California DTSC

SITE SPECIFIC HEALTH AND SAFETY PLAN

Exide Facility
Vernon CA

20 August 2016
SITE SPECIFIC
HEALTH AND SAFETY PLAN

Prepared for:
California Department of
Toxic Substances Control
8800 Cal Center Dr
Sacramento, CA 95826

Prepared by:
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111 SW Columbia Street
Suite 670
Portland, Oregon

Our Ref.:
POEXIDE1.0001
Date:
August 22, 2016

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## VERSION CONTROL

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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. JLAs 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: 1
Project Number: POEXIDE1.0002
Date of Changed Conditions: November 4, 2016
Date of Addendum: November 4, 2016

Description of Change that Results in Modifications to HASP:

Exposure to overhead line hazards are not anticipated. A minimum safe distance will be maintained while on site. All work will be completed with hand tools. Added to section 2.2 of HASP

Arcadis project teams will have access to shade tents when temperatures exceed 80 degrees Fahrenheit. Added to Appendix E - Arcadis Heat Illness Prevention Plan

Arcadis workers will not be exposed to occupational noise levels greater than 85db. All work will be completed with hand tools and noise hazards are not anticipated. Added to Appendix G - Personal Protective Equipment

Signed: Project Manager
Signed: Site Safety Officer

Signed: H&S Plan Writer
Signed: H&S Plan Reviewer
SIGNATURES

I have read, understand and agree to abide by the requirements presented in this health and safety plan (HASP). I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

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CONTENTS

Acronyms and Abbreviations.................................................................................................................................. iii

1 EMERGENCY ACTION PLAN.................................................................................................................................. 1
  1.1 Route to the Hospital (To Be Designated by Crew Daily)............................................................................. 1
  1.2 Hospital Information................................................................................................................................... 1
  1.3 Emergency Contact Information and Procedures....................................................................................... 2
  1.4 Emergency Supplies and Equipment List.................................................................................................... 3

2 INTRODUCTION.................................................................................................................................................. 1
  2.1 General .................................................................................................................................................... 1
  2.2 HASP Structure..................................................................................................................................... 1
  2.3 Hierarchy of Administrative Controls................................................................................................... 3

3 PROJECT SITE HISTORY AND REQUIREMENTS......................................................................................... 3
  3.1 Site Background...................................................................................................................................... 3
  3.2 Site Description...................................................................................................................................... 4
  3.3 List of Project Tasks and Scope of Work................................................................................................ 5

4 ARCADIS ORGANIZATION AND RESPONSIBILITIES................................................................................ 5
  4.1 All Personnel........................................................................................................................................ 5
  4.2 Project Manager/Task Manager............................................................................................................... 5
  4.3 Site Safety Officer (SSO)...................................................................................................................... 6

5 PROJECT HAZARDS AND CONTROL MEASURES.................................................................................... 7
  5.1 Task Hazard Analysis............................................................................................................................... 7
    Table 1. Hazard Ranking Chart................................................................................................................ 7
  5.2 Job Safety Analyses (JSAs), Permits and H&S Standards....................................................................... 7
    5.2.1 Job Safety Analyses...................................................................................................................... 7
    5.2.2 Permits.......................................................................................................................................... 7
    5.2.3 H&S Standards............................................................................................................................. 7
  5.3 Personal Protective Equipment................................................................................................................ 8
    5.3.1 General Requirements................................................................................................................... 8
    5.3.2 Levels of PPE Protection.............................................................................................................. 10
    5.3.3 Field Health & Safety Handbook................................................................................................ 10
6 HAZARD COMMUNICATION (HAZCOM)/ GLOBAL HARMONIZATION SYSTEM (GHS)..............11
7 TAILGATE MEETINGS..................................................................................................................11
8 PERSONAL EXPOSURE MONITORING AND RESPIRATORY PROTECTION ......................11
   8.1 General Requirements...........................................................................................................11
   8.2 Personal Exposure Monitoring............................................................................................12
      Sampling Methods and Instruments......................................................................................12
9 MEDICAL SURVEILLANCE.........................................................................................................13
10 SANITATION...............................................................................................................................13
   10.1 Potable Water.........................................................................................................................13
   10.2 Toilet Facilities.....................................................................................................................13
11 DECONTAMINATION.................................................................................................................14
12 SUPPLEMENTAL PLANS AND REQUIREMENTS.................................................................14
13 CLIENT-SPECIFIC HEALTH AND SAFETY REQUIREMENTS ..............................................14
14 ARCADIS BEHAVIOR BASED SAFETY PROGRAM ...............................................................15
15 SUBCONTRACTORS..................................................................................................................15
16 PROJECT PERSONNEL HASP CERTIFICATION .................................................................16

APPENDICES

Task Hazard Analysis (THA)
Job Safety Analyses (JSAs)
Hazard Communication/ Global Harmonization System
Field Forms
Supplemental Plans
Air Monitoring
Enhanced Personal Protective Equipment Requirements
ACRONYMS AND ABBREVIATIONS

ANSI  American National Standards Institute  
Arcadis Inc.  Arcadis  
CCR  California Code of Regulations  
CFR  Code of Federal Regulations  
CoC  Constituents of Concern  
FHSB  Field Health & Safety Handbook  
H&S  Health and Safety  
HASP  Health and Safety Plan  
HARC  Hazard Assessment and Risk Control  
HAZCOM/GHS  Hazard Communication/Globally Harmonized System  
HAZWOPER  Hazardous Waste Operations and Emergency Response  
JSA  Job Safety Analysis  
mg/kg  milligrams per kilogram  
NIOSH  National Institute for Occupational Safety and Health  
OEHHA  California Environmental Protection Agency Office of Environmental Health Hazard Assessment  
OSHA  Occupation Safety and Health Administration  
PM  Project Manager  
PPE  Personal Protective Equipment  
SPF  Sun Protection Factor  
SSO  Site Safety Officer  
THA  Task Hazard Analysis  
TIP  Task Improvement Processes  
TM  Task Manager  
TWA  Time Weighted Average  
µg/m³  micrograms per cubic meter  
XRF  X-Ray Fluorescence
1 EMERGENCY ACTION PLAN

1.1 Route to the Hospital (To Be Designated by Crew Daily)

1.2 Hospital Information

There are multiple hospitals available in support this project, with the two primary facilities listed below. Note that the route and selection of hospital will vary based on the operating location of individual field crews. Daily tailgate safety briefings will include a discussion of the target facility that will be used for
each crew and the most expedient way to reach that location. Mapping of the select facility by field leads can be completed via available smart phones or tablets.

The designated hospital for this project is provided below.

**Hospital Information**

<table>
<thead>
<tr>
<th>Hospital name</th>
<th>Hospital address</th>
<th>Hospital phone</th>
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<tbody>
<tr>
<td>Los Angeles Community Hospital</td>
<td>4081 East Olympic Blvd.</td>
<td>323-267-0477</td>
</tr>
<tr>
<td>Community Hospital of Huntington Park</td>
<td>2623 East Slauson Avenue, Huntington Park, 90255</td>
<td>323-583-1931</td>
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**1.3 Emergency Contact Information and Procedures**

<table>
<thead>
<tr>
<th>Contact</th>
<th>Phone Number</th>
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<tbody>
<tr>
<td>Local Police</td>
<td>911 and 323-562-5732 (Maywood)</td>
</tr>
<tr>
<td>Local Ambulance</td>
<td>911</td>
</tr>
<tr>
<td>Local Fire Department</td>
<td>911 and 323-560-1571 (Maywood)</td>
</tr>
<tr>
<td>WorkCare</td>
<td>1.888.449.7787</td>
</tr>
<tr>
<td>Client Emergency Response (if applicable) -</td>
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<tr>
<td>Poison Control</td>
<td>800.332.3073</td>
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<tr>
<td>National Response Center (all spills in reportable quantities)</td>
<td>800.424.8802</td>
</tr>
<tr>
<td>U.S. Coast Guard (spills to water)</td>
<td>800.424.8802</td>
</tr>
<tr>
<td>Arcadis Project Manager – Nichole Pagano</td>
<td>503-785-9433 (o) 503-952-6525 (m)</td>
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DTSC Exide HASP-August 2016

Use the following notification procedure in the event of an emergency:

- **Step 1**: Dial 911 (if necessary) and/or Work Care 1-888-449-7787
- **Step 2**: Contact the Arcadis PM Nicole Pagano or Rebecca Andresen as backup
- **Step 3**: Contact designated H&S representative for the project
- **Step 4**: PM or TM to contact Client unless the checkbox below is checked:

  Designated field lead to contact client according for all emergency or property damage situations.

All personnel should be aware of the location of the nearest field vehicle. If an evacuation is necessitated, all personnel should proceed to the vehicle immediately. The driver of each vehicle (identified during the daily tailgate meeting) should confirm that all employees are present. Each crew will be equipped with a cell phone for communication in the event of an emergency.

### 1.4 Emergency Supplies and Equipment List

Emergency supplies and equipment for specific tasks are presented on job safety analyses for the task. The following supplies and equipment are applicable to all tasks performed on the project.

<table>
<thead>
<tr>
<th>Emergency Supplies and Equipment (check all that apply)</th>
<th>Location on Project Site</th>
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<tbody>
<tr>
<td>☒ First Aid Kit (type): essential personal kit (contents below)</td>
<td>Work Truck</td>
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<tr>
<td>☒ Fire Extinguisher</td>
<td>Work Truck</td>
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<tr>
<td>☒ Mobile Phone</td>
<td>Field Sampling Kits</td>
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<tr>
<td>☐ Satellite Phone</td>
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<tr>
<td>☒ Traffic Cones</td>
<td>Work Truck</td>
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<tr>
<td>☐ Walkie Talkies</td>
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<tr>
<td>☒ Water or Other Fluid Replenishment</td>
<td>Work Truck</td>
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<tr>
<td>☒ Eye Wash (1 litre bottle)</td>
<td>Field Sampling Kits</td>
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arcadis.com
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<tr>
<th>Item</th>
<th>Location</th>
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<tbody>
<tr>
<td>Eye Wash Bottle</td>
<td>Work Truck</td>
</tr>
<tr>
<td>Wash and Dry Towelettes</td>
<td>Field Sampling Kits</td>
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<tr>
<td>Sunscreen (SPF 15 or higher)</td>
<td>Work Truck</td>
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<tr>
<td>Insect Repellent</td>
<td>Field Sampling Kits</td>
</tr>
<tr>
<td>Chemical Spill Kit</td>
<td>Work Truck and/or Decon Station</td>
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Other (specify): Work Truck and/or Decon Station

First Aid Kit Contents (minimum)

Arcadis personnel, as well as Subcontractors working for Arcadis, are expected to maintain first aid kits that are compliant with Section 5.3 of American National Standards Institute (ANSI) Z308.1-1998 (minimum requirement for First Aid kits). The first aid kits must be appropriate for the scope of work and number of workers at the project Site (combination of kits is acceptable). First aid kits are to be inspected and documented every month.
2 INTRODUCTION

2.1 General

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.

2.2 HASP Structure

Arcadis Inc (Arcadis) and its subcontractors are responsible for operating in accordance with the most current requirements of Title 8, California Code of Regulations (CCR) Section 5192 (8 CCR 5192); and Title 29, Code of Federal Regulations (CFR) Section 1910.120 (29 CFR 1910.120), Standards for Hazardous Waste Operations and Emergency Response. Onsite personnel are responsible for operating in accordance with all applicable regulations of the Occupational Safety and Health Administration (OSHA) outlined in 8 CCR General Industry and Construction Safety Orders; 29 CFR 1910; and 29 CFR 1926, Construction Industry Standards; and with other applicable federal, state, and local laws and regulations. All personnel must operate in compliance with all California OSHA requirements.

A project-specific health and safety plan (Arcadis HASP) has been prepared in compliance with above regulations and DTSC health and safety requirements. As minimum safety requirements for the work, all subcontractors must evaluate job safety analyses (JSAs), prepare a site-specific subcontractor health and safety plan, and review and accept the Arcadis HASP. The Arcadis project managers, field team leaders and the field staff all have the authorization to stop work at any time if deemed necessary due to safety concerns in accordance with Arcadis Stop Work H&S Standard ARC HSGE009. When a Stop Work call has been made all affected employees will be immediately notified including other site personnel and the Arcadis project manager. The basis for the Stop Work call will be evaluated and the hazards and associated risks related to the Stop Work call will be assessed. Appropriate controls will be identified and implemented. Work will resume once a hazard assessment and control implementation has been evaluated and approved by the affected employees and project manager and is found to be a satisfactory solution by all affected employees.

Each site worker will attend a detailed project orientation on the first day work and all workers will attend daily tailgate safety meetings. The field sampling plan/work plan and related JSAs will be reviewed daily at the tailgate safety meetings in order to inform each employee of potential hazards associated to each job step (e.g. exposure to site contaminants, biological hazards, traffic, site security, utility clearance etc.). Due to the 2015 risk evaluation conducted by DTSC and
Parsons regarding the Arcadis scope of work, the field sampling tasks are anticipated to be conducted in Level D PPE.

Particular attention will be given to minimizing impacts to the residents and their surrounding neighbors. This will include establishing clear work zones and areas where the public may not enter.

Exposure to overhead line hazards are not anticipated. A minimum safe distance will be maintained while working. All work will be completed with hand tools.

Chemical exposure to lead in soil for site workers is anticipated to be of low risk for this project. Administrative and engineering controls will be implemented to minimize dust generation during all sampling activities. As such site worker exposure due to inhalation of dust is considered to be a low risk. Exposure to impacted soil and dust due to ingestion may pose a risk to site workers. Such exposure will be mitigated by proper use of Level D PPE and Administrative controls requiring site workers to practice good personal hygiene. Hands and shoes may come in direct contact with potentially impacted soil. Therefore, workers will be required to wear safety toe work boots, safety glasses with side shields, nitrile gloves, Class 2 or Class 3 high visibility vests, and hard hats consistent with Arcadis Level D PPE requirements. Handling of soil, soil samples, and sampling equipment is only allowed while wearing nitrile gloves, or work gloves over nitrile gloves. After soil sampling activity is completed, the nitrile gloves will be discarded and hand washing will be required. Additionally, to prevent track-out off-site, disposal paper boot covers will be work while conducting sampling activities. After soil sampling activity is completed at each property, the disposal booties will be removed and discarded.

This HASP contains important information related to this project in the appendices. Review of relevant appendix information must be conducted to ensure work is performed safely on the project site. The following appendices are included in this HASP with a summary of their contents:

- **Appendix A – Task Hazard Analysis (THA).** This appendix contains an analysis of the hazards and controls to be used for tasks performed on this project.

- **Appendix B – Job Safety Analyses (JSAs) and permits.** This appendix contains the project JSAs and any applicable permits required to perform work on this project.

- **Appendix C – All Applicable Arcadis H&S Standards and Hazard Communication/Globally Harmonized System (HAZCOM/GHS) plan details.** This appendix contains a list of the Arcadis H&S Standards and site chemicals used on the project and safety data sheets (SDSs) applicable to the chemicals used on site.

- **Appendix D – Field Forms.** This appendix contains all of the field forms and checklists staff are expected to use on the project.

- **Appendix E - Supplemental Plans –** This appendix contains all applicable supplemental plans (i.e. Traffic Control Plan, Lone or Remote Worker Plan, Journey Management Plan, etc.). Shipping Determinations should also located in this appendix.

- **Appendix F – Air Monitoring Requirements.** This appendix contains all of the action levels for constituents of concern (CoCs), required monitoring instruments to be used, and monitoring frequency for specific tasks or for the project.
Appendix G – Enhanced Personal Protective Equipment Requirements. This appendix contains all of the specific requirements for tasks on this project requiring enhanced skin, eye and/or respiratory protection.

### 2.3 Hierarchy of Administrative Controls

This HASP references several documents that might be used in the field which contain requirements specific to the task and/or project. Arcadis staff utilizing these documents must implement the requirements [(personal protective equipment (PPE), safety equipment, monitoring equipment, etc.)] based on the hierarchy specified below (in order of decreasing priority):

1. Permits, if applicable to the task or project.
2. Job Safety Analyses (JSAs)
3. HASP/Supplemental Plans
4. Arcadis H&S Standards
5. Field H&S Handbook

During the tailgate safety meeting, the applicable administrative controls to be utilized for the task will be identified, communicated to the field staff, and documented. Requirement changes to a lesser hazard control in a lower hierarchy document requires approval of the HASP reviewer project manager or member of the Corporate H&S Department.

### 3 PROJECT SITE HISTORY AND REQUIREMENTS

#### 3.1 Site Background

The former Exide Facility is located at 2700 South Indiana Street in the City of Vernon, California (Figure 1). This industrial property occupies approximately 15 acres, bounded by South Indian Street to the west, 26th Street to the north, Bandini Boulevard (Bandini) to the south, and industrial properties to the east. The facility was formerly used for lead battery recycling. The immediate surrounding area is industrial.

To determine whether off-site residential soils had concentrations of selected constituents that were greater than background or residential screening levels, Exide’s contractors, Advanced GeoServices Corp. and ENVIRON International Corporation, conducted soil sampling at residential properties and two schools near the Site in November 2013. Additional soil samples were collected from a background area approximately 14 miles to the south of the facility.

Air dispersion modeling based on the South Coast Air Quality Management District requirements identified a preliminary indication of the area in which Exide emissions may have resulted in lead-impacted soil near the Site. Based on this air modeling, soil sampling took place in two residential areas that were identified as having the greatest potential for elevated lead impacts. The Northern Assessment Area for soil sampling is located in Boyle Heights and East Los Angeles; the Southern Assessment Area is located in Maywood.
Nineteen properties were sampled in the Northern Assessment Area, and twenty properties were sampled in the Southern Assessment Area. The soil sampling results were compared to the background results and to California Environmental Protection Agency Office of Environmental Health Hazard Assessment (OEHHA) health screening levels.

Soil lead concentrations exceeding the OEHHA residential soil screening value of 80 miligrams per kilogram (mg/kg) were identified in both the Northern and Southern Assessment Areas. No attempt was made to attribute observed lead concentrations to specific sources, although it is recognized that, due to the heavily industrialized and densely populated nature of the area, multiple sources exist, including Exide’s historic emissions. Other potential lead sources that have affected the soils in the Study Area include deposition from leaded fuel combustion emissions (e.g., from gasoline combustion prior to lead phase-out) and from lead-based paint that is present on virtually most structures in these areas.

### 3.2 Site Description

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Active</th>
<th>Inactive Industrial</th>
<th>Remote Area</th>
<th>X</th>
<th>Parking Lot/Private Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>Residential</td>
</tr>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>Retail</td>
</tr>
<tr>
<td>X Commercial</td>
<td></td>
<td></td>
<td></td>
<td>Service Station</td>
<td></td>
<td>Non-Military Government Installation</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td>Mining</td>
<td></td>
<td>Utility</td>
</tr>
<tr>
<td>Military Installation</td>
<td></td>
<td></td>
<td></td>
<td>Railroad</td>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

Other Specify: Public space (parks)

Sampling activities will primarily be conducted on residential properties, although some commercial properties (non-industrial) or green spaces may be included.

The primary constituents of concern (CoCs) on this project are:

<table>
<thead>
<tr>
<th>Known Compounds</th>
<th>Source (soil/water/drum, etc.)</th>
<th>Known Concentration Range (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead in soil*</td>
<td>Surface soils (0-2 feet)</td>
<td>Lowest 11, Highest 4,858</td>
</tr>
</tbody>
</table>

*from August 13, 2015 DTSC Presentation, “Preliminary Estimate Distribution of Exide’s Lead Emissions in Soil”
3.3 List of Project Tasks and Scope of Work

This HASP addresses the following work tasks on this project:

- Task 1 Utility Clearance 811 One Call Property Notification Calls
- Task 2 General Site Mobilization
- Task 3 Site Soil Sampling – XRF Analysis
- Task 4 Site Soil Sampling – Soil Sample Collection for Laboratory Analysis
- Task 5 Site Soil Sampling – Equipment Decontamination
- Task 6 Site Soil Sampling – Sample Preparation for Lab Courier

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 that 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

Nichole Pagano (Alternate - Rebecca Andresen)

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.

4.3 Site Safety Officer (SSO)

Lawrence Brown (Alternate – Watson Metsutnan)

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:

- Stop work operations in the event that field crew personnel or community members’ safety is in question.
- 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 that 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, including the evacuation of field crew if necessary.
- Evaluating available monitoring data to make field decisions regarding safety and health based on established criteria.
- Ensure that all necessary permits and safety information provided by the client is disseminated to other site personnel and maintained in an organized manner.
- Communicate with the PM on health and safety issues.
- Reports all injuries, illnesses and near-misses to the PM
- Ensures that necessary safety equipment is maintained and used at the site.

The SSO will contact a health and safety professional for assistance. David Kudlinski, a Certified Industrial Hygienist, will serve as the initial point of contact for this project. Should additional assistance beyond that provided by Mr. Kudlinski be required, the Arcadis Corporate Health and Safety department will be contacted.
5 PROJECT HAZARDS AND CONTROL MEASURES

5.1 Task Hazard Analysis

The scope of work for this project has been subdivided into tasks and each task has been evaluated for hazards using the Hazard Ranking Chart illustrated in Table 1 in accordance with the Arcadis Hazard Assessment and Risk Control (HARC) Health and Safety Standard (AUS HSMS002). Refer to Appendix A for a detailed Task Hazard Analysis (THA) for this project.

Table 1. Hazard Ranking Chart

<table>
<thead>
<tr>
<th>Consequences Ratings</th>
<th>Risk Assessment Matrix</th>
<th>Likelihood Ratings** (likelihood that incident would occur)</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>People</td>
<td>A</td>
</tr>
<tr>
<td>1 - Slight or no health</td>
<td>Slight or no damage</td>
<td>0 - Low</td>
</tr>
<tr>
<td>2 - Minor health effect</td>
<td>Minor damage</td>
<td>0 - Low</td>
</tr>
<tr>
<td>3 - Major health effect</td>
<td>Local damage</td>
<td>0 - Low</td>
</tr>
<tr>
<td>4 - Fatalities</td>
<td>Major damage</td>
<td>0 - Low, 4 - Medium</td>
</tr>
</tbody>
</table>

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

5.2.1 Job Safety Analyses

A JSA has been completed for each safety critical task and is 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 task or activity. PPE listed in the task specific JSA will take precedence over PPE requirements listed in section 5.3.1 of this HASP.

5.2.2 Permits

Selected work tasks listed below require a permit in accordance with client or specific Arcadis H&S Standards. Any applicable permit is presented in Appendix B with the JSAs. PPE and equipment prescribed by the permit take precedence over JSA and HASP requirements.

- Permits are not required for any task on this project.

5.2.3 H&S Standards

Arcadis H&S Standards applicable to this project are listed below. These standards should be reviewed by the PM, TM and site personnel prior to start of the project or applicable task to ensure all requirements are met.

- AFS LLC Health and Safety Management System
5.3 Personal Protective Equipment

5.3.1 General Requirements

PPE requirements are specified in task specific JSAs and/or permits listed in Appendix B. If the work activity is not performed under a permit or JSA, then all project workers working on-site outside of an office or cabbed vehicle must wear, at a minimum:

- Hard hat;
- Safety glasses;
- Safety toed boot; and
- Class II Traffic vest.
Regardless of the requirements above, the following PPE marked “R” is required to be available on site for this project:

<table>
<thead>
<tr>
<th>Description</th>
<th>R= Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Put specific Material or Type in Box)</td>
<td>O= Optional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coveralls</td>
<td></td>
</tr>
<tr>
<td>Chemical Protective Suit</td>
<td></td>
</tr>
<tr>
<td>(Include type in cell, e.g., Tyvek, Saranex, PVC, etc.)</td>
<td></td>
</tr>
<tr>
<td>Splash Apron</td>
<td></td>
</tr>
<tr>
<td>Rain Suit</td>
<td></td>
</tr>
<tr>
<td>Traffic Safety Vest (Class II minimum)</td>
<td>R</td>
</tr>
<tr>
<td>Hard Hat (if does not create other hazard)</td>
<td>R</td>
</tr>
<tr>
<td>Head Warmer</td>
<td></td>
</tr>
<tr>
<td>(depends on temperature and weather conditions)</td>
<td></td>
</tr>
<tr>
<td>Safety Glasses (incorporate sun protection as necessary)</td>
<td>R</td>
</tr>
<tr>
<td>Goggles (based on hazard)</td>
<td></td>
</tr>
<tr>
<td>Splash Guard (based on hazard)</td>
<td></td>
</tr>
<tr>
<td>Ear Plugs</td>
<td></td>
</tr>
<tr>
<td>Ear Muffs</td>
<td></td>
</tr>
<tr>
<td>Outer Chemical Resistant Gloves</td>
<td></td>
</tr>
<tr>
<td>(specify the type of glove based on chemical hazard)</td>
<td></td>
</tr>
<tr>
<td>Inner Chemical Resistant Gloves</td>
<td></td>
</tr>
<tr>
<td>(specify the type of glove based on chemical hazard)</td>
<td></td>
</tr>
<tr>
<td>Insulated Gloves</td>
<td></td>
</tr>
<tr>
<td>Work Gloves*</td>
<td></td>
</tr>
<tr>
<td>Safety Toe Boots</td>
<td>R</td>
</tr>
<tr>
<td>Rubber, Chemical Resistant Boots</td>
<td></td>
</tr>
<tr>
<td>Rubber Boots</td>
<td></td>
</tr>
</tbody>
</table>
5.3.2 Levels of PPE Protection

The following is a summary of the different levels of PPE protection which may be referred to in this HASP, project related JSAs/permits or in H&S Standards:

- Level D - Standard work clothing consisting of long pants, shirt with at least a quarter sleeve, hard hat, safety glasses, safety toed boots, protective gloves and Class II retroreflective vest (traffic vest).
- Level D Modified – All of the PPE listed above plus coveralls (standard or flame resistant coveralls or Tyvek).

