensation manager has been notified of any injury-related incident</p> <p>Complete reporting and notification process</p>	<p>Receive initial notification based on severity of the incident</p>	<p>Receive initial notification as appropriate</p>

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 3 of 9	<u>Approver</u> P. Vollertsen

	All Personnel (Field and office employees)	Supervisor	H&S Professional	PM, PIC, Area Manager or Department Manager	Senior Leadership
Investigation	Participate as team member in investigation; help to identify root causes and develop solutions.	Initiate investigation process; select personnel for investigation team; participate/lead investigation team.	Participate as necessary.	Participate as appropriate.	Participate as appropriate.
Investigation Report	Participate in completing investigation report form.	Participate in completing investigation report form; assign reviewers.	Review investigation reports and provide feedback as necessary.	Review investigation reports and provide feedback as necessary.	Review investigation reports and provide feedback as necessary. Steward process for quality, timeliness, participation, and provide feedback.
Communication Safety Alert and Info Sharing Report	Participate in the development of a Safety Share or other communications as able and as appropriate. Review incident related communications, Safety Shares.	Participate in the development of Safety Shares written by reporting employees. For others, communicate incident related information to personnel, including Safety Alerts and Info Sharing Reports, as appropriate.	Communicate information internally as necessary. Review Safety Shares as appropriate	Communicate information internally as necessary.	Steward Safety Shares
Solution Implementation, Verification & Validation of Effectiveness	Implement as directed. Notify supervisor of effectiveness.	Manage implementation; field verify and validate solutions.	Field verify and validate solutions and provide feedback as appropriate	Field verify and validate solutions and provide feedback	Field verify and validate solutions and provide feedback.

5. PROCEDURE

- The procedures discussed in this section are broken down into several steps as to the completion of the reporting and investigation of incidents including:
- Near losses
- Investigation Team
- Stop Work

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 4 of 9	<u>Approver</u> P. Vollertsen

- Reporting and Notification
- Case Management and WorkCare Intervention
- Timing of investigation
- Initiating the investigation
- Documentation
- Fact gathering
- Incident descriptions
- Conclusions
- Root Causes
- Solutions
- Review
- Validation and Verification

5.1 Near Losses


Near losses are incidents and are, therefore, an integral part of the incident investigation process. Health and safety research indicates that for every major incident there are hundreds of near losses that could potentially result in a major injury or other type of loss can be avoided. In other words, by managing near losses, incidents involving a loss can be prevented.

Therefore, employees are required to report all near losses without fear of reprimand or peer pressure, and no individual should feel threatened about honest reporting of a near-loss. A near loss is simply an injury, illness or other loss that was avoided because of more favorable circumstances, or “luck.” By managing near losses, we have an opportunity to be proactive in the identification and resolution of hazards before an injury, illness or other loss occurs.

5.2 Reporting and Notification

The employee is responsible for reporting any incident including reporting to the Supervisor/PM and/or the client as outlined in the project H&S Plan. Reporting and notification times vary depending on the incident, but all should be done as soon as possible and no later than as outlined in the Incident Reporting and Investigation Process flowchart in Exhibit A. This reporting will be completed via telephone to the appropriate person or via the Near Loss Hotline.

As necessary, an ARCADIS employee that is present on the site where the injury occurred is authorized to and will accompany the employee to the treating facility.

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 5 of 9	<u>Approver</u> P. Vollertsen

5.3 Case Management and WorkCare Intervention

Every non-emergency, work-related injury or illness is required to be called into WorkCare via their reporting hotline number to ensure proper medical management of the injury. WorkCare will manage the case along with the ARCADIS Workers Compensation manager to ensure the appropriate and effective care is provided to the employee and so that the interests of the company are also represented. A flowchart of the WorkCare intervention process is shown in Exhibit B

5.4 Investigation Team

Team composition varies depending on the type, location, and severity of the incident. Personal knowledge and experience are key to the success of the investigation. Furthermore, the people who perform the tasks that led to an incident have the knowledge to identify the real root cause(s) and develop the solution(s) that will likely keep the incident from recurring.

The recommended members of the investigation team are listed in the Investigation Flowchart in Exhibit A. Management may designate personnel in addition to the members listed, as appropriate (e.g., legal department, technical specialist).

5.5 Incident Investigation Process

Immediately following an incident, **STOP** operations until it is determined that it is safe to resume! This assessment may be as simple as performing TRACK or as complex as a team assessment of practices and conditions.

5.6 Initiating the Investigation


Information or conditions that may change with time must be captured immediately. This may include taking pictures of damage before it is repaired and of the site before conditions change, and getting names of witnesses before they leave the area. The longer the delay in examining the incident scene and interviewing witnesses the greater the possibility of obtaining erroneous or incomplete information.

The severity or potential severity of the incident will determine when the formal investigation should be initiated. If a person sustains a major injury, or if the incident had the potential for serious or fatal injury, the operation must be stopped and the investigation initiated immediately. Other incidents, including near losses should be initiated as soon as possible.

5.7 Fact Gathering

It is essential that proper information and data gathering take place at all times during the investigation. The accuracy and thoroughness with which the investigators obtain and record information and data largely determines the quality of the final report and the effectiveness of corrective actions.

For minor incidents, the information may be gathered by the supervisor or other personnel immediately following the incident. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the incident, determine the root cause, and develop solutions. More complex situations may require the

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 6 of 9	<u>Approver</u> P. Vollertsen

investigation team to revisit the incident 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 any damaged equipment or property should be taken from all sides and from various distances. Sketches or drawings could also be pertinent to the investigation. This is especially important when the investigation team is not able to visit the incident scene.

5.8 Starting an Investigation

The supervisor, as it relates the activity being conducted at the time of the incident, is responsible for initiating the investigation process. The incident investigation is initiated once the area is secure, injured people have received appropriate medical attention, and appropriate notifications have been made.

5.9 Investigation Reporting Form

All incident investigations are maintained in the LPS database. Information is documented on the ARCADIS Incident/ Investigation Form and then entered into the database or entered directly in the LPS database. The purpose of the form is fourfold:

- State clearly what happened;
- Conclude why the incident occurred by identifying causal and contributing factors;
- Determine root cause(s); and
- Develop and implement solution(s) to prevent similar events from occurring in the future.

5.10 Description of Incident

It is critical to accurately describe what happened. Do not speculate on causes, state “just the facts.” The description should be clear and concise. For example:


“Mechanics opened the flange on transfer line Number 2 from Tank 101 and 50 gallons of diesel fuel was released. No injuries occurred. Spill was contained in the area drainage system”.

5.11 Conclusion: Determining the Causal and Contributing Factor(s)

The contributing factors section describes WHY the loss or near loss occurred. Avoid repeating what happened and focus instead on causal and contributing factors. It is important to investigate beyond mere symptoms to identify fundamental causes and contributing factors that led to the event. Only then can accurate root causes be identified.

5.12 Determining the Root Cause(s) of the Causal and Contributing Factor(s)

The Root Cause Analysis Flow Chart presented in ARC HSMS011 will be used by the investigation team to identify the root cause(s) for all investigations. This chart leads investigators through a range of possibilities for factors that cause or contribute to incidents. This keeps investigators focused on potential root causes, steering them away from

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 7 of 9	<u>Approver</u> P. Vollertsen

symptoms.

Any incident may have one or more root cause. Those that relate to the person involved in the incident, his/her peers, the supervisor, or manager are referred to as “personal factors.” Causes that pertain to the system or environment within which the incident occurred are referred to as “job factors.”

5.13 Development of Solution(s)

Each root cause must be addressed by a solution, with a responsible person identified and notified for solution implementation. The investigation team cannot identify a root cause and then make no recommendation to address it. Furthermore, there must be a “match” between the root cause and the solution.

There are a few guidelines that should generally be adhered to when deciding what solution to recommend... The solutions are:

Practical: The most effective solutions to most incidents address basic worker activities, require that standards for job procedures are developed and maintained, and confirm that the right tools are provided for and used by workers.

Specific and Verifiable: The solution should be specific to something that can be verified as having been implemented and effective not only by those involved, but by other personnel not involved in the incident. For example, “Always work safely” is neither specific nor verifiable.

Controllable: The most effective solutions are those that focus on personal or job factors that the worker or supervisor can control.

Cost Effective: A \$1M solution is not needed for a \$100 hazard. Again, the majority of effective solutions are relatively inexpensive and are implemented with resources within one’s own organization.

Sustainable: This solution is not merely for the week or month; it must be sustainable. If solutions are made that are even remotely unsustainable, the solutions must be re-evaluated. Otherwise, the road is being paved for “loss of credibility.”


5.14 Review Process

The roles and responsibilities of the investigation and review processes are outlined in the Incident Reporting and Investigation Process flowchart presented in Exhibit A. Review and follow-up on incident investigations is important to verify the effectiveness of the process.

Quality reviews of incident investigations begin with the immediate project or department manager and continue up through the executive management levels. At each level, there is an opportunity to provide positive feedback or constructive advice for the continued improvement of LPS tool effectiveness.

5.15 Validation and Verification

Management provides follow-up on incident investigations by verifying that the solutions have been implemented and validating that the solutions have adequately addressed the root

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 8 of 9	<u>Approver</u> P. Vollertsen

cause(s) of the incident. Again, each of these steps provides opportunities for positive management feedback to those involved in the investigation. REFERENCES (regulation citation, technical links, publications, etc.)

6. TRAINING

All employees receive Incident Reporting and Investigation training during LPS training

7. REFERENCES

ARC HSMS011 – Root Cause Analysis and Solution Development

8. RECORDS

All incidents are recorded and stored in the LPS database and maintained per ARCADIS recordkeeping requirements.

9. APPROVALS AND HISTORY OF CHANGE


Approved by:

Patricia A. Vollertsen

Patricia A. Vollertsen, Director, H&S Administration

History of Change

Revision Date	Revision Number	Reason for change
22 October 2007	01	Original document
9 June 2009	02	Revision and update to include WorkCare intervention which has been implemented since 2006 but documented in separate document. Also update new LPS terminology
26 June 2009	03	Revision to include language that, when necessary, an injured employee will be accompanied to medical care by authorized employee

	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 04
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 6 October 2010
<u>Author</u> M. Thomas	Page 9 of 9	<u>Approver</u> P. Vollertsen

Revision Date	Revision Number	Reason for change
6 October 2010	04	Change name from Procedure to Standard; revision to section 5.2 & App A to clarify client must be notified when required by the HASP


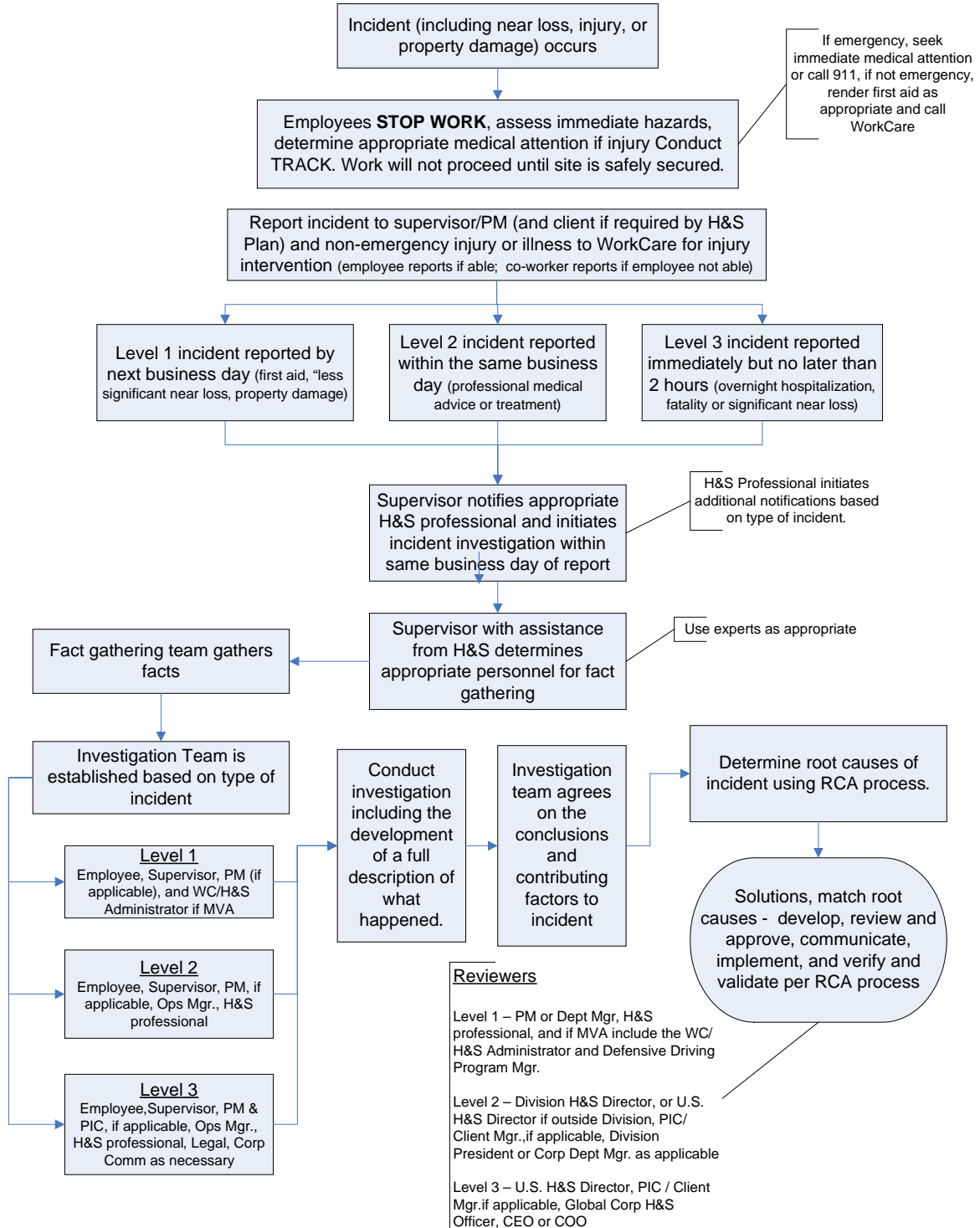
	<u>ARCADIS HS Standard Name</u> Incident Reporting and Investigation	<u>Revision Number</u> 03
<u>Implementation Date</u> 22 October 2007	<u>ARCADIS HS Standard No.</u> ARC HSMS010	<u>Revision Date</u> 26 June 2009
<u>Author</u> M. Thomas	Page E1 of E2	<u>Approver</u> P. Vollertsen

Exhibit A Incident Reporting and Investigation Process Flow




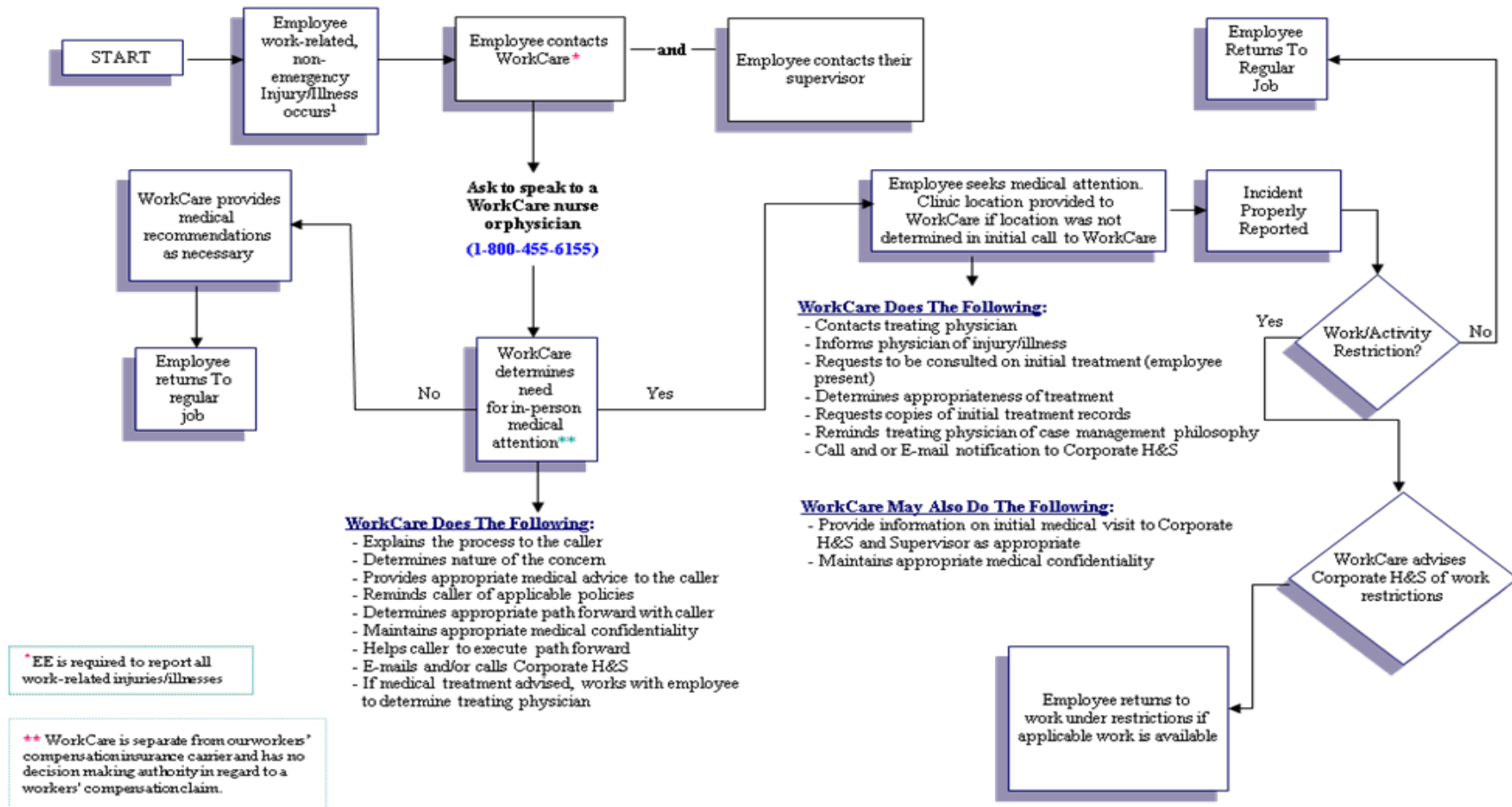

 Infrastructure, environment, facilities	ARCADIS HS Standard Name Incident Reporting and Investigation	Revision Number 03
Implementation Date 22 October 2007	ARCADIS HS Standard No. ARC HSMS010	Revision Date 26 June 2009
Author M. Thomas	Page E2 of E2	Approver P. Vollertsen

Exhibit B

ARCADIS WorkCare Incident Intervention®

For work-related injuries or illnesses that are not life threatening or emergencies



	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 1 of 12	<u>Approver</u> Tony Tremblay

EXECUTIVE SUMMARY

The hazards related to lead exposure are well-defined. It is the policy of ARCADIS to prevent and minimize occupational exposure to lead through the use of engineering and administrative controls and personal protective equipment (PPE).

Lead can be encountered on ARCADIS projects as a contaminant in soils, ground and surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing lead are present. Personnel may also encounter lead in other forms at certain client facilities at which ARCADIS works. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites.

Project Managers are responsible, as part of the project hazard assessment, for determining if lead is or is potentially present on a project site.

Project Personnel are responsible for completing lead training as required by this policy and standard, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP.

The following personal exposure limits are established for lead by inhalation:


- OSHA ACTION LEVEL – 30 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) lead in air 8-hour time weighted average (TWA).
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
 - TWA - $50 \mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)
 - TWA – $50 \mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.

Exposure monitoring shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate that employee exposure is below the Action Level.

Annual lead training is required for all employees a exposed to lead at levels equal to or greater than the OSHA Action Level

Initial and annual Medical Surveillance are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.

All exposure, medical, and training records shall be kept for 40 years or at least 20 years past the last date of employment.

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 2 of 12	<u>Approver</u> Tony Tremblay

1. POLICY

ARCADIS understands the hazards of personal exposure to lead. Based on this understanding, ARCADIS will implement the appropriate controls to minimize or eliminate the hazards of lead. These controls will focus first on engineering controls to mitigate lead hazards where appropriate and practical. Administrative controls may also be implemented as appropriate and practical. Where it is not appropriate or practical to implement engineering and administrative controls, personal protective equipment (PPE) will be provided to employees at no cost to them and implemented to control lead hazards below known occupational exposure limits.

2. PURPOSE AND SCOPE

2.1 Purpose

2.1.1 Exposure to Lead

This policy and associated procedures provides information to protect ARCADIS employees, subcontractors, and other effected personnel from exposures to lead while conducting work on ARCADIS projects.

2.1.2 OSHA Standards

This policy meets the requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations including Title 29 Code of Federal Regulations (CFR) Part 1910.1025 and Part 1926.62.

2.2 Scope

This policy and the associated procedures apply to all projects where lead is known or thought to be present, and where ARCADIS employees, subcontractors and other affected personnel are or could be exposed to lead above the OSHA Action Level.

3. DEFINITIONS


There are a number of definitions associated with this standard. These definitions are presented in [Exhibit 1](#) of this document.

4. RESPONSIBILITIES

4.1 Project Managers

Project Managers are responsible, as part of the project hazard assessment, for:

- Determining if lead is or is potentially present on a project site;
- Determining client requirements with respect to the control of lead hazards;
- Notifying health and safety staff when working on sites containing lead;
- Ensuring that project staff has the appropriate and applicable training for lead prior to those staff beginning work.

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 3 of 12	<u>Approver</u> Tony Tremblay

4.2 Corporate Health and Safety

Corporate Health & Safety is responsible for keeping this policy and standard up-to-date with current regulatory requirements and best practices. In addition, Corporate Health and Safety oversees the medical surveillance program for lead, as applicable and provides a lead training package to for presentation to appropriate staff.

4.3 Project Health and Safety Staff

Project Health and Safety staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control processes and techniques on specific projects based on the levels of lead expected to be encountered on project facilities.

4.4 ARCADIS Employees

ARCADIS employees are responsible for completing lead training as required by this policy and standard, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel believe that lead is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. PROCEDURE

5.1 Lead Hazards


The health effects of lead are based on the type of exposure encountered by workers.

The primary route of exposure to lead in the work place is through inhalation of airborne lead. However, oral ingestion may represent a major route of exposure in contaminated workplaces. Most exposures occur with inorganic lead. Organic (tetraethyl and tetramethyl) lead, which was added to gasoline until the late 1970s, is not commonly encountered. Organic forms may be absorbed through the skin, while inorganic forms cannot.

Inorganic lead is not metabolized, but is directly absorbed, distributed and excreted. The rate depends on its chemical and physical form and on the physiological characteristics of the exposed person (e.g. nutritional status and age). Once in the blood, lead is distributed primarily among three compartments – blood, soft tissue (kidney, bone marrow, liver, and brain), and mineralizing tissue (bones and teeth). Absorption via the gastro-intestinal (GI) track following ingestion is highly dependent upon presence of levels of calcium, iron, fats, and proteins.

5.1.1 Health Effects of Lead

Lead adversely affects numerous body systems and causes forms of health impairment and disease that arise after periods of exposure as short as days (acute exposure) or as long as several years (chronic exposure). The frequency and severity of medical symptoms increases with the concentration of lead in the blood. Common symptoms of acute lead poisoning are loss of appetite, nausea, vomiting, stomach cramps,

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 4 of 12	<u>Approver</u> Tony Tremblay

constipation, difficulty in sleeping, fatigue, moodiness, headache, joint or muscle aches, anemia, and decreased sexual drive. Acute health poisoning from uncontrolled occupational exposures has resulted in fatalities. Long term (chronic) overexposure to lead may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems.

5.1.2 Exposure Limits and Regulated Areas

The following personal exposure limits are established for lead by inhalation:

- OSHA ACTION LEVEL – 30 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) lead in air 8-hour time weighted average (TWA).
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
 - TWA - $50 \mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)
 - TWA – $50 \mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.


Personal exposure is the concentration of lead to which a person would be exposed if that person were not wearing respiratory protection. Personal exposures shall be measured over the exposure period in the breathing zone of the employee. Personal exposures should not be determined by area sampling.

A Regulated Area is defined as an area where the lead exposure does or can be expected to exceed the OSHA PEL. Since it may be difficult to determine the exposure time for employees working in areas with concentrations that exceed PEL values, the facility/location may wish to regulate any area that exceeds the 8-hour TWA PEL. Only Authorized Persons are permitted to enter regulated areas.

With respect to Construction Industry tasks, where lead is present, until ARCADIS performs an employee exposure assessment and documents that the employee performing construction related tasks is not exposed above the PEL, ARCADIS shall treat the employee as if the employee were exposed above the PEL, and not in excess of ten (10) times the PEL, and shall implement employee protective measures including respiratory protection, personal protective clothing and equipment, change areas, hand washing facilities, biological monitoring and training.

5.1.3 Actions for Employee Exposures Greater Than or Equal to the OSHA Action Level but Less Than the PEL

- Training – Annual lead training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 5 of 12	<u>Approver</u> Tony Tremblay

- Periodic Monitoring – shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the Action Level.

5.1.4 Actions for Employee Exposures Greater Than OSHA PEL

- Respiratory Protection – a minimum of air-purifying respirators equipped with HEPA filters shall be used in all regulated areas.
- Training – Annual lead training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the PEL on a least 10 calendar days during the coming year.
- Written Program – A written program to reduce personal exposure is required detailing the methods to be used to reduce exposures below the PEL. These written programs will be in the form of the project HASP based on project-specific and client requirements. The HASP will indicate the schedule for the implementation of the any lead-related hazard control processes or methods. The HASP is reviewed periodically but at least annually per the ARCADIS SOP ARC HSFS010 – Health and Safety Plans. All project personnel have access to the project HASP at all times.
- Periodic Monitoring – at least every 6 months until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL; then annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL Action Level.

5.1.5 Exposure Monitoring

Representative personal exposure monitoring is required for each type of operation involving the handling of or potential exposure to lead.


Initial monitoring can be omitted if there is documented data or industrial hygiene calculations to demonstrate that exposures are below the action level.

Personal exposure monitoring shall utilize standard industrial hygiene sampling techniques and recordkeeping.

Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of these results . If the PEL is exceeded, the notification must indicate the follow-up plans or corrective actions to be taken to reduce exposures to below the PEL.

Personal TWA monitoring can be used for extended tasks, such as soil and sediment sampling, working on mine sites where lead is present, where clients require monitoring, etc.

Area sampling can be used to determine regulated areas.

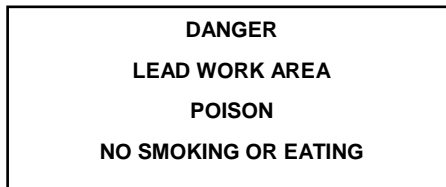
	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 6 of 12	<u>Approver</u> Tony Tremblay

Periodic Monitoring is required if exposures exceed the Action Level or PELs.

5.1.6 Requirements for Regulated Areas

Posting – Regulated areas shall be indicated such as by barricades, barricade tape, painted demarcations, or other devices.

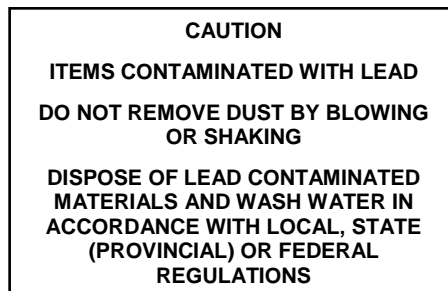
A sign shall be posted at the access to the regulated area with the warning:



[Minimum lettering height: DANGER LEAD WORK AREA 4"; others 3"]

Respiratory Protection – Respirators shall be worn by all personnel when in a regulated area, regardless of the time period or over-all personal exposure measurement.


In addition to appropriate Hazard Communication labeling, containers or equipment containing lead or lead compounds must also be labeled as such:



Eating, drinking, smoking, chewing any item, or applying cosmetics is strictly prohibited in a lead regulated area.

5.1.7 Exposure Reduction

- Written Program:
 - The Project Manager and the Project Health and Safety Staff will develop a written program and make a determination as to the initial exposure levels to be included in the project HASP for exposure reduction if there is a determination that employee exposures may exceed the OSHA Action Level. The HASP will be reviewed at least annually. The program must include:
 - The locations and operations of potential lead exposure

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 7 of 12	<u>Approver</u> Tony Tremblay


- Means to achieve compliance
- Available air monitoring data or industrial hygiene estimates of airborne concentrations
- Schedule for implementing control procedures
- Exposure control processes
- Medical surveillance requirements
- Training requirements
- Emergency response
- The written program must list the corrective actions that will be taken to reduce employee exposure to at or below the OSHA Action Level:
- identify regulated areas/tasks and the operations where lead may be encountered
- the specific means to achieve compliance with OSHA, client, and other applicable requirements
- engineering controls
- revised work practices
- respiratory protection and protective clothing
- schedule of development and implementation.