5.3.3 Field Health & Safety Handbook

The Field Health & Safety 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 II – Health and Safety Administration
- Section III.E - General H&S Rules and Safe Work Permits
- Section III.F–General housekeeping, Personal Hygiene and Field Sanitation
- Section III.H – Personal Safety and Other Unique Site Conditions
- Section III.M – Heat and Cold Stress
- Section III.Q – Field Office General Health and Safety Requirements
- Section III.S – Personal Protective Equipment
- Section III.U – Vehicle Safety Inspection
- Section III.V – Driving
- Section III.AF – Ergonomics
- Section III.AJ – Drums and Other Material Handling
- Section III.AN Utility Location
- Section III.AO – Backing Safety
- Section V.I – industrial Hygiene and Monitoring Equipment

**Note:** Subcontractors are required to have the same PPE available on site as the PPE listed above.
6 HAZARD COMMUNICATION (HAZCOM)/ GLOBAL HARMONIZATION SYSTEM (GHS)

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

All Arcadis staff must be made aware of the location of and have ready access to the SDS information on site. For this project, SDSs will be located:

- Arcadis Field Office and attachment to the HASPs (in crew vehicles)

7 TAILGATE MEETINGS

Tailgate safety briefings must be conducted at least once daily. The tailgate safety briefing must be documented on the form included in Appendix D and maintained with the project files. The tailgate safety briefing will serve as a final review for hazard identification and controls to be utilized. JSA and the Arcadis FHSHB controls (including any applicable permit or supplemental plans) should be reviewed as part of the briefing to ensure hazard controls are adequate for planned work. A tailgate safety briefing should be conducted again and documented during the same work shift if site conditions change from anticipated conditions.

8 PERSONAL EXPOSURE MONITORING AND RESPIRATORY PROTECTION

8.1 General Requirements

Personal and area exposure monitoring will be documented on the Air Monitoring Log provided in Appendix D. All monitoring equipment will be maintained and calibrated in accordance with manufacturer's recommendations. All pertinent monitoring data will be logged on the form and maintained on site for the duration of project activities. Calibration of all monitoring equipment will be conducted daily and logged on the same form.

Appendix F lists exposure monitoring requirements and associated action levels for site exposure hazards (e.g. chemical, noise, radiation, etc.). Action levels have been developed for exposure monitoring with real-time air monitoring instruments as specified in the table. Air monitoring data will determine the required respiratory protection levels at the Site during scheduled intrusive activities. The action levels are based on sustained readings indicated by the instrument(s). Air monitoring will be performed and recorded at intervals specified in Appendix F.

General Site monitoring will involve using real-time particulate air monitors during excavation activities. Monitoring stations with data logging capabilities will be used by approximately 50% of the sampling
teams initially (four teams). Periodic monitoring will be conducted by site personnel and results will be recorded to ensure that dust control measures are implemented correctly.

If elevated concentrations are indicated, the monitoring frequency will be increased and/or additional monitoring stations will be added, as appropriate. If sustained measurements are observed during this time, the following actions will be instituted, and the Project Manager and Project Health and Safety Manager will be notified. For purposes of this HASP, sustained readings are defined as the average airborne concentration maintained for a period of one (1) minute.

8.2 Personal Exposure Monitoring

Personal exposure monitoring assessment for Site constituents of concern (lead) will be conducted during the beginning of the project using National Institute for Occupational Safety and Health (NIOSH) Method 7300. Samples will be collected using air sampling pumps on a representative number of personnel for analysis of lead and total dust. Additional samples may be collected throughout the project based on results and as conditions change.

Sampling Methods and Instruments

The sampling methods and instruments specified for air monitoring are provided in the table below.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Measurement Type/Units</th>
<th>Location and Frequency</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIE DataRAM</td>
<td>Total airborne particulate (dust) in ( \mu g/m^3 ) of air. Real-time and cumulative average results.</td>
<td>One monitor for approximately 50% of the sampling teams (4 monitors) MIE DataRAMs will be manually checked and recorded at least every 2 hours during sampling operations.</td>
<td>Measure generation of dust and direct implementation of engineering controls. Alarm levels will be set at the applicable action level. Field staff will verify operation at least every 2 hours. Background levels will be collected prior to commencing work.</td>
</tr>
<tr>
<td>NIOSH 7300 sampling pump kit and preweighed mixed cellulose ester filter (NIOSH Methods 0500 and 7300)</td>
<td>NIOSH Method 7300 lead (micrograms per cubic meter ( [\mu g/m^3] ))</td>
<td>One personal monitor on three personnel working at sampling areas Samples will be collected three times during the first week of work. Subsequent sampling will be performed once per quarter through the completion of sampling activities.</td>
<td>Measure generation of lead and total dust. Results will be reviewed immediately upon receipt.</td>
</tr>
</tbody>
</table>
NIOSH method samples will be collected three times during the first week of work to verify no exceedance of the action level. For this project, the OSHA action level of 30 micrograms per cubic meter of air (µg/m³) lead in an air 8-hour time weighted average (TWA) sample will be used.

During the first week of NIOSH method sampling (three days of sample collection), sample media will be shipped priority overnight with a requested 24-hour turnaround time from the laboratory. If the results of the first three days of sampling show results below the action level, NIOSH method sampling will continue at a rate of once per quarter (every three months) during sampling activities. NIOSH method sample media will be shipped with standard turnaround time requested from the laboratory. If real-time or time-weighted average action levels are exceeded at any time, daily NIOSH method sampling with 24-hour turnaround will be instituted until 5 consecutive days of results below the action level are achieved.

9 MEDICAL SURVEILLANCE

Medical surveillance requirements prescribed by OSHA’s Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations apply to all tasks on this project. Arcadis’ medical surveillance requirements for HAZWOPER work 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.

10 SANITATION

10.1 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 on each field vehicle and in the Arcadis Field Office.

10.2 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.

Toilet facilities will be available at the Arcadis Field Office, or field personal will have access to transportation readily available to a nearby facility.
11 DECONTAMINATION

Site workers should exercise good hygiene practices by washing hands and face with soap and water prior to consumption of food, drink, or use of tobacco products. Ready access to an adequate supply of potable water, soap and disposable towels is expected to be maintained on site. Exposed skin in contact with potentially impacted environmental media, site chemicals, decontamination materials (i.e. alconox), or calibration solutions should promptly wash the affected area with soap and water to reduce potential for contamination or skin irritation.

12 SUPPLEMENTAL PLANS AND REQUIREMENTS

<table>
<thead>
<tr>
<th>Traffic Control Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Traffic Awareness and Response Plan</td>
</tr>
<tr>
<td>Lone or Remote Worker Plan</td>
</tr>
<tr>
<td>Journey Management Plan</td>
</tr>
<tr>
<td>Site Security Plan</td>
</tr>
<tr>
<td>International Travel Security Plan</td>
</tr>
<tr>
<td>State Specific Injury and Illness Prevention Plan – State:</td>
</tr>
<tr>
<td>State Specific Heat Prevention Plan – State:</td>
</tr>
<tr>
<td>Other: Dangerous Animals SOP</td>
</tr>
<tr>
<td>Supplemental plans are not required for this project</td>
</tr>
</tbody>
</table>

A shipping determination is required for all equipment, chemical, battery and sample shipments. For this project, one or more shipping determinations are:

| Required for this project and are presented in Appendix E. |
| Not required for this project. |

13 CLIENT-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

Arcadis project personnel must comply with the client’s specific H&S requirements at all times. Client-specific H&S requirements have been integrated into this HASP.
14 ARCADIS BEHAVIOR BASED SAFETY PROGRAM

As part of any project, no matter how simple or complex, Task Improvement Processes (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.

The following tasks are suitable for TIP activity for the project:

- Driving
- Sample Collection
- XRF Analysis
- Sample Preparation for Lab Courier
- Equipment Decontamination

15 SUBCONTRACTORS

Subcontractors are responsible for the H&S of their employees at all times, and have the authority to halt work if unsafe conditions arise.

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.

When the subcontractor is under contract to Arcadis or if directed by the client to act on the client’s behalf, 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.
16 PROJECT PERSONNEL HASP CERTIFICATION

All site project personnel will sign the certification signature page provided in the front of this HASP.
APPENDIX A

Task Hazard Analysis (THA)
Project Tasks
The following tasks are identified for this project:

Examples: "Drilling/soil sampling", "Surveying", "General Inspections", "Construction Management/Inspections"

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

☐ Subcontractor H&S information is attached
☐ The following H&S Standards are attached:
☐ Utility clearance required.
☐ Journey Management Plan attached
☐ State specific H&S required:
Comments:

See Appendix C for all Arcadis H&S Standards that apply. Included are the CalOSHA Heat Illness Prevention Plan & CalOSHA Injury and Illness Prevention Plan H&S Standards

Roles and Responsibilities

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Additional Responsibilities (Describe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicole Pagano</td>
<td>PM</td>
<td></td>
</tr>
<tr>
<td>Brain Marcum</td>
<td>TM</td>
<td></td>
</tr>
<tr>
<td>Lawrence Browne</td>
<td>Field Lead</td>
<td></td>
</tr>
<tr>
<td>Watson Metsutnan</td>
<td>SSO</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Training

All Arcadis employees are required to have the following training to be on site:

- H&S Program Orientation
- HAZCOM GHS/EAP
- Defensive Driving - Smith On-Line
- BBP (Bloodborne Pathogens)
- First Aid/CPR
- DOT HazMat #1
- Lead General Awareness
- Hazwoper 40 Hour
- HAZCOM GHS/EAP
- H&S Program Orientation
- Hearing Conservation/Protection
- PPE
- Nuclear Density Gauges and/or XRF

Other:
- CalOSHA Compliant Heat Illness

Selected Arcadis employees are required to have the following additional training:

Names or Numbers from above

<table>
<thead>
<tr>
<th>Names or Numbers from above</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANA Staff</td>
</tr>
<tr>
<td>DOT HazMat #1</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Other: DOT HazMat #12</td>
</tr>
<tr>
<td>AFS LLC Staff</td>
</tr>
</tbody>
</table>

Page 4 of 34
Prevention training
Project Tasks
The following tasks are identified for this project:

Examples: "Drilling/soil sampling", "Surveying", "General Inspections", "Construction Management/Inspections"

1 Utility Clearance 811 One Call Property Notification Calls
2 General Site Mobilization
3 Site Soil Sampling – XRF Analysis
4 Site Soil Sampling – Soil Sample Collection for Laboratory Analysis
5 Site Soil Sampling – Equipment Decontamination
6 Soil Sampling – Sample Shipment Preparation for Lab Courier

#

☐ Subcontractor H&S information is attached  ☐ The following H&S Standards are attached:
☐ Utility clearance required.  Lead HS Standard
☐ Journey Management Plan attached  Utility Clearance HS Standard
☐ State specific H&S required:  Not applicable

Requires preparation of the Arcadis Heat Illness Prevention Plan and Injury and Illness Prevention Plan in accordance with CalOSHA.

Comments:
### Hazard Analysis

#### Business Line

<table>
<thead>
<tr>
<th>Task 2:</th>
<th>Mobilization</th>
</tr>
</thead>
</table>

#### Hazardous Activity #1

Field-Mobilization/Demobilization - from a site

- **Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):**
  - Biological: L
  - Environmental: M
  - Personal Safety: L

- **Overall Unmitigated Risk:** Medium
- **Mitigated Risk:** Low

- **Controls that should be considered:**
  - Primary: TRACK Field H&S Handbook (see ref. above) Engineering Controls (specify below)
  - Secondary: JSAs, Job Briefing, Site Awareness

- **Enter Required Controls:**
  - Conduct vehicle inspection and review JMP prior to mobilizing to the site. Utilize Smith System driving principals, obey all traffic laws.

#### Hazardous Activity #2

General-Vehicle - motor vehicle operation (all types on roadways)

- **Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):**
  - Biological: -
  - Environmental: -
  - Personal Safety: M

- **Overall Unmitigated Risk:** High
- **Mitigated Risk:** Low

- **Controls that should be considered:**
  - Primary: TRACK Smith System (on line) Inspections
  - Secondary: JSAs, Admin. Controls (specify below)

- **Enter Required Controls:**
  - Conduct vehicle inspection and review JMP prior to mobilizing to the site. Utilize Smith System driving principals, obey all traffic laws.

#### Hazardous Activity #3

General-Fatigue - work requiring long hours and working early and/or late, jet lag from traveling

- **Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):**
  - Biological: -
  - Environmental: -
  - Personal Safety: M

- **Overall Unmitigated Risk:** Medium
- **Mitigated Risk:** Medium

- **Controls that should be considered:**
  - Primary: TRACK Admin. Controls (specify below) Job Rotation
  - Secondary: Job Briefing, Site Awareness

- **Enter Required Controls:** TRACK, Site Awareness

#### Hazardous Activity #4

- **Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):**
  - Biological: #N/A
  - Environmental: #N/A
  - Personal Safety: #N/A

- **Overall Unmitigated Risk:** #N/A
- **Mitigated Risk:** #N/A

- **Controls that should be considered:** #N/A

- **Enter Required Controls:**
## Hazard Analysis

### Risk Assessment Matrix

<table>
<thead>
<tr>
<th>People</th>
<th>Property</th>
<th>Consequences Ratings</th>
<th>Likelihood Ratings (likelihood that incident would occur)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Slight or no health</td>
<td>Slight or no damage</td>
<td>0 - Low</td>
<td>1 - Low</td>
</tr>
<tr>
<td>2 - Minor health effect</td>
<td>Minor damage</td>
<td>0 - Low</td>
<td>2 - Low</td>
</tr>
<tr>
<td>3 - Major health effect</td>
<td>Local damage</td>
<td>0 - Low</td>
<td>3 - Low</td>
</tr>
<tr>
<td>4 - Fatalities</td>
<td>Major damage</td>
<td>0 - Low, 4 - Medium</td>
<td>6 - Medium</td>
</tr>
</tbody>
</table>

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref:

- Biological
- Chemical
- Driving
- Electrical
- Environmental
- Gravity
- Mechanical
- Motion
- Personal Safety
- Pressure
- Radiation
- Sound

### Hazardous Activity #1

**Field-Ambient environment - exposure heat, cold, sun, weather, etc**

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III I, III M

- Biological - M
- Chemical - -
- Driving - M
- Electrical - L
- Environmental - L
- Gravity - H
- Mechanical - -
- Motion - L
- Personal Safety - M
- Pressure - -
- Radiation - -
- Sound - -

Overall Unmitigated Risk: Medium

Mitigated Risk: Medium if utilizing:

- Controls that should be considered:
  - Primary: TRACK Field & H&S Handbook (see ref. above)
  - Secondary: H&S Standards (specify below)
- Engineering Controls (specify below)
- Admin. Controls (specify below)
- Specialized Equipment (specify below)
- PPE (see HASP "PPE" section)

Enter Required Controls:
- TRACK, Site Awareness, PPE

### Hazardous Activity #2

**Field-Biological - insects, spiders, snakes, etc**

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III N

- Biological - M
- Chemical - -
- Driving - -
- Electrical - -
- Environmental - -
- Gravity - -
- Mechanical - -
- Motion - -
- Personal Safety - -
- Pressure - -
- Radiation - -
- Sound - -

Overall Unmitigated Risk: Medium

Mitigated Risk: Medium if utilizing:

- Controls that should be considered:
  - Primary: TRACK Field & H&S Handbook (see ref. above)
  - Secondary: JSAs H&S Job Briefing/Site Awareness
- PPE (see HASP "PPE" section)

Enter Required Controls:
- TRACK, Site Awareness, PPE, Housekeeping

### Hazardous Activity #3

**Field-Walking - uneven or slippery terrain**

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III E, III F

- Biological - -
- Chemical - -
- Driving - -
- Electrical - -
- Environmental - -
- Gravity - M
- Mechanical - -
- Motion - -
- Personal Safety - -
- Pressure - -
- Radiation - -
- Sound - -

Overall Unmitigated Risk: Medium

Mitigated Risk: Medium if utilizing:

- Controls that should be considered:
  - Primary: TRACK Field & H&S Handbook (see ref. above)
  - Secondary: Housekeeping PPE (see HASP "PPE" section)

Enter Required Controls:
- TRACK, Housekeeping, PPE
### Hazardous Activity #4

**General:** Lifting and movement of equipment of varying weights at varying frequencies by manual methods

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHS&amp;H Ref:</th>
<th>III AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological -</td>
<td>Chemical -</td>
<td>Driving -</td>
</tr>
<tr>
<td>Environmental -</td>
<td>Gravity -</td>
<td>Mechanical -</td>
</tr>
<tr>
<td>Personal Safety M</td>
<td>Pressure -</td>
<td>Radiation -</td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** High  
**Mitigated Risk:** Medium  
if utilizing: Controls that should be considered:  
Primary: TRACK, JSAs, Engineering Controls (specify below)  
Secondary: Job Briefing/Site Awareness  
Controls Required: TRACK, JSAs, Site Awareness  

### Hazardous Activity #5

**Field-Tools, hand - use of hammers, screwdrivers, wrenches, etc**

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHS&amp;H Ref:</th>
<th>III AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological -</td>
<td>Chemical -</td>
<td>Driving -</td>
</tr>
<tr>
<td>Environmental -</td>
<td>Gravity L</td>
<td>Mechanical -</td>
</tr>
<tr>
<td>Personal Safety -</td>
<td>Pressure -</td>
<td>Radiation -</td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** Medium  
**Mitigated Risk:** Low  
if utilizing: Controls that should be considered:  
Primary: TRACK, JSAs, Engineering Controls (specify below)  
Secondary: H&S Standards (specify below)  
Job Briefing/Site Awareness  
Admin. Controls (specify below)  
Specialized Equipment (specify below)  
Site Awareness, PPE (see H&P "PPE" section)  
Controls Required: TRACK, JSAs, Job Briefing, Site Awareness, PPE. Implement lessons learned from previous investigations.

### Hazardous Activity #6

**General:** Pinch points - moving parts from doors, closures, rotating devices, falling objects, well covers, manholes, etc

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHS&amp;H Ref:</th>
<th>III AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological -</td>
<td>Chemical -</td>
<td>Driving -</td>
</tr>
<tr>
<td>Environmental -</td>
<td>Gravity M</td>
<td>Mechanical -</td>
</tr>
<tr>
<td>Personal Safety -</td>
<td>Pressure -</td>
<td>Radiation -</td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** Low  
**Mitigated Risk:** Low  
if utilizing: Controls that should be considered:  
Primary: TRACK, JSAs, Engineering Controls (specify below)  
Secondary: Admin. Controls (specify below)  
Job Briefing/Site Awareness  
Inspections  
Specialized Equipment (specify below)  
PPE (see H&P "PPE" section)  
Controls Required: TRACK, JSAs, Site Awareness, Planning
### Task 3-4: Soil Screening/Sampling

#### Hazardous Activity #1
**Field-Sampling** - manual soil sampling (hand auger, trowel, etc)

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III F, III AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical M Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental L Gravity L Mechanical - Motion M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Unmitigated Risk: **Medium**

Mitigated Risk: **Low** if utilizing:

- Controls that should be considered:
  - Primary: TRACK JSAs, Job Rotation, Job Briefing/Site Awareness
  - Secondary: Inspections, Specialized Equipment

Enter Required Controls: TRACK, JSAs, Site Awareness, Inspections, PPE

#### Hazardous Activity #2
**Field-Radiation** ionizing - working with or in vicinity of XRF instruments

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III E, III F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical - Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental L Gravity - Mechanical - Motion -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Unmitigated Risk: **Low**

Mitigated Risk: **Low** if utilizing:

- Controls that should be considered:
  - Primary: TRACK JSAs, Job Rotation, Job Briefing/Site Awareness, Cont/Emerg. Planning, Admin. Controls
  - Secondary: Inspections, Specialized Equipment

Enter Required Controls: TRACK, ALARA, Training, JSAs, Job Briefing, PPE

#### Hazardous Activity #3
**Field-Contaminated media** (contact with impacted soil, water, air, sediment, etc)

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III E, III F, III AH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical H Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental M Gravity - Mechanical - Motion -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Unmitigated Risk: **High**

Mitigated Risk: **Low** if utilizing:

- Controls that should be considered:
  - Primary: TRACK JSAs, Engineering Controls, HAZWOPER Training
  - Secondary: H&S Standards, Admin. Controls

Enter Required Controls: TRACK, JSAs, SOPS, Training, PPE
<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III K, III AG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental L Gravity -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Unmitigated Risk: **Medium**

**Mitigated Risk: Low** if utilizing:

**Controls that should be Considered:**
- Primary: TRACK, JSAs, Engineering Controls (specify below)
- Secondary: HASP, Job Briefing/Site Awareness
- Hazcom Training, MSDS/SDS (see also HASP Hazcom/GHS section)
- Admin. Controls (specify below)
- Specialized Equipment (specify below)
- Housekeeping
- PPE (see HASP "PPE" section)

**Enter Required Controls:** TRACK, JSAs, Training, SDS, PPE
### Hazard Analysis

#### Task 6: Decontamination

**Hazardous Activity #1**

**Chemical-Corrosives** - working with or exposure to corrosives in laboratory work, sample bottle preservatives, decon chemicals, etc.

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III AG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical - Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental - Gravity - Mechanical - Motion -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** Medium  
**Mitigated Risk:** Low if utilizing:

- **Controls that should be Considered:**  
  - Primary: TRACK, JSAs  
  - Engineering Controls (specify below)  
  - Secondary: H&S Standards (specify below)  
  - Job Briefing/Site Awareness  
  - Hazcom Training  
  - MSDS/SDS (see also HASP Hazcom/GHS section)  
  - Admin. Controls (specify below)  
  - Specialized Equipment (specify below)  
  - Housekeeping  
  - PPE (see HASP "PPE" section)

**Enter Required Controls:** TRACK, JSAs, SOPs, Training, PPE

**Hazardous Activity #2**

**Field-Contaminated media** (contact with impacted soil, water, air, sediment, etc.)

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III E, F, III AH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical - Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental - Gravity - Mechanical - Motion -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** High  
**Mitigated Risk:** Low if utilizing:

- **Controls that should be Considered:**  
  - Primary: TRACK, JSAs  
  - Engineering Controls (specify below)  
  - Secondary: H&S Standards (specify below)  
  - HASP Admin. Controls (specify below)  
  - HAZWOPER Training  
  - PPE (see HASP "PPE" section)

**Enter Required Controls:** TRACK, JSAs, PPE, SOPS, Training, Site Awareness

**Hazardous Activity #3**

**Field-Equipment** - work with small pressurized equipment (power washers, air compressors, etc.)

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FHSHB Ref:</th>
<th>III AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological - Chemical - Driving - Electrical -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental - Gravity - Mechanical - Motion -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Safety - Pressure - Radiation - Sound -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overall Unmitigated Risk:** Medium  
**Mitigated Risk:** Low if utilizing:

- **Controls that should be Considered:**  
  - Primary: TRACK, JSAs  
  - Specialized Training per Standard (see HASP Training section)  
  - Operator Competency per Standard  
  - Specialized Equipment (specify below)  
  - Secondary: H&S Standards (specify below)  
  - Job Briefing/Site Awareness  
  - Housekeeping Inspections  
  - Competent Person Required (designated person)

**Enter Required Controls:** TRACK, JSAs, PPE, SOPs, Training, Site Awareness
**Hazardous Activity #4**

**General-Redundant tasks**

<table>
<thead>
<tr>
<th>Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):</th>
<th>Suggested FSHSB Ref:</th>
<th>III AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological -</td>
<td>Chemical -</td>
<td>Driving -</td>
</tr>
<tr>
<td>Environmental -</td>
<td>Gravity -</td>
<td>Mechanical -</td>
</tr>
<tr>
<td>Personal Safety - M</td>
<td>Pressure -</td>
<td>Radiation -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sound -</td>
</tr>
</tbody>
</table>

Overall Unmitigated Risk: **Medium**
Mitigated Risk: **Medium**

Controls that should be Considered:
- Primary: TRACK, Job Rotation, JSAs, Job Briefing/Site Awareness
- Secondary: Inspections

Enter Required Controls: TRACK, Site Awareness
## Job Safety Analysis

### General

<table>
<thead>
<tr>
<th>JSA ID</th>
<th>Status</th>
<th>Created Date</th>
<th>Completed Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>11466</td>
<td>(2) Review</td>
<td>8/8/2014</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil sampling using manual methods (hand auger).</td>
<td></td>
</tr>
</tbody>
</table>

### Client / Project

<table>
<thead>
<tr>
<th>Client</th>
<th>Project Number</th>
<th>Project Name</th>
<th>PIC</th>
<th>Project Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECK AMERICAN INC</td>
<td>B00950100000</td>
<td>TECK American Inc. - SOIL STUD</td>
<td></td>
<td>ANDRESEN, REBECCA</td>
</tr>
</tbody>
</table>

### User Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Employee</th>
<th>Due Date</th>
<th>Completed Date</th>
<th>Supervisor</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>Flomerfelt, Jonathan</td>
<td>8/22/2014</td>
<td>8/8/2014</td>
<td>Annis, Matthew</td>
<td>( )</td>
</tr>
<tr>
<td>Developer</td>
<td>Silverman, David</td>
<td>8/22/2014</td>
<td>8/8/2014</td>
<td>Dunn, Shannon</td>
<td>( )</td>
</tr>
<tr>
<td>HASP Reviewer</td>
<td>Merkle, Kurt</td>
<td>8/8/2014</td>
<td>8/8/2014</td>
<td>Nelson, Denice</td>
<td>( )</td>
</tr>
</tbody>
</table>

### Job Steps

<table>
<thead>
<tr>
<th>Job Step No.</th>
<th>Job Step Description</th>
<th>Potential Hazard</th>
<th>Critical Action</th>
<th>H&amp;S Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sampling set-up</td>
<td>1 Underground utilities could be encountered during hand augering</td>
<td>Follow the Utility Clearance HS Standard, if applicable at sampling location.</td>
<td>Utility Clearance HS Standard ARCHSF019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Muscle fatigue can occur from lifting heavy equipment in and out of vehicle</td>
<td>Park as close as possible to the sample locations. Use lifting techniques outlined in the Field H&amp;S Handbook.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Slips/trips/falls could occur from uneven walking and working surfaces</td>
<td>Remove any gravel or debris from sampling location. Gravel will get stuck in auger and continue to fall back down in hole.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sampling set-up</td>
<td>1 Underground utilities could be encountered during hand augering</td>
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<td>Utility Clearance HS Standard ARCHSF019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Muscle strains can occur from lifting heavy equipment in and out of vehicle</td>
<td>Park as close as possible to the sampling locations. Use lifting techniques as outlined in the Field H&amp;S Handbook.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Slips/trips/falls could occur from uneven walking and working surfaces</td>
<td>Remove any gravel or debris from sample location. Gravel will get stuck in auger or will continue to fall back down in hole.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Installation of hand auger boring</td>
<td>1 Muscle strains from pulling/pushing could occur when installing the boring, and when removing the auger from the hole</td>
<td>Stretch out arms/back/shoulder muscles prior to beginning. Using firm grip on handle, slowly turn auger and progress downward. Slowly pull auger from hole- use legs to pull auger out of hole. If water is encountered, suction will be created when trying to remove the auger. Ask for assistance from another worker if you can't remove safely on your own.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Hand strain and blisters could develop from prolonged hand augering</td>
<td>Select proper gloves for task, usually leather type work gloves or mechanics style gloves. If hot spots develop on hands (Hot Spots are where blisters start to form) readjust gloves or change to better padded glove. If blisters begin to form, stop work so as not to worsen blistering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Over-exertion could occur when trying to force an auger forward if there is refusal.</td>
<td>If refusal occurs, Stop Work. Remove auger from hole and check hole with flashlight if possible. DO NOT overexert by using</td>
<td></td>
</tr>
</tbody>
</table>
4. Fatigue can occur due to strenuous nature of hand augering activities. Take rest breaks as needed or switch out task with another employee.

4. Collect Sample Soil Sample

1. Staff can come into contact with impacted soils. Wear chemical protective gloves as outlined in the HASP, and wear safety glasses.

5. Decon Hand Auger

1. Exposure to COCs while deconing equipment. Wear chemical protective gloves as outlined in the HASP, and wear safety glasses.

2. Cleaning solutions can splash while deconing equipment. Use PPE as outlined in the HASP, and try to minimize splashing. Wear splash guard when deconing.

3. The end of the hand auger has sharp edges, and lacerations can occur. Use brush to scrub off soils and not hands. Do not reach into the nose (the end with teeth) of the auger with hand.

### PPE

<table>
<thead>
<tr>
<th>Type</th>
<th>Personal Protective Equipment</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal Protection</td>
<td>long sleeve shirt/pants</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>safety glasses</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Foot Protection</td>
<td>steel-toe boots</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Hand Protection</td>
<td>chemical resistant gloves</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>(specify type)</td>
<td>Leather gloves</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>work gloves (specify type)</td>
<td>Leather gloves</td>
<td>Required</td>
</tr>
<tr>
<td>Head Protection</td>
<td>hard hat</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Hearing Protection</td>
<td>ear plugs</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Miscellaneous PPE</td>
<td>traffic vest–Class II or III</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Splash guard</td>
<td>Apron/face shield</td>
<td>Required</td>
</tr>
<tr>
<td>Respiratory Protection</td>
<td>dust mask</td>
<td></td>
<td>Recommended</td>
</tr>
</tbody>
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### Supplies

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Devices</td>
<td>mobile phone</td>
<td>Satellite phone</td>
<td>Recommended</td>
</tr>
<tr>
<td></td>
<td>Personal Locator Beacon</td>
<td>GPS Locator</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Radio</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Decontamination</td>
<td>Decon supplies (specify type)</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>first aid kit</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Safety/survival kit.</td>
<td>Required</td>
</tr>
<tr>
<td>Personal</td>
<td>eye wash (specify type)</td>
<td>bottle</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>sunscreen</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>traffic cones</td>
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# Job Safety Analysis

## General

<table>
<thead>
<tr>
<th>JSA ID</th>
<th>11467</th>
<th>Status</th>
<th>(2) Review</th>
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<tbody>
<tr>
<td>Job Name</td>
<td>Environmental-Sample cooler handling</td>
<td>Created Date</td>
<td>8/8/2014</td>
</tr>
<tr>
<td>Task Description</td>
<td>Sample cooler handling.</td>
<td>Completed Date</td>
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</tr>
<tr>
<td>Template</td>
<td>False</td>
<td>Auto Closed</td>
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## Client / Project

<table>
<thead>
<tr>
<th>Client</th>
<th>TECK AMERICAN INC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Number</td>
<td>B00950100000</td>
</tr>
<tr>
<td>Project Name</td>
<td>TECK American Inc. - SOIL STUD</td>
</tr>
<tr>
<td>PIC</td>
<td></td>
</tr>
<tr>
<td>Project Manager</td>
<td>ANDRESEN, REBECCA</td>
</tr>
</tbody>
</table>

## User Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Employee</th>
<th>Due Date</th>
<th>Completed Date</th>
<th>Supervisor</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>HASP Reviewer</td>
<td>Merkle, Kurt</td>
<td>8/22/2014</td>
<td></td>
<td>Nelson, Denice</td>
<td></td>
</tr>
</tbody>
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## Job Steps

<table>
<thead>
<tr>
<th>Job Step No.</th>
<th>Job Step Description</th>
<th>Potential Hazard</th>
<th>Critical Action</th>
<th>H&amp;S Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transfer field samples to sample packing area</td>
<td>Lifting heavy coolers may result in muscle strain, especially to lower back.</td>
<td>Use proper lifting techniques and keep back straight. Use buddy system for large coolers, Use mechanical aids like hand trucks if readily available to move coolers. Do not over fill coolers with full sample containers for temporary movement to the sample prep area. Ensure an adequate supply of sample coolers are in field.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sample cooler selection</td>
<td>Hazards to hands from broken glass caused by over tightening lids or improper placement in cooler</td>
<td>Inspect all bottles and bottle caps for cracks/leaks before and after filling container. Do not over tighten sample lids. Clean up any broken bottles immediately, avoid contact with sample preservatives. Wear leather gloves when handling broken glass.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Samples containing hazardous materials must violate DOT/IATA HazMat shipping regulations</td>
<td>Exposure to chemicals (acid preservatives or site contaminants) on the exterior of sample bottles after filling.</td>
<td>Wear protective gloves for acid preservatives and safety glasses with side shields during all sample container handling activities (before and after filling), Once filled follow project specific HASP PPE requirements for skin and eye protection.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>All persons filling a sample bottle or preparing a cooler for shipment must have complete ARCADIS DOT HazMat shipping training. Compare the samples collected to the materials described in the Shipping Determination for the Project and ensure consistent. Re-perform all Shipping determinations if free product is collected and not anticipated during planning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Only use coolers that are new or in like new condition. No rope handled coolers unless part of the manufacturer's handle design.</td>
<td></td>
<td></td>
<td>ARCADIS Shipping Guide US-001</td>
</tr>
<tr>
<td>6</td>
<td>Selection of excessively large coolers introduces lifting hazards once the cooler is filled.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pack Samples

1. Pinch points and abrasions to hands from cooler lid closing unexpectedly
   - Beware that lid could slam shut; block/brace if needed; be wary of packing in strong winds. New coolers may be more prone to self-closing, tilt cooler back slightly to facilitate keeping lid open.

2. Awkward body positions and contact stress to legs and knees when preparing coolers on irregular or hard ground surfaces.
   - Plan cooler prep activities. Situate cooler where neutral body positions can be maintained if practical, like truck tailgate. Avoid cooler prep on rough gravel surfaces unless knees and legs protected during kneeling.

3. Frostbite or potential for oxygen deficiency when packing with dry ice. Contact cold stress to fingers handling blue ice or wet ice
   - Dry ice temperature is -109.30°F. Wear thermal protective gloves. DO NOT TOUCH with bare skin! Dry ice sublimes at room temp and could create oxygen deficiency in closed environment. Maintain adequate ventilation! Do not keep dry ice in cab of truck. Wear gloves when handling blue ice or gaging wet ice. Dry Ice is DOT regulated for air shipping, follow procedures in Shipping Determination.

Sealing, labeling and Marking Cooler

1. Cuts to hands and forearms from strapping tape placement or removing old tape and labels
   - Do not use a fixed, open-blade knife to remove old tags/labels, USE SCISSORS or other safety style cutting device. Only use devices designed for cutting. Do not hurry through task.

2. Lifting and awkward body position hazards from taping heavy coolers, dropping coolers on feet during taping.
   - Do not hurry through the taping tasks; ensure samples in cooler are evenly distributed in cooler to reduce potential for overhanging cooler falling off edge of tailgate/table when taping.

3. Improper labeling and marking may result in violation of DOT/IATA HazMat shipping regulations delaying shipment or resulting in regulatory penalty
   - Do not deviate from ARCADIS Shipping Guide or Shipping Determination marking or labeling requirements.

Offering sample cooler to a carrier or lab courier for shipment.

1. Lifting heavy coolers may result in muscle strain especially to lower back.
   - See lifting hazard controls above.

2. Carrier refusal to accept cooler may cause shipping delay and/or result in violation of DOT HazMat shipping regulations
   - Promptly report all rejected and refused shipments to the ARCADIS DOT Program Manager. Do Not re-offer shipment if carrier requires additional labels markings or paperwork inconsistent with your training or Shipping Determination without contacting the ARCADIS DOT Compliance Manager.

### PPE (Personal Protective Equipment)

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<thead>
<tr>
<th>Type</th>
<th>Personal Protective Equipment</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal Protection</td>
<td>long sleeve shirt/pants</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>safety glasses</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Foot Protection</td>
<td>steel-toe boots</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Hand Protection</td>
<td>chemical resistant gloves</td>
<td>nitrile</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>work gloves</td>
<td>leather</td>
<td>Required</td>
</tr>
</tbody>
</table>

### Supplies

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscellaneous</td>
<td>first aid kit</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Personal Locator Beacon</td>
<td>GPS Locator</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Paper towels or absorbent material</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Scissors</td>
<td>Required</td>
</tr>
</tbody>
</table>
# Job Safety Analysis

## General

<table>
<thead>
<tr>
<th>JSA ID</th>
<th>11468</th>
<th>Status</th>
<th>(2) Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Name</td>
<td>Environmental-Drum sampling/handling</td>
<td>Created Date</td>
<td>8/8/2014</td>
</tr>
<tr>
<td>Task Description</td>
<td>Drum Handling, Sampling and Transfer of Drum Contents.</td>
<td>Completed Date</td>
<td></td>
</tr>
<tr>
<td>Template</td>
<td>False</td>
<td>Auto Closed</td>
<td>False</td>
</tr>
</tbody>
</table>

## Client / Project

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</tr>
<tr>
<td>PIC</td>
<td>ANDRESEN, REBECCA</td>
</tr>
</tbody>
</table>

## User Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Employee</th>
<th>Due Date</th>
<th>Completed Date</th>
<th>Supervisor</th>
<th>Active</th>
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</thead>
<tbody>
<tr>
<td>HASP Reviewer</td>
<td>Merkle, Kurt</td>
<td>8/22/2014</td>
<td></td>
<td>Nelson, Denice</td>
<td>_</td>
</tr>
</tbody>
</table>

## Job Steps

<table>
<thead>
<tr>
<th>Job Step No.</th>
<th>Job Step Description</th>
<th>Potential Hazard</th>
<th>Critical Action</th>
<th>H&amp;S Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspect Drums for signs of Bulging, Leaking, Crystals, Temperature, and Odor</td>
<td>1 Exposure to chemicals stored in drum or container.</td>
<td>Read drum labels for information about contents. Review all relevant MSDSs about chemical contents. If labels are not attached, call PM or Local H&amp;S Representative.</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Remove lids or bungs from Drums</td>
<td>1 Hand Injuries can occur from sharp edges, pinch points, and from use of hand tools.</td>
<td>Wear appropriate work gloves. When removing ring from drum, fingers can get pinched between ring and drum. Keep fingers clear of this space. Select proper tool for task. If large amount of drums will be encountered, use a speed or drum wrench.</td>
<td>Employee H&amp;S Field book, Section III Subpart II, page 104. Also Section III Subpart L, page 38.</td>
</tr>
<tr>
<td>3</td>
<td>Sample Contents from Drums</td>
<td>1 Exposure to COCs can occur by contacting impacted contents.</td>
<td>Select proper dermal protection for task, at a minimum nitrile gloves should be worn. Wear appropriate eye face and body protection as outlined in the HASP.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Staff can be exposed to chemical vapors/fumes when</td>
<td>Conduct air monitoring as outlined in the HASP, and if required, select appropriate</td>
<td></td>
</tr>
</tbody>
</table>
### PPE

<table>
<thead>
<tr>
<th>Type</th>
<th>Personal Protective Equipment</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal Protection</td>
<td>chemical protective suit (specify type)</td>
<td>Depending on drum contents.</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>long sleeve shirt/pants</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>faceshield</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>safety goggles</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Hand Protection</td>
<td>chemical resistant gloves (specify type)</td>
<td>Nitrile</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>work gloves (specify type)</td>
<td>Leather</td>
<td>Required</td>
</tr>
<tr>
<td>Hearing Protection</td>
<td>ear plugs</td>
<td></td>
<td>Recommended</td>
</tr>
</tbody>
</table>

### Supplies

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscellaneous</td>
<td>fire extinguisher</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>first aid kit</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Drum wrench and opening tools.</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Dolly</td>
<td>Required</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>barricades</td>
<td>As needed.</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>traffic cones</td>
<td>As needed.</td>
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## Job Safety Analysis

### General

<table>
<thead>
<tr>
<th>JSA ID</th>
<th>Status</th>
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<tr>
<td>11452</td>
<td>(2) Review</td>
<td>8/5/2014</td>
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<table>
<thead>
<tr>
<th>Job Name</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Industry - Driving - passenger vehicles</td>
<td>Driving in remote areas to project locations, often on unpaved backroads, timber roads, 4x4 likely required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client / Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
</tr>
<tr>
<td>Project Number</td>
</tr>
<tr>
<td>Project Name</td>
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<table>
<thead>
<tr>
<th>User Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
</tr>
<tr>
<td>Developer</td>
</tr>
<tr>
<td>HASP Reviewer</td>
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<table>
<thead>
<tr>
<th>Job Steps</th>
</tr>
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<tbody>
<tr>
<td>Job Step No.</td>
</tr>
<tr>
<td>-------------</td>
</tr>
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Smith System "5-Keys" is a registered trademark of Smith Driver Improvement Institute, Inc.
<table>
<thead>
<tr>
<th>Type</th>
<th>Personal Protective Equipment</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Protection</td>
<td>safety glasses</td>
<td>While checking engine or tires</td>
<td>Required</td>
</tr>
<tr>
<td>Hand Protection</td>
<td>work gloves (specify type)</td>
<td>Leather or equivalent checking engine or tires</td>
<td>Required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Devices</td>
<td>mobile phone</td>
<td>Satellite phone as necessary</td>
<td>Required</td>
</tr>
<tr>
<td>other</td>
<td>Vehicle kit (applies to company trucks)</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Personal Locator Beacon</td>
<td>GPS Locator</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td></td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>fire extinguisher</td>
<td>Applies to company trucks</td>
<td>Required</td>
</tr>
<tr>
<td>first aid kit</td>
<td></td>
<td>Applies to company trucks</td>
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</table>
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### General

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<tr>
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<th>Status</th>
<th>Job Name</th>
<th>Created Date</th>
<th>Completed Date</th>
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<tbody>
<tr>
<td>11470</td>
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<td>Environmental-Other</td>
<td>8/8/2014</td>
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<table>
<thead>
<tr>
<th>Task Description</th>
<th>Template</th>
<th>Auto Closed</th>
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</thead>
<tbody>
<tr>
<td>Decontamination of equipment using acids.</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

### Client / Project

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<thead>
<tr>
<th>Client</th>
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<tbody>
<tr>
<td>TECK AMERICAN INC</td>
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<td>ANDRESEN, REBECCA</td>
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<th>Supervisor</th>
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</thead>
<tbody>
<tr>
<td>HASP Reviewer</td>
<td>Merkle, Kurt</td>
<td>8/22/2014</td>
<td></td>
<td>Nelson, Denice</td>
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</tr>
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</table>

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<th>Critical Action</th>
<th>H&amp;S Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transportation and handling of decontamination solution chemicals.</td>
<td>1 Exposure to chemicals during transportation, storage, and handling can lead to severe irritation of skin and eyes.</td>
<td>Store and transport decontamination chemicals in appropriate containers according to manufacturers’ specifications and safety data sheets. Safety data sheets should accompany chemicals at all times and all staff should know where they are located. For strong acids, secondary containment of chemicals should be used.</td>
<td></td>
</tr>
</tbody>
</table>
| 2            | Apply decontamination solution to exposed surface. | 1 Exposure to decontamination chemical(s) can cause severe skin or eye irritation or damage. | - Don appropriate PPE before setting up the decontamination station.  
- Handle acids and/or other hazardous substances with extreme care. Setup an ergonomic decontamination station that is conducive to handling hazardous acids.  
- Read the safety data sheets for the decontamination chemicals that are being used and follow the manufacturer’s instructions. | |
| 3            | Rinse decontaminated surfaces with de-ionized or distilled water. | 1 Exposure to decontamination chemicals in the rinse water due to splashing or runoff. | Collect used decontamination solution and rinse water in appropriate container (e.g., 5-gallon bucket or drum). Label container appropriately and treat as investigation-derived waste in accordance with the project-specific field sampling plan and/or health and safety plan. | |
| 4            | Transporting decontamination water. | 1 Physical injury from manually handling drums or buckets. | Avoid over-filling drums and buckets. For buckets, fill no more than half way and be sure to use a lid. Use team lifts of necessary. Handle drums in accordance with JSA for manual drum handling. If transporting buckets or drums via truck or watercraft, ensure that buckets and drums are tightly secured before moving the vehicle or watercraft. | |
|              |                      |                  | 2 Exposure to chemicals in decontamination rinse water due to spillage from drum or bucket. | Ensure bucket and drum lids are securely fastened before transportation. Transport rinse water very carefully in accordance with the step above. | |

### PPE

**Personal Protective Equipment**
<table>
<thead>
<tr>
<th>Type</th>
<th>Personal Protective Equipment</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal Protection</td>
<td>long sleeve shirt/pants</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>safety glasses</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Foot Protection</td>
<td>rubber boots</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Hand Protection</td>
<td>chemical resistant gloves (specify type)</td>
<td>Nitrile</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>work gloves (specify type)</td>
<td>Leather</td>
<td>Required</td>
</tr>
<tr>
<td>Head Protection</td>
<td>hard hat</td>
<td></td>
<td>Required</td>
</tr>
</tbody>
</table>

**Supplies**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscellaneous</td>
<td>first aid kit</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Radios</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Personal Locator Beacon</td>
<td>GPS Locator</td>
<td>Required</td>
</tr>
<tr>
<td>Personal</td>
<td>eye wash (specify type)</td>
<td></td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Splash guard</td>
<td>Apron or face shield</td>
<td>As necessary</td>
</tr>
</tbody>
</table>
APPENDIX C

Hazard Communication/ Global Harmonization System
Hazard Communication (HazCom)/Global Harmonization System (GHS)

List the chemicals anticipated to be used by Arcadis on this project per HazCom/GHS requirements. (Modify quantities as needed)

<table>
<thead>
<tr>
<th>Preservatives</th>
<th>Qty</th>
<th>Decontamination</th>
<th>Qty</th>
<th>Calibration</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td></td>
<td>Not applicable</td>
<td></td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>&lt;500 ml</td>
<td>Alconox</td>
<td>≤ 5 lbs</td>
<td>Isobutylene/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>&lt;500 ml</td>
<td>Liquinox</td>
<td>≤ 1 gal</td>
<td>Methane/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>&lt;500 ml</td>
<td>Acetone</td>
<td>≤ 1 gal</td>
<td>Pentane/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>&lt;500 ml</td>
<td>Methanol</td>
<td>≤ 1 gal</td>
<td>Hydrogen/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Zinc acetate</td>
<td>&lt;500 ml</td>
<td>Hexane</td>
<td>≤ 1 gal</td>
<td>Propane/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>&lt;500 ml</td>
<td>Isopropyl alcohol</td>
<td>≤ 4 gal</td>
<td>Hydrogen sulfide/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>&lt;500 ml</td>
<td>Nitric acid</td>
<td>≤ 1 L</td>
<td>Carbon monoxide/air</td>
<td>1 cyl</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>&lt; 4 gal</td>
<td>Other:</td>
<td></td>
<td>pH standards (4,7,10)</td>
<td>≤ 1 gal</td>
</tr>
<tr>
<td>Formalin (&lt;10%)</td>
<td>&lt; 4 gal</td>
<td>Other:</td>
<td></td>
<td>Conductivity standards</td>
<td>≤ 1 gal</td>
</tr>
<tr>
<td>Methanol</td>
<td>&lt;500 ml</td>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium bisulfate</td>
<td>&lt;500 ml</td>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuels</th>
<th>Qty.</th>
<th>Kits</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td></td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Gasoline</td>
<td>≤ 5 gal</td>
<td>Hach (specify):</td>
<td>1 kit</td>
</tr>
<tr>
<td>Diesel</td>
<td>≤ 5 gal</td>
<td>DOTech (specify):</td>
<td>1 kit</td>
</tr>
<tr>
<td>Kerosene</td>
<td>≤ 5 gal</td>
<td>Other:</td>
<td>1 kit</td>
</tr>
<tr>
<td>Propane</td>
<td>1 cyl</td>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remediation</th>
<th>Qty.</th>
<th>Other:</th>
<th>Qty.</th>
<th>DOT(1):</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td></td>
<td>Not applicable</td>
<td></td>
<td>MOT eligible soils</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spray paint</td>
<td>≤ 6 cans</td>
<td>MOT eligible water</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WD-40</td>
<td>≤ 1 can</td>
<td>MOT eligible solids</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pipe cement</td>
<td>≤ 1 can</td>
<td>MOT eligible liquids</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pipe primer</td>
<td>≤ 1 can</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mineral spirits</td>
<td>≤ 1 gal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Attach applicable Materials of Trade (MOT) generic shipping determination. SDS not generally applicable to this category.

Safety Data Sheets (SDSs) must be available to field staff. Indicate below how SDS information will be provided:

- [ ] Not applicable
- [ ] Contractor SDSs are not applicable
- [ ] Printed copy in company vehicle
- [ ] Contractor SDSs are attached
- [ ] Printed copy in the project trailer/office
- [ ] Contractor SDSs will be on site and located:
- [ ] 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.
ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
            30 Glenn St.
            Suite 309
            White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
                                        813-248-0585 (outside of the United States).

Supplier MSDS date: 2009/04/20

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>CONCENTRATION %</th>
<th>Ingredient Name</th>
<th>T.L.V.</th>
<th>LD/50</th>
<th>LC/50</th>
</tr>
</thead>
<tbody>
<tr>
<td>25155-30-0</td>
<td>10-30</td>
<td>SODIUM DODECYLBENZENESULFONATE</td>
<td>NOT AVAILABLE</td>
<td>438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>497-19-8</td>
<td>7-13</td>
<td>SODIUM CARBONATE</td>
<td>NOT AVAILABLE</td>
<td>4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL</td>
<td>2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION</td>
</tr>
<tr>
<td>7722-88-5</td>
<td>10-30</td>
<td>TETRASODIUM PYROPHOSPHATE</td>
<td>5 MG/M3</td>
<td>4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>7758-29-4</td>
<td>10-30</td>
<td>SODIUM PHOSPHATE</td>
<td>NOT AVAILABLE</td>
<td>3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL &gt;4640 MG/KG RABBIT DERMAL</td>
<td>NOT AVAILABLE</td>
</tr>
</tbody>
</table>
Section 2A: ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3: PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid
Appearance & odor: Almost odourless.
White granular powder.
Odor threshold (ppm): Not available.
Vapour pressure (mmHg): Not applicable.
Vapour density (air=1): Not applicable.
By weight: Not available.
Evaporation rate (butyl acetate = 1): Not applicable.
Boiling point (°C): Not applicable.
Freezing point (°C): Not applicable.
PH: (1% aqueous solution).
9.5
Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10
Solubility in water (%): 100 - > 10% w/w
Coefficient of water\oil dist.: Not available.
VOC: None

Section 4: FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.
Conditions of flammability: Surrounding fire.
Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.
Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Auto-ignition temperature: Not available.
Flash point (°C), method: None
Lower flammability limit (% vol): Not applicable.
Upper flammability limit (% vol): Not applicable.
Not available.
Sensitivity to mechanical impact: Not applicable.
Hazardous combustion products: Oxides of carbon (COx),
Hydrocarbons.
Rate of burning: Not available.
Explosive power: None
Section 5: REACTIVITY DATA

Chemical stability: Stable under normal conditions.
Conditions of instability: None known.