- **Spills and Emergencies:**

An emergency is any occurrence which may result in an unexpected significant release of lead or lead-containing compounds that may result in a significant inhalation. After an emergency, appropriate monitoring must be conducted to assure the ambient lead levels are back to normal; and conduct appropriate medical surveillance for affected employee(s).

- **Respiratory Protection and Personal Protective Equipment**

- Respirator selection will be based on exposure monitoring/assessment in accordance with the Respiratory Protection standard. ARCADIS shall provide employees with a full face piece respirator instead of a half mask respirator for protection against lead aerosols that may cause eye or skin irritation at the use concentrations.
- ARCADIS shall provide a powered air-purifying respirator when an employee chooses to use such a respirator and it will provide adequate protection to the employee.
- Respirators shall be worn, maintained and managed in accordance with the OSHA standard, 29 CFR 1910.134 and ARCADIS SOP ARC HSGE017 – Respiratory Protection. In addition, any client requirements on project sites will be followed.

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 8 of 12	<u>Approver</u> Tony Tremblay

- Respiratory protection will be worn in all areas as determined in the project HASP and per client requirements. Respirators will be at a minimum, air purifying respirators equipped with HEPA filters.
- Where an employee is exposed to lead above the PEL without regard to the use of respirators, where employees are exposed to lead compounds which may cause skin or eye irritation (e.g. lead arsenate, lead azide), and as interim protection for employees performing construction related tasks in which an initial exposure assessment has not been completed, ARCADIS shall provide at no cost to the employee and assure that the employee uses appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments such as, but not limited to:
 - § Coveralls or similar full-body work clothing
 - § Hood
 - § Gloves
 - § Boots and boot covers
 - § Face shield (depending on work activity); and
 - § Goggles (depending on work activity)

- **Ventilation Systems:**

Where appropriate, ventilation systems will be utilized to control the level of airborne lead. These ventilation systems will be equipped with HEPA filtration and shall be maintained to ensure effective collection of the lead particulate. Personnel who maintain these systems and change the filters will be appropriately protected per this policy and standard to minimize exposure.


- **Personal Hygiene:**

Where lead is present at any level, project personnel handling such media containing lead will wear gloves to minimize exposure of lead to the skin that can then be transferred to the mouth. In all areas where lead is present, personnel will dutifully wash their hands and face before leaving the area to eat, drink, smoke, chew or apply cosmetics. Decontamination and changing facilities will be provided as necessary. In situations as indicated in the project HASP, PPE will be worn to protect the skin from exposure. However, even where PPE is worn, hand and face washing is required.

5.1.8 Medical Surveillance

Initial medical surveillance is required:

- If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year; or

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 9 of 12	<u>Approver</u> Tony Tremblay

- If employee personal exposures are reasonably expected to exceed the PEL on a least 10 calendar days per year.

Periodic exams are required on an annual basis for employees who continue to meet the criteria listed above. Annual exams may be discontinued after the exam conducted the year after personal exposures fall below the limits stated above in this section.

The specific medical exam requirements are explained in detail in ARCADIS SOP ARC HSGE010 - Medical Monitoring. In addition, ARCADIS will work with WorkCare to ensure the proper medical surveillance, testing and notification is completed related to exposure to lead. This includes timing of sampling (e.g., at least every 6 months to each covered employee; at least every two months for each employee whose last blood sampling and analysis indicated a blood lead level at or above 40 ug/100 g of whole blood; and at least monthly during the removal period), treatment if levels are elevated (e.g., temporary removal from the site), and employee notification (i.e., within 5 days of levels are not acceptable).

The physician must be supplied a copy of the OSHA lead regulation 29 CFR 1910.1025 and a description of the employee's lead exposure.

For employees exposed to lead from an emergency, ARCADIS will immediately call WorkCare and follow all instructions for treatment and testing.


6. TRAINING

Initial lead training is required for all employees assigned to a work area suspected or known to contain lead. This training can be accomplished at the project orientation prior to the initiation of site work.

Annual lead training is required for all employees an exposed to lead at levels equal to or greater than the OSHA Action Level.

Initial and annual training shall consist of:

- The operations that involve lead exposure
- The methods/observations that can be used to detect the presence or release of lead
- The physical and health hazards of lead
- Methods used to protect against the hazards of lead including PPE and respiratory protection
- The proper use of personal protective equipment in emergency situations
- The meaning of a regulated area and how such are demarcated
- A review of the applicable standard and where copies can be found
- An explanation of the medical surveillance program and an employee's right to access medical and exposure records

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 10 of 12	<u>Approver</u> Tony Tremblay

7. REFERENCES (regulation citation, technical links, publications, etc.)

- OSHA 29 CFR 1910.1025 – Lead
- OSHA 29 CFR 1926.62 – Lead
- ACGIH 2006 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices
- ARCADIS Medical Surveillance SOP – ARC HSGE006
- ARCADIS Respiratory Protection SOP – ARC HSGE017

8. RECORDS

All exposure, medical, and training records shall be kept for 40 years or at least 20 years past the last date of employment.

All exposure and medical records shall be made available to appropriate regulatory agencies upon written request.

Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of these results; a written request is not required.


9. APPROVALS AND HISTORY OF CHANGE

Tony Tremblay, CSP – Infrastructure Division Director of H&S



History of Change

Revision Date	Revision Number	Reason for change
26 March 2007	01	Original Document
6 September 2007	02	Changing to new template format
12 February 2009	03	Changing to new template format

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page 11 of 12	<u>Approver</u> Tony Tremblay

Revision Date	Revision Number	Reason for change
17 April 2012	04	Added Executive Summary
12 February 2013	05	Definitions moved to Exhibit 1; Added that PPE is provided at no cost to employees; Added section 5.1.1. Health Effects of Lead; Section 5.1.2 added information about assumption of lead exposure during construction activities until an initial exposure assessment is conducted; Section 5.1.7 respirator selection criteria was detailed; Annual lead training requirement clarified in Section 6.0; ARCADIS Logo updated


	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page E1 of E2	<u>Approver</u> Tony Tremblay

Exhibit 1 - Definitions

Action Level is the airborne concentration established by OSHA that triggers certain regulatory requirements.

Authorized person means any person authorized by ARCADIS and required by work duties to be present in lead regulated areas.

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.


Lead is encountered on ARCADIS projects as a contaminant in soils, ground and surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing lead are present. Personnel may also encounter lead in other forms at certain client facilities at which ARCADIS works. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites. In addition, other activities that may expose ARCADIS staff to lead include:

- Demolition or salvage of structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- Installation of products containing lead;
- Lead contamination/emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and
- Maintenance operations associated with the construction activities described in this paragraph.

High-efficiency particulate air [HEPA] filter means a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter.


Permissible Exposure Limit (PEL) is an average airborne concentration regulatory limit established by OSHA above which requires control to protect people from adverse health effects.

Short Term Exposure Limit (STEL) is a PEL or TLV established as a limit of exposure measured over a designated period of time less than 8 hours.

	<u>ARCADIS HS Standard Name</u> Lead	<u>Revision Number</u> 05
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Standard No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2013
<u>Author</u> Pat Vollertsen	Page E2 of E2	<u>Approver</u> Tony Tremblay

Threshold Limit Value is a recommended average airborne concentration limit established by American Conference of Governmental Industrial Hygienists (ACGIH). The TLVs are reviewed and updated as appropriate annually.

Time Weighted Average (TWA) is a measurement of airborne exposure to a chemical compound measured and averaged over a designated period of time for comparison to an STEL or an 8-hour PEL or TLV.


	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 1 of 12	<u>Approver</u> Tony Tremblay

EXECUTIVE SUMMARY

Damaging an underground or above ground utility can result in serious injury and loss of life, disrupt essential services, and create significant liability to ARCADIS, clients and subcontractors. Therefore, it is ARCADIS' policy that the presence of all existing utilities will be investigated and cleared (to the extent feasible) by locating, marking, and, where appropriate, visually verifying before the start of any field operation. The following requirements are mandatory under this policy:

- A minimum of **three (3) reliable lines** of evidence are required for an acceptable utility clearance.
- Additional lines of evidence are required if the primary three lines of evidence cannot adequately identify subsurface, submarine or above ground utilities within the area of proposed intrusive work.
- The lines of evidence used will be reasonable and appropriate for the conditions expected to be encountered (soil type, water table, etc.) and the type of utilities expected to be encountered (e.g., gas line versus an irrigation line).
- For point clearance (single intrusive point, used as 1 of the 3 required lines of evidence) the borehole must be cleared to 110% of the diameter of the intrusive device (i.e. auger, drill head, etc.) or an additional 2 inches of overall diameter, whichever is greater.
- Utility clearance information will be documented on the ARCADIS [Utility and Structures Checklist](#) (USC) or equivalent client provided checklist or permit.
- Employees overseeing utility clearance activities will:
 - Be familiar with the contents of this standard & [ARC HSFS-019 Supplement 2](#);
 - Have one year field experience in the identification of utilities; and
 - Have training and six months experience in the proper operation and results interpretation of any clearance equipment used by ARCADIS employees, including without limitation, magnetometers and ground penetrating radar.
- All utility strikes must be reported to [Corporate Health and Safety and Legal](#) within 24 hours using the [Utility Line Strike Investigation Form](#). **Do not enter the incident into 4-Sight until approved to do so by Corporate Legal. Refer to [ARC HSFS-019 Supplement 5](#), Utility Strike Emergency Action Plan Guidelines.**

[Report Utility
Incident Now](#)

	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 2 of 12	<u>Approver</u> Tony Tremblay

1. POLICY

It is the practice of ARCADIS and its affiliated companies to implement appropriate, reasonable and practical standards within acceptable and customary industry practices to promote the health and safety of its employees, and avoid and mitigate exposure of risk in the performance of their work. In furtherance of this policy, ARCADIS promotes and encourages compliance by all employees with this policy and standards relating to work in the vicinity of subsurface, submarine or aboveground utilities.

2. PURPOSE AND SCOPE

2.1 Purpose

This standard directs general safety standards and best practices associated with the identification and management of subsurface, submarine and aboveground utilities on project sites. Utility location SOP for submarine utilities can be found in [ARC HSFS-019 Supplement 6](#).

2.2 Scope

This standard assigns responsibilities and expectations for proper utility clearance by both ARCADIS employees and ARCADIS subcontractors at project sites.

3. DEFINITIONS

Above Ground Utilities - For the purpose of this procedure, above ground utilities include, but are not limited to: any above ground line, pipe, conduit, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications signals, electricity, gas, liquid, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, sanitary sewage, storm water, or other materials, liquids, or gases.


Subsurface Utilities - For the purposes of this procedure, subsurface utilities include, but are not limited to: any underground line, pipe, conduit, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications signals, electricity, gas, liquid, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, storm water, or sanitary sewage; underground storage tanks; tunnels and cisterns; and septic tanks and lines.

4. RESPONSIBILITIES

4.1 Project Manager Responsibilities

For every project site having the potential to come into contact with utilities, Project Managers must ensure that:

- The requirements of this standard are followed.
- Local regulations governing utility clearance are followed. This includes ensuring local and or state laws defining activities or depth of intrusive

	ARCADIS HS Standard Name Utility Location and Clearance	Revision Number 12
Implementation Date 13 December 2006	ARCADIS HS Standard No. ARCHSFS019	Revision Date 7 July 2013
Author Andrew McDonald	Page 3 of 12	Approver Tony Tremblay

work/excavation requiring utility clearance are reviewed as they vary by location. For further information refer to [One-Call and State Law Directory](#).

- Efforts are made to work with the client, project site representatives and subcontractors to identify the nature of any utilities, and to determine what control processes need to be implemented by ARCADIS and the subcontractors to prevent damage to these utilities and to properly manage the effects in the event there is utility damage.
- Utility clearance activities are only delegated to a Task Manager or other individual meeting the requirements of section 3.2 below, as appropriate. However, even if the Project Manager delegates certain responsibilities, the Project Manager maintains primary responsibility for a complete utility clearance. For additional information on PM responsibilities and best practices refer to [ARC HSFS-019 Supplement 1](#)


4.2 Field Personnel Responsibilities

ARCADIS field personnel conducting work on a project site having the potential to come into contact with utilities have the responsibility to:

- Read, understand, and follow this standard and [ARC HSFS-019 Supplement 2](#) and complete the appropriate checklists during the on-site utility locate process.
- Complete a minimum of 1 year of utility clearance related experience before accepting responsibility for any utility clearance tasks.
- Complete training and have 6 months of experience in operating and interpreting the results of remote sensing technologies, including without limitation, magnetometers and ground penetrating radar, before operating such technologies. Field staff should understand the technologies being utilized by a private utility locate contractor, and how they are operating in comparison with the site conditions. Refer to [ARC HSFS-019 Supplement 3](#) for more information.
- Use their Stop Work Authority to eliminate any reasonable concern if utilities cannot be reasonably located and contact the Project Manager to review the Stop Work situation and confirm the direction of action moving forward.
- Ensure that ARCADIS subcontractors conduct their own reasonable independent utility clearance efforts as required by ARCADIS' standard subcontract, and are aware of any ARCADIS clearance standards used onsite.
- Be on site during utility locate activities, and any active intrusive activities involving contractor under contract to ARCADIS.

4.3 ARCADIS Subcontractor Responsibilities

According to ARCADIS' standard subcontract, subcontractors have agreed to take responsibility for any damages resulting from a utility impact caused by their work. Therefore, ARCADIS subcontractors are expected to take reasonable time

	ARCADIS HS Standard Name Utility Location and Clearance	Revision Number 12
Implementation Date 13 December 2006	ARCADIS HS Standard No. ARCHSFS019	Revision Date 7 July 2013
Author Andrew McDonald	Page 4 of 12	Approver Tony Tremblay

and diligence to conduct their own independent utility clearance using reasonable standards and processes. Subcontractors have the responsibility to stop their work if utility concerns are identified and will report those concerns to the ARCADIS employee overseeing their work activities. ARCADIS staff should reinforce these responsibilities with subcontractors during job safety briefings.

In jurisdictions where the actual contractor performing the intrusive work activity is required to perform utility clearance notifications, the contractor will perform the clearance notification and will provide evidence of the notification to ARCADIS (ticket or ticket number, etc). Refer to ARC [HSFS-019 Supplement 4](#) for Best Practices for State One Call procedures.

5. STANDARD

5.1 General

Protocols to be followed during utility clearance activities are outlined in:


- Best Practices for Project Managers (or Their Delegates) Concerning Utility Clearance ([ARC HSFS-019 Supplement 1](#)).
- Best Practices for Field Personnel Concerning Utility Clearance ([ARC HSFS-019 Supplement 2](#)).
- Use and Limitations of Common Underground Locating Technologies and Clearance Methods ([ARC HSFS-019 Supplement 3](#))
- Best Practices for State One Call Procedures ([ARC HSFS-019 Supplement 4](#))
- Emergency Action Plan guidelines for Utility Strikes ([HSFS-019 Supplement 5](#))
- Utility Location Standard Operating Procedure for Aquatic Work Activities ([ARC HSFS-019 Supplement 6](#))

5.2 Lines of Evidence

A minimum of 3 reliable lines of evidence are required for an appropriate utility clearance as defined in this standard. Generally, the following lines of evidence may be utilized to meet this requirement:

- Contact the State One Call or equivalent service (Nationwide “[811](#)” is acceptable). For work on private property or in areas not served by such services, utilize a reputable private utility locating company to locate and mark the utilities. Use of a private utility locator is encouraged for all projects with subsurface or submarine utility issues. Note that One Call can provide valuable information regarding locations and types of utilities entering the private property, even when not marking the actual intrusive work area.
- Use detailed scaled site utility plans, preferably in the form of an “as-built” or “record” drawing, to identify and/or confirm utility locations. Document request and/or receipt of utility drawings from the property owner/client on the Utilities and Structures Checklist.

View the
[Utilities and Structures Checklist](#)

	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 5 of 12	<u>Approver</u> Tony Tremblay

- Conduct a detailed visual site inspection to identify and/or confirm utility locations. For underground utilities, conduct an inspection for structures that tend to indicate the presence and general location of such utilities, including, but not limited to manholes, vaults, valve covers, valve markers, telephone pedestals, transformer housings, fire hydrants, spigots, sprinkler heads, air relief valves, backflow preventers, meters, downspouts going into the subsurface, power poles with wiring going into the subsurface and line markers. Saw cut lines and concrete /asphalt repairs often yield valuable information regarding utility locations. Always discuss the presence of utilities with the site owner, operator and/or occupant to identify any potential utilities that might not be readily identified by non-intrusive clearing methods or may be:
 - At depths > 5 ft below ground surface; or
 - At very shallow depths (< 2ft below ground surface) such as communication lines, electrical conduits/wiring, irrigation lines, etc.

If one of the above lines of evidence cannot be utilized, or if using the above lines of evidence does not adequately identify utilities with reasonable certainty, one or more additional lines of evidence must be utilized. Commonly used lines of evidence are listed on the [Utility and Structures Checklist](#).


A discussion of use and limitations associated with common utility location and clearance methods is provided in [ARC HSFS-019 Supplement 3](#).









Standard operating procedures for utility location in subaquatic settings are presented in [ARC HSFS-019 Supplement 6](#).

The lines of evidence will be recorded on the Utility and Structures Checklist or equivalent client provided checklist or permit.

5.3 Color Codes Used for Utility Markings

The following colors are used for marking utilities. Some government agencies or large industrial facilities may use additional colors not provided below. ARCADIS policy is to assume any paint marking or pin flag color not provided below is a subsurface utility marking until proven otherwise.

 Infrastructure · Water · Environment · Buildings	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 6 of 12	<u>Approver</u> Tony Tremblay

COLOR	Utility Line
WHITE 	Proposed Excavation
PINK 	Temporary Survey Markings
RED 	Electrical Power Lines, Cables, Conduit and Lighting Cables
YELLOW 	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE 	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE 	Potable Water
PURPLE 	Reclaimed Water, Irrigation and Slurry Lines
GREEN 	Sewer and Drain Lines

APWA and ANSI standard Z-53.1

5.4 Locating Technologies


There are several types of locating technologies that can be used to identify and locate utilities in the subsurface. Project teams need to work closely with private utility locators (PUL) in order to best match locating technology with site conditions. To provide the best results all possible locating technologies should be available for use and implementation at the project location. Any potential interferences should also be discussed up front and then at the project site during utility location activities. Potential interferences could be soil moisture, soil type, standing water on concrete/asphalt, rebar, fencing, and metal structures that are in the subsurface. Employees overseeing locating technology activities should have an understanding of device operation and limitations. For further information refer to [ARC HSFS-019 Supplement 3](#), Use and Limitations of Common Utility Location Technologies and Clearance Methods.

5.5 Clearance Methods

In some cases, proposed intrusive locations may be pre-cleared using other intrusive methods. Determine the clearance or soft dig method based on site conditions and utilize the least invasive method possible. The number of intrusive locations and soil type should be taken into consideration. The following clearance methods are listed from least invasive to most:

1. Vacuum Extraction/Potholing (air or water based),
2. air knifing,
3. hydro knifing,
4. probing,
5. hand auguring
6. hand digging, and
7. posthole digging.

Single point clearance must be 110% of the proposed intrusive area, or the diameter plus 2", whichever is greater. 3-Point clearance must be installed in a triangular pattern around the proposed borehole and in a configuration not to allow for utilities to enter the borehole. 3-Point clearance must be 110% of the

	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 7 of 12	<u>Approver</u> Tony Tremblay

proposed intrusive area, or the diameter of the intrusive area plus 2”, whichever is greater. Each method of clearance should be documented on the Utility and Structure Checklist.

Prior to the start of intrusive activities, all utilities must be located and measures instituted to avoid subsurface utility hazards. Do not conduct subsurface work within 30 inches of a line marking and around the utility in a 360° direction. If subsurface work must take place within the 30 inch buffer zone of the line marking, the utility must be exposed (potholed) by soft dig / clearance methods prior to starting intrusive work; **no mechanized equipment is permitted for the exposing of the utility.** Once the utility has been exposed, if mechanized equipment is planned for use within the 30 inch buffer zone of the utility, such activity must receive pre-approval by Corporate H&S and others, as necessary, to mitigate or accept the risk associated with the planned work. Additional excavation safety procedures may have to be developed as part of the approval to proceed. It should be noted that any disturbance within the 30 inches or disruption of the bedding materials could affect the integrity of the utility.


For horizontal borings, do not drill within 30 inches of the line in the vertical direction (above or below the top or bottom of the utility). Make sure to factor the diameter of the line when computing 30 inch buffer zone. When exposing utilities for horizontal borings the same exposing techniques would be required as above.

During well installations via mechanical equipment, the 30 inch buffer zone rule applies outward from the outside edge of the largest diameter auger or tool to be used for installation and abandonment (over drilling). In cases where wells have been previously installed and the 30 inch rule has not been followed, approval for using mechanized equipment to work within the 30 inch buffer zone will require approval from Corporate H&S.

Manual clearing methods such as shoveling, using pick axes, digging bars and other hand tools should be avoided completely or only used when absolutely necessary and used with caution. Excessive down force, prying or use in poor/obstructed visibility conditions is prohibited as these tools can damage utilities.

Surface cover (e.g., asphalt) removal methods that pose excessive down force such as Jackhammering should be used with extreme caution. Methods that only cut the surface cover (coring or saw cutting) present less risk due to the absence of the downward force which could cause collateral damage to shallow subsurface utilities. Note that utilities are often present at the concrete or pavement/soil interface or encased within the concrete or pavement and are easily damaged during concrete coring or pavement removal. Always work slowly, methodically and frequently stop work to evaluate conditions during these work activities.

For borings and excavations, if the utility is known to be at depths where hand clearing is not feasible or creates additional safety concerns, no work will be performed within 30 inches vertically or horizontally of the utility unless manual clearing is performed under the oversight of an Excavation Competent Person as defined in [ARC HSCS005 ARCADIS Excavation and Trenching](#).

 Infrastructure · Water · Environment · Buildings	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 8 of 12	<u>Approver</u> Tony Tremblay

For horizontal borings, to avoid potential of utility strike, damage from vibration, damage by pressure of the advancing boring, do not plan the drill boring location within 30 inches of utilities. This requirement applies even if the operating contractor has technology that places the location to within a few inches. Make sure to factor the diameter of the utility when determining the 30 inch buffer zone.

Additional cautions for horizontal borings include gravity utilities such as sewers and storm drains as the depth of these utilities will change (sometimes significantly) as they run across the project site. Always obtain the utility depth at the location where the boring will actually cross the line.

5.6 Acceptable Clearance for Working in Vicinity of Overhead Power Lines

No work will be performed by ARCADIS or our subcontractor near overhead power lines where any Unqualified Person or equipment is within the limits specified below, unless the power line has been properly covered or de-energized by the owner or operator of the power line. Qualified Person approach distances are defined in Exhibit 5 of [ARC HSFS0006 Electrical Safety Standard](#).


Power Line Voltage Phase to phase (kV)	Minimum Safe Clearance (feet)
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

ANSI standard B30.5-1994, 5-3.4.5

5.6.1 Reducing Vehicle and Mechanical Equipment Clearance Requirements

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 ft. (305 cm) is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 in. (10 cm) for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. (122 cm). If the voltage is higher than 50kV, the clearance shall be increased 4 in. (10 cm) for every 10 kV over that voltage.
- If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 9 of 12	<u>Approver</u> Tony Tremblay

- If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) may be reduced to the distance given in Exhibit 1 - Table S-5.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments unless:

- The employee is using protective equipment rated for the voltage; or
- The equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the line than permitted in this section of this standard.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

When a machine is in contact with an overhead power line, do not allow anyone to come near or touch the machine. Stay away from the machine and summon outside assistance.

5.7 Reporting Utility Incidents


ARCADIS field personnel involved with any subsurface, submarine, and above-ground utility strikes should immediately stop work and contact the Project Manager to discuss the incident. The utility strike must be reported to Corporate Health and Safety and Legal Departments immediately, and no later than 24 hours. Use the [Utility Line Strike Investigation Form](#) as part of the notification process.

Selected utility strike incidents may also utilize a conference call with operations management to review findings and lessons learned. The Divisional Health and Safety Director will make the determination concerning the need to have the incident review call, and will arrange the call, if deemed necessary.

5.8 Relationship of this standard to the Project Specific HASP

With the exception of the Utility and Structures Checklist, this standard, including most supplements, are not designed to be printed off and attached to project HASPs. During project health and safety planning, this standard will be reviewed and applicable clearance technologies and methods will be documented on the Utility and Structures Checklist.

Additionally, emergency action standards specific to utility strikes should be addressed. [ARC HSFS-019 Supplement 5](#) provides general guidelines for emergency response to utility strikes. Applicable information may be attached to

	ARCADIS HS Standard Name Utility Location and Clearance	Revision Number 12
Implementation Date 13 December 2006	ARCADIS HS Standard No. ARCHSFS019	Revision Date 7 July 2013
Author Andrew McDonald	Page 10 of 12	Approver Tony Tremblay

the Utility and Structures Checklist to facilitate communication of response expectations.

5.9 Required Contract Terms and Conditions


ARCADIS' standard client and subcontractor contracts contain required terms and conditions defining responsibility for utility clearance and the allocation of risk associated with an impacted utility. These terms and conditions have prescribed language concerning subsurface work that is presented in ARCADIS [client contracts](#) and ARCADIS [subcontractor contracts](#). If such provisions cannot be agreed upon, the reasons are documented and other risk-management actions should be identified, such as limits of liability, add additional physical investigations, additional lines of evidence or utility location, assignment of risk to subcontractors, etc. In addition, any changes to these terms and conditions require approval by Legal Services.

6. TRAINING

Employees responsible for coordinating or conducting utility clearance activities will be familiar with the requirements of this standard. ARCADIS in-house 8-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) refresher provides awareness-level training regarding this utility location and clearance standard.

7. REFERENCES

- [Utility and Structures Checklist](#)
- [Utility Line Strike Investigation Form](#)
- [ARC HSFS-019 Supplement 1](#), Best Practices for Project Managers (or Their Delegates) Concerning Utility Clearance
- [ARC HSFS-019 Supplement 2](#), Best Practices for Field Personnel Concerning Utility Clearance
- [ARC HSFS-019 Supplement 3](#), Use and Limitations Associated with Location Technologies and Common Utility Clearance Methods
- [ARC HSFS-019 Supplement 4](#), Best Practices for State One Call Procedures and Notifications
- [ARC HSFS-019 Supplement 5](#), Emergency Action Plan guidelines for Utility Strikes
- [ARC HSFS-019 Supplement 6](#), Utility Location SOP for Aquatic Work Activities
- [ARC HSCS005 Excavation and Trenching](#)
- [One-Call and State Law Directory](#)
- [Required client contract language concerning subsurface work](#)

	ARCADIS HS Standard Name Utility Location and Clearance	Revision Number 12
Implementation Date 13 December 2006	ARCADIS HS Standard No. ARCHSFS019	Revision Date 7 July 2013
Author Andrew McDonald	Page 11 of 12	Approver Tony Tremblay

- [Required subcontractor language concerning subsurface work](#)

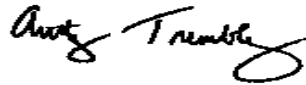
8. RECORDS

8.1 Utility Clearance Records

All records (maps, checklists and documentation of communications) used to determine the location of utilities should be retained and kept in the project file.


9. APPROVALS AND HISTORY OF CHANGE

Approved By: Tony Tremblay, CSP – Corporate H&S, Director of Technical Programs



History of Change

Revision Date	Revision Number	Standard Developer or Revised By / Approver	Reason for change
13 December 2006	01		Original document
26 March 2007	02		Put in new company format
15 May 2007	03		Added nation-wide 811 number
6 September 2007	04		Changing over to new template format
22 February 2008	05		Changing over to new template format
13 January 2009	06		Define lines of evidence
4 October 2010	07		Reformatting and addition of utility clearance information
13 February 2012	08		Modified link information for utility strike reporting, clarified local/state requirements in section 4.1 and 4.3
28 January 2013	09		Utility and Structures Checklist revised; hyperlink updated

	<u>ARCADIS HS Standard Name</u> Utility Location and Clearance	<u>Revision Number</u> 12
<u>Implementation Date</u> 13 December 2006	<u>ARCADIS HS Standard No.</u> ARCHSFS019	<u>Revision Date</u> 7 July 2013
<u>Author</u> Andrew McDonald	Page 12 of 12	<u>Approver</u> Tony Tremblay

Revision Date	Revision Number	Standard Developer or Revised By / Approver	Reason for change
12 February 2013	10		Clarified clearance boundaries for Unqualified staff in Section 5.7 and added information about vehicles and equipment being used near power lines in Section 5.7.1
15 March 2013	11	Kurt Merkle, Rebecca Lindeman / Tony Tremblay	Added additional text to standard for recent lessons learned, added section 5.4 (Locating Technologies) and 5.5 (Clearance Methodologies), added additional details to section 5.6 when working in close proximity to subsurface utilities, and added Supplement 6 - Utility Location SOP for Aquatic Work Activities.
07 July 2013	12	Andrew McDonald/ Tony Tremblay	Removed HSFS-019 Supplement 1, Utility Definitions. Added hyperlink for One-Call and State Law Directory. Segregated evidence of sewer or storm drains in USC. Removed Sam Moyers and added Andrew McDonald as author.