- Hazardous polymerization: Will not occur.
- Hazardous decomposition products: See hazardous combustion products.

Section 6: HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

- **Eye contact:** May cause irritation.
- **Skin contact:** Prolonged contact may cause irritation.
- **Inhalation:** Airborne particles may cause irritation.
- **Ingestion:** May cause vomiting and diarrhea. May cause abdominal pain. May cause gastric distress.

Effects of chronic exposure:
Contains an ingredient which may be corrosive.

- **LD50 of product, species & route:** > 5000 mg/kg rat oral.
- **LC50 of product, species & route:** Not available for mixture, see the ingredients section.
- **Exposure limit of material:** Not available for mixture, see the ingredients section.

Sensitization to product: Not available.
Carcinogenic effects: Not listed as a carcinogen.
Reproductive effects: Not available.
Teratogenicity: Not available.
Mutagenicity: Not available.
Synergistic materials: Not available.
Medical conditions aggravated by exposure: Not available.

First Aid

- **Skin contact:** Remove contaminated clothing. Wash thoroughly with soap and water. Seek medical attention if irritation persists.
- **Eye contact:** Check for and remove contact lenses. Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
- **Inhalation:** Remove victim to fresh air. Seek medical attention if symptoms persist.
- **Ingestion:** Dilute with two glasses of water. Never give anything by mouth to an unconscious person. Do not induce vomiting, seek immediate medical attention.
Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak/Spill: Contain the spill.
  Recover uncontaminated material for re-use.
  Wear appropriate protective equipment.
  Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
  Avoid breathing dust.
  Wash thoroughly after handling.
  Keep out of reach of children.
  Avoid contact with skin, eyes and clothing.
  Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
  Store away from strong acids or oxidizers.
  Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves/Type: Neoprene or rubber gloves.

Respiratory/Type: If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye/Type: Safety glasses with side-shields.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash capability should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.
EXECUTIVE SUMMARY

The Arcadis FieldTech Solutions LLC (AFS LLC) Health & Safety Management System (HSMS) follows the Arcadis U.S. Inc (Arcadis) HSMS and the quality concept of Plan-Do-Check-Act for continuous improvement in Health & Safety (H&S) performance. Additionally, AFS LLC has generally adopted Arcadis Health and Safety Standards with specific exceptions to the Arcadis standards listed in Exhibit 3.

With implementation of the HSMS, AFS LLC constantly strives to improve H&S performance. This HSMS Standard (standard) defines key requirements, responsibilities, operating procedures and training to optimize H&S compliance.

The AFS LLC risk management tools are proactive in planning and managing risk. This integrated approach is used to manage H&S, quality and project risk management.


AFS LLC identifies, assesses and defines controls for H&S risks using various types of hazard identification and risk assessment/management tools. These are further defined and described in the Arcadis Hazard Assessment and Risk Control (HARC) process and include an employee self-risk assessment tool (TRACK).

AFS LLC reviews the H&S objectives and targets periodically to determine which have been achieved, to revise them and to establish new ones, as appropriate.

H&S competency is achieved through training, education and experience. Competency can be assessed through written or oral testing, auditing and review, hands-on demonstrations, and behavioral observations and feedback.

All H&S incidents, including near misses with actual or potential consequences, are thoroughly investigated. A Root Cause Analysis is also included in the report.
Table of Contents

EXECUTIVE SUMMARY 1

1. POLICY 4

2. PURPOSE AND SCOPE 7
   2.1 Purpose 7
   2.2 Scope 7

3. DEFINITIONS 7

4. RESPONSIBILITIES 7
   4.1 Manager and Project Manager 7
   4.2 Health and Safety Manager & Site Safety Officer (SSO) 8
   4.3 Field Supervisor 9
   4.4 AFS LLC Employee 9

5. PROCEDURE 10
   5.1 Health & Safety Vision and Policy and Tagline 10
   5.2 Hazard Assessment and Risk Control Standard (Arcadis ARC HSMS002) 10
   5.3 AFS LLC H&S Risk Management Tools 12
   5.4 Performance Measuring and Monitoring 13
   5.5 Training and Competence 14
   5.6 Communications 15
   5.7 H&S Documents and Document Control (Arcadis ARC HSMS007) 15
   5.8 Emergency Preparedness and Response (Arcadis ARC HSMS008) 16
   5.9 H&S Conformance Verification Assessment (Arcadis ARC HSMS009) 16
   5.10 Incident Reporting and Investigation (Arcadis ARC HSMS010) 17
   5.11 Root Cause Analysis and Corrective Actions (Arcadis ARC HSMS011) 17
   5.12 Recordkeeping and Reporting (Arcadis ARC HSMS012) 17
   5.13 HHSMS Internal H&S Program Assessments 18

6. TRAINING 18

7. REFERENCES (regulation citation, technical links, publications, etc.) 18
8. RECORDS - DATA RECORDING AND MANAGEMENT  

9. APPROVALS AND HISTORY OF CHANGE  

Exhibit 1 – Definitions E1  

EXHIBIT 2 – Applicable Health and Safety Standards for the AFS LLC E6  

EXHIBIT 3 – Exemptions form Arcadis Health and Safety Standards for the AFS LLC HSMS E9
1. POLICY

The AFS LLC FieldTech Solutions LLC (AFS LLC) Health & Safety Management System (HSMS) follows the Arcadis U.S. Inc (Arcadis) HSMS and the quality concept of Plan-Do-Check-Act for continuous improvement in Health & Safety (H&S) performance. Additionally AFS LLC has generally adopted the Arcadis Health and Safety Standards with specific listed in Exhibit 3.

**PLAN:** The planning phase is a critical component of the cycle, and there are many tools that staff can use, including:

**TRACK:** First implemented in 2004, TRACK is a hazard recognition tool that has become the cornerstone of our H&S program. The acronym is defined on the TRACK card, which all employees receive when hired. TRACK, defined to the right, is a paperless awareness tool that gives staff the ability to recognize hazards, assess risk, put controls in place and stop work when necessary.

**H&S Planning Checklist:** A planning checklist that guides Project Managers through the hazard identification and control process and assists with budgeting and staffing relative to H&S project needs.

**Standards:** AFS LLC will use the Arcadis library of H&S standards that collectively will serve as our company H&S manual. These standards are referenced in the planning process to guide staff on the appropriate operating procedures that must be used for activities, such as confined space entry, energized work, utility location, and excavation and trenching.

**H&S Plans (HASPs) and Job Safety Analyses (JSAs):** The HASP is a required written plan that staff use as their guide for H&S on each field project. Each HASP includes JSAs that take safety-critical jobs, break them down by job steps and identify the hazards and controls for each step.
DO: During this phase, staff conduct the project work using our H&S implementation tools, including:

**Stop Work Authority:** All employees have the authority and responsibility to stop work if they feel that their safety—or that of their co-workers, contractors, the client or the public—is at risk. This could mean stopping work for a few minutes to conduct a tailgate meeting or ceasing work until appropriate corrective measures can be implemented.

**“If not me, then who?” concept:** A concept that encourages all staff to speak up if they see something that is not safe before someone gets hurt. Meaning: If we don't intervene when we see an unsafe condition, an unsafe situation, or an unsafe practice, who will intervene? Or, who do we expect to intervene?

**Tailgate meeting:** Tailgate meetings are required at the start of each day for all field work. For some projects, this activity is repeated after the lunch break and/or at the end of the work shift, as applicable. This tool gets staff identifying site-specific features and reviewing JSAs and facilitates communication so that all staff at the site understand the hazards and controls.

**“Dirty” JSA:** The JSA is not something that stays untouched within the HASP. This tool is designed for staff use and reference during the course of their day and changes as work progresses, thereby becoming “dirty.” This change management document can then be reviewed with the Project Manager and evaluated for potential formal HASP updates.

**Field H&S Handbook:** The Field H&S Handbook is a comprehensive field manual that provides extensive details about hazards that can be encountered in the field. All field staff are provided this manual at the start of employment.

CHECK: As with any plan, checking must be ongoing to proactively identify areas of improvement. The tools used for this phase of the cycle are:

**Task Improvement Process (TIP):** The TIP is a behavior-based safety observation that is also a learning opportunity. A staff member observes another staff member completing a task and identifies safe and questionable behaviors. The observer then reviews the findings with the observee in a post-TIP feedback discussion. This tool primarily focuses on encouraging safe work practices and also promotes awareness of at-risk behaviors and, as needed, details action items so the employee can accomplish the task safely—in essence, eliminating potential incidents.

**Near Miss Reports:** During the course of work, near misses can occur. These events are indicators that adjustments need to be made to avoid a future incident. Near misses are investigated so that corrections can be made to prevent future occurrences. Near misses are a key leading indicator and staff are highly encouraged to report and investigate them.

ACT: If improvement areas are identified or incidents do occur, staff then act using the following:
Investigation Process: All incidents and near misses are thoroughly investigated. This process includes fact gathering and the identification of contributing factors, followed by a root cause analysis of those factors that are key to the event. Root causes are then categorized for tracking and trending and action items are implemented and tracked.

Safety Shares: When staff see a learning opportunity that a broader audience would benefit from, they are encouraged to prepare a brief one-page Safety Share. It can comprise lessons learned from a TIP, a near miss or an incident investigation, or the identification of a hazard. Safety Shares are distributed to staff on a frequent, periodic basis.

Global Health & Safety Day: Each November, AFS LLC sets aside one day to celebrate our safety successes and discuss one relevant topic worldwide. Activities on Global H&S Day typically consist of a video and an individual or group activity to promote discussion of the topic.

Key to the success of the adequate functioning of this HSMS is demonstrable and visible leadership.

AFS LLC is committed to achieving this vision at all levels of the company and in all that we do by:

- Proactively assessing and controlling risks
- Complying with H&S requirements
- Demonstrating visible H&S leadership
- Assigning H&S responsibility and holding all accountable
- Including H&S in performance evaluations
- Ensuring necessary H&S competencies
- Promoting a positive H&S culture
- Setting and reporting on achievable H&S objectives
- Regularly evaluating H&S programs to achieve zero incidents
- Working with partners who align with our H&S Policy
- Sharing lessons learned and best practices
2. PURPOSE AND SCOPE

2.1 Purpose

AFS LLC operates under the Arcadis Business Control (ABC) Framework and the Arcadis General Business Principles (AGBP), which are implemented throughout the organization. The ABC Framework and the AGBP state that AFS LLC provides healthy and safe working conditions for its employees. To that end, we have in place a firm-wide H&S Vision and Policy that is based on a proactive and risk management approach. This commitment is supported by this standard, which describes the AFS LLC HSMS.

The AFS LLC HSMS is a principle- and behavior-based system that sets minimum requirements for conducting our work but also relies on employees and supervisors to assess risk at the time of the work and determine the proper controls before proceeding with the activities.

Working safely is an integral part of the AFS LLC culture and is reflected in the behavior of our employees. Our goal is to protect our staff from injury and illness and educate our staff on the behavioral tools that they can use to recognize, assess and control hazards to protect themselves and work in a safe manner. To achieve this goal, H&S has the same priority as our other core values and is an integral part of the solutions we provide to our clients.

2.2 Scope

This policy and associated procedures apply to all operations and activities conducted by AFS LLC in all locations, including all project sites and office settings.

3. DEFINITIONS

Exhibit 1 includes relevant definitions associated with the HSMS Standard.

4. RESPONSIBILITIES

4.1 Manager and Project Manager

Managers and Project Managers shall:

- Be ultimately responsible for the H&S policy and performance of AFS LLC
- Act as a visible steward of H&S clearly stewarding H&S and developing a culture that allows the company to achieve its H&S Vision, including demonstrating leadership and commitment internally through visits to company locations and project sites and, externally, at conferences and client meetings
- Conduct an annual review of the H&S Vision, Policy and Program
<table>
<thead>
<tr>
<th>Implementation Date</th>
<th>AFS LLC HS Standard Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 April 2016</td>
<td>Health and Safety Management System</td>
</tr>
<tr>
<td>AFS LLC HS Standard No.</td>
<td>AFS HSM000</td>
</tr>
<tr>
<td>Revision Date</td>
<td>Revision Number 01</td>
</tr>
</tbody>
</table>

- Ensure that he/she are made aware of, and remains informed of the H&S requirements, in particular, those which may have an effect on company H&S policy
- Ensure that sufficient authorized resources (including time and training) are set aside for the development, maintenance and communication of H&S policy
- Ensure that AFS LLC is meeting Arcadis H&S requirements
- Include a H&S Moment, which may be a Safety Shares, as an agenda item prior to each respective organizational meetings
- Report incidents to Arcadis U.S. Leadership in accordance with the Reporting and Investigation Standard
- Establish specific H&S objectives and targets, and tracking, monitoring and acting on H&S performance data
- Provide the resources essential to implementation and continuous improvement of H&S risk controls, H&S performance and the HSMS. These resources include human resources, financial resources, training and education, technology, and time to ensure the H&S of all employees.

4.2 **Health and Safety Manager & Site Safety Officer (SSO)**

The H&S Manager and SSO are responsible for:

- Visibly stewarding H&S
- Coach/Mentor and implement TRACK as the hazard awareness methodology and encourage the use of Stop Work when hazards are uncontrolled.
- Conduct periodic H&S assessments to determine conformance with HSMS requirements
- Encourage and promote safety sharing for the benefit of AFS LLC and others
- Work with Managers to effectively administer this Health and Safety Standard (HSS) within AFS LLC
- Assist Managers with the development of H&S goals and objectives, and track/measure the success of the program
- Monitor and review H&S performance
- Provide employees access to applicable HSS and the Field Health and Safety Handbook
- Report all injuries and incidents to the Manager or PM immediately.
• Investigate or provide assistance with any investigation relating to a H&S incident, as is required

4.3 Field Supervisor

The Field Supervisors shall:

• Lead/Steward H&S on the project site
• Disseminate communications regarding the H&S program (e.g., distribution of Safety Shares and other H&S communications)
• Participate in Daily Tailgate Safety Meetings to ensure staff questions are answered
• Ensure that project HASP requirements are met and understood by all project staff, including:
  ✓ Required training and/or medical clearance
  ✓ Completion of required inspections and/or permits
  ✓ Use of Dirty JSA’s
• Provide employees access to applicable HSS and the Field Health and Safety Handbook
• Participate in and/or facilitate the proactive use of H&S Tools (TRACK, TIP, Near Miss Investigation Process)
• Report all incidents to the H&S Manager or SSO immediately and participate in the investigation process.

4.4 AFS LLC Employee

AFS LLC employees are responsible for adhering to established H&S standards, project-specific H&S plans, client-specific H&S requirements and other related H&S documents and for communicating H&S concerns to their Supervisor, Manager, and/or H&S Manager. In addition, all employees are responsible for using the established behavior-based risk management tools.

Employees shall:

• Visibly steward H&S
• Carry out their work and behave in such a way as to prevent injury to themselves or others
• Take proper care of and appropriately use the standards, guidelines, procedures, instructions, plans, equipment and PPE supplied and as instructed by Managers and Supervisors
• Use TRACK before commencing any work-related task
• Actively participate in the Daily Tailgate Safety Meetings
• Not attempt to take on any task or service for which they have not received adequate training, are not competent, do not have the correct equipment or supervision, or that due to any unusual nature of the task or service may make them and others feel unsafe or be at risk.
• Apply Stop Work Authority by immediately stopping work, act upon (where competent to do so), and report any circumstances where they do not feel competent or have observed omissions, failings or issues with a H&S-related process, standard, method or procedure, to their Project/Task Manager and/or Supervisor. This Stop Work Authority will remain the case whether working in company premises, or representing the company in other premises.
• Participate in and/or facilitate the proactive use of H&S Tools (TRACK, TIP, Near Miss Investigation Process)
• Report of all incidents and near misses to the Field Supervisor and/or H&S Manager and participate in the investigation process.

5. PROCEDURE

5.1 Health & Safety Vision and Policy and Tagline

AFS LLC has adopted the Arcadis Vision, Policy and tagline, which are:
• Prominently displayed on project sites (available on AFS LLC team page under Health and Safety)
• Made known to employees
• Made available to clients and the public upon request
• Reviewed periodically for suitability to the company’s business

5.2 Hazard Assessment and Risk Control Standard (Arcadis ARC HSMS002)

In order to identify hazards, assess their risk and determine proper controls, AFS LLC uses the Hazard Assessment and Risk Control (HARC) process. HARC follows TRACK and is a systematic, qualitative approach to:

1. Identify the hazards that may be encountered during AFS LLC-related operations and activities,
2. Assess H&S risks posed by those hazards,
3. Identify means and methods to control those risks, and
4. Document the results

The HARC process is applied to:

- Routine and non-routine activities on project sites;
- Activities of all people having access to the AFS LLC workplace; and
- Facilities and services at the AFS LLC workplace, whether provided or directly controlled by AFS LLC or not (i.e. client activities on an active client site where AFS LLC is providing services, etc.) that could present hazards to our staff.

The HARC process essentially follows the TRACK process but it is done at a higher level in the organization. It is typically used to identify companywide hazards and risks. However, it can effectively be used for project level hazards and risks. The HARC process follows TRACK.

To help recognize, assess and control H&S risks on a regular basis, the employee self-risk assessment is accomplished by all employees using the TRACK process before and during completion of tasks. TRACK is an undocumented process tool that employees use to ensure the health and safety of themselves, their co-workers and others present. TRACK is an acronym that represents the following activities:

- **T**hink through the task.
- **R**ecognize the hazard.
- **A**ssess the risk.
- **C**ontrol the risk.
- **K**eep health and safety first in all things.

To ensure that employees perform this assessment, Field Supervisors and Managers promote a culture that motivates and stimulates employees to perform their activities/tasks in a safe and healthful manner.

In addition to the HARC process and TRACK, AFS LLC uses other methodologies to assess hazards and determine appropriate control procedures. These include the Job Safety Analysis (JSA) and the H&S Planning processes described in section 5.3.

Risk control is commensurate with the level of risk. The focus of H&S risks control is primarily on measures to prevent hazardous situations. The hierarchy of controls is used when determining the appropriate control. The hierarchy of risk controls is a list, in preferential order, of the means by which H&S risks can be controlled:

- **Elimination** – eliminate the hazard (e.g., discontinue the use of a chemical or machine)
Substitution – substitute the hazard for a lower-risk hazard (e.g., use a safer machine for the same task)

Isolation – isolate the hazard from those who could be exposed to it (e.g., isolate a noisy piece of equipment in a separate room)

Engineering controls – install an engineering control to reduce the risk – (e.g., machine guarding, sound proof panels, etc.)

Administrative controls – training, behavioral changes, signage, job rotation, etc. to reduce the risk

Personal protective equipment (PPE) – provide PPE to reduce exposure (e.g., gloves, hard hat, respirator, etc.)

The hierarchy of controls should always be considered when assessing the effectiveness of controls. The higher in the hierarchy, the more effective the control usually is. Elimination of the hazard is always the preferred control. When this is not possible, a control or controls lower in the hierarchy can then be considered. This process is repeated until the proper and practical control or controls are selected for each hazard.

Additional details on the HARC process can be found in the Arcadis HARC H&S Standard (ARC HSMS002).

5.3 AFS LLC H&S Risk Management Tools

Field Supervisors, Managers and all staff are responsible to ensure that hazards are identified and controlled as is reasonable and practicable and risks are assessed and are documented and reviewed as appropriate. Ultimate responsibility lies with the Project Manager and the Field Supervisor of the employee conducting the activity to ensure that the activities are appropriately planned and the hazards are identified, assessed and controlled.

AFS LLC has developed risk management tools to further improve the H&S program. These tools bring a behavior-based safety component into the program and include the following:

- TRACK, as described in Section 5.2 and Arcadis ARC HSMS002
- JSA, as described in the Health and Safety Plan (HASP) HSS (Arcadis ARC HSFS010)
- The TIP, described in Section 1.
- Project or site H&S assessments and/or audits.
- Incident Investigation and Reporting, as described in the Incident Reporting and Investigation (Arcadis ARC HSMS010)
- Root Cause Analysis, as described in Arcadis ARC HSMS011
The AFS LLC risk management tools are designed to proactively plan for and manage H&S risks effectively and consistently. Through the Risk Management System, employees map out their work using planning tools that serve as a guide to ensure that work proceeds in a safe manner.

H&S planning will vary with the activity and the location of the activity(ies). These variations and the recommended or required planning and hazard assessment requirements are:

- Those activities that are conducted by AFS LLC staff in an Arcadis office or office setting:
  - Following the task level TRACK process is typically sufficient for most activities in the ARCADIS office
  - Reviewing Job Safety Analysis for safety critical tasks (for example: ladder use, home office set-up, etc.)
  - Each office (including site offices and field trailers) has an emergency action plan (EAP) detailing emergency response procedures specific to that office location (see Section 5.8). These EAPs identify and assess the emergencies that could reasonably arise in that office.
    - Visitors to offices shall be briefed on these processes at the start of their visit
- Those activities conducted by AFS LLC staff outside of the office setting:
  - Follow the task level TRACK process
  - Review the JSA for safety critical tasks (for example: driving vehicle, weekly vehicle inspection, ladder use, home office set-up, etc.)
  - Obtain, review and understand client and/or facility EAP procedures
  - Complete Office Assessment TIPs
  - Assess personal security during employee activities on site

5.4 Performance Measuring and Monitoring

AFS LLC has developed project-specific H&S objectives and targets that are in line with the H&S objectives established by Arcadis H&S requirements. The level of effort to achieve each objective and target is determined, and periodically reviewed by project
teams to determine those that have been achieved and those that should be revised or updated to reflect changes in identified hazards, operations or processes, and/or business factors that may impact the achievement of H&S objectives and targets established under the H&S project plan. New objectives and targets may also be identified and established.

5.5 Training and Competence

There is a separate section outlined within each Arcadis HSS which defines and documents the necessary levels of competency that employees must attain to work in conformance with the AFS LLC and Arcadis H&S Vision and Policy. Competency is achieved through a variety of mechanisms, including:

- Training (classroom, in-person or on-line)
- Tests/quizzes
- Individual and group exercises/topic specific games
- Education
- Coaching/Mentoring
- Behavior based observations
- Hands-on practice and/or demonstration
- Experience

AFS LLC offers training to staff in order to meet company, legal and client requirements within our areas of operation. In addition, employees are trained and made aware of:

- The importance of conforming to the H&S Vision and Policy and all standards that are provided to conduct their work safely and in good health
- The H&S consequences of their work and the benefits of completing their work safely and in good health
- Their roles and responsibilities within the HSMS
- Safe behaviors for completing job tasks, as well as at-risk or unsafe behaviors that could result in employee injury or illness

The AFS LLC training matrix is provided to assist Field Supervisors and Managers in selecting H&S training that employees need to maintain the defined competencies required for their job responsibilities. In addition, AFS LLC defines and implements methods to evaluate the effectiveness of training that is provided to employees. These methods may include but are not limited to:
• Written or oral testing
• Auditing and review
• Hands-on demonstrations
• Behavioral observations and feedback

5.6 Communications

Internal communication processes include mechanisms to ensure that employees have a way to communicate their H&S concerns, questions, suggestions, comments or other issues. Once appropriate action is taken, the employee raising the issue is (at a minimum) provided a response within a practical timeframe.

Internal communication may be accomplished through the PM, Manager, H&S Manager, SSO, and/or Field Supervisor using a variety of methods, including but not limited to on-site postings, handouts, company newsletters, H&S moments, emails, Safety Shares, Yammer. In addition, through the AFS LLC risk management tools, feedback is provided to discuss safe and questionable behaviors when appropriate.

Additionally, communications resulting from regulatory requirements are distributed to ensure employee access to the information.

5.7 H&S Documents and Document Control (Arcadis ARC HSMS007)

Adequate H&S standards are in place and understood at the appropriate organizational levels in accordance with Arcadis ARC HSMS007 – H&S Documents and Document Control. Field Supervisors and Managers will distribute appropriate standards to AFS LLC employees.

All documents generated as part of the HSMS are identified as being “controlled” documents in accordance with Arcadis ARC HSMS007. These include but are not limited to:

• H&S risk identification, assessment and control as part of the HARC process
• H&S standards
• Work process mapping through the risk management system
• JSAs
• Health and Safety plans
• Employee Field H&S Handbook
• Inspection checklists and other types of forms
AFS LLC and Arcadis H&S Standards shall be reviewed every three years (at minimum) with the exception of those standards that require a regulatory-defined review timeframe more frequent than 3 years (for example, the Lockout Tagout - Control of Hazardous Energy Standard requires an annual review according to OSHA requirements). For some documents, the review period may need to be more frequent depending on changes in legislation, corrective action from incidents or to aid in continuous improvement. Following completion of any review, the program will be revised or updated in order to correct any deficiencies.

A list of the AFS LLC and Arcadis H&S standards are included in Exhibit 2, access is provided by Field Supervisor and/or Manager through the company intranet. Other H&S hazard control documents are prepared on a project basis and kept in project files or in the 4-Sight database. Access is provided by Field Supervisor and/or Manager through the company intranet.

5.8 Emergency Preparedness and Response (Arcadis ARC HSMS008)

Each operational location (e.g. project site, office) is required to complete, maintain and implement documented emergency preparedness and response plans in accordance with the Arcadis Emergency Preparedness and Response for Office and Project Sites (ARC HSMS008). These plans are updated as responsibilities change and are reviewed and updated periodically or after each emergency in which the plan has been implemented. At a minimum, each plan includes the following:

• Identification of the possible emergencies that could occur
• Instructions on what employees should do in the event of an emergency situation
• Emergency resources and phone numbers
• Procedures for evaluating response actions or drills that require implementation of the plan

In addition, operational locations periodically test these plans to ensure their effectiveness.

Note: If a project site has a HASP, it complies with (ARC HSMS008) and no additional plan is required.

5.9 H&S Conformance Verification Assessment (Arcadis ARC HSMS009)

An H&S auditing standard for project and office locations has been developed to ensure regulatory compliance and conformance with company and client requirements. This procedure is documented in the Arcadis H&S Conformance Verification Assessment Standard (ARC HSMS009).

Directly following an H&S assessment, and based on the audit’s findings and recommendations, staff develop measures to correct and prevent the recurrence of
identified deficiencies. These measures are documented and incorporated into 4-sight or on a report issued to the project team.

5.10 Incident Reporting and Investigation (Arcadis ARC HSMS010)

All H&S incidents, including near misses with actual or potential consequences, are investigated and reported in accordance with the Incident Reporting and Investigation (Arcadis ARC HSMS010).

This HSS includes levels of incident investigation and reporting based on the severity of the incident. As part of the investigation, a thorough Root Cause Analysis is conducted in accordance with the Root Cause Analysis and Solutions Development (Arcadis ARC HSM011) to identify the root cause(s) of the incident, and appropriate solutions are developed and implemented to correct unsafe conditions and behaviors and prevent their recurrence.

5.11 Root Cause Analysis and Corrective Actions (Arcadis ARC HSMS011)

In accordance with the procedures presented in Arcadis ARC HSMS011, the root cause is determined for:

- H&S Incidents, including near misses (Arcadis ARC HSMS010)
- H&S Conformance Verification Assessment (Arcadis ARC HSMS009)

5.12 Recordkeeping and Reporting (Arcadis ARC HSMS012)

H&S records are maintained in accordance with OSHA requirements. If there is no OSHA recordkeeping requirement for a particular document, then AFS LLC recordkeeping requirements are employed for these H&S documents.

AFS LLC is one of the exempted industries listed in 29CFR Part 1904 and is, therefore, not required to maintain OSHA 300 recordkeeping logs as defined in 29CFR Part 1904. However, to help AFS LLC meet client requirements and requests by the Department of Labor, AFS LLC does maintain OHSA logs through Arcadis.

Employees should immediately report any injury or illness thought to be work-related to their Field Supervisor or Manager. Field Supervisors and Managers should immediately report any fatality, inpatient/overnight hospitalization, amputation or loss of eye to the H&S Manager or Project Manager who will then follow Level 3 Incident Reporting Flowchart in the Incident Reporting and Investigation HSS (ARC HSMS010). The Arcadis North America H&S Director or designee will contact OSHA, as appropriate.

As soon as possible, report all other injuries and illnesses that are being reported as work-related to the H&S Manager.
A 300A for all of Arcadis including AFS LLC will be posted in a conspicuous location in each office and appropriate project site from February 1st through April 30th of each year.

All OSHA Logs and DOL/BLS Surveys and Reports are maintained by Arcadis Corporate Health and Safety according to the Arcadis and OSHA statutory record keeping policies.

Recordkeeping procedures are described in more detail in the Recordkeeping and Reporting Standard (Arcadis ARC HSMS012) and the Arcadis Record Retention Policy.

5.13 **HHSMS Internal H&S Program Assessments**

Annually AFS LLC will conduct an internal assessment of its HSMS in accordance with Arcadis ARC HSMS009. Deficiencies identified during these assessments will be addressed through the Root Cause Analysis procedure (Arcadis ARC HSMS011).

6. **TRAINING**

Training on the AFS LLC HSMS and H&S program requirements is conducted at the start of employment. Additional training that is required so that staff can complete their work safely is detailed in each individual HSS under Section 5.5.

This process starts upon hire to ensure that new employees are introduced to our H&S culture and program as soon as possible. Field Supervisors, Managers or designees are required to verify appropriate H&S Training and basic understanding of the H&S program and culture for all new hires. Training requirements are listed in the AFS LLC training matrix.

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

AFS LLC Training Matrix
Arcadis General Business Principles
Arcadis Management Charter
Arcadis H&S Vision and Policy
Arcadis H&S Standards
Arcadis H&S Incident Reporting and Investigation HSS (ARC HSMS010)

8. **RECORDS - DATA RECORDING AND MANAGEMENT**

Records will be kept according to individual procedures listed in Exhibit 2.
### Implementation Date

<table>
<thead>
<tr>
<th>Implementation Date</th>
<th>AFS LLC HS Standard Name</th>
<th>AFS LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 April 2016</td>
<td>Health and Safety Management System</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>AFS HS Standard No.</th>
<th>Revision Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AFS HSM000</td>
<td>01</td>
</tr>
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</table>

### 9. APPROVALS AND HISTORY OF CHANGE

Approved by:

Julie Santaniello, CSP – Corporate Health & Safety, Manager of Technical Programs

[Signature]

#### History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 April 2016</td>
<td>01</td>
<td>Andrew McDonald/Denis Balcer/Tony Tremblay/Julie Santaniello</td>
<td>Original document</td>
</tr>
</tbody>
</table>

Page 19 of 19
<table>
<thead>
<tr>
<th>AFS LLC Risk Management System</th>
<th>Health and safety, project and quality risk are managed by the AFS LLC Risk Management System, which uses proactive planning and improvement tools that have been developed to provide a consistent approach to managing H&amp;S, quality and project risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit</td>
<td>A structured independent assessment of the efficiency, effectiveness and reliability of a company management system or certain aspects of the business (e.g. business controls, procedures, financial statements, health and safety compliance)</td>
</tr>
<tr>
<td>Client</td>
<td>A person or organization requesting a product or service from a third party, normally according to a set of specific contractual arrangements</td>
</tr>
<tr>
<td>Competence</td>
<td>An objective description of the skill and/or experience required for effective performance in an area of expertise</td>
</tr>
<tr>
<td>Consequence</td>
<td>The effect, result, or outcome of something occurring earlier</td>
</tr>
<tr>
<td>Emergency Preparedness Plan</td>
<td>A pre-established plan to mitigate an unusual situation that has the potential for harm (or damage), which incorporates the best use of local as well as remote facilities and resources</td>
</tr>
<tr>
<td>Experience Modification Rate (EMR)</td>
<td>A number calculated by the Workers’ Compensation insurance industry that is used to determine a company’s level of risk based on its past history of Workers’ Compensation claims. The lower the number, the less risk there is to insure that company</td>
</tr>
<tr>
<td>Ergonomic(s)</td>
<td>The science of studying people at work and designing tasks, jobs, tools, equipment, facilities and the work environment so that people can be safe, healthy, effective, efficient, productive and comfortable</td>
</tr>
<tr>
<td>Exposure Hours</td>
<td>See “Working hours”</td>
</tr>
<tr>
<td>Fatality</td>
<td>A death resulting from a work-related injury or occupational illness, regardless of the time interval between the incident causing the injury or illness and the time of death</td>
</tr>
<tr>
<td>First Aid</td>
<td>First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires little technology or training to administer. First aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn; applying bandages and dressings; the use of non-prescription medicine; draining blisters; removing debris from the eyes; massage; and drinking fluids to relieve heat stress</td>
</tr>
<tr>
<td><strong>Hazard Analysis and Risk Control (HARC)</strong></td>
<td>A process that includes the identification of hazardous activities, assesses the unmitigated and mitigated risk of those activities, and outlines control methods</td>
</tr>
<tr>
<td><strong>Health and Safety Plan (HASP)</strong></td>
<td>A document that dictates the health and safety requirements of a particular project</td>
</tr>
<tr>
<td><strong>Hazard</strong></td>
<td>The potential to cause harm, including illness and injury, or damage to property</td>
</tr>
<tr>
<td><strong>Housekeeping</strong></td>
<td>Maintaining the working environment (workplace) in a tidy manner so that, in particular, access and movement is not hindered.</td>
</tr>
<tr>
<td><strong>Health and Safety (H&amp;S)</strong></td>
<td>In this context, &quot;health&quot; means &quot;occupational health&quot;</td>
</tr>
<tr>
<td><strong>Health and Safety Management System (HSMS)</strong></td>
<td>A structured set of interdependent doctrines, processes, documents and principles that are intended to ensure that the activities of an organization are directed, planned, conducted and controlled in such a way as to provide reasonable assurance that the H&amp;S objectives of the organization are met</td>
</tr>
<tr>
<td><strong>H&amp;S Training Hours</strong></td>
<td>The total number of hours of spent on dedicated H&amp;S training (e.g., First Aid, Defensive Driving, HSMS training)</td>
</tr>
<tr>
<td><strong>Incident</strong></td>
<td>A sudden and unplanned event or chain of events that has, or could have caused, injury or illness and/or damage to assets</td>
</tr>
<tr>
<td><strong>Injury</strong></td>
<td>Damage to the human body (e.g., cut, fracture, sprain, amputation) that results from a single instantaneous exposure</td>
</tr>
<tr>
<td><strong>Job Safety Analysis (JSA)</strong></td>
<td>The application of the HARC process at the task level. A JSA, quite simply, is a documented TRACK. A JSA is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. After you identify uncontrolled hazards, you will take steps to eliminate or reduce them to an acceptable risk level</td>
</tr>
<tr>
<td><strong>Lagging Performance Indicators</strong></td>
<td>Performance indicators that indicate a reactive activity (e.g., Total Recordable Case Frequency, which looks at OSHA recordable injuries/illnesses that have already occurred).</td>
</tr>
<tr>
<td><strong>Leading Performance Indicators</strong></td>
<td>Performance indicators that indicate a proactive activity (e.g., behavior based observations (TIPs), near miss reporting, assessments, audits and/or number of hours of training)</td>
</tr>
<tr>
<td><strong>Likelihood</strong></td>
<td>The chance or probability that a specified consequence will happen. In this document, likelihood is expressed qualitatively in terms of</td>
</tr>
</tbody>
</table>
events that have happened in a particular industry, organization or location.

**Lost Time Injury (LTI)**

The sum of OSHA recordable injuries/illnesses, including fatalities, permanent total disabilities and lost workday cases, but excluding restricted work cases and medical treatment cases.

**Lost Time Injury Frequency (LTIF)**

An incidence rate for work-related OSHA recordable injuries/illnesses involving time away from work. The LTIF incidence rate is the number of lost-time injuries per million hours worked, calculated using this equation:

\[
\text{LTIF incidence rate} = \frac{\text{Number of Lost Time Injuries/Illnesses}}{100,000} \times \frac{\text{Number of hours worked by all employees}}{\text{Number of hours worked by all employees}}
\]

**Lost Work Day (LWD)**

A day on which an injured person is temporarily unable to work as a result of an OSHA recordable lost-work case. In the case of a fatality or a permanent total disability, no lost workdays are recorded.

**Lost Work Day Case (LWC)**

Any OSHA recordable work-related injury/illness that renders the injured person temporarily unable to perform his or her normal work, or restricted work on any day after the day on which the injury occurred, including rest days, scheduled holidays, public holidays or days after ceasing employment.

**Management Review**

The formal annual evaluation of a company's management system by the company executive board or management team.

**Medical Treatment Case (MTC)**

Any OSHA recordable work-related injury/illness that does not involve lost or restricted workdays but that requires treatment by a physician or medical specialist.

For the purposes of this guide, medical treatment does not include:

- Visits to a physician or other licensed health-care professional solely for observation or counseling;
- Diagnostic procedures, such as x-rays, blood tests, or the administration of prescription medications used solely for diagnostic purposes (e.g., eye drops to dilate pupils); or
- "First aid" as defined above.

**Near Miss**

An incident, unsafe and/or unhealthy practice, or hazardous situation observed by an AFS LLC employee that could have resulted in illness, injury or damage to assets, but did not
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational Illness</td>
<td>An abnormal health condition or disorder (physical or mental) that is caused or aggravated by exposure to environmental factors associated with employment, including chemical, physical, biological and ergonomic factors</td>
</tr>
<tr>
<td>Performance Indicator</td>
<td>A specific measure to describe management, operational process or indicator performance</td>
</tr>
<tr>
<td>Personal Protective Equipment (PPE)</td>
<td>All equipment and clothing that is intended to be worn or held by a person at work and that affords protection against one or more risks to health and safety and against adverse weather conditions</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Those actions, activities or assets for which a person is held liable and for which he alone must account</td>
</tr>
<tr>
<td>Restricted Work Case (RWC)</td>
<td>Any OSHA recordable work-related injury/illness that renders the injured person temporarily unable to perform one or more of his/her routine job functions but still able to perform some meaningful work-related function on any day after the day on which the injury occurred</td>
</tr>
<tr>
<td>Risk</td>
<td>The likelihood that a specific undesired event will occur within a specified period. Risk is therefore a function of both the likelihood and the consequence of a specific hazard being released. When applying the Risk Assessment Matrix (RAM) to assess the risk rating (Low, Medium or High) of a specific hazard release scenario, risk is a function of the likelihood of a consequence and the severity of that consequence</td>
</tr>
<tr>
<td>Risk Assessment</td>
<td>The process of rating potential hazard consequences together with their probabilities using the Risk Assessment Matrix</td>
</tr>
<tr>
<td>Risk Assessment Matrix (RAM)</td>
<td>A practical tool that is used to qualitatively assess H&amp;S and other business risks</td>
</tr>
<tr>
<td>Risk Control</td>
<td>A technical, operational and/or organizational measure put in place to prevent a hazardous situation or unwanted consequence</td>
</tr>
<tr>
<td>Root Cause Analysis</td>
<td>A systematic method for determining the cause of an incident</td>
</tr>
<tr>
<td>Repetitive Strain Injury</td>
<td>A disorder caused by repetitive movement; (complains of arm, neck and/or shoulder)</td>
</tr>
<tr>
<td>Severity</td>
<td>The level of consequence on a scale of 0 to 5 (see RAM)</td>
</tr>
<tr>
<td>SMART</td>
<td>An acronym describing specifications for objectives (i.e., they should be Specific, Measurable, Achievable, Relevant and Time bound)</td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td>Any interference that disturbs a person’s mental and physical well-being</td>
</tr>
<tr>
<td><strong>Subcontractor</strong></td>
<td>A person, company or organization that maintains a system of operation with AFS LLC</td>
</tr>
<tr>
<td><strong>Task Improvement Process (TIP)</strong></td>
<td>A process that includes peer learning and feedback on critical safety behaviors</td>
</tr>
<tr>
<td><strong>Total Recordable Case (TRC)</strong></td>
<td>The sum of OSHA recordable injuries/illnesses resulting in fatalities, permanent total disabilities, lost workday cases, restricted work cases and medical treatment cases</td>
</tr>
</tbody>
</table>
| **Total Recordable Case Frequency (TRCF)** | The number of Total OSHA Recordable work-related Injury/Illness Cases per calendar year. In accordance with the OSHA 300 log, AFS LLC calculates the TRCF incidence rate using the following equation: 

\[
\frac{\text{# of Recordable work-related injuries/illness cases} \times 200,000}{\text{Number of hours worked by all employees}} = \text{TRCF incidence rate}
\] |
| **Total Recordable Occupational Illness (TROI)** | The sum of all OSHA recordable identified occupational illnesses. Cases involving no lost or restricted workdays and no medical treatment are included. A single exposure can give rise to several occupational illness cases. |
| **Total Recordable Occupational Illness Frequency (TROIF)** | The number of Total OSHA Recordable work-related Illness Cases per calendar year. In accordance with the OSHA 300 log, AFS LLC calculates the TROIF incidence rate using the following equation: 

\[
\frac{\text{# of Recordable work-related illness cases} \times 200,000}{\text{Number of hours worked by all employees}} = \text{TROIF incidence rate}
\] |
| **TRACK** | An acronym describing the behavior-based self-assessment of H&S risks: **Think** through the task, **Recognize** the hazard, **Assess** the risk, **Control** the hazard, and **Keep** health and safety first in all things |
| **Work-Related Activities** | Those activities for which management controls are, or should be, in place. Injuries occurring during the course of work-related activities are work-related injuries |
| **Working Hours** | The number of hours all employees actually worked during the calendar year as defined by OSHA |
EXHIBIT 2 – Applicable Health and Safety Standards for the AFS LLC

AFS HSMS000  AFS LLC Health & Safety Management System
ARC HSMS002  Hazard Assessment and Risk Control
ARC HSMS007  H&S Documents and Document Control
ARC HSMS008  Emergency Preparedness and Response – office and site
ARC HSMS009  H&S Conformance Verification Assessment
ARC HSMS010  Incident Reporting and Investigation
ARC HSMS011  Root Cause Analysis and Solutions Development
ARC HSMS012  Recordkeeping and Reporting
ARC HSMS013  Management of Change – Standard Development Pending
ARC HSMS015  H&S Program Glossary of Terms – Standard Development Pending

General H&S Procedures (GE)

ARC HSGE001  Daily Tailgate Meeting
ARC HSGE002  DOT – Haz Mat Transportation
ARC HSGE004  First Aid/CPR
ARC HSGE005  Bloodborne Pathogens
ARC HSGE006  General Safety (eye/body wash stations, ventilation, potable water sanitation) – Standard Development Pending
ARC HSGE007  Hazard Communication
ARC HSGE008  Illness and Injury Prevention Program
ARC HSGE009  Stop Work Authority
ARC HSGE010  Medical Surveillance
ARC HSGE011  Office Ergonomics
ARC HSGE012  Office Safety
ARC HSGE013  OSHA Inspections
ARC HSGE015  Personal Protective Equipment (to include head, hands, feet, eye, face and body)
ARC HSGE016  Personal Safety and Security – Standard Development Pending
ARC HSGE017  Respiratory Protection
ARC HSGE018  Return to Work – Standard Development Pending
ARC HSGE019  Short Service Employee Program – Reserved (Addressed in Field H&S Handbook)
ARC HSGE020  Simultaneous Operations – Standard Development Pending
ARC HSGE021  Subcontractor Prequalification – Standard Development Pending
ARC HSGE021  Subcontractor Management – Standard Development Pending
ARC HSGE022  International Travel
ARC HSGE023  Fit For Duty – Standard on Hold
ARC HSGE024  Motor Vehicle Safety Program
**Industrial Hygiene (IH)**

- ARC HSIH002 Asbestos
- ARC HSIH003 Benzene
- ARC HSIH004 Radiation Safety Program
- ARC HSIH005 Non-ionizing Radiation Safety – **Standard Development Pending**
- ARC HSIH006 Cadmium
- ARC HSIH007 H2S
- ARC HSIH008 Hearing Conservation
- ARC HSIH009 IH Program
- ARC HSIH010 Lead
- ARC HSIH011 Sealed Radiation Sources
- ARC HSIH012 Silica – **Standard Development Pending**
- ARC HSIH013 Heat Stress
- ARC HSIH014 Cold Stress
- ARC HSIH015 Non-radioactive Source Based Handheld X-ray Fluorescence (XRF) Analyzers – **Standard Development Pending**

**Field Safety (FS)**

- ARC HSFS001 ATVs and Utility Vehicles – **Standard Development Pending**
- ARC HSFS002 Water Operations Safety Standard
- ARC HSFS003 Confined Space
- ARC HSFS004 Control of Hazardous Energy (Lockout/Tagout)
- ARC HSFS005 Cutting Tools – Reserved (To be Addressed in HSFS008)
- ARC HSFS006 Electrical Safety
- ARC HSFS007 Elevated Work and Fall Protection
- ARC HSFS008 Power and Hand Tools – **Standard Development Pending**
- ARC HSFS009 Field Ergonomics – **Standard Development Pending**
- ARC HSFS010 H&S Plans
- ARC HSFS011 Drilling Operations – **Standard Development Pending**
- ARC HSFS012 HAZWOPER Work
- ARC HSFS013 Material Handling, Storage, Use and Disposal – **Standard Development Pending**
- ARC HSFS014 Process Safety Management
- ARC HSFS015 Scaffolds
- ARC HSFS016 Ladders
- ARC HSFS017 Aerial Work Platforms
- ARC HSFS018 Trailer Usage – **Standard Development Pending** (refer to Field H&S Handbook)
- ARC HSFS019 Utility Location Procedures
- ARC HSFS020 Chartering an Aircraft for ARCADIS Activities - **Standard Development Pending**
- ARC HSFS021 Site Security - **Standard Development Pending**
- ARC HSFS022 Signs, Signals and Barricades - **Standard Development Pending**
### Construction Safety (CS)
- **ARC HSCS001** Blasting and Use of Explosives - *Standard Development Pending*
- **ARC HSCS002** Concrete and Masonry Construction - *Standard Development Pending*
- **ARC HSCS003** Hoisting, Rigging and Other Lifting (Cranes, Derricks, Hoists, Elevators and Conveyors)
- **ARC HSCS004** Demolition - *Standard Development Pending*
- **ARC HSCS005** Excavation and Trenching
- **ARC HSCS008** Reserved
- **ARC HSCS009** Steel Erection - *Standard Development Pending*
- **ARC HSCS010** Underground Construction, Caissons, Cofferdams and Compressed Air - *Standard Development Pending*
- **ARC HSCS012** Temporary Floors, Stairs, Railings and Toeboards - *Standard Development Pending*
- **ARC HSCS013** Hot Work (Including Welding and Cutting)

### Special Work Areas (SP)
- **ARC HSSP001** Munitions and UXO - *Standard Development Pending*
- **ARC HSSP002** Railroad
- **ARC HSSP003** Survey - *Standard Development Pending*
- **ARC HSSP004** Wilderness Safety/Survival - *Standard Development Pending*
- **ARC HSSP005** Working in the Arctic (Alaska North Slope) - *Standard Development Pending*
- **ARC HSSP006** Forklifts
- **ARC HSSP007** Bear Safety - *Standard Development Pending*
- **ARC HSSP008** Firearms Safety – *Standard on Hold/Reserved*

**Standard Development Pending:** Until the H&S Standard is developed, refer to the Field H&S Handbook, the ARCADIS 2003 rev Health and Safety Manual (Edited 2014) or task specific JSAs for requirements/guidelines.
### EXHIBIT 3 – Exemptions form Arcadis Health and Safety Standards for the AFS LLC HSMS

<table>
<thead>
<tr>
<th>Standard Control Number</th>
<th>Standard Title</th>
<th>Section</th>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC HSGE015</td>
<td>Personal Protective Equipment</td>
<td>Section 5.6.4 Foot Protection</td>
<td>Employees of the AFS LLC will not be reimbursed for the purchase of Safety Boots.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum expenditure or reimbursement for approved safety shoe purchases will be $150. Reimbursement requests must be approved by the employee’s supervisor.</td>
<td></td>
</tr>
<tr>
<td>ARC HSGE015</td>
<td>Personal Protective Equipment</td>
<td>Section 5.6.1 Eye/Face Protection</td>
<td>Employees of the AFS LLC will not be reimbursed for the purchase of prescription safety eyewear. AFS employees will be provided with appropriate safety glasses that will fit over prescription glasses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For prescription eye protection contact your supervisor to fill out an AOSafety order form available on the ARCADIS Health and Safety website (The Source). For temporary staff, standard prescription safety glasses will be provided with the approval of the administrative supervisor and Project Manager. If the administrative supervisor or Project Manager elects to not provide standard prescription safety glasses to temp staff, the employee will be informed of the requirement to provide their own prescription safety meeting project health and safety requirements prior to hire.</td>
<td></td>
</tr>
<tr>
<td>ARC HSGE024</td>
<td>Motor Vehicle Safety Program</td>
<td>Section 2.2.3.2 Drivers without an Assigned Driving Function for Arcadis</td>
<td>AFS LLC employees driving on behalf of AFS LLC are required to comply with the Motor Vehicle Safety Program ARC HSGE024.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drivers without an assigned driving function for Arcadis are still subject to the requirements of the Arcadis Vehicle Use Policy maintained by Human Resources.</td>
<td></td>
</tr>
</tbody>
</table>
| ARC HSGE024 | Motor Vehicle Safety Program | Section 5.3.1 New Hire Defensive Driving Training  
All new hires (regardless of driving assignment) with an active driver’s license will complete on-line defensive driving training prescribed by Health and Safety within 30 days of employment. | AFS LLC employees driving on behalf of AFS LLC are required to comply with the Motor Vehicle Safety Program ARC HSGE024, including Smith System online driver training |
EXECUTIVE SUMMARY

It is the policy of ARCADIS to prevent and minimize occupational exposure to blood borne pathogens through the use of engineering and administrative controls and personal protective equipment (PPE).