Job Safety Analysis

General

JSA ID	7622	Status	(3) Completed
Job Name	Environmental-Drilling, soil sampling, well installation	Created Date	6/8/2012
Task Description	Drilling, soil sampling, well installation, and well decommissioning	Completed Date	06/20/2012
Template	False	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Putnam, Lauren	6/29/2012	6/8/2012	Hill, Sarah	<input checked="" type="checkbox"/>
HASP Reviewer	Edwards, Lauren	6/22/2012	6/20/2012	Lenz, Mark	<input checked="" type="checkbox"/>
Quality Reviewer	Newcombe, Andy	6/25/2012	6/25/2012	Secor, Beth	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Set up necessary traffic and public access controls	1 Struck by vehicle due to improper traffic controls	Use a buddy system for placing site control cones and/or signage. Position vehicle so that you are protected from moving traffic. Wear Class II traffic vest	
2	Utility Clearance	1 Potential to encounter underground or above ground utilities while drilling.	Complete utility clearance in accordance with the ARCADIS Utility Clearance H&S Standard.	ARCADIS H&S Standard ARCHSFS019
3	General drill rig operation	1 Excessive noise is generated by rig operation.	When the engine is used at high RPMs or soil samples are being collected, use hearing protection.	
		2 During drill rig operation, surfaces will become hot and cause burns if touched, and COCs in the soils more readily vaporize generating airborne contaminates.	Due to friction and lack of a drilling fluid, heat will be produced during this method. Mainly drill augers. Be careful handling split spoons. Wear proper work gloves. When soils and parts become heated, the COC could volatilize. Air monitoring should always be performed in accordance with the HASP.	
		3 Moving parts of the drilling rig can pull you in causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts.	Stay at least 5 feet away from moving parts of the drill rig. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing, and tie long hair back. Avoid wearing jewelry while drilling. Cone off the work area to keep general public away from the drilling rig.	
		4 Dust and debris can cause eye injury and soil cuttings and/or water could contain COCs.	Wear safety glasses and stay as far away from actual drilling operation as practicable. Wear appropriate gloves to protect from COCs.	
		5 Drilling equipment laying on the ground (i.e. augers, split spoons, decon equipment, coolers, etc), create a tripping hazard. Water from decon buckets generate mud and cause a slipping hazard.	Keep equipment and trash picked up, and store away from the primary work area.	
		6 The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Clearance H&S Standard for guidance.	

4	Mudd rotary drilling	1	The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	
		2	This technology uses fluid, which collects with sediments in large basin. Fluid can splash out and cause slipping/mud hazard. Liquid mixture can splash into your eyes.	Wear rubber boots if needed, and keep clear of muddy/wet area as much as practicable. If area becomes excessively muddy, consider mud spikes or covering the area with a material that improves traction. Wear safety glasses.	
5	Hollow stem auger drilling	1	All hazards in step 3 apply. Additionally, The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	
		2	Hands or fingers can get caught and crushed if trying to clean by hand or with tools while the auger is still turning.	Auger should always be stopped and clutch disengaged prior to cleaning.	
6	Air Rotary Drilling	1	This drilling method works with high air pressure and can generate flying debris that can strike your body or get in your eyes.	When the drill rig is being driven into media, it will produce flying debris. The flaps behind the drill rig should stay closed whenever possible to reduce the risk of flying debris. Safety glasses and hard hat should always be worn when the drill rig is operating. When penetrating asphalt, protect surrounding cars that may be present to avoid damage to pain or windshields.	
		2	The raise derrick can strike overhead utilities, tree limbs or other elevated items.	Never move this rig with the derrick up. Ensure there is proper clearance to raise the derrick and that you are far enough away from overhead power lines. See the Utility clearance H&S Standard for guidance.	
		3	When drilling through bedrock prior to groundwater, dust can be produced from pulverization. Inhalation of dusts/powder can occur.	Supplemental water should be used to manage dust and/or dust masks should be used if necessary.	
7	Reverse rotary drilling	1	This method will use fresh water to pump out drill cuttings through the center of the casing. Water/sediment mixture is generated and could cause contact with impacted soils or groundwater.	Ensure the pit construction can hold the amount of cuttings that are anticipated. Air monitoring should also be used of pit area.	
		2	Fire hydrants are often used for water source. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Water usage from fire hydrants should be cleared with local municipalities prior to use. Only persons that know how to use the hydrant should be performing this task. Ensure all connections are tight, and hose line is not run over to cut by traffic. Any leaks from the hydrant should be reported immediately.	
		3	Settling pit construction can cause tripping hazard from excavated soils, and plastic sheeting can cause slipping.	Cone off the area to keep the general public/visitors away from the settling pit. Ensure proper sloping of excavation.	
		4	The raised derrick can strike overhead utilities, tree limbs or other elevated items.	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	

8	Rotosonic drilling	1	Fire hydrants are often used for water source. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Water usage from fire hydrants should be cleared with local municipalities prior to use. Only persons that know how to use the hydrant should be performing this task. Ensure all connections are tight, and hose line is not run over to cut by traffic. Any leaks from the hydrant should be reported immediately.	
		2	This method requires a lot of clearance. The drill head can turn 90 degrees to attach to the next drill flight or casing. This usually requires a large support truck to park directly behind the rig. As the drill head raises the new casing flight is angled down at the same time until it can be turned completely vertical.	Ensure sufficient overhead clearance.	
		3	Heavy lifting of cores can cause muscle strain.	Always use 2 people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use job rotation.	
		4	The rotosonic drill head can move very quickly up and down while working on a borehole. Moving parts can strike someone or catch body parts.	The operator and helper must communicate and stay clear of the path of the drill head. The drill utilizes two large hydraulic clamps to continuously hold casings while load/unloading previous casings. Do not wear loose clothing.	
9	Direct push drilling	1	The drill rods will be handled by workers most of the time rather than the rig doing it, therefore pinch points can cause lacerations and crushing of fingers/body parts.	Keep a minimum of 5 feet away from drill rig operation and moving parts.	
		2	The direct push rigs are usually meant to fit in spaces where larger rig can't. Tight spaces can pin workers.	Do not put yourself between the rig and a fixed object. Use Spotters or a tape measure to ensure clearances in tight areas. Pre-plan equipment movement from one location to the next.	
		3	Some direct push equipment is controlled by wireless devices. These controls can fail and equipment can strike workers or cause damage to property.	The drill rig should be used in a large open area to test wireless controls prior to moving to boring locations. The operator of the rig will test the kill switch with wireless remote prior to use. Operator will stay in range of rig while moving so that wireless signal will not be too weak and cause errors to the controls.	
		4	Sampling sleeves must be cut to obtain access to soil. Cutting can cause lacerations.	It's preferable to let the driller cut the sleeves open. Many drillers have holders for the sleeve to allow for stability when cutting. If you cut the sleeves, use a hook blade, change blade regularly, and cut away from the body.	
		5	Soil cores may contain contaminated media.	Wear nitrile gloves and safety glasses for protection from contaminated media when logging soil borings.	
10	Rock coring	1	Flying debris can hit workers or cause debris to get in eyes.	Rock chips or overburden may become airborne from drilling method. Wear safety glasses and hard hat and remain at a safe distance from back of drill rig.	
		2	Heavy lifting of cores can cause muscle strain.	Always use 2 people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use job rotation.	

11	Sample collection and processing	1	Injuries can result from pinch points on sampling equipment, and from breakage of sample containers.	Care should be taken when opening sampling equipment. Look at empty containers before picking them up, and do not over-tighten container caps. Use dividers to store containers in the cooler so they do not break.	Sample Cooler Handling JSA
		2	Lifting heavy coolers can cause back injuries.	Use two people to move heavy coolers. Use proper lifting techniques.	
12	Monitoring well installation	1	Same hazards as in Step 3 with general drill rig operation	See step 3	
		2	Monitoring well construction materials can clutter the work area causing tripping hazards.	Well construction materials should be picked up during the well installation process.	
		3	Heavy lifting can cause muscle strains, and cutting open bags can cause lacerations.	Well construction materials are usually 50 lbs or greater. Team lift or use drill rig to hoist bags. Always use work gloves while cutting open bags.	
		4	Well pack material (i.e. sand, grout, bentonite) can become airborne and get in your eyes.	Wear safety glasses for protection from airborne sand and dust.	
		5	Cutting the top of the well to size can cause jagged/sharp edges on the top of the well casing.	Wear gloves when working with the top of the well casing, and file any sharp jagged edges that resulted from cutting to size.	
13	Monitoring Well Decommissioning	1	Same hazards as in Step 3 with general drill rig operation	See Step 3	
		2	Monitoring well decommissioning materials can clutter the work areas causing tripping hazards.	Well decommissioning materials should be picked up during the well decommissioning process.	
		3	Heavy lifting can cause muscles strains, and cutting open bags can cause lacerations.	Well decommissioning materials are usually 50 lbs or greater. Team lift or use drill rig to hoise bags. Always use work gloves while cutting open bags.	
		4	Well pack material (i.e., sand, grout, bentonite) can become airborne and get in your eyes.	Wear safety glasses for protection from airborne sand and dust.	
		5	Removal of the protective casing and well casing to a depth of approximately 3 to 4 feet below ground surface (bgs) can cause jagged/sharp edges on the top of the remainig portion of the well casing.	Wear gloces when working with the top of the well casing, and file any sharp jagged edges that resulted from cutting bgs.	
		6	Surface finish materials can create a trip hazard if not installed flush with surrounding surface.	Fill borehole and create surface finish flush with surrounding grade with appropriate matching material.	
14	Soil cutting and purge water management	1	Moving full drums can cause back injury, or pinching/crushing injury.	Preferably have the drilling contractor move full drums with their equipment. If this is not practicable, use lift assist devices such as drum dollies, lift gates, etc. Employ proper lifting techniques, and perfrom TRACK to identify pinch/crush points. Wear leather work gloves, and clear all walking and work areas of debris prior to moving a drum.	Drum Handling JSA

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III		Required
Respiratory Protection	dust mask		Recommended

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	Driller to Provide and Manage	Recommended
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
	water/fluid replacement		Recommended
Traffic Control	traffic cones		Required

Review Comments		
Reviewer	Comments	
Employee: Edwards, Lauren Role HASP Reviewer Review Type Approve Completed Date 6/20/2012		
Employee: Newcombe, Andy Role Quality Reviewer Review Type NA Completed Date 6/25/2012	Thorough well documented and planned JSA. Good clarification of the hazards associated with different drilling techniques.	

ARCADIS

Appendix C

HASP Forms



TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Project Name:			Project Location:		
Date:	Time:	Conducted by:	Signature/Title:		
Client:		Client Contact:	Subcontractor companies:		

TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

1 _____	3 _____	5 _____
2 _____	4 _____	6 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Pework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	<u>Doc #</u>		<u>Doc #</u>
<input type="checkbox"/> Not applicable	<u>Doc #</u>	<input type="checkbox"/> Working at Height	<input type="checkbox"/> Confined Space
<input type="checkbox"/> Energy Isolation (LOTO)	_____	<input type="checkbox"/> Excavation/Trenching	<input type="checkbox"/> Hot Work
<input type="checkbox"/> Mechanical Lifting Ops	_____	<input type="checkbox"/> Overhead & Buried Utilities	<input type="checkbox"/> Other permit

Discuss following questions (for some review previous day's post activities). **Check if yes :**

<input type="checkbox"/> Incidents from day before to review?	<input type="checkbox"/> Lessons learned from the day before?	<input type="checkbox"/> Topics from Corp H&S to cover?
<input type="checkbox"/> Any corrective actions from yesterday?	<input type="checkbox"/> Will any work deviate from plan?	<input type="checkbox"/> Any Stop Work Interventions yesterday?
<input type="checkbox"/> JLAS or procedures are available?	<input type="checkbox"/> Field teams to "dirty" JLAS, as needed?	<input type="checkbox"/> If deviations, notify PM & client
<input type="checkbox"/> Staff has appropriate PPE?	<input type="checkbox"/> Staff knows Emergency Plan (EAP)?	<input type="checkbox"/> All equipment checked & OK?
Comments: _____		<input type="checkbox"/> Staff knows gathering points?

Recognize the hazards (check all those that are discussed) (Examples are provided) and **Assess** the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

<input type="checkbox"/> Gravity (i.e., ladder, scaffold, trips) (L M H)	<input type="checkbox"/> Motion (i.e., traffic, moving water) (L M H)	<input type="checkbox"/> Mechanical (i.e., augers, motors) (L M H)
<input type="checkbox"/> Electrical (i.e., utilities, lightning) (L M H)	<input type="checkbox"/> Pressure (i.e., gas cylinders, wells) (L M H)	<input type="checkbox"/> Environment (i.e., heat, cold, ice) (L M H)
<input type="checkbox"/> Chemical (i.e., fuel, acid, paint) (L M H)	<input type="checkbox"/> Biological (i.e., ticks, poison ivy) (L M H)	<input type="checkbox"/> Radiation (i.e., alpha, sun, laser) (L M H)
<input type="checkbox"/> Sound (i.e., machinery, generators) (L M H)	<input type="checkbox"/> Personal (i.e. alone, night, not fit) (L M H)	<input type="checkbox"/> Driving (i.e. car, ATV, boat, dozer) (L M H)

Continue TRACK Process on Page 2

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

STOP WORK AUTHORITY (Must be addressed in every Tailgate meeting - (See *statements below*))

- Elimination
- Engineering controls
- General PPE Usage
- Personal Hygiene
- Emergency Action Plan (EAP)
- JLA to be developed/used (*specify*)

- Substitution
- Administrative controls
- Hearing Conservation
- Exposure Guidelines
- Fall Protection
- LPO conducted (*specify job/JLA*)

- Isolation
- Monitoring
- Respiratory Protection
- Decon Procedures
- Work Zones/Site Control
- Traffic Control
- Other (*specify*)

Signature and Certification Section - Site Staff and Visitors

Name/Company/Signature	Initial & Sign in Time	Initial & Sign out Time	I have read and understand the

Important Information and Numbers

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&S at

Visitor Name/Co - not involved in work

In	Out
In	Out
In	Out
In	Out

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB**, I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- Lessons learned and best practices learned today: _____
- Incidents that occurred today: _____
- Any Stop Work interventions today? _____
- Corrective/Preventive Actions needed for future work: _____
- Any other H&S issues: _____

Keep H&S 1st in all things WorkCare - 1.800.455.6155

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (Material used settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds/Hazards Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		
Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

List Trained Employee(s):

Appendix D

PPE Equipment List

PPE CHECKLIST

R = Equipment required to be present on the site. **O** = Optional equipment. Subcontractors must have the same equipment listed here as a minimum.

Description (Put Specific Material or Type in Box)	Level Of Protection		
	D	C	B
Body			
Coveralls			
Chemical Protective Suit			
Splash Apron			
Rain Suit	O		
Traffic Safety Vest (reflective)	R		
Head			
Hard Hat (if does not create other hazard)	R		
Head Warmer (depends on temperature and weather conditions)	O		
Eyes & Face			
Safety Glasses (incorporate sun protection as necessary)	R		
Goggles (based on hazard)			
Splash Guard (based on hazard)			
Ears			
Ear Plugs	R		
Ear Muffs			
Hands and Arms			
Outer Chemical Resistant Gloves			
Inner Chemical Resistant Gloves			
Insulated Gloves			
Work Gloves*	R		
Foot			
Safety Boots (steel toe and shank)	R		
Rubber, Chemical Resistant Boots			
Rubber Boots			
Disposable Boot Covers			
Respiratory Protection			
1/2 Mask APR			
Full Face APR			
Dust Protection			
Powered APR			
SCBA			
Air Line			

ARCADIS

Appendix E

MSDSs

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations



SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **ALCONOX®**
CHEMICAL FAMILY NAME: Detergent.
PRODUCT USE: Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER: Not Applicable
U.N. DANGEROUS GOODS CLASS: Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME: Alconox, Inc.
ADDRESS: 30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE: **TOLL-FREE in USA/Canada** 800-255-3924
International calls 813-248-0585
BUSINESS PHONE: 914-948-4040
DATE OF PREPARATION: May 2011
DATE OF LAST REVISION: February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS



EUROPEAN and (GHS) Hazard Symbols



Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1

EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 207-638-8 Index# 011-005-00-2

EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray

P264: Wash hands thoroughly after handling

P271: Use only in well ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

MATERIAL SAFETY DATA SHEET

ALCONOX®

Risk Phrases:

R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:

S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS:

ACUTE: Eye, respiratory System, Skin

CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard JIS Z 7250: 2000.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing difficulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT:

Not Flammable

AUTOIGNITION TEMPERATURE:

Not Applicable

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): NA Upper (UEL): NA

FIRE EXTINGUISHING MATERIALS:

As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

This product is non-flammable and has no known explosion hazards.

Explosion Sensitivity to Mechanical Impact:

Not Sensitive.

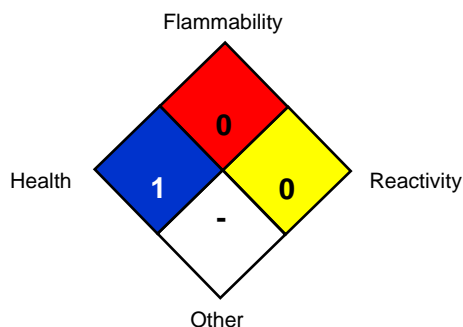
Explosion Sensitivity to Static Discharge:

Not Sensitive

SPECIAL FIRE-FIGHTING PROCEDURES:

Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD (BLUE)			1
FLAMMABILITY HAZARD (RED)			0
PHYSICAL HAZARD (YELLOW)			0
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8
For Routine Industrial Use and Handling Applications			

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.

SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m ³	5 mg/m ³	5 mg/m ³
Sodium Carbonate	497-19-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable

DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m ³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m ³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.

SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: No Data available at this time.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Non-Regulated Material

HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable

UN IDENTIFICATION NUMBER: Not Applicable

PACKING GROUP: Not Applicable.

DOT LABEL(S) REQUIRED: Not Applicable

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable

MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:

This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):

This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:

This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

MATERIAL SAFETY DATA SHEET

ALCONOX®

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

MATERIAL SAFETY DATA SHEET

ALCONOX®

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-in-place. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.



Compliance Today and Beyond

First Aid Measures
Personal Protection
Handling/Storage

Fire Fighting Measures
Physical-Chemical Properties
Chemical Ingredients

Manufacturer/Responsible Party
Accidental Release Measures
HAZCOM Label

Product Identification

Product ID: ISOBUTYLENE

MSDS Date: 01/01/1987 Tech Review: 03/07/1986

FSC: 6810 NIIN: LIIN: 00F002685 MSDS Number: 003409

Submitter: F BT

Status Cd: C

MFN: 01

Article: N

Kit Part: N

Manufacturer-Responsible Party

Company Name: LIQUID AIR CORPORATION

Address:

Box:

City: N/P State: NK ZIP: 00000 Country: NK

Info Phone Num:

Emergency Phone Num: (800) 231-1366

Resp. Party Other MSDS Num.:

Preparer's Name: N/P

Chemtrec Ind/Phone:

Proprietary Ind: Y

Review Ind: Y

Published: Y

CAGE: DO426

Special Project Cd: N

Contractor Identification

Company Name: LIQUID AIR CORP CALIFORNIA PLZ

Address: 2121 N CALIFORNIA BLVD

Box:

City: WALNUT CREEK State: CA ZIP: 94596 Country: US

Phone: 925-977-6500

Contract Num:

CAGE: 18260

Company Name: LIQUID AIR CORPORATION

Address: 2121 N. CALIFORNIA BLVD., SUITE 350
Box: N/K
City: WALNUT CREEK State: CA **ZIP:** 94596 **Country:** NK
Phone: 510-977-6500
Contract Num:
CAGE: DO426

CHEMICAL INGREDIENTS

Ingred Name: * PROPRIETARY HMIS *****

CAS: Cd:

RTECS #: Cd:

= Wt: Cd:

= Vol: Cd:

> Wt: Cd:

>Vol: Cd:

< Wt: Cd:

<Vol: Cd:

% Low Wt: Cd:

% High Wt: Cd:

% Low Vol: Cd:

% High Vol: Cd:

% Text:

Environmental Wt:

Other REC Limits:

OSHA PEL: Cd:

OSHA STEL: Cd:

ACGIH TLV: Cd:

ACGIH STEL: Cd:

EPA Rpt Qty:

DOT Rpt Qty:

Ozone Depleting Chemical:

Ingred Name:

CAS: Cd:

RTECS #: Cd:

= Wt: Cd:

= Vol: Cd:

> Wt: Cd:

>Vol: Cd:

< Wt: Cd:

<Vol: Cd:

% Low Wt: Cd:

% High Wt: Cd:

% Low Vol: Cd:

% High Vol: Cd:

% Text:

Environmental Wt:

Other REC Limits:

OSHA PEL: Cd:

OSHA STEL: Cd:

ACGIH TLV: Cd:
ACGIH STEL: Cd:
EPA Rpt Qty:
DOT Rpt Qty:
Ozone Depleting Chemical:

Hazards Identification

LD50 LC50 Mixture : N/P

Route of Entry Inds -

Inhalation: N/P

Skin: N/P

Ingestion: N/P

Carcinogenicity Inds -

NTP: N/P

IARC: N/P

OSHA: N/P

Health Hazards Acute and Chronic

N/P

Explanation of Carcinogenicity

N/P

Signs and Symptions of Overexposure

INHALATION: DIZZINESS, DROWSINESS AND EVENTUAL UNCONSCIOUSNESS. SKIN/EYE: MILDLY IRRITATION.

Medical Cond Aggravated by Exposure

N/P

First Aid Measures

First Aid

INHALATION: UNCONSCIOUS PERSONS SHOULD BE MOVED TO AN UNCONTAMINATED AREA/INHALE FRESH AIR/GIVEN OXYGEN. QUICK REMOVAL FROM THE CONTAMINATED AREA. DERMAL/FROSTBITE: REMOVE CONTAMINATED CLOTHING/FLUSH W/WATER. DON'T USE HOT WATER. CALL A PHY SICIAN

Accidental Release Measures

Spill Release Procedures

EVACUATE ALL PERSONNEL FROM AFFECTED AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF AK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING WITH AN INERT GAS IOR TO ATTEMPTING REPAIRS.

Neutralizing Agent

N/P

Disposal Considerations

Waste Disposal Methods

DON'T ATTEMPT TO DISPOSE OF WASTE OR UNUSED QUANTITIES. RETURN IN THE

SHIPPING CONTAINER PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE TO LIQUID AIR CORPORATION FOR PROPER DISPOSAL.

Handling and Storage

Handling and Storage Precautions

PROTECT CYLINDERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL-VENTILATED AREA OF NON-COMBUSTIBLE CONSTRUCTION. DON'T STORE ABOVE 130F.

Other Precautions

USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED WITH VALVE OUTLET PROTECTED POINT.

Fire Fighting Measures

Flash Point Method: N/P

Flash Point: **Flash Point Text:** -105F CLOSED CUP

Autoignition Temp: **Autoignition Temp Text:** N/A

Lower Limits: 1.8%

Upper Limits: 9.6%

Extinguishing Media

WATER, CO₂, DRY CHEMICAL

Fire Fighting Procedures

STOP THE FLOW OF ISOBUTYLENE. WATER TO COOL CONTAINERS.

Unusual Fire/Explosion Hazard

ISOBUTYLENE IS HEAVIER THAN AIR/INCREASE VENTILATION TO PREVENT FLAMMABLE MIX FORMATION IN LOW AREAS

Personal Protection

Respiratory Protection

POSITIVE PRESSURE AIR LINE WITH MASK/SCBA FOR EMERGENCY USE.

Ventilation

HOOD WITH FORCED VENTILATION

Protective Gloves

PLASTIC/RUBBER

Eye Protection

SAFETY GOGGLES OR GLASSES

Other Protective Equipment

SAFETY SHOES/SHOWER/EYEWASH.

Work Hygienic Practices

N/P

Supplemental Safety and Health

ONE CALIFORNIA PLAZA, SUITE 350/2121 N. CALIFORNIA BLVD/WALNUT CREEK, CALIFORNIA 94596. MOLECULAR WEIGHT: 56.03

Physical/Chemical Properties

HCC:**NRC/State Lic Num:****Net Prop Wt for Ammo:****Boiling Pt: B.P. Text:** 19.18F**Melt/Freeze Pt: M.P/F.P Text:** N/A**Decomp Temp: Decomp Text:** N/A**Vapor Pres: 38. Vapor Density:** .148**Volatile Org Content %:****Spec Gravity:** 1.98**VOC Pounds/Gallon:****pH:** N/P**VOC Grams/Liter:****Viscosity:** N/P**Evaporation Rate & Reference:** N/P**Solubility in Water:** INSOLUBLE**Appearance and Odor:** COLORLESS GAS W/AN UNPLEASANT ODOR.**Percent Volatiles by Volume:** N/P**Corrosion Rate:** N/P

Stability and Reactivity Data

Stability Indicator/Materials to Avoid: YES OXIDIZERS**Stability Condition to Avoid:** N/P**Hazardous Decomposition Products:** NONE**Hazardous Polymerization Indicator:** NO**Conditions to Avoid Polymerization:** N/P

Toxicological Information

Toxicological Information: N/P

Ecological Information

Ecological: N/P

MSDS Transport Information

Transport Information: N/P

Regulatory Information

SARA Title III Information: N/P**Federal Regulatory Information:** N/P**State Regulatory Information:** N/P

Other Information

Other Information: N/P

HAZCOM Label

Product ID: ISOBUTYLENE

CAGE: DO426

Assigned Ind: Y

Company Name: LIQUID AIR CORPORATION

Street: 2121 N. CALIFORNIA BLVD., SUITE 350

PO Box: N/K

City: WALNUT CREEK **State:** CA **ZIP:** 94596 **Country:** NK

Health Emergency Phone: (800) 231-1366

Label Required Ind: Y

Date of Label Review: 12/16/1998

Status Cd: C

Mfg Label Num:

Label Date: 12/16/1998

Year Procured: N/K

Origination Cd: G

Chronic Hazard Ind: N/P

Eye Protection Ind: N/P

Skin Protection Ind: N/P

Signal Word: N/P

Respiratory Protection Ind: N/P

Health Hazard:

Contact Hazard:

Fire Hazard:

Reactivity Hazard:

Hazard And Precautions INHALATION: DIZZINESS, DROWSINESS AND EVENTUAL UNCONSCIOUSNESS. SKIN/EYE: MILDLY IRRITATION.

Appendix F

TCP/STAR Plan Template



Site Traffic Awareness and Response (STAR) Plan

Revision 3, 9/18/2013

1.0 General

Project Name:	
Project Number:	
STAR Plan Developer Name:	
Reviewed By:	
Duration of Work (hours or days):	
Time Restrictions (describe below):	
Comments:	

2.0 Work Description

Provide a brief description of expected site traffic conditions:

Work is planned on off site properties but not in the public right-of-way.

To facilitate identification of traffic controls to use, check all that apply to this project:

Notes: Time at a specific location on the project site (" > 8 hours at MW-1" etc). Exclude activities such as monitor well pad setting times where equipment is not at location. Indicate controls to protect monitor well pads in comments below.

Short Duration Work (<1 hour)	Intermediate Duration Work (1-8 hours)												
<input type="checkbox"/> Water-level gauging and well sounding <input type="checkbox"/> Surface soil sampling using manual methods <input type="checkbox"/> Intermediate depth soil sampling using DPT <input type="checkbox"/> Shallow monitor well purging and sampling <input type="checkbox"/> Product recovery using manual methods <input type="checkbox"/> Surveying <input type="checkbox"/> Other (specify): <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<input type="checkbox"/> Intermediate/deep or > 2 in. diameter well sampling <input type="checkbox"/> Slug testing and similar tests <input type="checkbox"/> Deep handauger sampling (>20 ft depth) <input type="checkbox"/> Manual soil sampling through concrete/asphalt <input type="checkbox"/> Deep soil sampling using DPT (>40 ft depth) <input type="checkbox"/> Soil sampling using other automated drilling method <input type="checkbox"/> Other (specify): <div style="border: 1px solid black; height: 20px; width: 100%;"></div>												
Long Duration Work (>8 hours)	Comments:												
<input type="checkbox"/> Deep monitor well installation (>50 ft depth) <input type="checkbox"/> Monitor wells with surface casing installation <input type="checkbox"/> Intermediate depth monitor wells ≥ 4 in. diam. <input type="checkbox"/> Long term product recovery using equipment <input type="checkbox"/> Long term pump testing <input type="checkbox"/> Other (specify): <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<div style="border: 1px solid black; height: 40px; width: 100%;"></div> <p>Traffic Type: <i>Check all that apply:</i></p> <table style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> Automobiles</td> <td><input type="checkbox"/> Forklifts</td> <td><input type="checkbox"/> Construction equipment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Straight truck</td> <td><input checked="" type="checkbox"/> Bicycles</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Semi truck</td> <td><input checked="" type="checkbox"/> Pedestrian</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other:</td> <td colspan="2"></td> </tr> </table>	<input checked="" type="checkbox"/> Automobiles	<input type="checkbox"/> Forklifts	<input type="checkbox"/> Construction equipment	<input checked="" type="checkbox"/> Straight truck	<input checked="" type="checkbox"/> Bicycles		<input checked="" type="checkbox"/> Semi truck	<input checked="" type="checkbox"/> Pedestrian		<input type="checkbox"/> Other:		
<input checked="" type="checkbox"/> Automobiles	<input type="checkbox"/> Forklifts	<input type="checkbox"/> Construction equipment											
<input checked="" type="checkbox"/> Straight truck	<input checked="" type="checkbox"/> Bicycles												
<input checked="" type="checkbox"/> Semi truck	<input checked="" type="checkbox"/> Pedestrian												
<input type="checkbox"/> Other:													

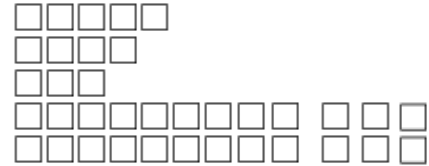
3.0 Traffic Control Layout

The following DOT Fact Sheets and/or diagrams are applicable to this project:

Notes: DOT Fact Sheets have numbered scenarios, select the appropriate scenario(s) for the project and indicate duration [Short (S), Intermediate (I), Long (L)]. Manually revise diagrams, if needed, to convey requirements.

- [DOT Facts-302a](#) Retail Gas Station/Small Business Parking Lot (<1 Hour)
 - With Truck
 - Without Truck
- [DOT Facts-302b](#) Retail Gas Station/Small Business Parking Lot (1-8 Hours)
- [DOT Facts-302c](#) Retail Gas Station/Small Business (>8 Hours)
- [DOT Facts-302e](#) Multi-business Parking Lot
- [DOT Facts-302e](#) Facility Parking Area
- Parking Garage (develop drawing for controls)
- Other (specify): vacant secured former zinc plan
- STAR Select controls to the right will be used

1 2 3 4 5 6 7 8 9 S I L

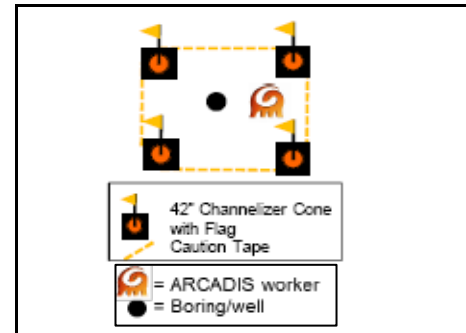


How will the above documents be communicated to field staff?

(excludes STAR Select)

- The above documents are attached to this STAR Plan
- The above documents are appropriate without significant modification and are available to field staff in the

[Field Guide for Roadway Work Zone Safety.](#)



4.0 Required Traffic Control Devices and Phasing

Tasks on this project may be implemented both individually or concurrently. Selection and number of traffic control devices required will be dependent on the scope of work.

Traffic control device help: [DOT Facts-302d](#)

<p><i>Check all that apply:</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Channelizer cone (42 inch height, 10 lb base) <input type="checkbox"/> Channelizer cone (42 inch height, 30 lb base) <input type="checkbox"/> Traffic cones (≥ 18 inches tall) <input type="checkbox"/> Barricade <input type="checkbox"/> Type I <input type="checkbox"/> Type II <input type="checkbox"/> Flags for cones <input type="checkbox"/> Lights (for night work) <input type="checkbox"/> Plastic fencing (rolls) <input type="checkbox"/> Caution tape (rolls) <input type="checkbox"/> Other (specify): _____ 	<p>Number:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><i>Phasing:</i></p> <ol style="list-style-type: none"> 1) Position truck as shield, if practical 2) Deploy traffic control devices 3) Affix flags, caution tape or fencing as prescribed in fact sheet 4) Unload project equipment 5) Commence work 6) SSO to maintain controls 7) Remove controls in opposite order
--	---	--

- Additional client requirements are attached

If vehicle equipped with high intensity strobe or rotating lights, the lights should be utilized during work. If the vehicle is not equipped with supplemental lighting devices, use vehicle flashers (be aware of battery drain when using any of the lighting devices) should be considered.

Personal protective equipment required for this work is listed in the applicable project Job Safety Analysis (JSA) or project specific HASP. A Class II (minimum) high visibility vest is required.

5.0 Approvals

	Printed Name	Date	Signature
Plan Developer:	_____	_____	_____
Plan Reviewer:	_____	_____	_____
	_____	_____	_____

ARCADIS

Appendix G

Shipping Determination Form
Template



SHIPPING/TRANSPORTATION DETERMINATION

(Rev.3, 1/09)

General Information

Revision Number	
Project Name	
Project Number	
City of Shipment	
City of Destination	
Analytical/MSDS/Hazard Information Attached	

Description of Material to be Shipped/Transported

--

Determination

<input type="checkbox"/>	Not Restricted/Regulated
<input type="checkbox"/>	Hazardous Material

Complete for Hazardous Materials

Proper Shipping Name	
ID Number	
Hazard Class	
Packing Group	

		<i>Package Instruction or Shipping Guide</i>
<input type="checkbox"/>	Materials of Trade Exception	
<input type="checkbox"/>	Excepted Quantity	
<input type="checkbox"/>	Limited Quantity	
<input type="checkbox"/>	Regulated, Non-Bulk	
<input type="checkbox"/>	Regulated, Bulk	
<input type="checkbox"/>	Regulated, Passenger or Cargo Aircraft	
<input type="checkbox"/>	Regulated, Cargo Aircraft Only	
<input type="checkbox"/>	Other: <i>Not Regulated</i>	

Method of Shipment/Transportation

<input type="checkbox"/>	Commercial Ground	<input type="checkbox"/>	Ground (FedEx)	<input type="checkbox"/>	Air (FedEx)	<input type="checkbox"/>	Lab Courier
<input type="checkbox"/>	ARCADIS Ground	<input type="checkbox"/>	Ground (UPS)	<input type="checkbox"/>	Air (UPS)	<input type="checkbox"/>	Other:

Special Instructions

--

Rationale for Determination

--

Regulatory Reference/Interpretation

--

Determination Performed By

Name Printed	Signature	Date

QA/QC Check Performed By

Name Printed	Signature	Date

ARCADIS

Appendix H

ENTACT HASP

**OLD AMERICAN ZINC SITE
REMEDIAL INVESTIGATION
Fairmont City, Illinois**



HEALTH AND SAFETY PLAN

PREPARED FOR:

BLUE TEE CORPORATION

PREPARED BY:

**ENTACT & ASSOCIATES, LLC
1 East Oak Hill Drive, Suite 102
WESTMONT, ILLINOIS 60559**

December 2014

Rev. 2

TABLE OF CONTENTS

SECTION	PAGE
1.0	INTRODUCTION 1
2.0	SITE BACKGROUND, SCOPE OF WORK, AND RESPONSIBILITIES..... 2
2.1	<i>SITE BACKGROUND</i> 2
2.2	<i>SCOPE OF WORK</i> 2
2.3	<i>RESPONSIBILITIES</i> 3
2.3.1	ENTACT Project Manager 3
2.3.2	ENTACT Health and Safety Officer..... 3
2.3.3	ENTACT Field Project Manager 4
2.3.4	ENTACT On-Site Health and Safety Coordinator 4
2.3.5	ENTACT Field Crew 5
2.3.6	Subcontractors..... 5
2.3.7	Other Personnel..... 5
3.0	HAZARD EVALUATION 7
3.1	<i>PHYSICAL HAZARDS</i> 7
3.1.1	Underground and Overhead Utilities 7
3.1.2	Heavy Equipment..... 8
3.1.3	Trenching and Excavation 8
3.1.4	Noise 8
3.1.5	Weather 9
3.1.6	Slip, Trip, and Fall Hazards 9
3.1.7	Fire Prevention..... 9
3.1.8	Debris Removal 9
3.1.9	Traffic 10
3.2	<i>CHEMICAL HAZARDS</i> 10
3.2.1	Routes of Entry 10
3.2.2	Exposure Limits and Health Hazards 11
3.3	<i>BIOLOGICAL HAZARDS</i> 14
4.0	TASK SAFETY ASSESSMENT 15
5.0	PERSONNEL TRAINING 24
6.0	SITE-SPECIFIC PERSONAL PROTECTIVE EQUIPMENT 25
7.0	PERSONAL AIR MONITORING..... 29
7.1	<i>PARTICULATE MONITORING</i> 29
7.2	<i>VOLATILE ORGANIC COMPOUND MONITORING</i> 30
7.3	<i>ACTION LEVELS FOR PERSONAL PROTECTION EQUIPMENT</i> 30
7.4	<i>AIR MONITORING LOG</i> 31
7.5	<i>CALIBRATION AND MAINTENANCE REQUIREMENTS</i> 31
8.0	SITE CONTROL 32
8.1	<i>SUPPORT ZONE</i> 32
8.2	<i>DECONTAMINATION ZONE</i> 32

8.3	<i>EXCLUSION ZONE</i>	33
9.0	DECONTAMINATION PROCEDURES	35
9.1	<i>PERSONNEL DECONTAMINATION</i>	35
9.2	<i>EQUIPMENT DECONTAMINATION</i>	36
9.3	<i>DISPOSITION OF DECONTAMINATION WASTES</i>	36
9.4	<i>DECONTAMINATION FACILITIES</i>	36
10.0	HAZARD COMMUNICATION PROGRAM.....	38
10.1	<i>MATERIAL SAFETY DATA SHEETS</i>	38
10.2	<i>CONTAINERS</i>	38
10.3	<i>CHEMICALS</i>	38
10.4	<i>ASSOCIATES INFORMATION</i>	38
11.0	EMERGENCIES, ACCIDENTS & INJURIES	40
11.1	<i>HOSPITAL AND CLINIC</i>	40
11.2	<i>COMMUNICATION</i>	41
11.3	<i>FIRST AID KITS</i>	41
11.4	<i>ACCIDENT REPORTING</i>	41
12.0	EMERGENCY RESPONSE PLAN.....	42
12.1	<i>FIRE</i>	42
12.2	<i>EVACUATION</i>	42
12.3	<i>EVACUATION RESPONSIBILITIES</i>	43
13.0	CONFINED SPACE	44
13.1	<i>CONFINED SPACE ENTRY</i>	44
13.2	<i>REQUIRED CONFINED SPACE ENTRY PERMIT</i>	45
14.0	EQUIPMENT SAFETY.....	48
14.1	<i>HEAVY EQUIPMENT</i>	48
14.1.1	Working Under Power Lines	48
14.1.2	Roll-Over Protection Structures (ROPS)	49
14.2	<i>VEHICLES</i>	49
14.3	<i>COMMERCIAL TRUCKS</i>	50
15.0	MEDICAL SURVEILLANCE	51
16.0	EXCAVATION SAFETY	52
16.1	<i>EXCAVATION HAZARDS</i>	53
16.2	<i>SOIL CLASSIFICATIONS</i>	54
16.3	<i>MAXIMUM ALLOWABLE SLOPES</i>	55
16.4	<i>SLOPING REQUIREMENTS FOR LAYERED SOILS</i>	55
16.5	<i>SLOPING AND BENCHING</i>	56
	ATTACHMENTS.....	57
	<i>ATTACHMENT A SITE SAFETY PLAN AMENDMENT</i>	58
	<i>ATTACHMENT B GENERAL SITE SAFETY RULES</i>	59
	<i>ATTACHMENT C SAFETY PLAN ACKNOWLEDGMENT FORM</i>	65
	<i>ATTACHMENT D BASIC EMERGENCY MEDICAL AND FIRST AID</i>	66
	<i>ATTACHMENT E JOURNEY MANAGEMENT PLANNING</i>	72
	<i>ATTACHMENT F PERSONAL PROTECTIVE EQUIPMENT</i>	81

ATTACHMENT G HAZARD COMMUNICATION 85
ATTACHMENT H HOSPITAL AND CLINIC ROUTE MAPS..... 86
ATTACHMENT I ACCIDENT REPORTING..... 90
ATTACHMENT J SPILL CONTROL..... 92
ATTACHMENT K ALCOHOL AND DRUG POLICY..... 94

1.0 INTRODUCTION

This document describes the health and safety guidelines developed for remedial investigation activities at the Old American Zinc Site (site) to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements will be revised when new information is received or conditions change. Any amendments to this plan will be documented on the form in Attachment A. Where appropriate, specific Occupational Safety and Health Administration (OSHA) standards or other guidance will be cited and applied.

All work practices and procedures implemented on site will be designed to minimize associate contact with hazardous materials and to reduce the possibility of physical injury. All work will be performed in accordance with applicable OSHA regulations found in Part 29 of the *Code of Federal Regulations* (CFR) 1910 and 1926; NIOSH Publications 85-115; ACGIH Publication "Threshold Limit Values and Biological Exposure Indices"; and applicable ANSI Guidelines. The purpose for this site-specific health and safety plan (HASP) is to set forth, in an orderly and logical fashion, appropriate safety procedures to be followed during on-site demolition and remediation activities at the site by ENTACT & Associates, LLC (ENTACT).

ENTACT's mission is to provide cost effective and timely environmental solutions, but to do so while maintaining the industry benchmark for health and safety. With this as our goal, this HASP will be implemented at the site project.

During remedial investigation activities, ENTACT will maintain an on-going safety process and therefore will continually instruct, promote, and prepare all associates for their positions. It is through this work process that ENTACT will achieve a safe work environment.

"Safety is a state of mind" that must be nurtured and reinforced every day. ENTACT's education and training of associates provides the insight to safety protocol and the understanding that the attitude and behavior of all associates is the key. As part of our safety culture a project orientation will be completed along with daily safety meetings that will be held at the start of each work day to ensure that all personnel understand site conditions and operating procedures and to ensure that personal protective equipment (PPE) is being used correctly and to address health and safety concerns.

The procedures presented herein are intended to serve as guidelines. They are not a substitute for the sound judgment of on-site personnel.

2.0 SITE BACKGROUND, SCOPE OF WORK, AND RESPONSIBILITIES

This section provides information about the site, describes the work activities to be conducted by ENTACT and its subcontractors, and defines the responsibilities of various roles of ENTACT associates who will be on site.

2.1 SITE BACKGROUND

The 132-acre site is located at 2575 Kingshighway in Fairmont City, St. Clair County, Illinois. The site is bordered by Kingshighway to the east, 45th Street to the west, Maryland Avenue to the north, Cargill (formerly Swift) to the southeast, and Rose Creek and the Penn Central and Baltimore/Ohio railroad corridor to the south. Residential properties surround the Site and commercial and industrial properties lie to the immediate east and west. Collinsville Road, a 4-lane highway, lies approximately 0.12 miles north of the Site to the immediate south of a wetland complex.

Prominent site features are the waste piles that are present in the northern section of the site. These include three large slag piles and a covered soil repository area. The slag pile wastes are associated with historic smelting operations and the covered soil repository area is from 2002 residential soil removal action. Waste disposal may have also occurred on a 4 acre area on the northern boundary of the site.

All structures associated with historic smelter operations were razed prior to 1978. However, several structures are present on the eastern portion of the site where XTRA Intermodal, Inc., the current property owner, had operations until 2003.

In 1994, area residents complained of smelter slag dust blowing onto their properties. Numerous regulatory investigations have occurred since that time, as described in the Support Sampling Plan prepared by ENTACT.

2.2 SCOPE OF WORK

The scope of work to be performed during this project includes, but is not limited to, the following general items of work:

1. Mobilization
2. Installation and development of monitoring wells
3. Multi-media sampling, including:
 - Waste (slag)
 - Soils
 - Sediments
 - Surface water

- Groundwater
- Air
- 4. Use of X-ray fluorescence (XRF) equipment
- 5. Trenching (up to 6 feet deep)
- 6. Surveying and establishing grid system
- 7. Decontamination including pressure cleaning
- 8. Demobilization

The tasks listed above are grouped by hazard and may not strictly follow the objectives or chronology of events detailed in the Support Sampling Plan.

2.3 RESPONSIBILITIES

Responsibilities for ENTACT associates are described below using titles familiar to ENTACT staff. The names of key personnel on this project are listed in Table 2.1. Attachment B contains general site safety rules that apply to all ENTACT associates.

2.3.1 ENTACT Project Manager

The ENTACT Project Manager will report directly to the client and ensure all ENTACT project members strive for zero accidents and incidents. The responsibilities of the Project Manager will be the field activities performed by ENTACT, but the number one goal will be a safe and healthy work site with zero accidents.

The ENTACT Project Manager will also have the overall responsibility for on-site activities and ensuring compliance with the approved work plan and applicable Federal, State, and local regulations. The Project Manager will ensure all operations at the site are performed in the safest manner possible following the site-specific HASP and promoting ENTACT's safety culture. Specific responsibilities will be to observe, promote, and facilitate a safe environment that will achieve zero accidents and zero incidents.

The ENTACT Project Manager or a designated representative shall be responsible for informing all individuals entering the exclusion zone or decontamination zone of the contents of this plan and ensuring that each person understands the hazards of the site and signs the HASP Acknowledgment Form in Attachment C.

2.3.2 ENTACT Health and Safety Officer

The Health and Safety Officer (HSO) is responsible for writing, reviewing, and approving the site-specific HASP and implementing ENTACT's Health and Safety Program. The HSO will serve as the primary contact to review health and safety matters, and provide direction to the ENTACT Field Project Manager and On-site Health and Safety Coordinator(s) as necessary on issues related to health and safety. The HSO will be responsible for conducting the health and

safety orientation meeting prior to the start of construction activities, reviewing weekly health and safety updates, and conducting health and safety inspections, audits, and job task observations at the site.

2.3.3 ENTACT Field Project Manager

The ENTACT Field Project Manager (FPM) will be responsible for directing all site personnel, equipment, subcontractors, and activities to ensure a safe and successful implementation of the remedial action activities. The FPM will have overall responsibility for the health and safety of site personnel. The FPM will ensure adequate resources are provided to carry out established health and safety responsibilities and will enforce the site-specific HASP. The FPM will ensure proper communications is established for emergency response. The FPM will coordinate with the on-site Health and Safety Coordinator in the planning and implementation of all site activities and ensure site personnel are knowledgeable of site hazards. Also, the FPM will assist with the development of each job safety analysis (JSA).

2.3.4 ENTACT On-Site Health and Safety Coordinator

The ENTACT Health and Safety Coordinator (HSC) will be assigned to the site on a full-time basis with functional responsibility for implementing the site-specific HASP. In addition, the ENTACT HSC will conduct site audits. Specific duties include, but are not limited to:

- Assume responsibility for health and safety of ENTACT personnel and promote ENTACT's safety culture
- Document safety concerns (accidents, near losses, etc.)
- Supervise decontamination of personnel and equipment
- Ensure air monitoring equipment is calibrated and operational
- Conduct personal air monitoring on all ENTACT personnel as outlined in 29 CFR 1910.120 (h) (4) and this plan
- Perform respiratory fit tests
- Inventory and inspect PPE prior to personnel entering work area
- Prepare summary letter of personal air sampling results
- Select PPE based upon the site-specific HASP, chemical properties, and air sample results
- Prepare and maintain OSHA Log within 3 days of accident and post within 5 days
- Ensure that all on-site ENTACT personnel have had medical exams and are fit for duty
- Inspect first aid kits and fire extinguishers
- Assist with the preparation and review of JSA
- Health and safety training and recognition
- Utilize "Stop Work Authority," if required
- Report and investigate all accidents and near losses and complete the near loss investigation/loss investigation (NLI/LI) report.

- Conduct Job Task Reviews (JTR)
- Coordinate safety orientation as well as daily safety meetings
- Work with the ENTACT FPM daily regarding work activities
- Complete Weekly Safety Report and forward it to ENTACT's HSO

The HSC and the FPM will work together to promote a safety goal of zero accidents and zero incidents.

2.3.5 ENTACT Field Crew

Each ENTACT associate (field crew member) is responsible for asking questions and understanding the site-specific HASP as well as the following:

- Report any unsafe or potentially hazardous conditions to the FPM or the HSC
- Comply with rules, regulations, and procedures as set forth in this HASP
- Express safety ideas or concerns in the daily safety meetings
- Perform all tasks safely
- Perform JTRs before performing task
- Utilize "Stop Work Authority," if required
- Every ENTACT associate has the authority and obligation to stop work in order to prevent incidents and injuries.

By signing the Safety Plan Acknowledgment Form, individuals are recognizing the potential hazards present on-site and the policies and procedures required to minimize exposure and/or adverse effects of these hazards.

2.3.6 Subcontractors

Subcontractors are anticipated for drilling and Geoprobe tasks. Subcontractors will be required to read, abide by, and sign the HASP and receive a site orientation. Any subcontractor who observes safety problems should immediately report observations or concerns to appropriate key ENTACT personnel. Subcontractors will also participate in daily tailgate safety meetings.

2.3.7 Other Personnel

Examples of other personnel that may be on site include representatives of the United States Environmental Protection Agency (USEPA,) Illinois Environmental Protection Agency (IEPA,) and ENTACT's client. Any person who observes safety problems should immediately report observations or concerns to appropriate key personnel. Although other personnel typically only make on-site observations, they will be expected to read, abide by, and sign the HASP and receive a site orientation.

Table 2.1 Key ENTACT Personnel		
ENTACT Title	Name	Telephone Number
Principle Contractor	ARCADIS 4565 Cornell Road Cincinnati, Ohio 45241	Office: 513-860-8700
ENTACT Project Manager	Patricia Thomson	Office: 630-986-2900 Cell: 630-669-4256
ENTACT Health and Safety Officer	Evan McShirley	Office: 972-580-1323
ENTACT Field Project Manager	Jenny Self	Office: 972-580-1323

3.0 HAZARD EVALUATION

Physical, chemical, and biological hazards exist at the work site. While all potential site hazards cannot be identified during HASP development, many can be anticipated. This section discusses the anticipated hazards and offers controls to minimize risk. Section 4 provides additional risk analysis in the form of JSAs.

3.1 *PHYSICAL HAZARDS*

Physical hazards associated with clearing and grubbing vegetation, excavation and trenching, demolition, debris removal, removal of underground utilities, high pressure cleaning, and other construction activities will likely pose an equal or greater potential for injury at the site than chemical exposure. Physical hazards can be caused by the following:

- Underground and overhead utilities
- Heavy equipment
- Trenching and excavation
- Noise
- Weather
- Slip, trip, and fall
- Fire protection
- Debris removal
- Traffic

Injuries that may result from these physical hazards can range from simple slip-trip-fall types of accidents to casualties, including fatalities due to moving or rotating equipment, electrocution, engulfment, or other activities related to construction. Injuries resulting from physical hazards can be avoided through the adoption of safe work practices and associate involvement.

Each of the above mentioned physical hazards are discussed below:

3.1.1 *Underground and Overhead Utilities*

Before heavy equipment is used, all utilities (electricity, natural gas lines, water lines, sewer lines, etc.) must be identified. ENTACT will be responsible for contacting the Joint Utility Locating Information for Excavators (JULIE) at 1-800-892-0123 for utility locates. Each day before work begins; utility locations will be discussed as they relate to planned activities. Deviation from planned activities must be discussed and approved by the FPM and the HSC. Additional training that addresses working around high voltage overhead electrical lines will be completed in the site orientation.

Table 3.1 provides the minimum clearances for equipment operation near power lines.

Table 3.1 Requirements for Equipment Operation Near Power Lines (29 CFR 1926.550)		
ACTIVITY	LINE RATING	MINIMUM CLEARANCE
Equipment Operation	< 50 kV	10 feet
	> 50 kV	10 feet + 0.4 inches per each kV over 50 kV, or 2 times the length of the line insulator (minimum of 10 feet)
In transit with no load and boom lowered	< 50 kV	4 feet
	> 50 kV to 345 kV	10 feet
	345 kV to 750 kV	16 feet

Note:
 kV = kilovolts
 Abandoned utilities slated for removal must be verified as de-energized or out of service prior to attempted removal.

3.1.2 Heavy Equipment

On-site activities that ENTACT will perform require extensive use of heavy equipment. Heavy equipment and its operation can represent a significant safety hazard if proper experience is not combined with site-required procedures. Trained and experienced personnel will perform operation of heavy equipment. PPE such as steel-toed shoes, safety glasses or goggles, hearing protection, hard hats, and high visibility vests must be worn whenever such equipment is present. Equipment will have a fire extinguisher on board and a backup alarm. See Section 14.0 for additional requirements for heavy equipment.

3.1.3 Trenching and Excavation

Excavation and trenching shall comply with OSHA 29 CFR 1926.650 Subpart P. Excavation depth is not expected to exceed about 10 feet. Section 16.0 provides excavation and trenching requirements.

3.1.4 Noise

Heavy equipment and other construction activities may produce noise levels above acceptable standards. High noise levels (85 dBA or higher) can contribute to hearing loss as well as interfere with communication between associates. Exposure to noise can be expected when working around equipment and machines such as heavy equipment, shears, generators, compressors, jackhammers, and the like. All personnel shall wear hearing-protective devices with a minimum noise reduction rating (NRR) of 25 (either earplugs or muffs) if they are within

25 feet of such operating equipment or when noise levels interfere with normal speech. Hand signals will be established by on-site personnel as appropriate to facilitate communications while involved in high-noise activities.

3.1.5 Weather

Adverse weather conditions will be important considerations when planning and conducting site operations. Hot and cold weather may be encountered as well as thunderstorms and lightning. A break trailer equipped with air conditioning and heating will be part of the site setup. Attachment D, Basic Emergency Medical and First Aid, address precautions and treatment of heat and cold stress.

Thunderstorms and lightning pose a threat to safety for personnel working outdoors. ENTACT follows the 30 – 30 Rule for lightning safety. At any time when there is less than 30 seconds between a lightning flash and the following thunder, work will be suspended and personnel will seek shelter. Work will not resume until 30 minutes after the last lightning strike with an interval less than 30 seconds.

3.1.6 Slip, Trip, and Fall Hazards

Slip, trip, and fall hazards will exist throughout the site. Protection from slip, trip, and fall hazards will be provided through standard safety procedures including good housekeeping. Properly locating equipment and removing debris and taking general precautions during site operations will be standard operating procedures. Associates will be apprized of any potential trip hazards through regularly scheduled health and safety meetings. Whenever possible, trip and fall hazards will be eliminated or clearly identified with yellow “caution” tape. Impalement hazards to associates will be neutralized as soon as they are identified. ENTACT and any subcontractors will be responsible for the use of safety harnesses, lifelines, lanyards, safety nets, etc., for safeguarding their employees when performing elevated work in compliance with 29 CFR 1926.500 Subpart M. Refer to the ENTACT Comprehensive Health and Safety Manual for Fall Protection information.

3.1.7 Fire Prevention

Fire extinguishers shall be provided in fuel areas, storage areas, portable buildings and equipment. All extinguishers will be inspected, serviced, and maintained. No burning of materials will take place at the project site. All flammable liquids will be marked and stored in a manner to conform to National Fire Protection Association (NFPA) and OSHA requirements. A hot work permit will be used when welding or cutting work is performed. Refer to the ENTACT Comprehensive Health and Safety Manual for Portable Fire Extinguishers.

3.1.8 Debris Removal

Debris removal will be accomplished with equipment and manual labor. Proper PPE, daily work requirements, and good housekeeping must be discussed and maintained. Debris removal will be an ongoing process that has many slip, trip, and fall hazards that must be addressed. Nails, metal panels, sharp edges, heavy loads, and biological hazards are some of the hazards associated with this job. Daily work activities will be discussed each day.

3.1.9 Traffic

Site personnel will maintain reasonable dust-free traffic. All traffic will follow typical construction safety practices. Specific on-site and off-site traffic routes will be established to accommodate construction activities. Necessary demarcation of routes, speed limits, and hazards will be made as appropriate. A journey management plan (JMP) will be completed by FPM and HSC before work begins and will be updated or revised as necessary for on-going work activities. The blank JMP is included in Attachment E.

3.2 CHEMICAL HAZARDS

Chemical hazards present in the soil include arsenic, cadmium, lead, and zinc. Particulates will represent a general site hazard.