Blood borne Pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Corporate H&S Department has the responsibility to communicate the policy and standard requirements with all ARCADIS-US (AUS) offices.

ARCADIS Managers and Supervisors (including project and task managers) have the responsibility to provide oversight management for the Health & Safety (H&S) of employees in their respective operations, and ensure that the HSS is being implemented.

ARCADIS Employees have the responsibility to adhere to this HSS and to communicate H&S concerns, issues and questions to their supervisor or to the corporate Health and Safety staff.

Each office or jobsite subject to this standard will have a written Exposure Control Plan that is to be reviewed annually. The Plan will outline methods to be utilized and schedules to be kept to maintain compliance with this standard. The Plan is designed to eliminate or minimize employee exposure. A copy of the plan should be accessible to all employees.

The Hepatitis B (HBV) vaccination series and post-exposure evaluation and follow-up will be made available to all employees who fall under this standard at no cost to the employee. Initial and annual training will be provided to all employees who have been designated as first aid responders or are expected to render first aid and/or are expected to clean an area contaminated with blood or other potentially infectious materials.

All exposure and medical records shall be kept for the duration of employment plus 30 years.

All employee training records will be kept from the date on which the training occurred and maintained for the duration of employment plus 10 years.
1. POLICY

It is the policy of ARCADIS to comply with the OSHA’s Blood borne Pathogens (BBP) Standard as it relates to the work we do.

2. PURPOSE AND SCOPE

2.1 Purpose

ARCADIS is committed to providing a healthy and safe work environment for its employees, subcontractors, clients and visitors. To this end, ARCADIS embraces this policy to eliminate or minimize exposure to blood borne pathogens.

2.2 Scope

The standard applies to all employees who have been designated as first aid responders or who are expected to render first aid and/or are expected to clean an area contaminated with blood or other potentially infectious materials as part of their job responsibilities. This standard does not cover employees who perform unanticipated “good Samaritan acts” at work.

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 Corporate H&S Department – has the responsibility to:

- Communicate the policy and standard requirements with all ARCADIS-US (AUS) offices.
- Establish a written Exposure Control Plan template for offices and projects to utilize that is designed to eliminate or minimize employee exposure.
- Ensure that a copy of this plan is accessible to employees in accordance with 29 CFR 1910.1020(e).
- Ensure that this Health and Safety Standard (HSS) is reviewed annually and revised as necessary.
- Facilitating the implementation of this HSS and providing “hands-on” assistance to ARCADIS staff in its implementation.
- ARCADIS Managers and Supervisors (including project and task managers) – provide oversight management for the Health & Safety (H&S) of employees in their respective operations, and ensure that the HSS is being implemented.
4.2 **ARCADIS Employees** – have the responsibility to adhere to this HSS and to communicate H&S concerns, issues and questions to their supervisor or to the corporate Health and Safety staff.

5. **PROCEDURE**

5.1 **General Requirements**

Each office or jobsite that is subject to this standard will have a written Exposure Control Plan that is to be reviewed annually.

5.2 **Written Exposure Control Plan**

The Written Exposure Control Plan is designed to eliminate or minimize employee exposure. The plan will be reviewed and updated at least annually, including any changes in technology and any devices that have been considered/purchased that may eliminate or decrease employee exposure. A copy of the plan will be accessible to all employees. A template plan can be found in Exhibit 2. The plan should address the following:

- Exposure Determination to include employees who, without regard to PPE, have potential exposures and what tasks (e.g. providing First Aid) could so expose them.
- Methods of Compliance;
- Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up;
- Labeling and Signs - Communication of Hazards;
- Recordkeeping; and
- How the route of exposure and circumstances under which it occurred will be documented.

5.3 **Methods of Compliance**

The written Exposure Control Plan will outline what methods will be utilized and what schedules must be kept to maintain compliance with this standard. The following will be addressed in the plan:

- Universal Precautions will be observed to prevent contact with blood or other potentially infectious materials; examples include gloves, masks or eye protection.
- Engineering and Work Practice Controls will be used to eliminate or minimize employee exposure. These include:
  - Hand washing facilities will be readily available. If this is not feasible, antiseptic hand cleanser, single use towels or antiseptic towelettes will be made available with hand washing to be done as soon as possible thereafter.
o Requiring that employees wash their hands as soon as possible after removal of PPE, and that they wash any skin or flush mucous membranes with water as soon as possible after contact with potentially infectious materials.

o Education of employees so that splashing, spraying, or spattering of blood or body fluids will be minimized.

• PPE will be considered appropriate only if it does not permit blood or other infectious material to pass through or reach clothes, undergarments, skin, eyes, mouth or other mucous membranes under normal conditions of use. Exhibit 3 is a guide to blood borne pathogen PPE.

o PPE that is appropriate to the potential exposure will be made available and, where necessary, made of hypoallergenic material. If the employee declines to wear PPE, the circumstances will be investigated and documented.

o PPE will be removed prior to leaving the incident area and placed in an appropriately designated container for decontamination or disposal. Defective, damaged or questionable PPE will be repaired or replaced as needed.

o Gloves will be worn when it is reasonably anticipated that the employee may have hand contact with blood or other potentially infectious materials, mucous membranes and/or non-intact skin. They will also be worn when handling or touching contaminated items or surfaces. Gloves must be disposable and will be exchanged for a new pair when contaminated, torn or punctured. Disposable (single use) gloves shall not be washed or decontaminated for re-use.

o Masks, eye protection and face shields are required whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

o Gowns, aprons, and other protective body clothing are required when splashing, splattering or spraying of the body with blood or other potentially infectious materials is reasonably anticipated.

• Cleaning and Decontamination of all surfaces by an appropriate disinfectant will be done as soon as possible after contact with blood or other potentially infectious materials. Contaminated waste and/or laundry such as bloodied bandages or clothing will be placed in leak-proof containers or bags and labeled or color coded as noted in Section 5.5. Contaminated sharps such as broken glass will be picked up by mechanical means such as a brush/dust pan, and will be discarded immediately in a container that is puncture resistant, leak-proof and labeled or color coded as noted in Section 5.5.

• If contaminated sharps (e.g., needles, metal or glass) or other contaminated material is an expected/potential hazard at a project site, the H&S Plan will include instruction for its removal by a professional company/service. If such items are unexpectedly found at a site, stop work, isolate the area in question, contact the client and
discuss with the client options for contracting with a professional company service for clean up and removal.

5.4 Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up

The Hepatitis B (HBV) vaccination series and post-exposure evaluation and follow-up will be made available to all employees who fall under this standard at no cost to the employee. The healthcare provider who examines the employee will document if HBV vaccination is indicated and if the employee received the vaccination. If an employee declines the vaccination, a declination form as shown in Exhibit 4 will be signed by the employee. However, if the employee later decides to have the vaccination and is still covered under this standard, the vaccination will be made available at that time.

Post-Exposure Evaluation and Follow-up will be made available immediately following an exposure incident. The ARCADIS office will supply to the physician a description of the employee’s duties as they relate to the exposure incident, the route and circumstances of exposure, the results of the source individual’s testing if known and the employee’s medical records including HBV vaccination status if not already available to the physician.

The medical provider will supply his/her written medical opinion to ARCADIS which will contain only that the employee has been informed of the results of the evaluation and has been told about any medical conditions that require further evaluation or treatment. The employee should receive a more detailed confidential medical evaluation from the medical provider.

- Testing of the employee’s blood will be done as soon as possible as recommended by the medical provider. If the employee decides to give consent for the blood to be drawn but not tested, the employee will have 90 days in which to change his/her mind as the sample must be preserved for 90 days.

5.5 Labeling and Signs

All contaminated waste, laundry and sharps will be labeled as required by this standard.

Red bags or containers may be substituted for labels. Labels will be fluorescent orange or orange-red with lettering and symbols in a contrasting color and include the following legend:
6. Training

All employees who have been designated as first aid responders or are expected to render first aid and/or are expected to clean an area contaminated with blood or other potentially infectious materials, will receive training upon initial assignment and then annually thereafter by a vendor approved by Corporate H&S.

A copy of the regulatory text of this standard will be made available to all applicable employees. Training will include opportunity for interactive questions and will include at a minimum:

- A general explanation of modes of transmission and symptoms associated with blood borne pathogens;
- An explanation and the location of the written exposure control plan;
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
- An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and PPE;
- Information on the types, basis for selection, proper use, location, removal, handling, decontamination and disposal of PPE;
- Information on the Hepatitis B vaccine;
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials including information on post-exposure evaluation and follow-up; and
- An explanation of the signs and labels and/or color coding.

Training records will include the training date, a summary of the training sessions, the name and qualifications of person conducting the training, and names and job titles of all persons attending the training sessions. The trainer will provide their qualifications and a training content summary.

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

CFR 1910.1030 “Blood borne Pathogens”

OSHA Interpretation Letters:

- 12/15/92: “Blood borne Pathogens Impact on Non-Health Care Industries”
- 10/5/92: “Employee Training in First Aid”
8. RECORDS

Complete employee medical records regarding exposure will be established and maintained for each employee with occupational exposure by the approved medical provider in accordance with 29CFR 1910.120.

These records will be kept confidential and will not be disclosed without an employee’s written consent except as required by this standard or by law.

Exposure and medical records shall be kept for the duration of employment plus 30 years.

All employee training records will be kept from the date on which the training occurred and maintained for the duration of employment plus 10 years.

9. APPROVALS AND HISTORY OF CHANGE

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

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2003</td>
<td>01</td>
<td>Sue Byers/Pat Vollertsen</td>
<td>Original document</td>
</tr>
<tr>
<td>24 February 2010</td>
<td>02</td>
<td>Sue Byers</td>
<td>Change to new format</td>
</tr>
<tr>
<td>5 December 2011</td>
<td>03</td>
<td>Sue Byers/Tony Tremblay</td>
<td>Review and update</td>
</tr>
<tr>
<td>13 April 2012</td>
<td>04</td>
<td>Camille Carollo/Tony Tremblay</td>
<td>Added Executive Summary; moved definitions from Section 3 to Exhibit 1</td>
</tr>
<tr>
<td>15 February 2013</td>
<td>05</td>
<td>Amanda Tine/Tony Tremblay</td>
<td>Added language about required length of time for keeping medical/exposure records and training records in executive summary and in Section 8.</td>
</tr>
<tr>
<td>28 February 2014</td>
<td>06</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>Added information to section 5.3 regarding contaminated items found at project sites and added ECP template as exhibit 2</td>
</tr>
</tbody>
</table>
EXHIBIT 1

BLOODBORNE PATHOGENS – DEFINITIONS

Blood means human blood, human blood components, and products made from human blood.

Blood borne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Contaminated means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Decontamination means the use of physical or chemical means to remove, inactivate, or destroy blood borne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Exposure Incident means a specific eye, mouth, other mucous membrane, non-intact skin, or needle contact with blood or other potentially infectious materials that results from the performance of an employee’s duties.

Licensed Healthcare Professional is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

Hand washing Facilities means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.

HBV means hepatitis B virus.

HIV means human immunodeficiency virus.

Occupational Exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee’s duties.

Other Potentially Infectious Materials means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Parenteral means piercing mucous membranes or the skin barrier through such events as needle sticks, human bites, cuts, and abrasions.

Personal Protective Equipment is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.
<table>
<thead>
<tr>
<th>Implementation Date</th>
<th>ARCADIS HS Standard No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2003</td>
<td>ARC HSIH005</td>
<td>28 February 2014</td>
</tr>
</tbody>
</table>

**Source Individual** means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, ARCADIS employees, subcontractors, clients or other persons who have sustained an injury.

**Sterilize** means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.

**Universal Precautions** is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other blood borne pathogens.

**Work Practice Controls** means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).
<table>
<thead>
<tr>
<th>Implementation Date</th>
<th>ARCADIS HS Standard No.</th>
<th>Revision Date</th>
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</thead>
<tbody>
<tr>
<td>June 2003</td>
<td>ARC HSIH005</td>
<td>28 February 2014</td>
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</table>

**EXHIBIT 2**

EXPOSURE CONTROL PLAN TEMPLATE
**EXHIBIT 3**

**BLOODBORNE PATHOGENS**

**GENERAL GUIDELINES FOR PPE**

(taken from Safetyinfo.com)

<table>
<thead>
<tr>
<th>TASK</th>
<th>GLOVES</th>
<th>PROTECTIVE CLOTHING</th>
<th>MASK</th>
<th>EYEWEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding with spurting blood</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Minimal bleeding with no spurting blood</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning up/Decontamination with no splashing/splattering</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning up/Decontamination with Splashing/splattering</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

These examples are based on the application of Universal Precautions.
HEPATITIS B VACCINATION DECLINATION FORM

(29 CFR 1910.1030 APP A)

HEPATITIS B DECLINATION

I understand that due to the potential of my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to receive the Hepatitis B vaccination series, at no charge to myself.

If you are declining the vaccination, please select one of the following:

☐ I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease.

   *If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.*

☐ I decline Hepatitis B vaccination as I have already had the Hepatitis B vaccination series.

______________________________  __________
Employee’s Name – Printed                                          Date

______________________________  __________
Employee’s Signature                                          Date

______________________________  __________
Witness’ Signature          Date

Revised 2/15/13
EXECUTIVE SUMMARY

The primary purpose of the Emergency Response Plan is to inform employees on what to do in the event of an emergency, including how and where to evacuate. ARCADIS offices may utilize a Plan provided by their property owner or Management Company, but must ensure that the Plan meets all requirements as outlined in this Health and Safety Standard (HSS) and, if it does not, amend the Plan so that requirements are met.

This standard provides guidelines so that ARCADIS office locations can ensure that an appropriate Emergency Response and Fire Prevention Plan (“Plan”), specific to the office location, is in place.

Corporate Health & Safety ensures that a review with necessary changes are done at least annually on this standard, communicates the program to appropriate staff and provides technical assistance as necessary.

Health and Safety Coordinators responsibilities include:

- ensures that the Plan is available to staff and reviewed annually, and revised as necessary;
- ensures completion of monthly fire extinguisher, housekeeping, and, where applicable, first aid kit and AED inspections; and
- assists in making training available regarding the Plan to new hires and assists in coordinating annual Emergency Response Warden training.
- distribution of Plan reminder to office location staff as described in this standard

The Emergency Response Plan will include the following:

- Emergency evacuation procedures and evacuation route assignments;
- Employee notification procedures during an emergency;
- Preferred means of reporting fires and other emergencies;
- Actions to be taken in an emergency;
- Rescue and medical duties for those employees who are to perform them; and
- Emergency Response Warden and Buddy names and responsibilities.

The primary purpose of the Fire Safety Plan is to minimize the possibility of fires in the work place. The plan should include the following:

- A list of fire hazards in the work place;
- Housekeeping procedures that will be followed;
- Explanation of alarm system in place at the office along with any fire suppression and/or smoke alarm systems;
- Names or titles of personnel or vendors who are responsible for maintenance of equipment and systems installed to prevent or control fires; and
- Presence or absence of fire extinguishers.
1. POLICY

It is the policy of ARCADIS to inform employees of evacuation, emergency response and fire safety procedures by means of a location-specific Emergency Response and Fire Safety Plan (“Plan”).

2. PURPOSE AND SCOPE

2.1 Purpose

This standard provides guidelines so that ARCADIS office locations can ensure that an appropriate Emergency Response and Fire Prevention Plan (“Plan”), specific to the office location, is in place. The Plan includes response to emergency situations that can be reasonably expected, including fire, and notification and evacuation procedures, process by which employees will be accounted for, and where employees may go to for additional information or questions.

2.2 Scope

Ensuring that an appropriate Emergency Response and Fire Safety plan (“Plan”) is in place is required of all ARCADIS office locations. ARCADIS offices may utilize a Plan provided by their property owner or Management Company, but must ensure that the Plan meets all requirements as outlined in this standard and, if it does not, amend the Plan so that requirements are met.

Offices with less than 10 employees may communicate this information verbally unless otherwise required by a local or state regulatory authority.

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 Director, Health and Safety (H&S) Administration

- Ensures that a review with necessary changes is done at least annually on this standard.
- Communicates the program to appropriate staff.
- Provides technical assistance as necessary.

4.2 Corporate H&S Assistant

- On annual basis reviews and, as necessary, updates this standard.
- Promotes this standard so that ARCADIS employees have access to relevant resources.

4.3 Health and Safety Coordinators

- When a written Plan is applicable to their office location, prepare a Plan and ensure that the Plan is available to staff.
- Review the Plan at least annually and revised as necessary.
- To ensure completion of monthly fire extinguisher, housekeeping, and, where applicable, first aid kit and AED inspections.
• Assist in making training regarding the Plan available to new hires and assist in coordinating annual Emergency Response Warden training.

• Annually, at a minimum, distribute Plan reminder to office location staff as described in this standard.

4.4 Location Leads
Location leads are responsible for ensuring that:

• Resources are available to implement the Plan such as identification of Emergency Response Wardens and Buddies; and

• Training is held as defined in this standard.

4.5 Supervisors
Supervisors ensure that new hires for which they are responsible are aware of the location of the Plan or if a written Plan is not required, that the Plan is described to them, and that the new hire completes the required training and quiz.

Supervisors shall assign fire extinguisher training to those staff required to use a fire extinguisher (client or project related requirement) and for those employees who are assigned company vehicles that have a fire extinguisher as part of the vehicle equipment.

4.6 Emergency Response Wardens (“Wardens”)
Be aware of all persons within their assigned area and aware of those who may require assistance in an emergency, whether temporary or permanent in nature.

• Assist and direct employees and guests in an evacuation and other emergency response actions.

• Notify the Primary Warden of the need to assign an Emergency Response Buddies.

• Notify the Primary Warden or H&S Coordinator of any concern regarding the Plan or any issue seen during an evacuation (real or drill).

4.7 Emergency Response Buddy (“Buddy”)
• Buddies are responsible for helping employees who need assistance in an evacuation or other emergency situation; assistance may be temporary or permanent in nature. In an evacuation, the buddy will do one of the following:
  o If the employee needing assistance is able to safely navigate to the exit and assigned meeting location, the Buddy will escort him/her to the designated meeting location.
  o If the employee needing assistance is not able to safely navigate to the exit and/or assigned meeting location, one Buddy will escort the employee to a designated area such as an enclosed stairwell and wait until Emergency personnel arrive to assist. The other Buddy will notify Emergency Personnel or a Warden of their location in the building.
4.8 Receptionist (at ARCADIS locations that have a receptionist)

Receptionists are responsible for understanding the overall Plan for their location and, as applicable, their role in case of emergency. Their role may include but is not limited to:

- Calling 911 or other authority.
- Making an overhead announcement with instructions for staff such as building evacuation, location of the emergency (e.g., fire, gas odor), weather warning, etc.
  - Receptions will make such announcements only if it is safe to do so.
- Directing Emergency Personnel to the location of the employee, client, or visitor who has been injured.
  - If a location has given the Receptionist responsibilities in an emergency, their role will be outlined as suggested in Exhibit 2.

4.9 ARCADIS employees

- Employees will take part in Emergency Response and Hazard Communication training upon hire which will cover emergency response procedures, fire prevention, fire extinguisher use, and hazard communication.
- Employees are responsible for being knowledgeable of the Plan for their office location, including safe exits and location of their designated meeting area.
- Employees will review and comply with the Plan for their location or project site unless otherwise directed by Emergency Personnel, Warden or Primary Warden.

5. PROCEDURE

5.1 Emergency Response Plan

The primary purpose of the Emergency Response Plan is to inform employees on what to do in the event of an emergency, including how and where to evacuate. ARCADIS offices may use a Plan provided by their property owner or Management Company, but must ensure that the Plan meets all requirements as outlined in this standard and, if it does not, amend the Plan so that requirements are met. If no Plan is available via the property owner/management company, a Plan will be developed. Exhibit 3 has a template plan that may be used.

- Offices with less than 10 employees may communicate this information verbally unless otherwise required by a local or state regulatory authority.

Evacuation and meeting location maps should be posted in locations regularly used by employees, should include exit and alarm locations and may include designated meeting locations and Warden names/areas of responsibility.

As part of the plan, a sufficient number of persons will be designated and trained as Emergency Response Wardens, and a Lead Emergency Response Warden named. OSHA recommends one Warden for every 20 employees.

The Emergency Response Plan will include the following:

- Emergency evacuation procedures and evacuation route assignments:
Evacuation maps will be posted in areas visible to all employees,

Refuge or safe areas will be designated, both inside and outside the building, and

Outside meeting locations and procedures to account for all employees will be designated.

- Employee notification procedures during an emergency.
- Preferred means of reporting fires and other emergencies.
  - Emergency phone numbers should be posted in conspicuous locations when telephones serve as a means of reporting emergencies.

- Actions to be taken in an emergency.
  - All location specific Plans will include actions to take:
    - In fire emergencies
    - In bomb threat situations
    - In the case of gas leak or noxious odors
    - In suspicious mail or threatening individual situations; and
    - In the event of a serious injury to an employee or visitor
  - In addition, location specific Plans will include actions to take in emergencies specific to their geographical area, such as:
    - Tornados
    - Earthquakes
    - Hurricanes
    - Flooding
    - Blizzards, ice storms

- Rescue and medical duties for those employees who are to perform them (details in section 5.3).

- Emergency Response Warden and Buddy names and responsibilities

Where applicable, the Plan will also include the procedures for employees who remain behind to operate critical equipment. (This is generally not applicable to ARCADIS offices. Critical equipment is equipment that would endanger lives or aggravate the emergency situation if it ceased to function.)

5.2 Fire Safety

The primary purpose of the Fire Safety Plan is to minimize the possibility of fires in the work place.
In the event of a fire, employees are required to immediately follow the evacuation process set forth in the office Plan. Fire extinguishers located at ARCADIS office locations are not intended for employee use. While no ARCADIS employee is required to use a fire extinguisher, all employees are advised in the Emergency Response and Hazard Communication training as to the general principles of fire extinguisher use and the hazards involved in incipient stage fire fighting. Employees should never attempt to use an extinguisher if there is any question that their personal safety could be compromised.

The plan should include the following:

- A list of fire hazards in the work place. For each of these fire hazards, the plan should include:
  - Proper handling and storage procedures,
  - Potential ignition sources,
  - Control procedures,
  - Type of equipment that can control a fire involving the source, and
  - Names or titles of personnel responsible for the control of fire hazards.

- Housekeeping procedures that will be followed to eliminate or reduce the accumulation of combustible materials in the work place. Monthly housekeeping inspections, done to help eliminate fire hazards and keep pathways clear, should be documented. Exhibit 4 is a sample inspection form that can be used for this purpose.

- Explanation of alarm system in place at the office along with any fire suppression and/or smoke alarm systems.
  - Alarm systems should provide warning for necessary emergency action and should be capable of being distinguished above ambient noise and light levels.
  - Alarm systems generally include an audible smoke and/or fire alarm and visual alarm (e.g., strobe lights), but alarm systems may vary depending on state and local fire codes and building age.
  - For most offices, these systems are installed and maintained by the building property managers.

- Names or titles of personnel or vendors who are responsible for maintenance of equipment and systems installed to prevent or control fires.

- Presence or absence of fire extinguishers.
  - Although ARCADIS employees are not designated to use fire extinguishers at office locations, if they are provided in the ARCADIS suite, monthly visual inspections are recommended unless done by building management. Names of those responsible for the inspection should be noted in the Plan.

  - Documentation of the inspection is maintained for each extinguisher and can be recorded on the extinguisher tag or on an inspection form such as the one found in Exhibit 4 and should include the inspection date, who did the inspection, and any corrective action taken.
Check with building management in regard to fire extinguisher annual maintenance/service, and periodic testing, and note these completion dates on the inspection documentation form/tag.

5.3 First Aid/CPR

First Aid/Emergency Response personnel will be designated if medical/emergency facilities are not located in near proximity.

OSHA has long interpreted the term “near proximity” to mean that emergency care must be available within no more than 3-4 minutes from the workplace. Medical literature establishes that, for serious injuries such as those involving stopped breathing, cardiac arrest, or uncontrolled bleeding, first aid treatment must be provided within the first few minutes to avoid permanent medical impairment or death. Accordingly, in workplaces where serious accidents such as those involving falls, suffocation, electrocution, or amputation are possible, emergency medical services must be available within 3-4 minutes, if there is no employee on the site who is trained to render first aid. OSHA exercises discretion in enforcing the first aid requirements in particular cases. OSHA recognizes that a somewhat longer response time of up to 15 minutes may be reasonable in workplaces, such as offices, where the possibility of such serious work-related injuries is more remote.

Personnel designated to perform First Aid/Emergency Response will receive annual Blood borne Pathogen training, biennial CPR/First Aid Training and be offered the Hepatitis B vaccination series.

6. TRAINING

6.1 New Hires

New hires, regardless of job function or hours worked per week, will be trained on their location Plan. Training will include the following:

- Location of the written Plan (if location is required to have a written plan);
- Employee responsibilities under the Plan;
- Evacuation procedures and meeting location;
- Emergency procedures; and
- Identification and responsibilities of persons tasked with implementation of the Plan.