A review of routes of entry, a list of exposure limits, and health hazards related to the on-site chemicals hazards are discussed below.

3.2.1 Routes of Entry

Chemical substances in gaseous, liquid, or solid form can enter the unprotected associate by routes of entry including inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically in a different part of the body.

Chemical exposure by inhalation is a concern since the lungs are extremely vulnerable to chemical agents. In addition, substances can pass through lung tissue into the bloodstream and on to other susceptible areas of the body. Since some toxic chemicals are not detectable by human senses, their toxic effects may not produce any immediate symptoms. Respiratory protection is therefore extremely important.

The skin and eyes also represent important routes of exposure. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface. Protection against skin and eye contact may be provided by:

- Wearing protective equipment.
- Keeping hands away from the face.

- Minimizing contact with liquid and solid chemicals.

Ingestion is the least significant route of exposure at a site, since deliberate ingestion of chemicals is unlikely. Inadvertent ingestion can occur, however, as a result of personal habits such as not washing your hands, chewing gum or tobacco, drinking, eating, smoking, and applying cosmetics. These practices may provide a route of entry for chemicals and will not be allowed in the exclusion or decontamination zone. Section 6.0 details requirements of PPE.

3.2.2 Exposure Limits and Health Hazards

Various exposure limits for the on-site chemicals of concern are listed in Table 3.2. The table also lists important physical and chemical properties and the health hazards of the chemicals of concern.

TABLE 3.2 CHEMICAL HAZARDS				
Chemical	PEL REL TLV IDLH	UEL LEL Flash Point IP	Routes of Exposure	Acute and Chronic Health Hazards
Arsenic (inorganic)	PEL: 0.010 mg/m ³ REL: 0.002 mg/m ³ c TLV: 0.01 mg/m ³ IDLH: Carc [5 mg/m ³]	UEL: NA LEL: NA F. PT: NA IP: NA	Inh. Ing. Con. SA	Ulceration of nasal septum; GI disturbances; peripheral neuropathy; respiratory irritation; CARC
Cadmium (dust)	PEL: 0.005 mg/m ³ REL: CARC TLV: 0.01 mg/m ³ IDLH: CARC [9mg/m ³]	UEL: NA LEL: NA F. PT: NA IP: NA	Inh. Ing. Con.	Pulmonary edema; dyspnea; cough; chest tightness;
Lead	PEL: 0.05 mg/m ³ REL: 0.1 mg/m ³ TLV: 0.05 mg/m ³ IDLH: 100 mg/m ³	UEL: NA LEL: NA F.PT: NA IP: NE	Inh. Ing. Con.	Weakness; lassitude; insomnia; facial pallor; anorexia
Zinc (as zinc oxide)	PEL: 5 mg/m ³ (resp) REL: 15 mg/m ³ TLV: 2 mg/m ³ IDLH: 500 mg/m ³	UEL: NA LEL: NA F.PT: NA IP: NE	Inh.	Metal fume fever; chills; muscle aches; nausea; fever
Nuisance dust (particulates NOR)	PEL: 15 total/5 respirable mg/m ³ REL: NE TLV: 10 inhalable/3 respirable mg/m ³	Varies	Inh. Con.	Irritates eyes, skin, throat upper respiratory system

**TABLE 3.2
 CHEMICAL HAZARDS**

Chemical	PEL REL TLV IDLH	UEL LEL Flash Point IP	Routes of Exposure	Acute and Chronic Health Hazards
	IDLH: NE			
The above listing should not be taken as a complete assessment of the hazards posed by materials at the Site. The known and unknown mixed chemical hazards at this site prevent a clear determination of the specific effects of discrete compounds. Therefore, personnel must be alert for irritation, as well as feeling extremely well, depressed, sleepy, or tired. Symptoms must be immediately reported to the site supervisor.				
Key of Abbreviations				
Carc.	Carcinogen	LEL	Lower Explosive Limit	
Con.	Contact	PEL	Permissible Exposure Limit	
IDLH	Immediately Dangerous to Life and Health	SA	Skin Absorption	
F.Pt.	Flash Point	TLV	Threshold Limit Value	
Inh.	Inhalation	UEL	Upper Explosive Limit	
Ing.	Ingestion	VP	Vapor Pressure	
IP	Ionization Potential	NE	Not established	

References:

- National Institute for Occupational Safety and Health (NIOSH) “Pocket Guide to Chemical Hazards”, February 2004.
- Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs), as found in Tables Z-1 or Z-2 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000).

Definitions:

- Permissible Exposure Limits (PELs) are enforceable standards promulgated by OSHA and represent the 8-hour time-weighted average above which workers may not be exposed. PELs are generally expressed as a time weighted average.
- Recommended Exposure Limit (REL)
- Threshold Limit Values (TLV) concentration for a normal 10-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLVs are generally expressed as a time weighted average. TLV are established by the American Conference of Governmental Industrial Hygienists, a professional organization.

- Time weighted average (TWA)
- Short Term Exposure Limit (STEL) values are the maximum concentration to which workers may be exposed intermittently for short periods of time (15 minutes or less) without suffering from: 1) irritation; 2) chronic or irreversible tissue damage; or 3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TWA is not exceeded.
- Immediately Dangerous to Life or Health (IDLH) is defined as the maximum concentration of toxic substance from which escape is possible without irreversible harm should a worker's respiratory protective equipment fails. The notation "Ca" means that NIOSH considers this substance to be a potential carcinogen. "N.D." indicates that an IDLH has not yet been determined.

3.3 BIOLOGICAL HAZARDS

Personnel will be cautioned not to disturb insects or animals. Personnel with particular allergies to bee or wasp stings will not work in areas where contact is possible; and will carry appropriate anti-venom kits as necessary. First aid kits should include remedies for possible encounters, including equipment for poisonous snakebites. Insect repellents will be available on the site at all times. Personnel with particular allergies to such compounds will be cautioned prior to their application of the chemical makeup.

The following biological hazards may be present at the site. The FPM will instruct the field crew of the applicable biological hazards during the site orientation and periodically throughout the project.

Insect Bites and Stings

Insects could be present at this site making the chance of bites possible. Although they can be painful, they rarely cause death. However, some people have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and/or as often as needed throughout the work shift.
- Wear proper protective clothing (work boots, socks, and light colored pants).
- Field personnel that may have insect allergies should provide this information to the HSC or FPM prior to commencing work.

Plants

The potential for contact with poisonous plants exists when performing fieldwork at the site. Poison ivy, sumac, and oak may be present on site. Poison ivy can be found as vines on tree trunks or as upright bushes (poison oak is another name for the bush form of poison ivy). Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green in the summer.

Poison sumac can be present in the form of flat-topped shrub or tree. It has fern-like leaves that are velvety dark green on top and pale underneath. The branches of immature trees have a velvety “down.” Poison sumac is white and has “hairy” berry clusters.

Contact with poison ivy, sumac or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin that needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

4.0 TASK SAFETY ASSESSMENT

This section assesses the risks of each major project task, though not all tasks will be performed during each sampling event. A Task Safety Assessment has been prepared and is designed to develop awareness of chemical and physical hazards specific to each task that may be performed. Information in this section should be discussed in prior to the scheduled start of each new task to be performed and during daily tailgate safety meetings. It is the responsibility of each associate to assess their task and analyze potential risk reduction procedures before performing their job by conducting a job task review.

It would be impractical to repeat in complete detail each control measure for each job task. Sources and hazards will be addressed for job tasks with reference made to applicable control measures in the following tables and site-specific plans. Tables 4.2 to 4.10 should be posted at the command post. When the Task Safety Assessment is discussed additional hazards may need to be addressed. In addition to reviewing the Task Safety Assessments, associates and the ENTACT HSC will prepare a JSA for each work process.

Table 4.1			
OVERVIEW OF JOB TASKS THAT MAY BE PERFORMED			
Table	Job Task	Hazard Rating	PPE Level
4.2	Mobilization	Low	D
4.3	Installation and development of monitoring wells (installation subcontracted to driller)	Low to medium	D+ or C
4.4	Multi-media sampling – including waste (slag), soils, and/or groundwater (use of drill rig or Geoprobe to be subcontracted)	Low to medium	D+ or C
4.5	X-ray fluorescence (XRF) use, if needed	Low to medium	D+ or C
4.6	Trenching	Medium	D
4.7	Surveying and laying out of grid system	Low	D
4.8	Decontamination including pressure cleaning	Low to medium	D, D+, or C
4.9	Demobilization	Low	D

Table 4.2
MOBILIZATION

PPE: Level D			Hazard Rating: Low		
Hazard	Sources	Control Measures			
Atmospheric Hazard	Chemicals listed in Table 3.2.	Visually inspect area. Exclusion, decontamination, and support zones will be delineated. PPE will be utilized. Dust will be minimized using dust suppression methods. Avoid unnecessary intrusive work.			
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.			
Slip/Trip/Falls	Various Sources	Housekeeping rules shall be established and followed. Pre-existing slip, trip, and fall hazards will be marked, barricaded, or eliminated. Areas will be discussed in safety orientation. Refer to the ENTACT Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.			
Electrocution	Electrical utilities	Only qualified electrician will be allowed to hook-up circuits. Extension cords will be inspected. GFCI will be used. Verification that electrical services have been disconnected from the exclusion zone or properly marked and identified.			
Heat/Cold Stress	Weather Conditions	See Attachment D.			
Accidental Injury	Mis-communications; Removal of vegetation; Road improvements; Erosion control	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.			
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 3.3.			
Explosion/Gas Asphyxiation	Utilities	Utilities will be disconnected by utility company and tagged. All utilities will be marked and noted on a facility map. Underground utilities must be verified as de-energized/de-pressured prior to work beginning.			

Table 4.3		
INSTALLATION AND DEVELOPMENT OF MONITORING WELLS		
PPE: Level D+ or C		Hazard Rating: Low to Medium
Hazard	Sources	Control Measures
Atmospheric Hazard	Nuisance Dust Unknown contaminants	Dust suppression. Remain outside limits of contamination Air monitoring and PPE
Slips/Trips/Falls	Uneven, outdoor environment	Identifiable areas will be either eliminated or marked. Discuss in safety meetings. Refer to ENTACT's Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.
Heat/Cold Stress	Weather Conditions	See Attachment D.
Biological Hazards	Insects, Snakes, Ticks	See Section 3.3.
Heavy Equipment Injury	Machinery	Qualified operators, daily inspection of equipment. A fire extinguisher must be located on all heavy equipment. Utilize 3-point mount and dismount procedures at all times. Maintain a minimum of 15 foot distance outside of swing radius
Noise	Machinery	Hearing protection with a NRR of at least 25 will be utilized.
Physical Labor	Moving heavy objects and routine tasks	Use moving equipment to transport pumps and hoses. A minimum of two people will be used to move supplies on uneven surfaces.

Table 4.4 MULTI-MEDIA SAMPLING		
PPE: Level D + or C		Hazard Rating: Low to Medium
Hazard	Sources	Control Measures
Atmospheric	Nuisance dust Contact with waste (slag)	Dust suppression Air monitoring and PPE Appropriate sampling techniques
Contact with chemicals of concern	Chemical contamination in environmental media	Proper PPE. Minimize contact with media; no kneeling or sitting on ground.
Misuse Of Tools	Hand tools	Tools will be maintained in safe working conditions.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 3.3.
Physical Labor	Moving heavy objects and routine tasks	Use moving equipment to transport pumps and hoses. A minimum of two people will be use4d to move supplies on uneven surfaces.
Back Strain	Lifting heavy objects	Use proper lifting technique.
Slips/Trips/Falls	Uneven, outdoor terrain; water in wetlands, ditches, and creek	Identifiable areas will be either eliminated or marked. Discuss in safety meetings. Refer to ENTACT's Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.
Noise	Drill rig	Hearing protection with a NRR of at least 25 will be utilized.
Drowning	Surface water in wetlands, ditches, and creek	Use personal flotation device (PFD) in water greater than 4 feet deep

Table 4.5 XRF USE		
PPE: Level D+ or C		Hazard Rating: Medium
Hazard	Sources	Control Measures
Atmospheric Hazard	Chemical hazards listed in Table 3.2 Sample handling	Dust suppression. Proper PPE. Personal air monitoring.
Radiation leakage	Improper use Equipment damage	XRF unit operator must have vendor-sponsored training

**Table 4.6
 TRENCHING**

PPE: Level D Hazard Rating: Low		
Hazard	Sources	Control Measures
Atmospheric Hazard	Nuisance dust	Dust suppression Proper PPE Personal air monitoring
Slips/Trips/Falls	Uneven terrain Debris	Visual inspection of work area, communication between associates, hazards marked and barricaded. Orientation each day prior to starting to work on slip/trip/fall concerns. Refer to ENTACT's Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.
Hot/Cold Temperatures	Weather Conditions	See Attachment D.
Noise	Machinery	Hearing protection with a NRR of at least 25 will be utilized.
Physical injury	Heavy equipment (excavator)	Qualified operators, daily inspection of equipment. A fire extinguisher must be located on all heavy equipment. Utilize 3-point mount and dismount procedures at all times. Maintain a minimum of 15 foot distance outside of swing radius

Table 4.7		
SURVEYING AND GRID		
PPE: Level D		Hazard Rating: Low
Hazard	Sources	Control Measures
Back strain	Lifting and pulling	Use proper lifting technique.
Heat/Cold Weather	Weather Conditions	See Attachment D.
Personal Injuries	Physical activities; manual labor	See Attachments B and D.
Slip/Trip/Falls	Uneven, outdoor terrain	Pre-existing slip, trip, and fall hazards will be marked, barricaded or eliminated.

Table 4.8		
DECONTAMINTION INCLUDING PRESSURE CLEANING		
PPE: Level D, D+, or C		Hazard Rating: Low to Medium
Hazard	Sources	Control Measures
Manual Lifting	Equipment Supplies	Utilizing two people when weight is over 50 pounds. Utilizing mechanical equipment whenever possible.
Slip/Trips/Falls	Various Sources	Area must be kept organized and housekeeping must be kept in good order. Short-cutting activities may be easier and faster, but are not the best way and cannot be utilized. Proper safety procedures must always be the right way.
Miscommunications	Associates	A safety evaluation must be completed on the overall project. What went right and where improvements can be made must be an ongoing thought process.
Atmospheric hazards	Contaminated equipment and supplies	Proper PPE Air monitoring
Pressure cleaning	Pressure washer	Use lowest temperature and pressure needed. Follow manufacturer's instructions. Proper PPE. Do not point wand at other associate.

Table 4.9 DEMobilization		
PPE: Level D		Hazard Rating: Low
Hazard	Sources	Control Measures
Manual Lifting	Equipment Supplies	Utilizing two people when weight is over 50 pounds. Utilizing mechanical equipment whenever possible.
Slip/Trips/Falls	Various Sources	Area must be kept organized and housekeeping must be kept in good order. Short-cutting activities may be easier and faster, but are not the best way and cannot be utilized. Proper safety procedures must always be the right way.
Miscommunications	Associates	A safety evaluation must be completed on the overall project. What went right and where improvements can be made must be an ongoing thought process.

5.0 PERSONNEL TRAINING

All ENTACT associates are required to attend 40 hours of initial training on safe work practices at hazardous waste sites in accordance with 29 CFR 1910.120. All field personnel receive 8 hours of annual refresher training on the initial 40 hour training topics. The FPM is required to have an additional 8 hours of training on safe management of hazardous waste sites, commonly known as Supervisor training. ENTACT personnel receive first aid and CPR training. Site personnel will have completed training on ENTACT's Behavior Based Safety Program prior to beginning work. In addition, the following criteria shall be met:

- All assigned personnel will receive site-specific training on routes of exposure and adverse health effects associated with the chemicals listed on the table of chemical hazards in Section 3.
- All site assigned personnel will complete Behavior Based Safety Training.
- At least one member of each work crew shall have training in the use of portable fire extinguishers in accordance with 29CFR 1910.157 (g).
- Personnel newly assigned to hazardous waste work will receive three (3) days of on the job training by a FPM.
- Each person entering the site shall sign a statement attesting to the fact that they have read and understand the Site-Specific HASP.
- All subcontractors entering the contamination reduction zone and exclusion zone will have adequate training satisfying 29 CFR 1910.120.
- Associates must attend the daily health and safety tailgate meetings held each morning prior to work beginning. Specific safety topics will be discussed including prior days' activities. All site discussions will be documented.
- Job task reviews will receive positive support and feedback.

6.0 SITE-SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

The materials of concern present at this site have been identified by laboratory analysis of samples obtained from the site. The appropriate protective equipment has been selected. Currently, arsenic, cadmium, lead, zinc, and nuisance dust are the materials of concern. ENTACT will be consistent with OSHA-defined levels of protection, with the exception of Level D+. This level of protection will be used when dermal protection is desirable, but respiratory protection is not needed. Most tasks will be conducted in a minimum Level C, D+, or D PPE depending on the specific task. Listed below are the components of each level of protection needed for the site. Level B protection is not anticipated for any on-site operations. Additional information regarding PPE is provided in Attachment F.

When a hazard exists, the ideal work environment would be achieved by the use of engineering controls such that the control used would either completely remove all hazards from the work place or fully isolate associates from hazardous conditions. An example of an engineering control is dust suppression accomplished by sprinkling soil with water. Whenever engineering controls can be proven effective and feasible, they will be initiated.

Table 6.1	
Level C PPE	
Protective Gear	Specific Type
Respiratory protection	North or 3M brand half- or full-face air purifying respirator (APR) with combination cartridges for organic vapors and particulates (P-100)
Chemical protective clothing	Disposable coated Tyvek, Saranex, or equivalent
Hand protection: Inner gloves	Nitrile, surgical fit
Hand protection: Outer gloves	Cotton/Latex dipped for physical protection Second layer of Nitrile for sampling
Foot protection: Inner boots	Steel-toe leather work boots
Foot protection: Outer boot	Rubber boot covers
Head protection	Standard hard hat
Eye protections	Standard safety glasses with side shields or goggles
Splash protection ¹	Standard face shield
Other protective clothing	High visibility, reflective safety vest, such as orange traffic type vests, at all times
Hearing Protection	Ear plugs or muffs with NRR of at least 25
1 Splash protection will be worn during high-pressure cleaning.	

Table 6.2	
Level D+ PPE	
Protective Gear	Type
Respiratory protection	None
Chemical protective clothing	Disposable coated Tyvek, Saranex, or equivalent
Hand protection: inner gloves	Nitrile, surgical fit
Hand protection: outer gloves	Cotton or leather work gloves Nitrile for sample handling
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	Rubber boot covers
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection ¹	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest, at all times
Hearing protection	Ear plugs or muffs with NRR of at least 25
1 Splash protection will be worn during high-pressure cleaning.	

Table 6.3	
Level D PPE	
Protective Gear	Type
Respiratory protection	None
Chemical protective clothing	None
Hand protection: inner gloves	None
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection ¹	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest, at all times
Hearing protection	Ear plugs or muffs with NRR of at least 25
1 Splash protection will be worn during high pressure cleaning.	

PPE will be upgraded:

- If new hazards are found with unknown toxic or physical hazards.
- If hazards exhibit higher toxic or physical hazards that require upgrading of PPE. Air monitoring will be closely monitored.
- If associate requests an upgrade.

PPE will be downgraded:

- Only when the FPM justifies the downgrade by monitoring or other practicable means.
- Downgrading request must be in writing and approved by the FPM and the HSC. The HSO or Health and Safety Director will give final approval.

7.0 PERSONAL AIR MONITORING

Personal and work area air monitoring will be implemented to ensure the safety of personnel at the job site. Air monitoring to determine possible off-site migration is discussed in the Support Sampling Plan.

Personal air monitoring will be performed during the RI to determine the appropriate level of PPE and to ensure that associates are not exposed to hazardous levels of chemicals at the site. Arsenic, cadmium, lead, zinc, and nuisance dust are the primary concerns. Initial background sampling will be performed during mobilization. PPE will be upgraded or downgraded based on air monitoring results. PPE is outlined in Section 6. If unknown hazards are discovered during the operation, work in that area will be discontinued until the ENTACT FPM and the HSC have:

- Identified the hazards
- Identified levels of concentration
- Determined proper PPE
- Determined appropriate air monitoring procedures
- Discussed the new hazards with the HSO

The following is a list of air monitoring equipment that will be used on this site.

- Real-time particulate (aerosol) air monitors, such as a DataRAM for dust
- Photoionization detector (PID) for total petroleum hydrocarbons

Personal sampling will be accomplished by placing a pump or detector in the breathing zone of specific associates, those most likely to have the highest exposure potential. Selection of the appropriate level of PPE will be based on personal air monitoring results. In order to achieve an understanding of the wind direction a wind sock will be utilized.

The objectives of air monitoring include the following:

- Monitor dust where there is a potential for airborne nuisance dust in the work area and at downwind perimeter locations
- Provide records and results to compare to action levels
- Provide results for exposure monitoring of on-site associates
- Meet regulatory and safety requirements

7.1 PARTICULATE MONITORING

Particulate monitoring for respirable dust will be conducted on a continuous basis during the RI in areas where dust may be generated. Real time monitoring will be performed using a field-portable monitor that displays airborne dust concentrations immediately and continuously on a

digital LCD screen in units of milligrams per cubic meter of air (mg/m³) with a data logging feature. These units use optical light scattering and have a built-in power source. These units are sometimes referred to as real-time aerosol monitors (RAM) or personal dataRAMs (PDR). Calibration of the RAM or PDR will be in accordance with the manufacturer's instructions. Monitoring will be performed in the breathing zone of the sampler. The frequency of air monitoring is summarized in Table 7.1.

7.2 VOLATILE ORGANIC COMPOUND MONITORING

A PID with a 10.6 eV lamp and data logging feature will be available to monitor VOC concentrations, although these are not anticipated. VOC monitoring will be used to measure concentrations in the breathing zone.

During site activities ENTACT will calibrate and check the PID as recommended by the specific instrument manufacturer. The field personnel will record the daily instrument calibration. The frequency of air monitoring is summarized in Table 7.1.

TABLE 7.1 FREQUENCY OF AIR MONITORING			
Site Task	Instrument	Frequency	Location
Sampling and trenching	PDR	Continuously	Breathing zone of primary sampler(s)
	PID	As needed	Breathing zone of primary sampler and within work area

7.3 ACTION LEVELS FOR PERSONAL PROTECTION EQUIPMENT

The initial level of protection and the action levels at which the PPE will be upgraded are determined based on the identification of specific chemicals expected to be present at the site and the established permissible exposure limits (PEL), recommending exposure limits (REL) or Threshold Limit Values (TLV), whichever is lower. Table 7.2 shows the action levels for determining levels of PPE. The PID will monitor organics as a whole. Similarly, the PDR (aerosol monitor) will measure particulates with out specificity. As analytical results are obtained from the multi-media samples, the data will be reviewed to determine the appropriateness of the action levels which may subsequently be adjusted. Actions will be based on sustained readings (greater than 3 minutes) in the breathing zone.

Table 7.2 ACTION LEVELS FOR DETERMINING LEVELS OF PROTECTION¹			
Monitoring Equipment	Hazard	Action Level Above Background	Level of Protection and Action
Particulate monitor (PDR or other RAM)	Dust	Visible dust	Initiate dust suppression
		> 2.5 mg/m ³	Level C PPE
PID	VOC	≤ 5 ppm	Level D Continue work and air monitoring
		>5 ppm (sustained for 3 minutes)	Stop work, relocate upwind until concentrations decline. Upgrade to Level C if concentrations do not decline.
¹ Based on analytical results obtained from the multi-media sampling, action levels may be revised during the project. On-going review of the data will be used for exposure modeling.			

If readings exceed the range for level of protection indicated, personnel will withdraw and not return until the personnel put on the appropriate level of protection. Personnel performing the monitoring will inform the FPM about the upgrade of protection, who will convey this information to the HSC. Upon review of PID measurement, the HSC may further adjust the PPE requirements. Any upgrading to higher levels of protection may require additional personal sampling and amendment of this HASP.

7.4 AIR MONITORING LOG

The FPM will ensure that all air monitoring data is logged including instruments, data, work process, location, calibration, and monitoring results. Air sample locations will be tracked on ENTACT's Sample Identification Log.

7.5 CALIBRATION AND MAINTENANCE REQUIREMENTS

Air monitoring instruments will be calibrated daily prior to use according to the manufacture's instructions. Batteries will be completely charged each night and units will be inspected for malfunction before each use.

8.0 SITE CONTROL

The purpose of site control is to minimize potential contamination of associates, protect the public from the site activities, and prevent vandalism. To prevent both exposure to unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with PPE requirements will be clearly identified. The areas of designation will be:

- Support zone (clean)
- Decontamination zone (transitioned)
- Exclusion Zone (hot)

The FPM and the team will properly identify, mark, and enforce all zones of operation. ENTACT shall access all field activities from the site entrance closest to the work area.

8.1 SUPPORT ZONE

The support zone will be designated by signs and caution tape. It shall be secured against active or passive contamination from the work site. The support zone will consist of those areas adjacent to the exclusion zone where the administrative offices, decontamination trailer, and equipment are staged. Eating and drinking will only be allowed in this area.

The support zone will be the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. All personnel arriving in the support zone will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

8.2 DECONTAMINATION ZONE

The decontamination (decon) zone will provide a location for removal of contaminated PPE when personnel leave the exclusion zone during the day and the final decon at the end of the day. Coveralls will not be worn more than one work shift without being washed or discarded. ENTACT personnel will decon by properly disposing of contaminated clothing and washing the face, forearms and hands as they exit the decon area and before leaving the site.

An on-site decon facility (portable decon sink) shall be provided by ENTACT. ENTACT shall be responsible for providing the appropriate decon tools, equipment, solutions, liquids, containers, and supplies along with a concrete pad or other suitable base on which to perform decon activities.

All personnel shall be decontaminated before leaving the site (leaving the exclusion zone and entering the contamination reduction zone). Decontamination shall be required prior to breaks, when picking up tools, equipment, or materials in the support zone, or any other activities where the potential exists for contaminant transfer.

Equipment shall be cleaned and decontaminated prior to use on-site and prior to leaving the site. Wheels on any equipment in contact with potentially contaminated soil shall be cleaned prior to leaving any work area. Care shall be taken to avoid the possibility of contaminating formerly uncontaminated material or areas through the use of contaminated equipment.

Decontamination facilities shall be designed to meet all requirements of the approved work plan and all local, state, and federal requirements.

Decontamination facilities shall be designed to:

- Isolate contamination;
- Prevent cross-contamination;
- Be substantially watertight;
- Prevent contamination from leaving the site;
- Be large enough to contain run-off and spray water; and
- Have provisions for the collection and removal of accumulated water.

All decontamination liquids shall be collected and disposed as outlined in the work plan. The decontamination facilities shall have a sump, pump, and piping system or other acceptable means to evacuate decontamination water from the facility in a timely manner.

Decontamination solids, PPE, and debris shall be handled as outlined in the work plan.

The decontamination facility shall be resistant to chemical attack by the materials that will be contained in the facility.

The decontamination stations may be temporary and transportable; side panels shall be used as needed to control fugitive emissions from the decontamination stations.

All equipment shall be free of visual contamination prior to leaving the site. All tires and tracks shall be free of soil, grease, oil, slag, or other contaminants.

Decontamination facilities shall be capable of providing decontamination of the undercarriage and exterior of a vehicle to remove particulate matter using high-pressure spraying from the sides and bottom.

8.3 EXCLUSION ZONE

Work in the exclusion zone will require Level C until air monitoring provides results showing exposure is below the action level of the contaminants of concern.

The exclusion zone will be the areas outside the support zone and decontamination zone. The exclusion zone and the decontamination zone will continually change as work progresses. Entry to and exit from this zone will be made through the decontamination zone. Appropriate warning signs to identify the exclusion zone will be posted (i.e. DANGER - AUTHORIZED PERSONNEL ONLY). Upon exiting the exclusion zone personnel and equipment must be decontaminated.

The exclusion zone will be identified with a yellow caution banner guard and/or signs. While in the exclusion zone, personnel will wear Level C PPE and refrain from horseplay, use of tobacco products, eating, drinking, and generating open flames.

9.0 DECONTAMINATION PROCEDURES

In general, items entering the exclusion zone must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including EPA, State, and local officials, must enter and exit the exclusion zone through the decon area. All personnel must be documented on the exclusion zone entry/exit log. Prior to demobilization, contaminated equipment will be decontaminated and inspected by the ENTACT FPM or designate before it is moved into the support zone. Any material that is generated by decontaminated procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

9.1 PERSONNEL DECONTAMINATION

Once sampling procedures have been implemented the ENTACT FPM shall be responsible for ensuring that the PPE items and associates have been sufficiently decontaminated through proper training and procedures. Each associate and the FPM are ultimately responsible.

Level C PPE will be the minimum acceptable requirement for personnel in the exclusion zone until air monitoring results are known and are below the action level of known contaminants.

Station 1 Equipment Drop

Deposit equipment used on-site on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2 Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots, outer gloves, and/or splash suit with decontamination solution or detergent water. Rinse off using water.

Station 3 Outer Boot and Glove Removal

Remove outer boots and gloves. If disposable, deposit in a container with plastic liner. If non-disposable, place in a clean dry place.

Station 4 Respiratory Protection Removal

Remove hard hat, face-piece, and if applicable, deposit SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean dry location with in a re-sealable plastic bag.

Station 5 Inner Glove Removal

Remove inner gloves. Deposit in container for disposal.

Station 6 Protective Clothing Removal

Protective cotton coveralls will be placed in a marked container for cleaning as needed. If polycoated coveralls are utilized they will be deposited in a container with a plastic liner that is properly marked.

Station 7 Field Wash

Thoroughly wash hands, forearms and face with biodegradable soap and water.

Eating, drinking or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any area where the possibility of contamination exists and is permitted only in the designated break area. Personnel will not wear or bring dirty or decontaminated clothing into the clean support area.

9.2 EQUIPMENT DECONTAMINATION

An equipment decontamination station will be setup to prevent off-site migration of contaminants by equipment. If a piece of equipment enters an exclusion zone it will not be permitted to leave without first being decontaminated. ENTACT will construct a decontamination station near the edge of the excavation limits in the contamination reduction zone. When equipment enters the decontamination area it will first be manually cleaned of loose soil with scrapers and brushes. All re-usable sampling equipment will be decontaminated using a triple rinse procedure. During this procedure, the sampling equipment will be scrubbed in a potable water and detergent wash (gross rinse,) rinsed in potable water (intermediate rinse,) and then rinsed with distilled water (final rinse.)

9.3 DISPOSITION OF DECONTAMINATION WASTES

Spent decontamination fluids will be collected throughout the project for sampling and proper disposal. Re-usable sampling equipment such as trowels and stainless steel bowls will be decontaminated after collection of each 5-part composite sample collected on site. Disposable gloves worn by the samplers will be changed after each decontamination process is complete.

9.4 DECONTAMINATION FACILITIES

Decontamination facilities for personnel PPE and equipment will be provided by ENTACT. ENTACT personnel will decontaminate (wash hands, forearms and face with soap and water) prior to leaving the site and taking breaks. ENTACT personnel will leave the ENTACT operations site in clean street clothing. Contaminated equipment will be placed into assigned

containers for disposal or further decontamination.

The decontamination of heavy equipment will be carried out by high-pressure water or steam on a designated decontamination pad. Water used in this process will be collected and managed as described in Section 9.3.

All personnel must use the decontamination zone to enter and exit the exclusion zone.

The decontamination station will be setup along the edge of the equipment decontamination station on poly sheeting to contain any spills if they should occur. The poly can be picked up at the end of each day or replaced when needed, and along with the other decontamination equipment can be easily picked up and relocated by hand in only a few minutes, making relocation when needed a simple process. This area will contain an air horn, first aid kit, and fire prevention materials.

10.0 HAZARD COMMUNICATION PROGRAM

Each contractor will be responsible for maintaining a copy of their Hazard Communication Program and material safety data sheets (MSDS) on site. However, information in the following sections and in Attachment G is specific to ENTACT on this job site.

10.1 MATERIAL SAFETY DATA SHEETS

MSDS will be maintained at the command post in the Health and Safety Binder. A special pre-orientation will review MSDS prior to the project beginning.

10.2 CONTAINERS

All containers received on site will be inspected by the contractor using the material to ensure that the containers are properly labeled with hazard warnings and manufacturer information.

10.3 CHEMICALS

The use of chemicals is anticipated to be minimal at the site. A brief list is included below of certain chemicals that may be necessary. Any additional chemicals used will be added to the list below and the MSDS will be added to the HASP.

- Sample preservatives

10.4 ASSOCIATES INFORMATION

Prior to starting work, each associate will attend a health and safety orientation and will receive information on the following:

- Equipment checklist.
- An overview of the requirements contained in the Hazard Communication Standard.
- Hazardous chemicals present at the site.
- The location and availability of the written Hazard Communication Program.
- Physical and health effects of the hazardous chemicals on-site.
- Methods of preventing or eliminating exposure.
- Emergency procedures to follow if exposed.
- How to read labels and review MSDS to obtain information.
- Location of MSDS file and location of chemical list.
- Equipment being used.
- Site layout.

- All required PPE.
- Respirator fit test.
- Locations of fire extinguishers and first aid locations.
- Proper decon.
- Requirements for driving company vehicles and their upkeep.
- Task analysis.
- Air monitoring protocol and location of results.
- Reporting of all accidents including vehicle or equipment damage.
- Daily safety meetings.

11.0 EMERGENCIES, ACCIDENTS & INJURIES

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. Table 11.1 should be posted as appropriate.

TABLE 11.1 EMERGENCY CONTACTS	
Fire Department	911 – Emergency (618) 874-2101 – Non-emergency
Police Department	911 – Emergency (618) 874-0115 – Non-emergency
Ambulance	911 – Emergency (618) 874-2101 Non-emergency
Hospital Granite City Hospital 2100 Madison Ave. Granite City, IL 62040	(618) 798-3000
Concentra Clinic 1617 S. 3 rd Street St. Louis, MO 63104	(314) 421-2557 After hours: (314) 647-0081
National Response Center	(800) 424-8802
Center for Disease Control	(404) 488-4100
Chemtrec	(800) 424-9300
Patricia Thomson ENTACT Project Manager	(630) 986-2900 (630) 669-4256 cell
Warren Houseman ENTACT Corporate Health and Safety Director	(972) 580-1323 office
Jenny Self ENTACT Field Project Manager	(972) 580-1323 office

11.1 HOSPITAL AND CLINIC

ENTACT will use a Concentra clinic as needed for hazmat physicals, heavy metals blood testing, drug screens, treatment of minor injuries, and so on, that may become necessary on the site. The ENTACT HSC should make personal contact with clinic before site work begins to establish a clear understanding of our minor injury requirements. The HSC should have a specific person to contact at the clinic and feel comfortable that the clinic can meet ENTACT requirements. A map to the clinic is located in Attachment H.

The Hospital will be used for all medical emergencies. A map to the hospital is located in Attachment H. The use of an ambulance service to the hospital is available for an emergency by dialing 911. The hospital shall be notified of ENTACT's activities and to supply insurance information at the start of job site activities to expedite admission into the trauma center in the event of an emergency situation.

The route to these medical facilities will be driven and verified by the FPM or HSC prior to work beginning. Modifications will be made as needed to the directions to these facilities prior to work beginning.

11.2 COMMUNICATION

A mobile phone stays with the FPM at all times. He may be reached by two-way radios that are assigned to field personnel. A private telephone will also be located at the command post. Emergency signals will be conveyed through an air horn. Three (3) short blasts signal an emergency.

11.3 FIRST AID KITS

First aid kits and fire extinguisher are located on site and in the work vehicles. An eye wash and safety shower station (in compliance with ANSI Z-358.1) will be located near the decontamination area but no more than 100 feet from the exclusion zone. Basic first aid procedures are provided in Attachment D.

11.4 ACCIDENT REPORTING

Refer to the Attachment I or the ENTACT Comprehensive Health and Safety Manual for instructions on accident reporting and investigation.

12.0 EMERGENCY RESPONSE PLAN

ENTACT's Emergency Response Plan complies with 29 CFR § 1910.120(l). Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed. First aid should be administered while awaiting an ambulance. All injuries and illnesses should be reported to the ENTACT FPM and designated HSC.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and information on the chemical(s) they may have been exposed to. Any vehicle used to transport contaminated personnel will be cleaned or decontaminated as necessary.

Attachment J, Spill Control, provides procedures for managing a uncontrolled release.

12.1 FIRE

At the start of intrusive work, the fire department will be notified and briefed about the potential hazards at the site. The ENTACT Health and Safety Coordinator will be responsible for this notification. In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the ENTACT Field Project Manager will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

In the event of a fire that cannot be controlled with available equipment, the local fire department will be summoned immediately by the Field Project Manager or his designee. The FPM shall inform the fire department of the situation and any site hazards upon their arrival. If firefighters have to enter the Exclusion Zone, decontamination will be required upon leaving.

In the event of fire or explosion, or if vapor concentrations of explosive vapors or gasses approach or exceed 10 percent of the LEL as indicated by an explosion meter, personnel will evacuate the area immediately.

ENTACT shall provide protection from fires in the form of portable fire extinguisher. This protection shall meet or exceed the requirements of NFPA-10-1984.

12.2 EVACUATION

Evacuation routes will be established by work zones and all outside work areas will be provided with designated exit points. Evacuation should be conducted immediately, without regard to equipment under conditions of extreme emergency. Emergency evacuation routes are being

discussed and will be presented during site orientation.

- Evacuation notification will be three (3) blasts on an air horn, or by verbal communication on radios.
- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone.
- The ENTACT Field Project Manager will conduct a head count to ensure all personnel have been evacuated safely.
- In the event of an emergency site evacuation, all personnel should escape from emergency situation, decontaminate to the maximum extent practical, and meet at the pre-determined off-site location.

12.3 EVACUATION RESPONSIBILITIES

As the administrator of the project, the ENTACT Field Project Manager has primary responsibility for responding to and correcting emergency situations. ENTACT's representative will:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, total evacuation and securing of the site or upgrading or downgrading the level of protective clothing and respiratory protection.
- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.
- Ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of a fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.
- Determine the cause of the incident and make recommendations to prevent the recurrence.
- Ensure that all reports have been prepared.

The Field Project Manager must immediately report emergency situations and take appropriate measures to protect site personnel.

13.0 CONFINED SPACE

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of entry and egress, but may be bodily entered. Examples include tanks, vats, and basements. Confined spaces will be identified below during site preparation and during site activities as they are discovered. At this time, confined space entries are not anticipated for this project. If additional work tasks are assigned or other work areas are identified as confined spaces, this HASP must be amended.

Table 13.1 Identification of Confined Spaces	
Type of Confined Space	Location
Not applicable	

13.1 CONFINED SPACE ENTRY

The Field Project Manager will not allow a confined space to be entered until OSHA regulations 1910.146 requirements are met, the Health and Safety Director is notified, and all components are met and completed on Section 13.2 – ENTACT’s Required Confined Space Entry Permit, including the arrangement for a stand-by rescue service to be available. See the ENTACT Comprehensive Health and Safety Manual for confined space procedures.

13.2 REQUIRED CONFINED SPACE ENTRY PERMIT

ENTACT Job Name and Number:		Date:
ENTACT FPM:	ENTACT HSC:	
Phone:	Phone:	
Other Contractor(s)		
Contractor:	Name/Phone:	
Contractor:	Name/Phone:	
Location And Description Of Permit Space To Be Entered		
Purpose Of Entry		
Date of entry:	Time of entry:	
Authorized Entrant(s)		
Authorized Attendant(s)		
Atmospheric Tester(s)		
Entry Supervisor		
Name:	Signature:	

Hazards Of Permit Space To Be Entered				
Physical:		Chemical:		
Measures Used To Isolate The Permit Space And To Eliminate Or Control Permit Space Hazards Before Entry				
Special Precautions:		Personal Protective Equipment:		
Lockout/Tagout		SCBA		
Lines blocked or broken		Coveralls		
Air flush (preliminary)		Face/eye protection		
Air flush (continuous)		Footwear		
Area security		Gloves		
Escape harness		Respirator		
Lifeline		Head protection		
Tripod/hoist		Radiation dosimeter(s)		
Communication (e.g. verbal, radio)		PIC		
Lighting		Other (specify):		
Other (specify):				
Describe Alarm Systems				
Describe Communication Method(s) and Equipment Used Between Attendant & Entrant				
Air Monitoring Device Information				
Device	Sequence or Serial No.	Date Due for Calibration	Pre-Use Spot Check Performed By	Notes

Air Monitoring Date									
Date	Time	Sample By	Air Sampling Required for:						Notes
			% O2 >19.5 %	% LEL < 10%	CO ppm < 10 ppm	H2S ppm <10 ppm	Stratifica tion	Other	
Rescue and Emergency Services:					Description and Location of Rescue Equipment:				
Fire Department: 911									
Police Department: 911									
Hospital Phone and Address:									
ENTACT Emergency Contact and Phone:					Protocol to summon emergency and rescue services:				
Client Emergency Contact and Phone:									
Additional Permits (such as Hot Work)									
Permit Authorization (must be signed before entry):									
Entry Supervisor's Signature			Date			Time			
(Signature certifies that all precautions and equipment are in place and all atmospheric testing shows air acceptable for entry.)									
Permit Cancellation <input type="checkbox"/> Work Complete <input type="checkbox"/> Work Stoppage <input type="checkbox"/> Other									
Entry Supervisor's Signature			Date			Time			

14.0 EQUIPMENT SAFETY

The following equipment safety standards are applicable for equipment and vehicles owned or leased by ENTACT and their subcontractors. Safety standards are divided into two categories, heavy equipment and vehicles. Heavy equipment includes rubber-tired and crawler type excavation materials handling equipment, haul trucks, and cranes. Vehicles include pick-ups, passenger vans and cars.

Specific heavy equipment that will be used on site includes the following:

- Excavator for trenching activities
- Drill rig for monitoring well installation and soil boring
- Geoprobe for soil boring

14.1 HEAVY EQUIPMENT

Parking: All equipment left unattended at night, adjacent to a roadway in normal use, or adjacent to active construction areas, shall have appropriate lights or reflectors, or barricades with appropriate lights or reflectors, to identify the location of the equipment.

Bulldozer blades, end-loader buckets, dump bodies, and similar equipment: These shall either be fully lowered or blocked when being serviced or not in use. All controls shall be in a neutral position, with the motors stopped and the brakes set.

Audible Alarms: All equipment shall be equipped with a reverse signal alarm. The alarm shall be distinguishable from the surrounding noise level, and shall be maintained in an operable condition.

Vehicle Cabs: All equipment with operator cabs shall be equipped with windshields and power wipers. All cab glass shall be safety glass, or equivalent, that does not introduce visible distortion affecting operation. Cracked and broken glass shall be replaced.

Seat Belts: Seat belts shall be provided in all equipment. Operators will be required to wear seat belts while the equipment is in operation. Seat belts are not required for equipment that is designed for stand-up operation.

Riders: Only equipment operators will be allowed on the equipment when it is in operation. Associates will not be allowed to ride on the equipment.

14.1.1 Working Under Power Lines

Except where electrical distribution and transmission lines have been de-energized and visibly

grounded at the point of work or where insulating barriers have been erected to prevent physical contact with the lines, equipment shall be operated in accordance with the following:

- Lines rated 50 kV or less - minimum clearance between the lines and any part of the equipment shall be 10 feet;
- Lines over 50 kV - minimum clearance between the lines and any part of the equipment shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV;
- A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.
- Electrical lines will be marked-off with caution tape to help visually locate the lines.

14.1.2 Roll-Over Protection Structures (ROPS)

All rubber-tired and crawler type equipment owned or leased by ENTACT and any subcontractors shall be equipped with roll-over protective structures which meet the minimum performance standards, as prescribed in 29 CFR 1926.1001 and 1926.1002.

14.2 VEHICLES

Driver Policy: Only authorized ENTACT drivers will be allowed to drive company vehicles.

Brakes: All vehicles shall have a service brake system, an emergency brake system and a parking brake system. These systems may use common components and shall be maintained in working order.

Lighting: All vehicles shall be equipped with two headlights and two taillights, and shall be maintained in working order. All vehicles or combination of vehicles shall have brake lights in operable condition.

Seat Belts: Seat Belts meeting DOT regulations shall be maintained in all vehicles. ENTACT associates will be required to wear their seat belts when operating or as passengers in company vehicles.

Riders: ENTACT associates riding in the back of pickups must be seated inside the bed. Associates will not ride on tailgates or fenders. This applies to on-site transportation. No riders will be allowed in the bed of a pickup that is traveling off-site.

Loads: Materials and tools will be firmly secured to prevent movement when transported in the same compartment with ENTACT Associates.

Audible Alarms: No associate shall use any vehicle having an obstructed view of the rear unless:

- The vehicle has a reverse signal alarm audible above the surrounding noise level; or
- The vehicle is backed up only when an observer signals that it is safe to do so.

14.3 COMMERCIAL TRUCKS

All commercial drivers will receive an orientation from the ENTACT Health and Safety Coordinator on their responsibilities and safety requirements.

Once trucks are loaded, drivers will proceed to the truck decontamination area. After the truck is decontaminated, drivers will cover their loads prior to leaving the site. ENTACT associates will wear an orange vest directing traffic to allow trucks to safely exit the property.

15.0 MEDICAL SURVEILLANCE

Pursuant to 29 CFR 1910.120, all ENTACT field personnel are required to have a pre-employment medical examination and annual update physicals. All associates must pass a pre-established physical and heavy metals blood work before being assigned to the work site. A copy of the medical pass or fail sheet will be kept on file at the site. In addition, a copy of the certificates for training, refreshers, first aid, CPR, respirator fit tests, medical fitness, and other pertinent information will be filed and available on site.

ENTACT field personnel are routinely monitored for blood lead, cadmium, and arsenic levels. Although exposure to these metals is not anticipated at the site, following any accidental or suspected exposure personnel will be scheduled for a special physical examination. The physical examination will focus on the specific contaminants and the associated target organs as well as test for blood lead, cadmium, and arsenic levels for comparison to previously established baselines.

16.0 EXCAVATION SAFETY

Work activities at the site will require excavation of contaminated media from various depths. All open excavations by ENTACT and its subcontractors will conform to the excavation requirements prescribed in OSHA 29 CFR, Subpart P, Parts 1926.650 through 1926.652.

- Contact the utility companies or property owners to locate the exact location of any underground installations in the area. If the utility companies or owners do not respond within 24 hours, or if they cannot establish the exact location of the underground installations, the excavation may proceed with caution. In this situation ENTACT must provide its associates with detection equipment or other safe and acceptable means to locate underground installations.
- Remove or adequately support objects in the excavation area that could create a hazard to ENTACT associates. These may include rubble, debris and stockpiles.
- Classify the type of soil at the site as either stable rock, Type A, Type B or Type C soil. The soil classification, as defined in Appendix A Subpart P to 1926.652, must be made based on the results of at least one visual and at least one manual analysis conducted by the Competent Person. See soil classifications in section 15.4.
- If the excavation is less than 20 feet in total depth, select the maximum allowable side slope from Table A and C. If proper sloping cannot be completed, approved bracing or an approved trench box must be used. If the excavation is less than 20 feet in total depth and is in layered soil, refer to Table B and C for the maximum allowable slope of each material layer. If the total depth of excavation exceeds 20 feet or does not allow for proper sloping, protective systems will be designed and approved by a registered professional engineer.
- All ENTACT personnel and subcontractors will have the authority to shut the operations down if they believe the operations are unsafe. The competent person will review the situation and make the decision on how to proceed.

COMPETENT PERSON

As defined in 29 CFR 1926.650, 651, 652, the Competent Person is the one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to associates. The Competent Person has the authority to take prompt corrective measures to eliminate such hazards.

The Field Project Manager will be the designated Competent Person for the site. The Field Project Manager reserves the authority to duly elect trained and knowledgeable associates to act in the capacity as Competent Person in his absence.

The Competent Person shall be responsible for inspecting all open excavations on the site on a daily basis or in the event of changing circumstances such as:

- Water
- Weather
- Traffic or
- Any other site concerns

Inspections shall note the integrity of side slopes and sidewalls and insure that only trained and knowledgeable associates are supporting the excavation operations.

16.1 EXCAVATION HAZARDS

Cave-Ins / Slides: A cave in or slide is defined as the separation or loss of soil material from the side of an excavation and its sudden movement into the excavation, either by sliding or falling, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.

All personnel will be aware of trench safety and will adhere to the following emergency procedures.

- Know exact location of emergency.
- Know number of victims.
- Know trench measurements.
- Know special hazards.
- Keep all life support and de-watering systems operating.
- Clear associates away from excavation.
- Shut down heavy equipment.
- Be prepared to meet and brief rescue personnel.

DO NOT try to dig the victim out with heavy equipment.

DO NOT allow others into the trench.

DO NOT panic.

ENTACT associates in open excavations will be limited to those persons involved in sample retrieval. Only those associates involved in sampling or required to support excavation activities will be allowed into open excavations.

Access / Egress: A stairway, ladder, ramp or other means of safe access / egress shall be located in excavations that are 4 feet or more in depth. Locations of such means shall require no more than 25 feet of lateral travel for associates.

Falling Loads: No associates will be permitted underneath loads handled by lifting or digging equipment. Associates will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

Water Accumulation: Associates shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating.

Warning System for Mobile Equipment and Personnel: A barricade of orange expanded fencing will be set up around the excavation site along with yellow caution tape at all times.

Ramps: A minimum of two ramps made of soil will be installed in areas that require mechanical equipment to enter excavation site.

Reflective Clothing: When excavation is adjacent to a public, road reflective vests must be worn by personnel.

16.2 SOIL CLASSIFICATIONS

Each soil and rock deposit at an excavation site must be classified by the Competent Person as stable rock, Type A, Type B, or Type C soil.

Stable Rock: Refers to the natural solid mineral matter which can be excavated with vertical sides and remain in tact while exposed.

Type A Soil: Is cohesive with an unconfined compressive strength of 1.5 tons per square foot (tsf). Type A soils include clay, silty clay, sandy clay, clay loam, caliche, hardpan and sometimes silty clay loam and sandy clay loam. No soil should be classified as Type A soil if it is fissured, subject to vibration from traffic or similar effects, previously disturbed or part of a sloped, layered system where the side slopes are four horizontal to one vertical or greater.

Type B Soil: Is cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf. Type B soils include granular cohesion less soils like angular gravel, silt, silt loam, sandy loam and sometimes silty clay loam and sandy clay loam; previously disturbed samples that are not Type C soils; fissured soils and soils subject to vibration that would otherwise be classified as Type A; dry rock that is not stable; and material that is part of a sloped layered system where the layers dip an a slope less steep than four horizontal to one vertical.

Type C Soil: Is cohesive soil with an unconfined compressive strength of 0.5 tsf or less. Type C soils include granular soils such as gravel, sand and loamy sand; submerged soil; soils from which water is freely seeping; submerged rock; submerged rock that is not stable; or material in a sloped, layered system where the layers dip into the excavation at a slope of four horizontal to one vertical or steeper.

16.3 MAXIMUM ALLOWABLE SLOPES

Table A defines the maximum allowable slopes.

Table A	
Soil or Rock Type	Maximum Allowable Slopes (H:V) For Excavations Less than 20 Feet Deep
Stable Rock	Vertical (90°)
Type A	3/4 : 1 (53°)
Type B	1:1 (45°)
Type C	1-1/2 : 1 (34°)

16.4 SLOPING REQUIREMENTS FOR LAYERED SOILS

Table B defines the sloping requirements for layered soils.

Table B			
Layered Soil Type	Type A Layer	Type B Layer	Type C Layer
B over A	3/4 : 1	1 : 1	
C over A	3/4 : 1		1-1/2 : 1
C over B		1 : 1	1-1/2 : 1
A over B	1 : 1	1 : 1	
A over C	1-1/2 : 1		1-1/2 : 1
B over C		1-1/2 : 1	1-1/2 : 1

16.5 SLOPING AND BENCHING

Table C provides sloping and benching information.





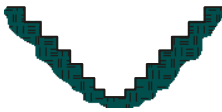
Table C

SLOPING AND BENCHING

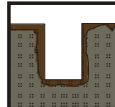
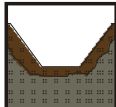
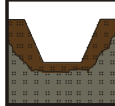
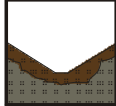
To slope and bench a site means cutting the walls of your excavation back at an angle to its floor. Sloping uses straight cuts. Benching uses a series of one or more steps. Angled cuts for excavations up to 20 feet deep are allowed by OSHA:



Sloping



Benching

<p>STABLE ROCK 90 degrees</p> 	<p>TYPE B 45 degrees</p> 
<p>TYPE A 53 degrees</p> 	<p>TYPE C 34 degrees</p> 

AN EXCEPTION: Excavation is TYPE A SOIL, less than 12 feet in depth and open less than 24 hours, may have a maximum slope or bench of 63 degrees.


DON'T FORGET:

- If the soil condition changes, re-inspect the system. Cut back the angle of slope if needed.
- Evacuate any excavation whose walls show signs of distress.


SOIL STABILITY AS A SAFETY MEASURE

Classifying a soil's stability is an important part of evaluating the site. In general, soil is divided into four classes, from most stable to least stable:


- **Stable Rock**
Solid mineral matter




- **Type A**
Cohesive soils, such as clay, silty clay and hardpan.



- **Type B**
Granular soils, silt, sandy loam, unstable rock, any unstable or fissured Type A soil.



- **Type C**
Gravel, loamy soil, submerged soil, sandy and any soil that is part of a layered, steeply sloped system.



ATTACHMENTS

- A. SITE SAFETY PLAN AMENDMENT
- B. GENERAL SITE SAFETY RULES
- C. SAFETY PLAN ACKNOWLEDGEMENT FORM
- D. BASIC EMERGENCY MEDICAL AND FIRST AID
- E. JOURNEY MANAGEMENT PLANNING
- F. PERSONAL PROTECTIVE EQUIPMENT
- G. HAZARD COMMUNICATION
- H. HOSPITAL AND CLINIC ROUTE MAPS
- I. ACCIDENT REPORTING
- J. SPILL CONTROL
- K. ALCOHOL AND DRUG POLICY

ATTACHMENT A SITE SAFETY PLAN AMENDMENT

Site Name:	Amendment Number:
Date:	Type of Amendment:
Reason for Amendment:	
Alternate Safeguard Procedures:	
Required Changes in PPE:	
Signatures:	
ENTACT FPM	Date
ENTACT HSO	Date
Client Representative	Date

ATTACHMENT B GENERAL SITE SAFETY RULES

The following guidelines have been implemented and are constantly monitored and reviewed, so as to fully comply with ENTACT's objective of keeping a safe and healthy work environment for all our associates and customers. An "associate" as used in this HASP, is any ENTACT employee.

1. Horseplay, running, or jumping of any obstacles is prohibited.
2. Associates, visitors, and/or subcontractors will observe and comply with all posted signs indicating danger, warning, caution, or unauthorized areas.
3. There will be no unauthorized use or operation of ENTACT or customers equipment.
4. Other unsafe acts such as jumping from a vehicle or structure, running or throwing objects are unacceptable.
5. Use or possession of narcotics, intoxicating substances, or guns and ammunition is prohibited.
6. Reporting for work under the influence of narcotics or intoxicating substances is prohibited.
NOTE: If on prescription drugs with a "stated" warning, let supervisor know.
7. Company Representative, designee, and ENTACT Health and Safety Coordinator are authorized to stop any work which they may consider hazardous to Company associates or equipment or subcontractor personnel.
8. Associates have a responsibility to report for work on time and in condition to work in a safe and efficient manner.
9. The safety and security regulations of our customers must be strictly adhered to. This also applies to government standards and regulations.
10. Associates are required to verbally report any injury or incident to their supervisor, no matter how small it may seem. Failure to do so before leaving work that day, may result in a delay or denial of benefits you may otherwise be entitled to. A written report should follow as soon as possible.
11. Before setting up operations, take a few moments to locate the nearest phone, eye wash, emergency shower, and fire alarm.
12. Tampering with or by-passing any safety device will not be tolerated.
13. Before setting up your operations, check the surrounding area for potential hazards and conflicts; overhead cranes, plant traffic, including railroads, associates in area, electrical wires, etc.
14. You should inform your supervisor of any incident or problem which may have occurred during that shift immediately. This would include, but not be limited to, injuries, near misses, faulty or defective equipment, use of fire extinguisher, customer requests or concerns, damage to equipment, vehicular accident, etc.