Employees identified as Emergency Response Wardens and other whose work may deem it necessary will undergo fire extinguishers training annually.
6.2 Current Employees

Annually, the H&S Coordinator at each location will send out a communication to all location staff highlighting significant points of the Plan. In addition, training will be provided whenever an employee’s responsibilities or designated actions under the Plan or the Plan changes. Although employees are not required to use fire extinguishers those employees who may be more likely to use fire extinguishers as part of their work including; employees working on project sites where it is required, employees assigned to company vehicles that have fire extinguishers as part of their equipment, and any others as applicable, are required to undergo training annually.

6.3 Wardens

Employees who have been identified as Emergency Response Wardens shall be trained on their responsibilities as follows:

- Upon assignment
- Annually, and
- Whenever their responsibilities or designated actions under the Plan or the Plan changes.

Exhibit 5 provides a sample agenda for this training.

7. REFERENCES

7.1 State Plans

Office locations must ensure that the Plan also meets any requirements set forth by an applicable state OSHA or local fire code. REFERENCES (regulation citation, technical links, publications, etc.)


8. RECORDS - DATA RECORDING AND MANAGEMENT

8.1 Fire Extinguisher Checks

Fire extinguisher check documentation should be maintained until the annual maintenance check is completed. All records will be kept locally by the Health and Safety Coordinator in the office.

8.2 Housekeeping Checks

A record of the housekeeping checks shall be maintained and kept by the H&S Coordinator.

8.3 Emergency Response and Fire Safety Plan

The Plan will be reviewed at least annually and revised as appropriate. When revised, the revision date/number will be documented under “History of Change” and the prior plan achieved per company policy.
9. APPROVALS AND HISTORY OF CHANGE

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

![Signature]

### History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Reason for change</th>
</tr>
</thead>
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<tr>
<td>28 Oct 2009</td>
<td>01</td>
<td>Original document</td>
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<tr>
<td>15 Feb 2013</td>
<td>02</td>
<td>ARCADIS logo updated; Executive Summary added; Definitions moved into Exhibit 1; Exhibit references were hyperlinked; Near Proximity definition in section 5.3 was corrected with current OSHA Interpretive Guidance; Added information regarding specific employee training on use of fire extinguishers; Added Supervisor responsibility for assigning fire extinguisher training; Added Exhibit 6</td>
</tr>
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</table>
Exhibit 1 - Definitions

Emergency Personnel – Ambulance, Fire Department, Police or other authority responding to an emergency.

Emergency Response “Buddy” – Employees who volunteer to aid personnel needing temporary or permanent assistance during an evacuation or other emergency situation.

Emergency Response Warden ("Warden") – Employees who volunteer and are trained to assist in an evacuation and other emergency response actions, and who can be contacted by any employee who needs more information about the Plan or their responsibilities under the plan.

Exit – Either the portion of an exit route that is generally separated from other areas to provide a protected way of travel to the exit discharge (e.g., a fire resistance-rated enclosed stairway that leads from one floor to another or to the outside), or the door or other means by which a room or building may be vacated in an emergency.

Lead Warden – One who oversees and assists the Emergency Wardens and Buddies in the event of an emergency.

Meeting Area – That designated area where staff gathers following an evacuation alarm or announcement. May be a location inside or outside a building.

Receptionist – Front desk personnel.
Exhibit 2 – Receptionist Emergency Procedures

If you think a situation requires immediate emergency response, call 911 first and then notify your property management service and the Facilities Manager or H&S.

Emergency Numbers

<table>
<thead>
<tr>
<th>Agency/Resource</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Rescue - Non-emergency</td>
<td></td>
</tr>
<tr>
<td>Police Department - Non-emergency</td>
<td></td>
</tr>
<tr>
<td>(Gas leaks)</td>
<td></td>
</tr>
<tr>
<td>Elevator Services</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td></td>
</tr>
<tr>
<td>Poison Control Center</td>
<td></td>
</tr>
<tr>
<td>Public Health Department</td>
<td></td>
</tr>
<tr>
<td>(Water leaks)</td>
<td></td>
</tr>
</tbody>
</table>

**FIRE**

- You may be asked to call the fire department (911).
- You may be asked to make an overhead announcement. If so, and it is safe for you to do so:
  1. Ask that all employees evacuate the building and proceed to their designated meeting locations (if possible, include the location of the fire); and
  2. Evacuate and proceed to your meeting location.

**BOMB THREAT**

- If you receive a call, try to remain calm as you:
  1. Try to wave someone down to call 911 while you’re on the phone.
  2. Call 911 as soon as you are able to do so.
  3. Notify you Property Management Service and the Location Lead or, if not available, H&S.
  4. Fill out Bomb Threat Questionnaire.
- If someone else receives a call, you may be asked to contact 911 and/or do an overhead announcement.
- Follow instructions given by Police or Fire Department.

**POSSIBLE NATURAL OCCURANCES FOR YOUR AREA (Tornado, Earthquake, etc.)**

**POWER FAILURE**
PERSON TRAPPED IN THE ELEVATOR

ACCIDENT OR ILLNESS

1. Call (911) FIRST* and report “a medical emergency.” This will guarantee the quickest response.

2. Someone should meet the emergency unit in front of your building in order to direct them to the scene of the accident/illness.

The fire department will arrive and administer first aid, followed by paramedics and police. If necessary, an ambulance will then take the victim for further assistance.

SUSPICIOUS PERSON or PERSONS

- If you question the appearance of a visitor, contact the Facilities Manager or Property Management Services to verify the presence of contract workers.
- Solicitors or suspicious person(s) should be reported to your Property Management Services.
- If in doubt, contact the Facilities or Health & Safety Manager or the authorities.
- If you are alarmed, and it is safe to do so, call 911.

CHEMICAL SPILL OUTSIDE OF THE BUILDING

- If we are notified of a chemical spill outside of the building, we will follow the instructions of the authority in charge.
- You may need to make announcements as instructed by the authorities.
- You may be asked to contact your Property Management Services to shut down the ventilation system.

OTHER EMERGENCIES

You may be asked to make overhead announcements and/or call the authorities.
Exhibit 3 – Template for Emergency Response Plan

(Available in Word on The Source US/H&S/Office H&S Program)

Your Office

Your address
TABLE OF CONTENTS

Emergency Phone Numbers.............................................................................................. i

1. Emergency Preparedness..............................................................................................
2. Overview of Life Safety Systems..................................................................................
3. Elevator Emergency......................................................................................................
4. Fire - Evacuation Procedures......................................................................................
5. Fire/Life Safety.............................................................................................................
6. Accident/Illness - Emergency Medicine......................................................................
7. Procedures for possible local phenomenon (Earthquakes, tornadoes, etc.)..............
8. Gas Leak, Noxious Odors............................................................................................
9. Power Outage..............................................................................................................
10. Unforeseen Inclement Weather: Blizzards, Ice Storms, etc...........................................
11. Intruders and Solicitors..............................................................................................
12. Coping with Threats and Violence ............................................................................
13. Bomb Threat..............................................................................................................
14. Suspicious Mail.......................................................................................................... 
15. Acts of Terrorism........................................................................................................
Appendix A – Area Site Plan Maps....................................................................................
Appendix B – Bomb Threat Questionnaire........................................................................

The following general information has been designed to assist you with the safe and efficient handling of an emergency situation. Please read it carefully. This information is in no way all-inclusive, and may be expanded, altered or revised periodically.
EMERGENCY CONTACT PHONE NUMBERS

LOCAL EMERGENCY CONTACTS

Fire Rescue – Emergency
Fire Rescue - Non-emergency
Sheriff Department – Emergency
Sheriff Department - Non-emergency

NEAREST HOSPITAL

ADDRESS:

General Information
Emergency Services-24 hours
TDD Calls (Hearing Impaired)
(Gas leaks)
Elevator Service Co.
National Weather Service
Poison Control Center
Public Health Department
(Water leaks)

OTHER CONTACTS

BUILDING MANAGEMENT EMERGENCY NUMBERS

24 Hour Emergency Line

ARCADIS Emergency Plan Contacts:

Facility Related Questions:
Emergency Plan Questions:
1. **EMERGENCY PREPAREDNESS**

This manual has been prepared to provide an outline of responsibilities and action to take in the event of an emergency. However, not all emergency situations are covered in this manual.

As part of the overall safety and emergency preparedness program, employees will participate in an annual fire drill.

Emergency Response Wardens will evaluate staff response during fire drills and during an actual emergency, the Fire/Emergency Wardens serve as liaison between ARCADIS staff and Emergency personnel, and provide invaluable assistance should an evacuation be necessary. Wardens will be trained annually on evacuation procedures.

2. **OVERVIEW OF LIFE SAFETY SYSTEMS**

Provide overview of fire safety systems – should be provided by property management.

3. **ELEVATOR EMERGENCY**

If applicable, provide elevator services emergency procedures.

4. **EVACUATION PROCEDURES**

A. When an alarm sounds/is seen or an announcement made, evacuate immediately through the closest, safe exit and go to your predesignated meeting location.
   2. Close the door to your office as you leave. Do not return for coats, purses, etc.
   3. If visitors are in your suite, please assume the responsibility for their evacuation. Visitors are to report to the re-assembly area that has been designed for the party whom they are visiting.
   4. Follow the predetermined procedures for evacuating any physically impaired personnel. (See Section 4.1 of the ARCADIS policy ARC HSMS008)
   5. Listen to the instructions of the Emergency Response Wardens and Emergency Response personnel.

B. Fire/Emergency Wardens should check for employees/visitors in the surrounding area as they evacuate.
   - Emergency Response Wardens account for staff at their designated area of re-assembly and will report any personnel unaccounted for (and/or location of personnel remaining in the building) to Emergency Response Agency Personnel or, if not yet on site, the Lead Warden.

C. The last person exiting an area should close the doors behind them. DO NOT go back to close the doors.

D. Use enclosed stairwells. **Do not use the elevators.**

E. Keep talking to a minimum. Listen for instructions from authorized personnel and follow them.

F. Keep calm. Walk; **do not run** – proceed single file down the stairs.

G. **Do not** leave the evacuation area or re-enter your building/suite until the Fire Department or other Emergency Response Agency has authorized you to do so.
4.1 INDIVIDUALS NEEDING ASSISTANCE:

Staff needing assistance in an emergency, whether temporary or permanent, should notify an Emergency Response Warden so that 1-2 Emergency Response Buddies can be assigned. The name of the employee and assigned Buddies will be given to the Wardens.

If the employee NOT on the ground floor and:

- Is able to safely walk down the steps with assistance, the buddies will escort him/her to the stairs and to the designated meeting location.
- Is not able to safely walk down the stairs, one buddy will escort the employee to the closest closed stairwell and wait with the employee until the Fire Department arrives to assist. The other buddy will notify a Warden, H&S Administrator, Facilities Manager, or the Fire Department as to their location.

5. FIRE / LIFE SAFETY

No ARCADIS staff is designated to use fire extinguishers unless required at project sites.

Space heaters are serious fire hazards and should not be used unless specifically approved by property management service.

Candles are a serious fire hazards and are not allowed.

- Do not use unapproved extension cords
- Do not place items in the designated exit ways (paths of egress)

In the event of a fire:

A. If possible and available, close off area in which fire is located by closing the door
B. Pull the fire alarm manual pull if the fire alarm is not already sounding
C. Follow evacuation procedures
  - Do not attempt to fight fire

6. ACCIDENT/ILLNESS – EMERGENCY MEDICINE

In the event that an employee or visitor should become seriously injured or ill:

- Call (911) FIRST* and report “a medical emergency.” This will guarantee the quickest response.

*If you have to dial a number to get an outside line, dial that number first + 911.

- Be prepared to give the following information:
  - Your name
  - The company name
  - The address of the building
  - The location within the building where the medical emergency is taking place
  - The phone number from which you are calling
  - Do not hang up until asked to do so
• Arrange to have someone meet the emergency unit in front of your building in order to direct them to the scene of the accident/illness.
• Do not attempt to move the injured or ill person. Try to make him/her comfortable.
• Someone should stay with the injured or ill person until arrival of emergency personnel.

7. PROCEDURES FOR POSSIBLE LOCAL PHENOMENON (Earthquake, Tornado, etc.)

8. GAS LEAK – NOXIOUS ODORS

If a natural gas or other noxious odor is present in the building:

• Exit to a safe area
• Call 911 *
• Call the receptionist or a Warden to report the situation and determine if evacuation is necessary

HAZARDS:

• Do no switch lights on/off or use electrical outlets, as sparks may be created
• Do not stop to turn off anything
• Refrain from smoking until the all clear is given
• Do not close or open anything
• If ordered to evacuate, do not return to the building/suite for any reason until told to do so by Emergency Response Agency Personnel

9. POWER OUTAGE

10. UNFORSEEN INCLEMENT WEATHER: BLIZZARDS, ICE STORMS, etc.

Please refer to Section 2.15 of the Employee Handbook on the HR page of APEX:

If conditions become so dangerous during the normal workday, local management may decide that it would be in the best interest and safety of the staff to send the staff home. Only the Overhead Manager, Location Lead or their designated representative can make the decision to close an office.

11. INTRUDERS AND SOLICITORS

Soliciting, selling, petitioning, and posting of signs is strictly prohibited. If you observe any of these activities in the building or parking lot, please notify property management service.

In general, any solicitor or suspicious person(s) should be reported to Property management service and, when in doubt, the authorities.

12. COPING WITH THREATS AND VIOLENCE

For an angry or hostile customer or coworker:

• Stay calm. Listen attentively.
• Maintain eye contact
• Be courteous. Be patient
• Keep the situation in your control.
For a person shouting, swearing, and threatening

- Signal a coworker, or supervisor, that you need help. (Use a duress alarm system or prearranged code words.)
- Do not make any calls yourself.
- Have someone call the FPS, contract guard, or local police.

For someone threatening you with a gun, knife, or other weapon

- Stay calm. Quietly signal for help. (Use a duress alarm or code words.)
- Maintain eye contact.
- Stall for time.
- Keep talking -- but follow instructions from the person who has the weapon.
- Don't risk harm to yourself or others.
- Never try to grab a weapon.
- Watch for a safe chance to escape to a safe area.

Federal Protective Service
U. S. General Services Administration


13. **BOMB THREAT**

In the unlikely event that you receive a bomb threat, it is important to remain calm.

**Police or Fire Official authority exceeds that of ARCADIS and their instructions are to be followed.**

If the decision is made to evacuate the building, Follow evacuation procedures.

- If a suspected device is found, **do not touch it**. Evacuate the area and contact the authority conducting the search.
- Two-way radios, cell phones, and pagers **should not be** used in the area of a suspected device.
- **Do not use the elevator**

**Telephone Threats**

When a bomb threat is received by telephone, keep your voice as calm as possible and gather as much of the information as you can that is noted on the Bomb Threat Questionnaire (Exhibit 5). As soon as possible, notify your supervisor or call 911.

- You or your supervisor should then call 911 and an Emergency Response Warden

Emergency Response Warden should also notify Building Management. If possible, while you are talking with the caller, signal someone so they can notify your supervisor. **Do not make statements to newspapers, radio, or television news.** As soon as possible, complete the Bomb Threat Questionnaire and give it to your supervisor or the Facilities Manager.

**Written Threats**

Written threats must be dealt with just as carefully and if an item you receive looks suspicious **do not touch it.** Notify your supervisor.
• Supervisors should call 911 and an Emergency Response Warden
• Emergency Response Warden should also notify Building Management

Searching Procedures
It is the responsibility of the authorities to decide how, when and who is to search building areas. You may be asked to help them search your work area – this is voluntary and if you do not wish to do so, you should decline.

14. SUSPICIOUS MAIL
Identifying Suspicious Mail
• Excessive postage, or marked with restrictive endorsements such as “Personal” or “Confidential”.
• Handwritten or poorly typed addresses and/or misspelling of common words.
• Incorrect titles, a title with no name or a title with the wrong name.
• Addressed to someone no longer with our company or otherwise outdated.
• Unexpected or from someone unfamiliar to you.
• Postmarked or stamped from a foreign address that is unexpected, unknown or otherwise suspicious.
• Shows a city or state in the postmark that does not match the return address, or has no return address or one that can’t be verified as legitimate.
• Oily stains, discolorations or crystallization appear on the wrapper or there is an odor.
• Excessive or unusual weight given the size of the parcel, or one that is lopsided, oddly shaped or uneven.
• Protruding wires or aluminum foil, and/or a ticking sound.
• Excessive security material such as masking tape or string, and other visual distractions.

If you receive or identify suspicious mail:
• Isolate the parcel and alert others who are nearby.
• Do not try to open it, pass it to others to look at, shake it or empty its contents.
• Place the parcel in a plastic bag or some other type of container to prevent leakage of contents or, if you do not have a container, cover the parcel with anything (e.g., clothing, paper, trash can, etc.) and do not remove this cover.
• If any substance has spilled from parcel, do not try to clean it up but cover it and do not remove the cover.
• Turn off local fans and contact Building Management to see if / ventilation units can/should be shut down.
• Evacuate the immediate area and close all doors to the area gently.
• Wash your hands with soap and water to prevent spreading any powder.
• Contact 911 and an Emergency Response Warden. Once authorities have been notified, they will determine the need for any further action.
• If possible, list all people who were in the room or area, especially those who may have had contact with the parcel or powder.

15. ACTS OF TERRORISM

To report suspected illegal intelligence or terrorism activity against the interest of the United States, telephone the ANSIR coordinator at the Denver FBI Field Office, telephone 303-629-7171.
Maps for your building defining Zones and listing Wardens
BOMB THREAT QUESTIONNAIRE

All bomb threats must be taken seriously. If the caller is familiar with the building and specific about the location of the bomb, the call should be regarded with a high degree of urgency.

LISTEN CAREFULLY AND REMAIN CALM

DATE: __________ TIME CALL WAS RECEIVED: __________ TIME CALL TERMINATED: __________

EXACT WORDS OF CALLER: ____________________________________________________________

QUESTIONS TO ASK:

- WHEN will the bomb go off? __________________________________________________________
- WHERE is the bomb located? _________________________________________________________
- WHAT kind of bomb is it? ____________________________________________________________
- WHAT does it look like? _____________________________________________________________
- WHAT will cause it to explode? _______________________________________________________
- DID the caller place the bomb? ______________________________________________________
- WHY did the caller place the bomb? __________________________________________________

CHARACTERISTICS OF CALLER:

Male _____ Female _____ Race _____ Age ______  Other ______

VOICE/SPEECH:

Loud __ Soft __ High __ Low __ Fast __ Slow __ Distorted __ Clear __ Stutter __ Slurred __
Nervous __ Calm __ Nasal __ Accent __ Other ___________________________________________

BACKGROUND NOISES:

Quiet __ Traffic __ Voices __ Music __ Machines __ Airplanes __ Other ____________________

ADDITIONAL INFORMATION:

Did the caller indicate knowledge of facility? If so, how? __________________________________

Extension Called? __________ Local or long distance? __________

Police or Fire Department called? __________ Property Management notified? __________

Do not discuss the situation with anyone except your immediate supervisor, H&S Manager or the Police or Fire Department.

Name & Job Title: _________________________________________________________________

Date and Time Questionnaire Completed: _____________________________________________

Phone: (Office) ____________________________ (Home) ____________________________
**Exhibit 4 – Monthly Inspection Checklist**

**MONTHLY INSPECTION CHECKLIST**

<table>
<thead>
<tr>
<th>Fire Extinguishers</th>
<th>First Aid Kits</th>
<th>Housekeeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gouge reading in the green area?</td>
<td>2. Missing and outdated items</td>
<td>1. Blocked, malfunctioning or non-functioning exit doors (e.g., locked, hard to open, etc.).</td>
</tr>
<tr>
<td>2. Any leakage from the inspection port and is port free from obstruction?</td>
<td>3. Kit in good condition</td>
<td>2. Blocked or cluttered exit passageways or other means of exit (e.g., halls, stairwells).</td>
</tr>
<tr>
<td>4. Extinguisher secure (e.g., in brackets, cabinet, etc)?</td>
<td>5. Extraordinary amount of one or two materials used</td>
<td>4. Improper shelving organization (e.g., heavy items on top shelves) or shelving stability.</td>
</tr>
<tr>
<td>5. Extinguisher accessible and not blocked</td>
<td></td>
<td>5. Overloaded outlets and electrical cords creating tripping hazards.</td>
</tr>
<tr>
<td>6. Extinguisher mounted or available at a height accessible by all</td>
<td></td>
<td>6. IT equipment &quot;graveyards.&quot;</td>
</tr>
<tr>
<td>7. All extinguishers are present</td>
<td></td>
<td>7. Spilled or leak of liquids.</td>
</tr>
<tr>
<td>8. Location is marked with a sign</td>
<td></td>
<td>8. Other hazardous situations.</td>
</tr>
</tbody>
</table>

If a potential problem is identified, list appropriate supervisor/manager and notify so problem can be fixed.

<table>
<thead>
<tr>
<th>Checklist by:</th>
<th>Date of Inspection:</th>
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<th>First Aid Kits</th>
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<td>Result</td>
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<td><strong>Issue 4</strong></td>
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</tr>
<tr>
<td><strong>Issue 5</strong></td>
</tr>
<tr>
<td>Result</td>
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</table>
Exhibit 5 – Emergency Response Warden Training – Sample Agenda

1. Overview of Importance of Emergency Preparedness
2. Emergency Warden Materials and Responsibilities
3. Life Safety Systems – Fire alarm, sprinklers, emergency lighting
4. Fire Drills
5. Evacuation Procedures
   a. Individuals needing assistance
6. Fire/Life Safety
7. Accident/Illness
8. Severe Weather
9. Gas/Noxious Odors
10. Power Outage
11. Intruders
12. Threats and Violence
13. Bomb Threat
14. Suspicious Mail
15. Earthquake
16. Acts of Terrorism
17. Map of building – go over exits, fire alarm boxes, fire extinguisher locations, meeting areas and severe weather shelter locations.
**Exhibit 6 – Fire Extinguisher Training Requirements**

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Roles/Responsibilities That Necessitate The Training</th>
<th>General ENV Field Staff</th>
<th>General ENV PMs and TMs</th>
<th>CES Field Staff</th>
<th>CES PMs and TMs</th>
<th>IH &amp; Safety Field Staff</th>
<th>Sr. Mgrs. and TKI &amp; Client Dev. Staff</th>
<th>EN Office Support &amp; Admin</th>
<th>Training Frequency</th>
<th>Primary Delivery Method</th>
<th>Estimated Training Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Extinguisher</td>
<td>If required by a project site and for those employees who are assigned company vehicles that have a fire extinguisher as part of the vehicle equipment.</td>
<td>GR</td>
<td>C</td>
<td>GR</td>
<td>C</td>
<td>GR</td>
<td>NG</td>
<td>NG</td>
<td>Annual</td>
<td>Online or Hands-On</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

**Job Group Determination Codes Definitions:**

- **RNE:** Required No Exceptions
- **GR:** Generally Required, but exceptions can be made based on employee responsibilities and/or other courses completed
- **C:** Consider based on employee’s roles and responsibilities
- **NG:** Not Generally required. HOWEVER, if employee performs activities described in column B, the training may be required.

*As with all other aspects of project work, it is imperative that you follow any client requirements that may go beyond what is provided here.*
EXECUTIVE SUMMARY

This standard complies with the Occupational Safety and Health Administration’s (OSHA’s) Medical Services and First Aid Standard as it relates Arcadis work. According to OSHA, the employer will ensure the “ready availability of medical personnel”, but how this is implemented is dependent on the circumstances of each place of work.

The First Aid/Cardiopulmonary Resuscitation (CPR)/Automated External Defibrillator (AED) standard applies to all Arcadis offices that designate or expect employee(s) to act as First Aid Responders at the office location and/or a job site. Employees who are not designated or expected to act as a First Aid Responder may render first aid voluntarily if they are trained in first aid, but their actions are not covered under the OSHA standard.

If the office or job site is in near proximity (within 3-4 minutes) to medical services, employees do not need to be designated or expect to act as First Aid Responders unless required to do so by a particular OSHA standard or client requirement. However, if the job site is not in near proximity to medical services and serious accidents are possible, an employee or employees will be designated and trained as a First Aid Responder.

Note: OSHA has long interpreted the term "near proximity" to mean that emergency care must be available within no more than 3-4 minutes from the workplace. Accordingly, in workplaces where serious accidents such as those involving falls, suffocation, electrocution, or amputation are possible, emergency medical services must be available within 3-4 minutes, if there is no employee on the site who is trained to render first aid. OSHA exercises discretion in enforcing the first aid requirements in particular cases. OSHA recognizes that a somewhat longer response time of up to 15 minutes may be reasonable in workplaces, such as offices, where the possibility of such serious work-related injuries is more remote.

The Project Manager (PM), Location Leader, and/or Office Health & Safety (H&S) Coordinator determines if they are required to designate First Aid Responders at the office location and/or at any particular job site. The types of accidents/injuries that could occur, location/availability of medical facilities, and the response time of emergency services are considered in making this determination.

In the absence of an infirmary, clinic or hospital in near proximity to the workplace, an employee(s) will be trained to render First Aid/CPR/AED. This may also be necessary if required to do so by another standard (i.e. more stringent Arcadis standard or State OSHA standard) or client requirements. First aid supplies are readily available if an employee is designated as a First Aid Responder.