15. Smoking and the use of open flames are strictly prohibited in areas where flammable liquids, gases, or highly combustible materials are stored, handled, or processed, and also in the decontamination or exclusion zones. Obey "NO SMOKING" signs. Smoke only in designated areas.
16. All posted warning, safety, and security signs and barriers shall be observed. Additionally, ENTACT shall provide warning signs, barriers, barricades, etc., wherever such protection is needed. Where signs and barricades do not provide adequate protection, particularly along a road way, flagman will be used.
17. ENTACT associates will not be permitted to use hoists and powered apparatus belonging to customers unless approval is obtained in each instance from the customer and ENTACT representative.
18. ENTACT associates will not be permitted to carry cameras or take pictures without prior approval from the customer. If progress or finished construction photographs are desired, request for same should be made through the ENTACT representative and/or the customer representative and security.
19. Prior to beginning work, associates will be instructed on emergency procedures to be followed. The supervisor is responsible for notifying the associates of emergency situations and the evacuation. In the event of an evacuation, do not go home or leave the work site until released by your supervisor.
20. Areas sealed with polyethylene may become slick especially when disposable booties are worn - extra caution should be taken to secure footing and maintain proper balance during these situations.
21. Working from elevated platforms, scaffolding, and ladders can pose a great danger. Do not overreach, move ladder, scaffold or platform. Avoid shortcuts on scaffolding, ladders, and platforms. All provision of 29 CFR 1926 Subpart L must be complied with when working in or around platform, scaffolding, and ladders.
22. Good housekeeping procedures will be maintained during all project operations. Tools, materials, and equipment are more easily located and placed into service when good housekeeping procedures are followed.
23. Associates are prohibited from the unauthorized removal of any property or Company materials without the special authorization. Associates involved with theft of company property without authorization are subject to immediate termination. Associates involved in theft activities are also liable to the company for full restitution of monies and/or properties taken from ENTACT, and are subject to criminal prosecution by the Company. Theft of Company property, client's property, or personal property belonging to associates will not be tolerated, and violators will be prosecuted.
24. Associates are cautioned that the Company will not be responsible for loss of personal property due to theft. Associates are advised to leave jewelry items, valuables, and personal items in a locked and secured area away from the job site.
25. Associates will wear all required personal safety protective equipment as required by ENTACT,

while inside or outside the containment areas or exclusion zones.

26. Associates, visitors, and subcontractors are required to be dressed in the proper work uniforms at all times as per the requirements of the job.
27. Associates will obtain proper authorization prior to leaving the job site.
28. Safety guards, safety plugs, and/or any other electrical safety device shall not be bypassed, removed, or compromised in any way.
29. Step ladders, scaffolding, and/or platforms are to be used as designed and instructed by the supervisor. Step ladders are to be used in the fully extended position only.
30. Respiratory equipment will be worn properly in accordance with EPA and OSHA rules.
31. Respiratory equipment will be kept clean and sanitary for reuse. Respirators not in use will be cleaned and stored in sealed protective bags.
32. Respirator cartridges new or used will be kept clean at all times. Cartridges that are spent should be properly discarded to prevent accidental re-use.
33. Optical eye-wear other than industrial safety eye-wear is prohibited from use on the job site.
34. Safety body harness and lanyards are to be worn properly when required.
35. Specific maintenance and service to equipment and/or tools is to be conducted only by skilled maintenance personnel. Equipment used at the site will be inspected daily by a competent person.
36. Intentional violations of associate rights concerning health and physical well being will be cause for termination. Willfully causing an accident and/or injury to ones self or to a fellow associate will be cause for immediate termination.
37. Hand tools are to be used for the specific purpose of their design. Hand tools, electrical tools, and mechanically operated tools are to be free obstructions.
38. Trash bags marked for asbestos containing materials shall not be used for disposal of non-asbestos trash.
39. Waste identification labels will not be applied to any material that does not correspond with label (such as hazardous waste labels).
40. All safety equipment and tools are to be inspected for defects routinely by each associate prior to use. Damaged tools or equipment must be reported immediately to a supervisor and taken out of service.
41. All job site personnel must be aware of and know where to locate all fire extinguisher and emergency evacuation routes.

42. Hand tools are not to be left on the floor, scaffolding, ledges, and/or ladders.
43. Extension type ladders should be used with a 1 to 4 ratio - one foot out for every four feet of elevation.
44. Ladder users will face the ladder while ascending and descending. The top and second to top steps are not to be used for standing. Only one person at a time on a ladder. Bracing on the back of the ladder should not be used for climbing. Ladders should be secured to a fixed object when possible.
45. Guardrails and toe boards should always be installed on scaffolding. Associates should be careful to keep all debris bagged and obstacles off the floor. All components such as cross braces, railing, pin connectors, planking, toe boards, or scaffold grade lumber should be available before the unit is assembled.
46. Mobile scaffolding base dimensions should be at least one-half of the height. Scaffolding ten feet high or higher must have rigid guardrails.
47. All electrical equipment used on the job site will have electrical grounding devices with ground fault circuit interrupters. An extension cord without a ground wire plug is never to be used. Damaged electrical cords will be discarded or turned into the office for repair. All electrical cords and boxes are to be considered live until tested otherwise. Never spray water on or near open panels or electrical boxes. All 110v, 15-20 amp circuits must be protected with ground fault circuitry, or an assured grounding program. Electrical tools should be unplugged prior to servicing.
48. ENTACT requires that an electrical lock out program be in effect at all job sites.
49. While preparing to do work around energized equipment such as transformers and/or electrical panel boxes, all aspects of 29 CR 1926 Subpart K must be complied with. Equipment that cannot be de-energized during the abatement, will be covered and sealed on three sides only. There must be adequate ventilation to the panels and or boxes, or else there is the possibility and danger of explosion.

MOTOR VEHICLES

1. Any associate operating a company vehicle must have a current, valid and appropriate driver's license. In addition, all applicants considered for positions that include driving a company vehicle, will be subject to a Motor Vehicle Record search and evaluation.
2. All company vehicles must be equipped with a first aid kit at all times.
3. All company vehicles must be equipped with a fire extinguisher and flares or reflectors.
4. All company vehicles must be maintained in good mechanical condition. A pre-trip inspection shall be performed, and any defects or malfunctions must be reported to the supervisor before the vehicle leaves the yard.

5. The number of persons inside the vehicle shall be limited by the number of seat belts available for use.
6. The driver is responsible to see that he/she and each authorized passenger is properly wearing a seat belt while riding in a company vehicle.
7. All rules of the road and all customer regulations concerning vehicles must be obeyed.
8. Use extreme caution when backing a vehicle. If at all possible, use a spotter to guide you or back into the parking space to be able to pull forward when leaving.
9. All vehicles will be maintained in a clean and orderly manner to prevent injuries and fire hazards. This includes the cab as well as the inside and outside of the truck.
10. When your job assignment requires you to drive a company vehicle, you are considered to be a professional driver. Failure to drive courteously and to obey the rules of the road may result in the loss of this privilege and termination of your employment.
11. The use of company vehicles shall be restricted to the specific job to which you are assigned. Any unauthorized use will be cause for disciplinary action up to and including discharge.
12. All vehicles must be parked in authorized areas only.

MOTOR VEHICLE ACCIDENT REPORTING AND GENERAL LIABILITY

When an accident occurs, as soon as the preliminary investigation has been completed and the necessary claims handling actions have been taken (medical care for injured, rental cars obtained, etc.), the accident report must be filled out immediately. The vehicle operator and/or equipment operator, and project manager are responsible for generating the accident report and initial investigation of the accident. The operator must immediately notify the supervisor of all equipment or vehicle damage. The accident report should be submitted to the Accounting Department for file distribution. The Accounting Department will be responsible for reporting all auto/general liability claims involving property damage.

In some state, additional forms and paperwork are required by state and local law enforcement agencies. It is the driver's responsibility to obtain these forms and to submit the properly prepared reports on a timely basis to these additional regulatory agencies.

If signs of contamination are encountered that differ from those addressed in this plan, such as visible soil stains or unusual odors, ENACT associates will stop all work in the area, barricade or otherwise isolate the area, and immediately contact the Field Project Manager or the Health and Safety Coordinator. Protection of worker health and safety shall be the first priority. Continuation of work in the area and the amount of, if any, personal protective equipment shall be determined by the Health and Safety Coordinator. Other precautions to be undertaken to ensure a safe work place on this project where the potential for chemical exposure may exist include:

- No smoking, eating, or drinking in areas where contaminants may be present.
- Avoid the area immediately downwind of any excavation.
- Contact with contaminated materials should be minimized through the knowledge of site conditions and the location of potential contamination based on previous site investigation reports.
- Minimize the creation of dust, through dust suppression such as water application.
- Adequately barricade all work zones to ensure public safety.

ATTACHMENT C SAFETY PLAN ACKNOWLEDGMENT FORM

I have been informed of and understand and will abide by the procedures set forth in the Health and Safety Plan and Amendments for the Site.

Printed Name	Signature	Company	Date

Page ____ of ____

ATTACHMENT D BASIC EMERGENCY MEDICAL AND FIRST AID

In the event of personal injury, a site associate trained in first aid will administer treatment to the injured associate after taking precautions to protect him- or herself. If necessary, the injured associate will be transported to the nearest hospital. (For all areas, emergency arrangements will be made prior to the commencement of work at the project.) An ambulance will be provided if necessary. The Project Manager is responsible for the completion of an Accident Report Form.

OSHA Subpart K, Medical Services and First Aid, states that an employer shall ensure that medical personnel are readily available for consultation if professional assistance is not in near proximity to the workplace, persons will be adequately trained to render first aid. ENTACT requests that at least one person for every ten associates working is trained in first aid procedures and cardiopulmonary resuscitation (CPR).

ENTACT advises the following procedures in case of an accident, however these recommendations are not a substitution for First Aid Training:

1. Evaluate the situation and take immediate appropriate action. If necessary, remove the victim from a hazardous environment.
2. Make certain help has been obtained from an appropriate source.
3. Ascertain that the victim is breathing. If not, begin rescue breathing. Make sure the airway is not blocked.
4. Stop bleeding. Follow proper decontamination procedures prior to removing a victim contaminated with hazardous substances. If the victim is not decontaminated, other people and areas could be contaminated.
5. Double check that help is on the way.
6. Communicate accurate information concerning details of the accident to medical personnel. It is very important that the medical personnel understand what type of chemicals that the victim has been exposed to. The ENTACT office is equipped with specific chemical information and first aid guidelines to assist you and the medical personnel. This information can be accessed and relayed to the hospital or medical personnel within minutes.

Order of Obtaining First Aid

If possible, designate another person to go for assistance while you stay with the victim.

1. Notify a physician, make him/her aware of the emergency and follow his/her advice regarding further first aid and transportation of the victim.
2. If it is apparent that the services of an ambulance are necessary, tell the telephone operator it is an emergency and ask him/her to connect you with the local ambulance service. If there is no ambulance service, telephone the nearest city, county, or state police.

3. In the telephone request to the doctor, police, or ambulance, be prepared to give:
 - Phone number calling from
 - Address and directions to the site
 - Describe the accident, number of victims and condition
 - Give your name
 - Do not hang up until emergency personnel end the conversation
4. Stay at the site until the doctor or ambulance arrives.

Condition, Symptoms and Treatment

Breathing Stopped - Breathing stopped completely

1. Check that breathing passages are not blocked.
2. Apply mouth to mouth method of artificial respiration at once.

Shock - Pale skin, body clammy and cold, pulse rapid and weak

1. Keep victim lying down.
2. Maintain normal body heat, but do not allow victim to become overheated.
3. If victim's face is pale, elevate feet slightly.

Bleeding - Blood flowing

1. Apply direct pressure over wound with cloth compress (sterile if possible).
2. If bleeding continues apply pressure at nearest pressure point above the bleeding.

Electrical Shock - Unconsciousness, burns may be present, may convulse

1. Survey the situation carefully. Make certain you are not the second victim.
2. If possible, turn power off.
3. If unable to turn power off move person from contact by moving live wire with a rope or dry board. If the victim remains in contact with the source of the electricity and must be moved use only your feet. By using your hands an electrical current is sent through your entire body including your heart and is far more serious than current through the legs. An electrical current through the lower extremities is rarely fatal.
4. Check breathing. Check pulse. If necessary, begin CPR. Do not stop life saving measures until medical personnel arrive.

Burns

- 1st degree - skin reddened - cover lightly with sterile dressing
- 2nd degree - skin blistered - cover lightly with sterile dressing
- 3rd degree - deep destruction of tissue usually with charring - cover lightly with sterile dressing and consult physician at once. Do not place grease or oil on any burn.

Fractures

- Simple - pain and swelling, and/or deformed part.
 - Compound - broken bone plus break in skin and bleeding.
1. Immobilize fractured part.
 2. Stop bleeding and dress wound.
 3. Splint securely if patient has to be moved.

Spinal Injuries

Injury to the spinal cord should be suspected in any accident involving a fall or injury to the neck or back. Loss of sensation and/or movement. Move the victim only if necessary. Attempt to keep the body aligned and the back and neck straight. Preferably, the victim should not be moved until an ambulance arrives with a special stretcher and trained personnel.

Choking

Violent choking, alarmed expression, attempts at inhalation, discoloration in the face, neck, and hands, unconsciousness

1. If the victim can cough, speak or breathe - DO NOT interfere by pounding on the victim's back.
2. If the victim can not respond or speak, approach the victim from behind and place fist hands below the rib cage and apply firm pressure in quick, sharp, upward blows to force air from the lungs.
3. If unconscious, turn victim's head to one side, apply same pressure outlined in Step 3.
4. Artificial respiration may be necessary for the unconscious victim after the object has been removed from the throat.

Sudden Illness

- Heart Attack - Chest pain, shortness of breath, pale or bluish skin, shock.
 - Stroke - Loss of sensation and/or movement on one side of the body, pupils unequal, inability to talk, unconsciousness.
 - Convulsion - Rigidity of body muscles lasting from a few seconds to half a minute, bluish discoloration of face and lips.
 - Fainting - Unconsciousness
1. Check breathing. Check pulse. Begin CPR, if necessary.
 2. Loosen tight clothing.
 3. Keep normal body temperature.
 4. In the case of convulsions - protect the victim from injury, but do not attempt to place objects in the victim's mouth.
 5. Do not attempt to give liquids to an unconscious victim.

Prevention of Heat Stress

1. Proper clothing - Loose fitting, light weight, light colored, and properly ventilated.
2. Hat - To prevent radiant heat exposure to the head and to shield the face from ultraviolet light.
3. Acclimatization - Heat disorders are more likely to occur at times when associates are not acclimated to working in the heat. Most people require one week to adapt to a hot humid environment.
4. Work loads - During hot temperatures, work loads should be adjusted to each associate's acclimatization rate.
5. Body weight - Monitor your daily weight. A pint of water weighs one pound. If you have lost several pounds in one day, try to replace the amount of weight lost.
6. Heart rate and body temperature - While working in the heat your heart rate and body temperature are good measures of body stress.
7. Fluid intake - The most important measure of prevention adequate fluid intake during the work period.

Exposure to Hazardous Chemicals

The environmental industry is faced with the problem of handling mixtures of unknown substances. Speed is of prime importance in the prevention of injury from chemical exposure. It may not be possible to take the time to determine what particular chemical or combination of chemicals are responsible for the exposure. Even once a chemical is known it may require valuable time to refer to specific chemical exposure guidelines. If "worst case" exposure guidelines are followed then valuable time can be saved. In general, there are four ways that chemicals enter the body: inhalation, skin exposure, eye exposure, and ingestion.

Inhalation

1. Remove from hazardous area to fresh air.
2. If not breathing begin mouth to mouth respiration.
3. Give oxygen.
4. Call emergency services.
5. Identify chemicals.
6. Observation by physician for a 24-hour period depending on specific chemical.

Skin exposure

1. Remove contaminated clothing.
2. Wash under running water for 15 minutes.
3. Call emergency services.
4. Identify chemical
5. Observation by a physician if necessary.

Eye exposure

1. Wash eye for 15 minutes (remove contact lenses first).
2. Call emergency services.
3. Identify chemicals.
4. Evaluation and treatment by physician.

Ingestion

1. Identify chemical ingested.
2. Call poison control center or CHEMTREK 1-800-424-9300.
3. Follow actions given by center.
4. Seek follow-up medical attention if recommended by the center.

Hot Weather

- Orientation for all associates on heat stress and its related symptoms.
- Regular break periods with water and Gatorade.
- Methods to monitor heat stress:
- Body water loss (BWL) due to sweating should be measured by weighing the associate in the morning and the evening. The clothing worn should be similar at both weighings. BWL should not exceed 1.5% of total body weight. If it does the associate should be instructed to increase his or her daily intake of fluids; or
- 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 110 beats per minute. If the HR is higher the next work period should be shortened by 10 minutes while the length of the rest period remains the same.
- There will be established break periods and breaks on an as needed basis.

If symptoms of heat stress are noted for an associate the associate will be evaluated by measuring the heart rate for 30 seconds.

Signs and Symptoms of Heat Stress

Heat rash may result from continuous exposure to heat or humid air.

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include;

- Muscle spasms
- Pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
 - Pale, cool, moist skin
 - Heavy sweating
 - Dizziness
 - Nausea
 - Fainting
 - Tiredness
 - Headache

- Weakness

Heat stroke is the most serious form of heat stress. Temperature regulations fail and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Weak rapid pulse
- Coma or unconsciousness

Cold Weather

- When the air temperature is below 40°F associates will be reminded of the hazards of cold stress and that proper clothing is required.
- When air temperature is below 36°F, any time clothing becomes wet it must be replaced immediately.
- Temperatures below 30°F will require special insulated clothing and fluid replacement with warm, sweet, non-caffeine containing drinks.
- Specific Controls:
 - An area that is heated for breaks and lunch.
 - Areas minimizing air movement to shield wind.
 - Reducing conductive heat transfer.
 - Providing adequate clothing protection.
 - Special cold weather discussions will be held in daily safety meetings when temperatures are expected to be below 36°F.

See the ENTACT Comprehensive Health and Safety Manual for wind chill chart.

ATTACHMENT E JOURNEY MANAGEMENT PLANNING

Background:

ENTACT has formally embraced Chevron's "Take Five to Stay Alive" Journey Management Planning Program promoting motor vehicle safety. The first step of journey management planning is to "question the need for every trip." The journey management planning process is a simple risk assessment of the relative value of any proposed trip versus the inherent risk that making it presents. This planning process helps to ensure that all identified hazards are understood and managed and that unnecessary trips or those presenting an unreasonable or uncertain risk are not taken. Depending on the nature of company travel, this assessment may be something as simple as a driver asking themselves what route and time they will travel to a destination to a formal documented project journey management plan (JMP.)

Purpose:

This document provides guidance and outlines requirements regarding journey management planning. Its purpose is to minimize the risk associated with motor vehicle use and transport. This document includes forms which should be used to prepare a JMP.

Scope:

Journey management planning applies to ENTACT Associates and contractor/sub-contractors when on Company property or when using motor vehicles for company related business, including:

- Company-owned or leased vehicles
- Rental vehicles used on Company-authorized business
- Personal vehicles while being used for Company business

Journey management planning excludes multiple transport mode journeys where associated motor vehicle travel is less than 100 miles. Multiple transport mode journeys are those that include the use of, for example, a combination of personal vehicle, airplane, and rental car.

Definitions:

All employees should categorize their business travel into one of the following categories:

Routine journeys: routine and repetitive driving tasks associated with short journeys (those less than 100 miles one way), familiar regions and terrain, and normal driving conditions (such as familiar roads, good weather, and owner's vehicle.) For example, travel to a local site for a weekly project meeting is a routine journey.

Non-routine journeys: driving tasks associated with extended travel distances (greater than 100 miles one way) or duration, unfamiliar regions or terrain, and unusual conditions (such as unfamiliar roads, bad weather, and use of a rental vehicle.) For example, mobilizing to a new project or area that is not familiar to the driver, either because of unfamiliar roads, wildlife, night

driving, and bad weather is a non-routine journey. Such journeys may also require specific security and emergency response considerations as well as additional planning and controls.

Basic Operating Standards:

All journeys, whether routine or non-routine, must comply with ENTACT's basic motor vehicle operating standards as follows:

- All vehicle occupants must wear safety belts (seatbelts and shoulder harness if provided)
- No vehicle shall be operated by a driver under the influence of drugs or alcohol
- Keep speed appropriate to conditions and follow all local laws and regulations
- Cellular telephone use, in either the hand-held or hands free mode, by the driver of a motor vehicle is strictly prohibited while the vehicle is in motion
- Never operate a motor vehicle if you will exceed the "16 Hour Rule"
- Where practical, vehicles will be parked such that the first movement after inspecting and starting the vehicle is in the forward direction

16 Hour Rule:

To minimize risk caused by fatigue, employees will not engage in driving if the journey requires them to exceed 16 hours of continuous duty in one day. For example, a 5 hour road trip at the end of 12 hour work shift can raise the risk of a crash due to fatigue to an unacceptable level. The driver should have adequate rest prior to the start of the trip.

Additional Requirements for Routine Journeys:

Employees on routine journeys should "question the need for every trip" by asking themselves the following:

- Is there an alternative way of achieving this trip's objective, such as using a courier or having a teleconference or net meeting? If the answer to this question is yes, the trip may not be necessary.
- Do I know the route to the destination well? Drivers should have a clear understanding of the best route to the destination in advance. If this is not the case, a better alternative may be to take a taxi or car service.
- Have I considered all environmentally related hazards for the route of travel? Weather conditions, road conditions, and traffic conditions present at the planned time of departure must be considered. Fog, rain, ice, or road construction present hazards that need to be accounted for by selecting an alternative route or delaying or rescheduling the trip.
- Must this journey be made at night? Driving at night increases risk substantially. Consequently, extra caution is required. For night travel on routine journeys, consider what steps must be taken to minimize the risk. Actions such as decreasing speed, altering the route to well lighted streets, or delaying or rescheduling to arrive in daylight hours are possibilities.

Additional Requirements for Non Routine Journeys:

All non-routine journeys require a formal journey management plan (JMP.) The JMP should address security concerns (if applicable) and emergency response issues. At a minimum, all drivers will inquire about the safest route of travel and notify their business contact and/or supervisor of travel plans and expected arrival time. Copies of completed JMPs should be included with the employee's or contractor's travel itinerary. Completed JMPs should be electronically sent to the destination location. Safe arrival should be confirmed within 4 hours of the estimated arrival time with personnel at the same destination location. Personnel at the destination location should notify the traveler's supervisor if the traveler fails to confirm safe arrival. Additional considerations are as follows:

- Security concerns that may be present on the planned route need to be addressed. For example, planned demonstrations, high risk crime areas, car jacking, and kidnapping are security concerns. If security is an issue for the journey, the JMP should address how that risk will be minimized. Carrying of weapons while on Company business is not permitted.
- Emergency response (ER) services, especially in remote locations may not be available. Arrangements for communication and support, such as cell phone, local 911 service, two way radio must be made. The local emergency response service is an appropriate answer in many cases, however, on some journeys; drivers need to be aware of the limitations and even existence of ER services. The best way to minimize this risk is by ensuring personnel at the destination location know the planned arrival time and what to do in the event the driver does not arrive or make contact.
- Night driving during non-routine journeys should be avoided except in the event of an emergency. The journey should be rescheduled to allow for daylight travel in all other cases.

Related Documents:

Forms (provided on the following pages) have been developed to assist drivers and other affected Associates in complying with this journey management process. The forms include a Journey Assessment Form and Journey Management Plan. Also, a JSA (provided on the following pages) for driving passenger vehicles is applicable and required as part of the overall safety process.

Journey management planning requirements are in addition to other ENACT requirements that appear in Section 9.0 and 10.0 of the Associate Handbook as well as the Driver Safety and Cell Phone Policies.

JMPs will be prepared in addition to site-specific Health and Safety Plans.

Journey Assessment Form

For use by: ENTACT Associate Contractor/Sub-contractor

Assessment developed by: _____

Driving requirement: _____

Is this trip necessary? Yes No
Is there an alternative that does not involve driving? Yes No
If yes, by what means: _____

Basic Journey Steps

Was a JSA developed or revised for this driving task by employees from the site that will be involved in the task? Yes No

Does the JSA break the journey into steps necessary to accomplish the task and describe in “what” not “how” steps? Yes No

Are the journey steps numbered for reference? Yes No

Potential Crashes or Hazards

Are the hazards associated with each journey step identified by asking “what” driver action, condition, or event can lead to a crash? Yes No

Are potential health hazards identified (toxics, heat/cold, fatigue) Yes No

Are all potential crashes (struck by, line of fire, pinch points) identified with a corresponding solution or mitigation technique? Yes No

Are the potential crashes/hazards numbered for reference? Yes No

Safe Procedures and Behaviors

Are safe procedures and behaviors identified for minimizing or eliminating each identified potential crash or hazard? Yes No

Are the safe procedures and behaviors specific? Yes No

Are vague and general statements avoided? Yes No

Are the safe procedures and behaviors numbered for reference? Yes No

JSA Process Review

Was the JSA revised because the scope of work changed?

Yes

No

Does the JSA match the task to be performed?

Yes

No

Journey Management Plan

For use by: ENTACT Associate Contractor/Sub-contractor

Developed by: _____

Task or Trip description: _____

Is this trip necessary? Yes No
Is there an alternative way of achieving the trip objective? Yes No
If yes, how: _____

Destination: _____ Contact Phone Number _____

Vehicle	Driver	Passenger
_____	_____	_____
_____	_____	_____
_____	_____	_____

Departure Time: _____ Estimated Time of Arrival: _____

Security Escort Required? **Reason:** _____

Weather Dry Windy Rain Snow Fog
 Icy Dust

Road Conditions Dirt Road Pot holes Paved Road Mixed Conditions

Driver Hours Work hrs _____ + Driving Hrs _____ = Total Hrs _____
(total hours may not exceed 16 hours in any day)

Communications Cell phone Two-Way Radio Other _____

Night Driving Yes No Is it essential? Yes No
Night driving controls (list) _____

Vehicle condition Satisfactory
Person responsible for the daily inspection of the (these) vehicle(s)? _____

Person responsible for preventive maintenance on the (these) vehicle(s)? _____

Documentation Check

	Yes	No
Vehicle registration/license	<input type="checkbox"/>	<input type="checkbox"/>
Proof of insurance	<input type="checkbox"/>	<input type="checkbox"/>
Valid driver's license (or CDL as required)	<input type="checkbox"/>	<input type="checkbox"/>
Valid vehicle inspection (if required)	<input type="checkbox"/>	<input type="checkbox"/>

Journey Hazard Review

Step	Hazard	Mitigation
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

Comments:

Supervisor Approval _____ Date _____

Job Safety Analysis - JSA00_____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, success agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used during field activities. Also consider weather conditions (heat, cold, rain, lightning).

Date:	
JSA Type:	
Work Type:	Driving - Passenger Vehicle
Work Site:	
Organization:	ENTACT Services, LLC

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
	HSC	<input checked="" type="checkbox"/>	Girouard, Becky	Corp Safety	
	Operator/Driver		MacIntyre, Rick	Corp HSO	

Personal Protective Equipment (PPE) needed
Safety Glasses
Work Boots - Steel Toe, Leather

Job Steps	Potential Hazard(s)	Critical Action(s)
Conduct SPSA	• NLI/LI	Always conduct an SPSA prior to start. • Assess the risk. What is the worst that could happen? • Analyze how to reduce the risk. Ask yourself what you could do to make the task safer. If you are uncertain, then ask someone who would know. • Act to ensure safe operations. Use the ideas and tools that make the task safer.
Perform Vehicle Inspection	• Vehicle failure • Accident or injury	• Check overall condition of vehicle. • Inspect tire condition and pressure. • Check all fluids. • Check head lamps, turn signals, and back up lights. • Clean mirrors and windows. • Inspect the interior of the vehicle; including seat belts and gauges. Remove any clutter or items that may affect your driving or visibility. • Follow appropriate maintenance schedule for your vehicle. Verify insurance card, registration and inspection.
Pre vehicle entry	• Injury or accident. • Vehicle or property damage	• Before entering your vehicle, do a complete walk around. • Be sure that there are no persons or objects behind you or in your path. • Consider ground conditions. Is it wet or muddy? Could the vehicle become stuck or slide? • Consider weather conditions. Is there lightning, flooding or high winds?
Configure seating and controls and lock doors	• Visibility • Sitting too far or too close to pedals may effect reaction time in a stop, or have unexpected results during acceleration.	• Adjust seating to a comfortable position and so that you can easily reach the pedals and steering wheel. • Adjust all mirrors. • Wear seat belt. • If you haven't operated this vehicle before, become familiar with all the controls and where every this is located in the vehicle. • Look for blind spots in your viewing area. • Refer to the owner's manual if necessary.
Starting Vehicle	• Unexpected vehicle movement. • Engine damage or failure	• Before starting, ensure that the vehicle is in park and the parking break is applied. • After starting, check all gauges for proper temperatures, pressures, etc.
Pulling away from parked area.	• Collision with other vehicles, objects or persons.	• Check mirrors and over the shoulder before pulling away. • Vehicle should be situated so the first movement is forward, however if backing, either use a spotter or blow horn to warn others. • Proceed Cautiously.
Driving	• Auto accident • Pedestrians • Foreign objects in roadway •	• Always be alert while driving. • Plan your route, review maps before leaving. Stop in a secure areas if you need to review your map again. • NEVER drive under the influence of

	<p>Cross traffic • Mechanical failure • Becoming lost or disoriented. • Weather</p>	<p>drugs or alcohol. If under medical treatment, consult your physician about side effects of medications. Inform H&S if you are taking any medications. • Never operate the vehicle if you are abnormally tired. • Obey all laws of the land as well as site procedures. Follow posted signs. • Be observant of pedestrians and other traffic around you. Be prepared to “expect the unexpected”. You never know what someone else (or animals) might do. • Watch your gauges and listen to the sounds that the vehicle makes. If something doesn't seem right, pull over and check it out or call for help. • Continually check mirrors. Follow the 3 second rule for following in normal circumstances. • Leave adequate space between you and other when stopping. • Never use a cell phone or radio while driving. Save phone calls for when you are stopped. If you must take a call, pull off the road in a safe area away from traffic. • Reduce speed during hazardous circumstances. Pull off the road if necessary during bad weather.</p>
--	---	---

ATTACHMENT F PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment that may be required during remediation activities. The U.S. EPA terminology for Levels A, B, C, and D personal protective equipment will be used.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR 1910.134 requirements. ENTACT maintains a written respirator program detailing selection, use, cleaning, maintenance, and storage within the ENTACT Comprehensive Health and Safety Manual. A copy shall be available at each project and at ENTACT's Corporate Office in Irving, Texas.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories or levels according to the degree of protection required:

LEVEL A

Level A provides the highest level of skin and respiratory protection and is used in the following situations:

- The extremely hazardous substance requires the highest level of protection for skin, eyes, and the respiratory system.
- Substances with a high degree of hazard to the skin are known or suspected.
- Chemical concentrations are known to be above IDLH levels.
- Biological hazards requiring Level A are known or suspected.
- Oxygen deficient or potentially oxygen deficient atmosphere (<19.5%) are possible.

Protective Gear:

Supplied Air respirator- self-contained breathing apparatus (SCBA) or air line with 5-minute egress air pack

Fully encapsulating chemical resistant suit

Inner and outer gloves

Boot covers

Work gloves

Steel-toe leather and rubber over boots

Hard hat

Hearing protection

Communication device

LEVEL B

Level B provides the same level of respiratory protection, but a lesser degree of skin protection than Level A. It is used when:

- Substances have been identified and require a high level of respiratory protection but less skin protection.
- Concentrations of chemicals in the air are IDLH or above the maximum use limit of an APR with full-face mask.
- Oxygen deficient or potentially oxygen deficient atmosphere (<19.5%) are possible.

- Incomplete identification of gases and vapors, but not suspected to be harmful to skin.

Protective Gear

Supplied air respirator – SCBA or air line with 5-minute egress air pack
Chemical resistant suit
Inner and outer chemical resistant gloves
Steel toe leather work boots and over boots
Hard Hat
Hearing Protection
Communication devices

LEVEL C

Level C provides the same level of skin protection as Level B, but a lower level of respiratory protection is required. Level C is used when:

- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove contaminants.
- The substance has adequate warning properties and all criteria for the use of APR respirators have been met.
- Oxygen concentrations are in the normal range.

Protective Gear

Air purifying respirator with filters and cartridges
Chemical resistant Coveralls
Inner and outer chemical resistant gloves
Steel Toe Leather, safety boots with outer covers
Hard Hat
Safety glasses or goggles
Hearing Protection
Communication device

LEVEL D

Level D is a basic work uniform worn when no skin or respiratory hazards exist. Level D is used when:

- The atmosphere contains no known hazard; and,
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.

Protective Gear

Coveralls
Steel toe, leather work boots
Hard Hat
Safety Glasses or goggles
Hearing Protection

Any personal protective equipment issued to the associate by the company is the personal responsibility of the associate. He/she must ensure that it is kept in a safe and clean condition and in his/her possession

at job sites. When in disrepair, it must be returned for repair or replacement.

In certain construction and maintenance operations, personal protective equipment, such as safety glasses, chemical goggles, respirators, hard hats, and protective clothing is required. The type of protective equipment to be worn will be determined by the degree of exposure to the potential hazard. When in doubt about the safety measures to be observed, associates shall contact the supervisor.

Limitations of PPE

While personal protective equipment reduces the potential for contact with harmful substances, ensuring the health and safety of associates requires, in addition, safe work practices, decontamination, site entry protocols, and other safety considerations. Together these protocols establish a combined approach for reducing potential harm to associates.

Personnel must wear protective equipment when response activities involve known or suspected atmospheric contamination, when vapors, gases or particulate may be generated, or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicant. Chemical-resistant clothing can protect the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene limits or prevents ingestion of materials.

In addition to risks due to contaminants, some physical hazards or hazardous conditions may be present at the site. These include risk of injury while working around heavy equipment, explosive or combustible gas generation, hearing damage from heavy equipment noise, and heat or cold stress.

Additional Information

Eye Protection

Eye protection is required when engaging in operations such as the following:

- Drilling, chipping, grinding, wire brushing.
- Handling caustics and acids.
- Breaking bricks and concrete.
- Hammering and chiseling.
- At least number 2 shaded eye protection for burning and oxygas welding.
- Other situations that create a possible eye hazard, e.g., chemical environments.

The following are different types of eye protection used:

- Industrial type safety glasses must be worn. Monogoggles will be worn over regular prescription glasses, if the glasses are not industrial rated.
- A full-face shield must be worn while performing any job with high-pressure water. A face shield is not to be substituted for safety glasses or goggles, but used in addition to them.
- Chemical splash-guard goggles are required on all operations where solvents, acid, or caustics are used or in the immediate vicinity.
- Appropriate goggles must be worn at any time a hazard exists such as grinding or chipping operations or welding.
- Sandblasting hoods with plastic face shields and piece protection are required while operating a sandblast gun or nozzle. These must be positive pressure fresh air hoods.

Ear Protection

Ear plugs or muffs are required on projects where the noise level is above 85 dBA on an average of eight hours worked. If noise is a problem, associates must wear hearing protection that has NRR of at least 25.

Hand and Body Protection

Waterproof gloves, wet suits, and rubber boots will provide some protection. Where conditions warrant, additional protection such as acid suits, chemical gloves, metatarsal guards or shin guards must be worn. Personnel using arc welding equipment will comply with 29 CFR 1926.102 and will wear a long sleeve shirt, gloves, head protection, and using a welding hood with a sufficient shaded lens for the type of welding being performed.

Safety Harness and Lifelines

Whenever any associate is exposed to the hazard of falling six feet or more (10 feet on a scaffold), he must wear a serviceable safety harness and lifeline adequately secured to a fixed support. This will be so arranged that he cannot fall freely from a vertical distance more than three feet. This included any associate working on open steel, swing stages, suspended scaffolds, platforms without proper guarding, etc.

- When working on a swing stage or elevated device, the lifeline must be secured to a structure separate from the stage or elevating device.
- All harnesses, lifelines and lanyards are to be inspected before use for fraying or other weak spots. Any defective item must be replaced before using.
- Safety body harness must be in good condition and the "D" ring must be placed in the back.
- Bolts, shackles, safety snap hooks, "D" rings and metal links which connect parts of the lifeline system to each other should be properly inspected and maintained at all times.
- Safety body harness and lifelines are required on all work performed in confined spaces where an oxygen deficiency or toxic vapors may exist.

Back Support Harnesses

When any associate is required to move or lift any materials, dollies, forklifts, pallet jacks, back harnesses, and proper lifting techniques should be utilized. Proper lifting techniques are taught to all associates during training sessions and are as follows:

- Put on a back harness support
- Get a good footing on a solid surface
- Place one foot alongside and the other behind the object
- Squat down beside the object keeping your back as straight as possible
- Tilt the object and firmly grasp at the bottom center
- Draw the object close to your body and lift slowly by straightening your legs
- Do not lift more than you can carry. Get help with bulky or heavy loads.

ATTACHMENT G HAZARD COMMUNICATION

Material safety data sheets (MSDS) for chemicals that ENTACT will use or work with on the site are located in the on-site Hazard communication Binder. MSDS include the following:

Sample preservatives

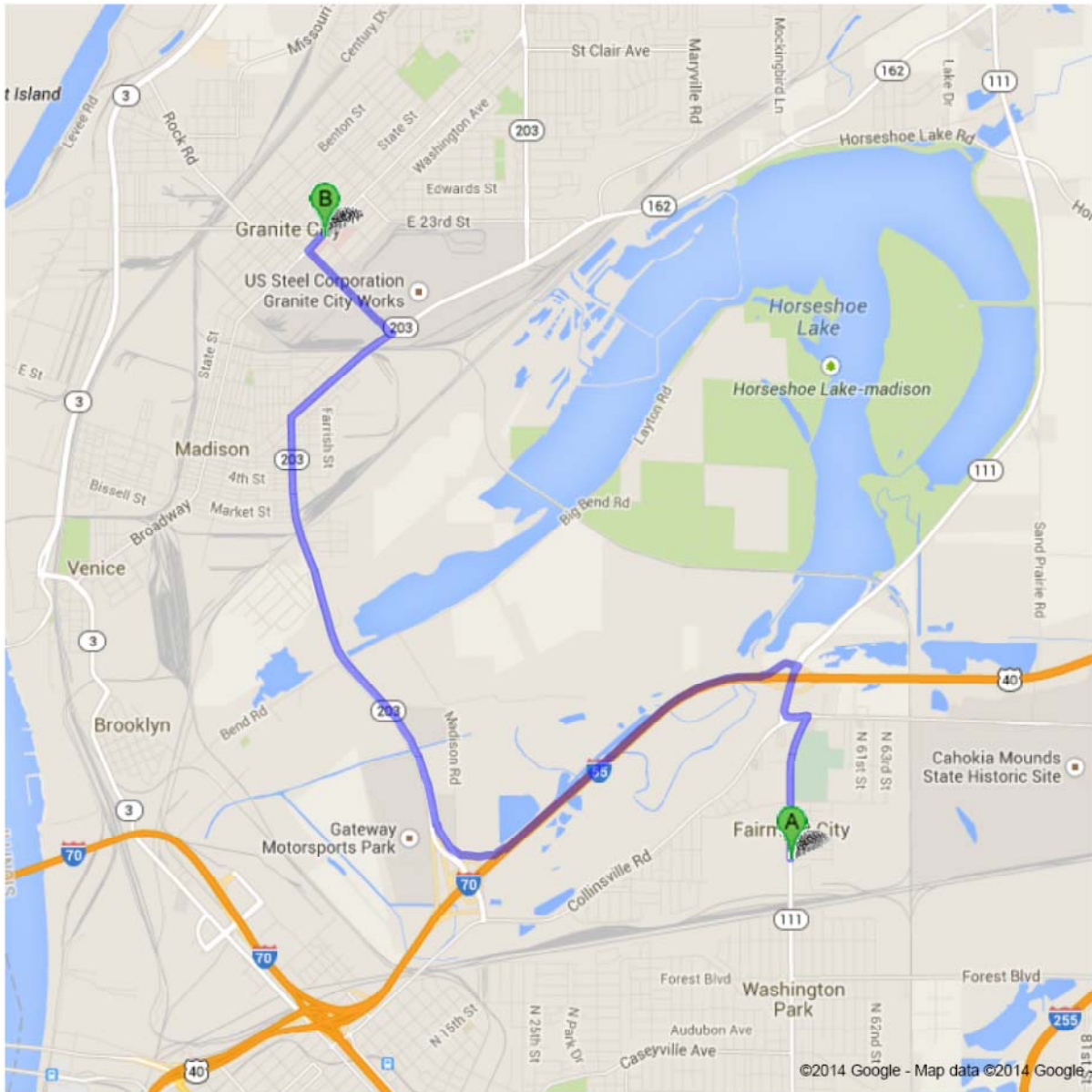
If additional chemicals are brought onto the site, MSDS will be secured and included in the on-site Hazard Communication Binder. All chemicals will be discussed during orientations and daily tailgate safety meetings.

ATTACHMENT H HOSPITAL AND CLINIC ROUTE MAP

Granite City Hospital
2100 Madison Avenue
Granite City, Illinois 62040
(618) 798-3000



Directions to 2100 Madison Ave, Granite City,
IL 62040
8.2 mi – about 13 mins



A 2575 Kingshighway, East St Louis, IL 62201

- | | |
|--|---------------------------|
| 1. Head north on Kingshighway toward Congress
About 1 min | go 0.9 mi
total 0.9 mi |
|  2. Turn left onto Collinsville Rd | go 315 ft
total 0.9 mi |
|  3. Take the 1st right onto IL-111 N
About 46 secs | go 0.4 mi
total 1.3 mi |
|  4. Turn left to merge onto I-55 S/I-70 W/US-40 W toward St Louis
About 2 mins | go 2.1 mi
total 3.4 mi |
|  5. Take exit 4B to merge onto IL-203 N toward Granite City
About 5 mins | go 3.2 mi
total 6.6 mi |
|  6. Slight right onto Edwardsville Rd
About 1 min | go 0.8 mi
total 7.4 mi |
|  7. Turn left onto E 20th St
About 2 mins | go 0.7 mi
total 8.1 mi |
|  8. Turn right onto Madison Ave
Destination will be on the right | go 0.1 mi
total 8.2 mi |

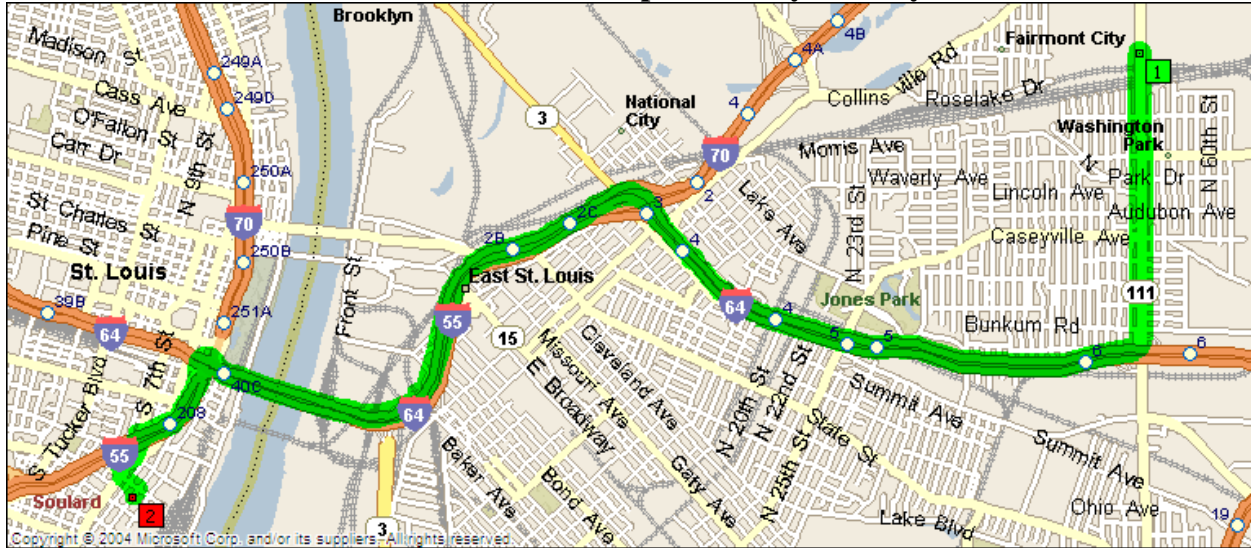
B 2100 Madison Ave, Granite City, IL 62040

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

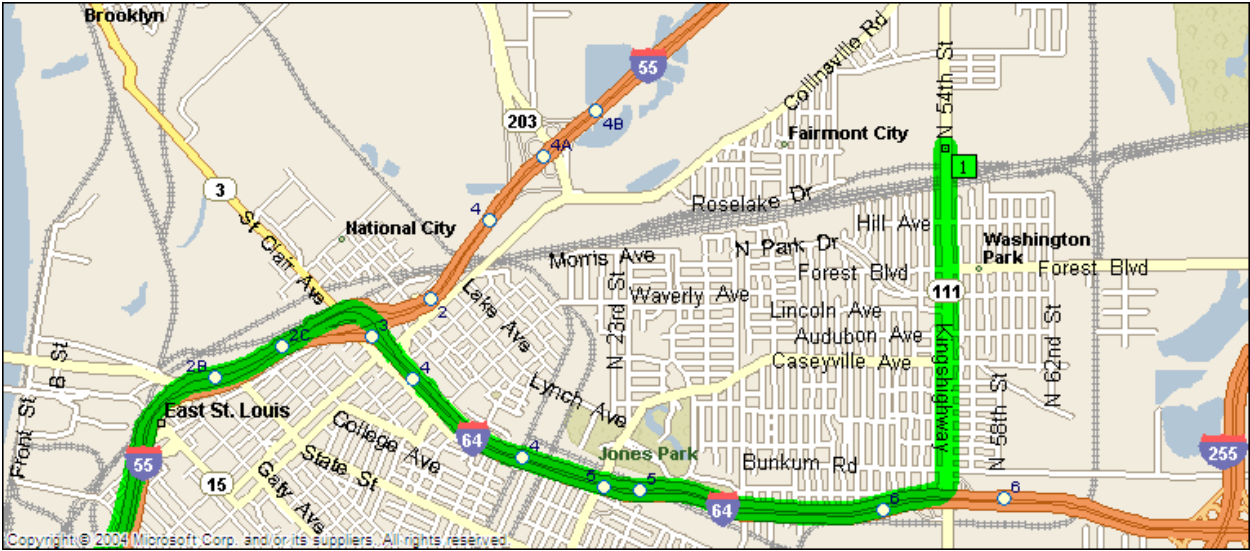
Concentra Clinic
1617 South 3rd Street
St. Louis, MO 63104
Phone: (314) 421-2557 - After Hours Phone: (314) 647-0081
Hours: 7:30am to 5:00pm Monday - Friday



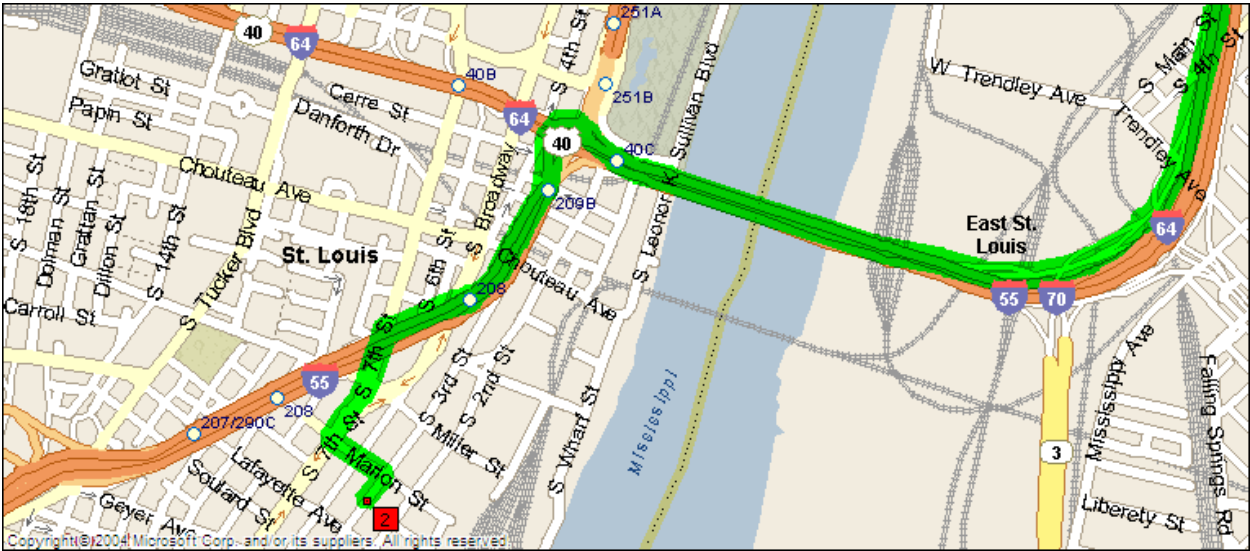
Summary: 9.0 miles (12 minutes)

Mile	Instruction	For	Toward
0.0	Depart 2575 Kingshighway, East St Louis, IL 62201 on SR-111 [N 54th St] (South)	0.3 mi	
0.3	Keep STRAIGHT onto SR-111 [Kingshighway]	1.2 mi	
1.6	Take Ramp (RIGHT) onto I-64	3.5 mi	
5.0	Merge onto I-55 [I-64]	1.0 mi	
6.0	Turn RIGHT onto Ramp	0.3 mi	
6.4	Keep LEFT to stay on Ramp	0.3 mi	
6.6	Take Ramp (LEFT) onto I-55 [I-64]	1.2 mi	
7.5	<i>Entering Missouri</i>		
7.8	At exit 40C, take Ramp (RIGHT) onto I-55	0.6 mi	
8.4	At exit 208, turn RIGHT onto Ramp	0.2 mi	I-64 / St Louis
8.6	Turn LEFT (South) onto S 7th St	0.3 mi	
8.8	Turn LEFT (East) onto Marion St	0.1 mi	I-70 / IL-3 / Cahokia / St Louis / Great River Road South
8.9	Turn RIGHT (South-West) onto S 3rd St	120 yds	IL-3 / I-64 / I-55 / I-70 / St Louis / Cahokia / Great River Road
9.0	Arrive 1617 S 3rd St, St Louis, MO 63104		I-64 / I-55 / I-70 / St Louis

Starting Location to Clinic



Ending Location of Clinic



ATTACHMENT I ACCIDENT REPORTING

ENTACT is guided by an established safety policy. This policy is based on a sincere desire to eliminate personal injuries, occupational illnesses, and damage to equipment and property, as well as to protect fellow associates and the general public whenever the public comes in contact with, or is affected by, the Company's work.

ENTACT recognizes associates and implement safety procedures. Those associates who avoid injury and any vehicle accident are recognized on an annual basis. In addition, other incentive programs are implemented and include programs such as short-term safety contests, whereby prizes are awarded to associates with exceptional safety records. It is the responsibility of the Director of Corporate Safety to determine such additional incentive programs and/or contests.

ENTACT shall provide a verbal report of all reportable accidents, as soon as the injured associate's immediate needs are attended to, a verbal report of all injuries that require medical attention or loss of work time. A written report to Owner's safety inspector shall follow within twenty-four (24) hours. In the event of severe injury, death or extensive property damage, ENTACT shall notify and assist Owner's investigation team during the inquiry. ENTACT shall maintain a log of occupational injuries and illnesses as required by federal law in accordance with the OSHA record keeping requirements of 29 CFR 1904.2

Completed accident documentation appropriate for the accident shall be maintained on site and include the following forms/reports/ summaries: Employer's First Report of Injury or Illness, Owner's Contract Injury Summary Report, Medical Treatment Authorization, Major Incident Report, Automobile Loss Notice, General Liability Loss Notice, Motor Carrier Accident Report, First Aid Register, Monthly Accident Analysis, and a Monthly Preventable Accident Monthly Summary. Copies of the Employer's First Report of Injury or Illness shall be submitted to Owner's safety inspector and construction foremen.

Managers and supervisors are charged with the responsibility of preventing the occurrence of incidents or conditions that could lead to occupational injuries or illness. While it is Management's responsibility to provide a safe environment in which to work, the ultimate success of a safety and health program depends upon the full cooperation of each individual associate.

Safety should never be sacrificed for production. It must be considered an integral part of quality control, cost reduction and job efficiency. Every supervisor will be held accountable for the safety performance demonstrated by the associates under their supervision. Our goal is the total elimination of accidents from our operations. There are three sound reasons for this goal:

1. No endeavor is worthy if it should cause human suffering through disabling injury or loss of life.
2. A good safety record reflects the quality of management, supervision and the work force. It also serves to promote business and thereby contributes to the continuing growth and success of the Company.
3. Poor accident experience increases costs, and results in a loss of profits. Our policy is to accomplish work in the safest possible manner consistent with good work practices. Management at every level is charged with the task of translating this policy into positive actions.

If an injury occurs on the job, no matter how minor, the supervisor is to be notified immediately so that appropriate medical treatment can be administered. As soon as possible thereafter, an Accident Report (NLI/LI) will be completed by the responsible supervisor and/or HSC.

Failure to report an accident immediately after it happens may result in dismissal and/or delay or denial of Associates' Compensation benefits.

All accidents and near accidents will be immediately investigated by the responsible project supervisor, the company safety officer, and management. Investigations will be conducted in accordance with the investigation format outlined in ENTACT's accident investigation report (see attached). Information will be obtained from witnesses, the first report of injury, the victim, and other sources that may be available.

ATTACHMENT J SPILL CONTROL

Information for this plan will vary from project to project according to site-specific needs. Site-specific information should be added once site operations have begun. The following are provided as guidelines.

Gasoline/Diesel

- Each tank is self-contained up to 110% of capacity of the tank.
- Barricades are installed around the tanks to prevent accidental damage to the tanks.
- Only skilled operators are allowed to refuel the equipment at specific times during the day.
- Tanks are inspected twice a day - once in the morning and once in the afternoon with a twenty-four hour guard service.
- Safety meetings outline spill prevention control measures.

Identifying Material

- Locations will be marked once they are established.
- Material Safety Data Sheets will be available on site for diesel and gasoline.
- “Flammable” signs will be posted at the locations on the gasoline tank.
- The material name will also be posted on all tanks.

Spill Response

The Field Project Manager is the responsible person in charge of spill protection and in the case that a spill does occur:

- The Field Project Manager will be notified.
- If a spill does occur one of the most important factors is in limiting the environmental damage through a speedy clean-up.
- The Field Project Manager will react immediately, stopping the leak, containing the product with absorbent bags and absorbent material.
- Client representatives will be notified as soon as possible.
- One person will be assigned to stand-by with a fire extinguisher.
- All materials picked up will be placed in a 55-gallon drum for proper disposal.
- All unnecessary personnel will be kept away from the area.
- Waste accumulated must be removed from the containment area within twenty-four hours or at the earliest practicable time.

To What Level Is Clean?

The spill material must be cleaned-up so that the environment is returned to as close to its pre-spill condition as possible. Any residue that remains must pose no risk to public health and must be at levels that are acceptable to regulatory agencies.

Disposal of Cleanup Materials

The material cleaned-up from a gasoline or diesel tank would be classified as hazardous waste and all containers would have to be clearly labeled and properly disposed. Material from the treated wastewater will be tested for proper disposal protocol.

Spill Report

After the clean-up has been completed a detailed report with all circumstances relating to the leak and how the spill response team reacted to the spill with an Estimated Damages Report must be submitted to ENTACT and client representatives. All spills require completion of a Near Loss Incident/Loss Incident Report.

ATTACHMENT K ALCOHOL AND DRUG POLICY

ENTACT strives to provide a safe and healthy work environment and protect its operations and facilities. It is the objective of ENTACT to maintain a productive and efficient work place. Therefore, ENTACT policy prohibits the unlawful manufacture, distribution, dispensation, possession, use, or being under the influence of a controlled substance in the work place. Any associate found to be in violation of this policy shall be subject to discipline, up to and including discharge.

ENTACT's Substance Abuse Policy was created to establish and maintain a safe and healthy work environment for its associates as mandated by the Drug-Free Work Place Act of 1988. "Drug" is defined as any substance, other than alcohol, capable of altering an individual's mood, perception, pain level or judgment. "Controlled Substance" is defined as any substance that can be legally obtained only by prescription by a licensed medical practitioner. "Illegal Drug" is defined as any drug or controlled substance that is generally recognized as illegally sold or consumed.

All applicants for employment will be advised of ENTACT's Drug and Alcohol Policy. A medical screen for drugs is a condition for employment and will be included in the pre-employment physical examination. Positive tests serve as grounds for denial of employment and/or termination. Associates who refuse a medical screen may be denied employment. The Drug and Alcohol Policy allows ENTACT to require an associate to submit to a drug and alcohol test at any time, without prior notice. ENTACT may refuse to hire an applicant who does not sign an agreement consenting to future drug and/or alcohol testing in accordance with company policy.

All associates are expected to abide by the terms of the Drug and Alcohol Policy as a condition of employment. Additionally, all associates are required to notify their immediate supervisor if they are convicted under any criminal drug statute for a violation occurring in the work place no later than five (5) days after the conviction. If an associate is convicted under any criminal drug statute for a violation occurring in the work place, ENTACT may at its discretion take appropriate personnel action against the associate, up to and including immediate discharge, and/or require the associate to satisfactorily participate in a drug abuse assistance program.

The following guidelines are mandatory for all ENTACT associates:

1. The use of illegal drugs is prohibited.
2. All associates are prohibited from being under the influence of alcohol, illegal drugs, or any drug not legally prescribed during working hours.
3. The use, sale, purchase, possession, or transfer of any controlled substance other than use as prescribed by a physician while performing company business, on or off company premises, is strictly prohibited and grounds for immediate dismissal.
4. No alcoholic beverages will be bought or consumed on company premises except in connection with company sponsored events. Violation will result in disciplinary action, up to and including dismissal.
5. Associates suspected of being under the influence of alcohol or any illegal drug during working

hours, will be suspended immediately and will be required to take a medical screen for drugs.

The ENTACT Drug and Alcohol Policy serves as protection for both ENTACT and its client. Therefore, compliance with the stated guidelines is mandatory and will ensure a safe, healthy work environment and reduce substance abuse related accidental injuries to person and property.