Employees designated or expected to act as First Aid Responders must have first aid supplies readily available. The type of work being done, job site and office sites are considered when determining the contents of a first aid kit. If exposure to the weather is possible, the contents of the first aid kit must be protected. Employees designated or expected to act as First Aid Responders will be offered the Hepatitis B vaccination series. The employee may decline the vaccination and, if so, will be asked to sign a declination form.

First Aid/CPR/AED/Bloodborne Pathogens (BBP) training occurs prior to assignment as a First Aid Responder. First Aid/CPR/AED training is certified by the American Heart Association (AHA) or the Red Cross and is required at a minimum on a bi-annual (every two years) basis. BBP training is required annually.
1. POLICY

It is the policy of Arcadis to comply with OSHA’s Medical Services and First Aid Standard as it relates to the work we do. According to OSHA, the employer will ensure the “ready availability of medical personnel”, but how this is implemented is dependent on the circumstances of each place of work.

2. PURPOSE AND SCOPE

2.1 Purpose

This Health & Safety Standard (HSS) assists Arcadis employees in determining if the OSHA standard applies to their job sites, and assists in evaluating appropriate training needs for employees.

2.2 Scope

The First Aid/CPR/AED HSS applies to all Arcadis offices that designate or expect employee(s) to act as First Aid Responders at the office location and/or a job site. Employees who are not designated or expected to act as a First Aid Responder may render first aid voluntarily if they are trained in first aid, but their actions are not covered under the OSHA standard.

If the office or job site is in near proximity to medical services, employees do not need to be designated or expect to act as First Aid Responders unless required to do so by a particular OSHA standard or client requirement. However, if the office or job site is not in near proximity to medical services, an employee or employees will be designated and trained as a First Aid Responder.

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 Manager

The PM determines if a First Aid Responder is required for their job site, and ensures that employees working on their job sites have the proper training as required by this HSS.

4.2 Location Leader and Office H&S Coordinator

The Location Leader and Office H&S Coordinator determines if a First Aid Responder is required for their office location, and ensures that employees working in those locations have the proper training as required by this HSS.

If the office is enrolled in the Cintas® US National First Aid and Safety Cintas First Aid and Safety Program (Cintas® First Aid and Safety Program), H&S Coordinators are responsible for ensuring Cintas has completed and documented all of the required
inspections. In offices not enrolled in the Cintas® First Aid and Safety Program, the H&S Coordinator is responsible for ensuring first aid kits are inspected at a minimum of monthly, maintained, and restocked after use.

4.3 Employees

If designated as a First Aid Responder, employees ensure their training is up to date as required by this HSS.

For job sites not enrolled in the Cintas® First Aid and Safety Program, employees are responsible for ensuring first aid kits are inspected at a minimum of monthly, maintained, and restocked after use.

4.4 Cintas

Arcadis offices with five or more staff and certain job sites, at the request of the PM, will be enrolled in the Cintas® First Aid and Safety Program. These locations will have a Cintas® issued first aid kit and/or leased AED that Cintas® will be responsible for restocking, inspecting and maintaining.

5. PROCEDURE

5.1 Designation of First Aid Responders

The PM, Location Leader and/or Office H&S Coordinator determines if a designated First Aid Responder is required at the office location and/or at any particular job site. The types of accidents/injuries that could occur, location/availability of medical facilities, and the response time of emergency services are considered in making this determination.

In the absence of an infirmary, clinic or hospital in near proximity to the workplace, an employee(s) will be trained to render First Aid/CPR. This may also be necessary if required to do so by another standard (i.e. more stringent Arcadis standard or State OSHA standard) or client requirements. First aid supplies will be readily available if an employee is designated as a First Aid Responder.

If the office and/or job site is in near proximity of emergency medical services (within 3-4 minutes), and if not required to do so by some other standard or client, there is no requirement to designate First Aid Responders. However, if the decision is made to designate First Aid Responders, all requirements of this HSS apply.

This HSS does not apply to employees who voluntarily obtain First Aid/CPR/AED/BBP certification for their own personal benefit, and were not designated by Arcadis as a First Aid Responder.

5.2 Injury/Illness Reporting and Notification

Where the illness/injury is acute or serious (life threatening) it is generally best that Emergency Medical Services (EMS) is contacted by dialing 911.

WorkCare must be contacted for every non-emergency, work-related injury or illness to an Arcadis employee via their reporting hotline number (888-449-7787) to ensure proper medical management of the injury. Additional information regarding incident reporting
requirements can be found in Incident Reporting and Investigation Standard (ARC HSMS010).

5.3 Transport to Medical Facility

When EMS is contacted, a designated First Aid Responder, if possible, should stay with the injured/ill employee until professional EMS has arrived to transport the employee to the hospital.

Where the injury or illness is minor or where waiting for ambulatory services is impractical, an injured or ill employee may be driven to a medical facility. The injured or ill person should be accompanied by at least one other employee, preferably a designated First Aid Responder, in addition to the operator of the vehicle.

5.4 First Aid Supplies/Kits

Employees designated or expected to act as First Aid Responders must have first aid supplies readily available. The type of work being done, job site and office sites are considered when determining the contents of a first aid kit. If exposure to the weather is possible, the contents of the first aid kit must be protected.

The OSHA standard does not specify what should be in a kit, but does reference the recommendations by American National Standards Institute (ANSI) in their Z308.1-1998 publication, “Minimum Requirements for Workplace First Aid Kits” which provides types of kits and basic and optional contents. Since the OSHA regulation was published, the ANSI Z308.1 publication was last updated in 2014. Please note that some state OSHA programs require additional contents within first aid kits. Additional recommendations from WorkCare in regards to the contents of a first aid kit for the State of California are included in Exhibit 4. Employees are responsible for verifying and complying with state-specific requirements. The first aid kit will also contain appropriate personal protective equipment (PPE) and waste disposal supplies as required in OSHA’s BBP standard described in the Arcadis BBP HSS (ARC HSGE005). First aid kits will not contain medications that have potential to cause drowsiness or contain prescription medications.

5.4.1 Types of First Aid Kits

ANSI Z308.1 designates two classes of first aid kits (Class A & B) and four types (Type I, II, III, IV). **Class A** first aid kits are intended to provide a basic range of products to deal with most common types of injuries encountered in the workplace including: major wounds, minor wounds (cuts and abrasions), minor burns and eye injuries. First aid kits designated as Class A shall contain the assortment of compliant supplies in the quantities specified in Exhibit 2.

**Class B** kits are intended to provide broader range and quantity of supplies to deal with injuries encountered in more populated, complex and/or high risk workplace environments. First aid kits designated as Class B shall contain the assortment of compliant supplies in the quantities specified in Exhibit 2.

Type I first aid kits are intended for use in stationary, indoor settings where the potential for damage of kit supplies due to environmental factors and rough handling is minimal.
Type I first aid kits shall have a means for mounting in a fixed position and are generally not intended to be portable.

   **Note:** Typical applications for Type I first aid kits may include, but are not limited to, the following: general indoor use, an office setting or a manufacturing facility. First aid cabinets would generally fall into the Type I classification. Class B Type I first aid kits are recommend for Arcadis Offices and job site trailers.

Type II first aid kits are intended for portable use in indoor settings where the potential for damage of kit supplies due to environmental factors and rough handling is minimal.

   **Note:** Typical applications for Type II first aid kits may include, but are not limited to, the following: general indoor use, an office setting or a manufacturing facility.

Type III first aid kits are intended for portable use in mobile, indoor and/or outdoor settings where the potential for damage of kit supplies due to environmental factors is not probable. Type III kits shall have a means to be mounted in a fixed position and shall have a water resistant seal.

   **Note:** Typical applications for Type III first aid kits may include general indoor use and sheltered outdoor use. Class B Type III first aid kits are recommend for Arcadis fleet/rental vehicles and job site.

Type IV first aid kits are intended for portable use in the mobile industries and/or outdoor settings where the potential for damage to kit supplies due to environmental factors and rough handling is significant. Type IV kits shall have a means to be mounted in a fixed position and shall meet specific performance requirements.

   **Note:** Typical applications for Type IV first aid kits may include, but are not limited to, the following: the transportation industry, the utility industry, the construction industry, and the armed forces.

### 5.5 Office First Aid Kit Program

Arcadis offices with five or more staff will be enrolled in the Cintas® First Aid and Safety Program. Cintas® will provide the Arcadis office with at a minimum one Class B, Type I first aid cabinet. Additional first aid cabinets may be needed based on office configuration or warehouse or shop spaces. Offices located in Puerto Rico are not currently eligible for the Cintas® First Aid and Safety Program.

Arcadis job sites are also eligible to enroll in the Cintas® US National First Aid and Safety Cintas First Aid and Safety Program. To begin the enrollment process, please contact 4-Sight-Support@Arcadis-us.com.

### 5.6 First Aid Kit Inspections

For offices enrolled in the Cintas® First Aid and Safety Program, Cintas® will conduct the required monthly inspections, restocking and any maintenance associated with the office first aid cabinets. Warehouse/shop spaces must be readily accessible during regular business hours.
Offices and job sites not enrolled in the Cintas® First Aid and Safety Program must complete and document routine inventory of all first aid kits. For job site first aid kits, the inventory is checked when it is initially taken to the job site, weekly thereafter, and anytime first aid is rendered. For office first aid kits, the inventory is checked monthly and anytime first aid is rendered. An example of an inventory form is included in Exhibit 3.

5.7 Emergency Eyewash and Body Wash Equipment

Where the eyes or body of an employee may be exposed to injurious corrosive materials, suitable facilities for emergency drenching/flushing of the eyes and body will be provided within the “immediate” work area.

5.8 Optional AED Leasing

Arcadis offices and job sites may opt to evaluate whether an AED is necessary at their location. The office or job site must first complete the AED Evaluation shown in Exhibit 5. Once the evaluation is complete, it must be submitted to Corporate H&S and Procurement at 4-Sight-Support@Arcadis-us.com for review. Upon review of the AED Evaluation, offices or job sites will be enrolled in the Cintas® AED lease program, which will provide the location a minimum of one AED. Additional AEDs may be needed based on office/job site configuration or warehouse/warehouse space location. The AED lease program includes Medical Direction, Written Plan, Replacement of Pads & Batteries, an AED wall cabinet, signage and on-going monthly checks to ensure regulatory compliance.

Staff must be trained in the use of an AED and be current in First Aid/CPR/AED/BBP training. Offices or job sites requesting an AED must ensure that staff are properly trained as per Section 6 and have at a minimum one trained staff member present during normal business/working hours. Additionally, it is recommended that offices or job sites with an AED have at a minimum 10 percent of the staff properly training on the use of an AED.

All costs associated with leasing and maintaining AEDs will be covered by office overhead or the project budget. Arcadis prohibits the purchasing of AED units.

5.9 Hepatitis B Vaccination Series

The Hepatitis B vaccination series will be made available to all employees who are designated or expected to act as First Aid Responders. If an employee declines the vaccination, the declination form will be signed by the employee.

Additional information along with the declination form regarding the Hepatitis B vaccination series can be found in the Arcadis BBP HSS (ARC HSIH005).

6. TRAINING

First Aid/CPR/AED training occurs prior to assignment as a First Aid Responder. Training is certified by the AHA or Red Cross. Exceptions to using the AHA or Red Cross certified training needs to be approved by the Arcadis Corporate Training Team (HRSolutionsCenter.ANA@arcadis.com) before proceeding with training.

First Aid/CPR/AED recertification is provided at a minimum on a bi-annual (every two year) basis. BBP training is required annually per OSHA’s BBP standard described in Arcadis BBP HSS (ARC HSIH005).
7. REFERENCES (regulation citation, technical links, publications, etc.)

CFR 1910.151, "Medical Surveillance and First Aid"

CFR 1926.50, "Medical Services and First Aid"

OSHA Technical Links, "Medical and First Aid"

OSHA Best Practices Guide: Fundamentals of a Workplace First-Aid Program

OSHA January 16, 2007 – OSHA Interpretation Letter Compliance for “in near proximity” and "serious injury"

ANSI Z308.1-1998 publication, "Minimum Requirements for Workplace First Aid Kits"

ANSI/ISEA Z308.1-2014 American National Standard - Minimum Requirements for Workplace First Aid Kits and Supplies

Arcadis Bloodborne Pathogens Standard (ARC HSIH005)

Arcadis Incident Reporting and Investigation Standard (ARC HSMS010)

8. RECORDS - DATA RECORDING AND MANAGEMENT

Upon completion of the AHA or Red Cross First Aid/CPR/AED and BBP course, certification cards are issued. Employees must send copies of the certification cards to the Arcadis Corporate Training Team (HRSolutionsCenter.ANA@arcadis.com).

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Julie Santaniello, CSP - Corporate H&S, Manager of Technical Programs

History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
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</thead>
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<tr>
<td>10 January 2008</td>
<td>01</td>
<td>Mija Coppola</td>
<td>Original document</td>
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<tr>
<td>28 April 2010</td>
<td>02</td>
<td>Cindy Larweth</td>
<td>Add clarification of “near proximity” in section 5.1</td>
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<tr>
<td>Revision Date</td>
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<td>3 April 2012</td>
<td>03</td>
<td>Camille Carollo/Tony Tremblay</td>
<td>Executive Summary added; Health and Safety Procedure revised to Health and Safety Standard; Serious Injury definition added as Section 3.4; Section 5.1 reference to near proximity changed to 3-4 minutes; OSHA “in near proximity” reference document in Section 8 updated; first aid kit content must comply with state OSHA reference added to Exhibit 1</td>
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<tr>
<td>19 November 2012</td>
<td>04</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>Addition of information and exhibit related to Hepatitis B vaccination series</td>
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<tr>
<td>12 February 2013</td>
<td>05</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>Section 3 Definitions moved to Exhibit 1; Added Section 5.2 Transport to Medical Facility (information about transport of injured personnel to medical facilities) and renumbered other Section 5 subsections</td>
</tr>
<tr>
<td>24 June 2014</td>
<td>06</td>
<td>Pat Vollertsen and Amanda Tine/Tony Tremblay</td>
<td>Revised Executive summary and section 6 to include Red Cross training; revised section 8 to include Red Cross and revise where records are to be sent; Revised Section 5.3 ANSI Z308.1-2009 Minimum requirements for workplace first aid kit; updated header/footer format; Updated Exhibit 2 First Aid kit contents; Exhibit 5 licensed physician letter for first aid kit content</td>
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<td>05 April 2016</td>
<td>07</td>
<td>Andrew McDonald/Tony Tremblay/Julie Santaniello</td>
<td>Updated and renumbered Section 5 to included new Section 5.2 Injury/Illness Reporting and Notification, Section 5.4 First Aid Supplies/Kits compliant with ANSI Z308.1-2014, Section 5.5 Office First Aid Kit Program (Cintas® First Aid and Safety Program), Section 5.8 Optional AED Leasing. Renumbered Exhibits. Removal of Exhibit 4 – Hepatitis B Declination Form. New Exhibit 5 AED Evaluation Form.</td>
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</table>
Exhibit 1 – Definitions

First Aid Responder – An employee designated by Arcadis to receive First Aid/CPR/AED/Bloodborne Pathogen training so that he/she can respond to emergency situations and administer First Aid/CPR/AED until medical attention can be administered by medical professionals.

Near Proximity – The ability to respond and start to administer first aid within 3 to 4 minutes.

Note: OSHA has long interpreted the term "near proximity" to mean that emergency care must be available within no more than 3-4 minutes from the workplace. Medical literature establishes that, for serious injuries such as those involving stopped breathing, cardiac arrest, or uncontrolled bleeding, first aid treatment must be provided within the first few minutes to avoid permanent medical impairment or death. Accordingly, in workplaces where serious accidents such as those involving falls, suffocation, electrocution, or amputation are possible, emergency medical services must be available within 3-4 minutes, if there is no employee on the site who is trained to render first aid. OSHA exercises discretion in enforcing the first aid requirements in particular cases. OSHA recognizes that a somewhat longer response time of up to 15 minutes may be reasonable in workplaces, such as offices, where the possibility of such serious work-related injuries is more remote.

Serious Injury – Injuries such as those involving stopped breathing, cardiac arrest, or uncontrolled bleeding where first aid treatment must be provided within the first few minutes to avoid permanent medical impairment or death.
### Exhibit 2 - Basic First Aid Kit Contents (Class A/B Type I/II/III/IV)

(ANSI Publication Z308.1-2014 and Arcadis Best Practice)

<table>
<thead>
<tr>
<th>First Aid Supply</th>
<th>Minimum Quantity</th>
<th>Minimum Size or Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class A Kits</td>
<td>Class B Kits</td>
</tr>
<tr>
<td>Adhesive Bandage</td>
<td>16</td>
<td>50</td>
</tr>
<tr>
<td>Adhesive Tape</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Antibiotic Application</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Antiseptic</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Breathing Barrier</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Burn Dressing (gel soaked)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Burn Treatment</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Cold Pack</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Eye Covering, with means of attachment</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Eye/Skin Wash</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 fl. oz total</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>4 fl. oz total</td>
</tr>
<tr>
<td>First Aid Guide</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hand Sanitizer</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Medical Exam Gloves</td>
<td>2 pair</td>
<td>4 pair</td>
</tr>
<tr>
<td>Roller Bandage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 inch</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4 inch</td>
<td>1</td>
</tr>
<tr>
<td>Scissors</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Splint</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Sterile pad</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Tourniquet</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Trauma pad</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Triangular Bandage</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Note:** Optional items and sizes may be added to the basic contents listed above to augment a first-aid kit, based on the specific hazards existing in a particular work environment.
<table>
<thead>
<tr>
<th>Use</th>
<th>Portable</th>
<th>Mountable</th>
<th>Water Resistant</th>
<th>Waterproof</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor/Outdoor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Indoor/Outdoor</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>ANSI Z308.1-2014</td>
</tr>
</tbody>
</table>

Exhibit 2 – Basic First Aid Kit Contents (Class A/B Type I/II/III/IV) Continued
Exhibit 3 - Sample First Aid Kit Inspection Form

MONTHLY CHECK OF FIRST AID CABINET

If any items appear missing, *(responsible Arcadis party name or vendor name)* will be contacted that same day so that replacement supplies can be ordered. *(Responsible Arcadis party name vendor name)* will also inspect, replace and remove and replace outdated items every *(#)* days.

Year ______

<table>
<thead>
<tr>
<th>Date Checked</th>
<th>Checked By</th>
<th>Date Checked</th>
<th>Checked By</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Checked by:

1. ______________________

2. ______________________

3. ______________________

Replacement: Place an asterisk (*) beside the date a missing item(s) was noted and when the vendor was called; note below when replacement was delivered. Include any other pertinent comments.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Page E4 of E7
Exhibit 4 – WorkCare Recommendations for First Aid Kits in California

November 4, 2013

Brian Kundert
US Director of H&S
ARCADIS
2000 Powell Street, Suite 700
Emeryville CA 94608

Re: First Aid Kits in California

Pat,

WorkCare is providing the following recommendation with regards to First Aid Kits, specifically those in California:

First aid for employees who become sick or injured on the job comes under the OSHA regulations in section 1910.151 of Subpart K. Such first aid may consist of attention to simple problems that require no further treatment or emergency help for the severely injured until professional medical personnel can take over.

First aid supplies should be stored in a waterproof container, located in a visible location with ready access in event of an injury or emergency. Kits should have a periodic schedule to be restocked. Kits should be accessible on each floor. Contents should be specifically selected to deal with events in specific or specialized occupations.

Contents should include:

- Gauze roller bandages 2" (i.e., Kerlix) — 8
- Adhesive bandages (Band-Aids, various sizes) box
- Triangular bandage with safety pins — 8
- Antiseptic applicators or swabs) 10 ea
- Alcohol 70% swabs (box) 1
- Eye pads 10
- Wire or thin board splints (SAM splint) 2
- Forceps (tweezers) 1
- Neosporin ointment — 1 tube or packets
- Gloves: medium & large sizes plastic or latex 6 pairs ea
- Germicidal hand cleansing solution (Puercil, Yvonex, etc) 1 btl
- Tape 1" adhesive (Micropore, Transpore) 1 roll ea

300 S. Harbor Blvd., Suite 830 • Anaheim, CA 92805 • (714) 978-7488 • Fax (714) 466-2164
1320 Harbor Bay Parkway, Suite 115 • Alameda, CA 94502-6556 • (510) 748-8000 • Fax (510) 748-6316
email: info@workcare.com • website: www.workcare.com
o Burn Cream - Water-Jel or equivalent.
  o Tylenol or generic - Purchased/stored in single dose, tamper evident packaging
  o Ibuprofen tablets 200mg (generic) for inflammation/pain - Purchased/stored in single dose, tamper evident packaging
  o Chemical cold packs 4 pks
  o Sterile eye irrigation solution 4oz/8oz bottle 2 btl
  o Bloodborne Pathogen clean up kit (gloves, eye shield/goggles, apron or protective garment, Chlorox solution, red bag for disposal) 1 ea
  o Hydrocortisone ointment 1% for itching, rashes 1 ea
  o Antihistimine – Moore Brand Phenylephrine (or equivalent NON Drowsy Formula) (OTC) for allergic reactions, insect bites, bee stings. Purchased/stored in single dose, tamper evident packaging.
  o Betadine solution (8oz bottle) to soak lacerations/cuts 1 btl
  o CPR mouth shield 1 ea
  o Paramedic scissors 1 ea
  o Gauze pads (3x3s) & (4x4s) sterile 1 bx of 50 ea size
  o Compression bandage or ABD pads 10 ea
  o Reference book on first aid 1 ea
  o Ace bandages 3", 4" 2 ea
  o Emergency blanket 1 ea
  o Penlight flashlight 1 ea
  o Sterile cotton tip applicators 1 bx of 50

Should you have any questions regarding this recommendation, please do not hesitate to contact me.

Sincerely,

Peter P. Greaney, MD
Medical Director
WorkCare

(800) 465-6155 • info@workcare.com • www.workcare.com

Page E6 of E7
AED Evaluation

The AED Evaluation below must be completed in its entirety prior to being submitted to Corporate Health and Safety for review (4-Sight-Support@Arcadis-us.com). Incomplete evaluations will be returned to the requesting party, potentially delaying enrollment in the Cintas AED Lease Program. Please contact Corporate Health & Safety at the email address above with any questions.

Office / Job Site Evaluation

<table>
<thead>
<tr>
<th>Location Information</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Circle/highlight: Office Project Site</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Location Leader / Project Manager</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phone Number:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Health and Safety Coordinator / Site Safety Officer</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phone Number:</td>
</tr>
</tbody>
</table>

- Is an AED located in close proximity to the office/job site (i.e. in the building lobby or common area)? If yes, indicate where.

- Will the building or client provide an AED at no cost?

- What is the average emergency response time for Emergency Medical Services (EMS)?

  Note: It is recommended contacting local EMS to help determine average response time.

<table>
<thead>
<tr>
<th>Total Head Count:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Are staff designated as First Aid Responders, per the definition in First Aid/CPR/AED Standard (ARC HSGE004)?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total number of Arcadis employees currently trained in First Aid/CPR/AED</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total number of AED units requested</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Individal Submitting Request</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phone Number:</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The purpose of this Health and Safety Standard (HSS) is to provide direction on the development and implementation of an office location or project specific Hazard Communication (HazCom) program. Each office or project site that is subject to the HazCom standard shall have a written program regarding chemical use and storage.

Arcadis is committed to preventing accidents and ensuring the safety and health of our employees. Arcadis will comply with applicable federal and state health and safety rules. Under this standard, employees will be informed of the contents of the OSHA Hazard Communications standard, the hazardous properties of chemicals in the work area, safe handling procedures and chemical protective measures.

This HazCom HSS applies to all office locations and project sites that store or use hazardous chemicals/products on site (office or field).

Every office within Arcadis shall develop and maintain a written HazCom program specific to their location and activities. With the exception of the sections regarding “Labeling” and “Safety Data Sheets,” use of hazardous chemicals at Arcadis laboratories is exempt from the requirements of this hazard communication standard.

For project sites, the project Health and Safety plan (HASP) shall serve as the documented written HazCom program for that site.

A Master Inventory List (MIL) is an inventory of all chemicals/products found on-site. At each location or project site, an inventory of the hazardous chemicals present shall be completed at least once per year, or as new chemicals are introduced to or removed from the location and more often as necessary. All primary and secondary containers of hazardous chemicals/products listed on the MIL must be labeled.

The SDS shall be obtained, reviewed and then maintained for each chemical subject to the HazCom standard. It shall be readily available to all employees who may use or may be exposed to the hazardous chemicals.

Employees who may be exposed to hazardous chemicals/products under normal operating conditions or in foreseeable emergency situations shall receive HazCom training. Arcadis shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area.

The SDSs shall be kept at the office location or in the project files.

HazCom training records will be kept in the corporate training database.
1. POLICY

It is Arcadis policy to inform all employees of the hazardous chemicals they may encounter during their work activities. This shall be accomplished through the development and implementation of a location and project specific hazard communication process that includes Safety Data Sheets (SDS), container labeling, and training. Hazard Communication (HazCom) requires a written program specific to each location or project site where hazardous chemicals/products are used or stored.

This HSS meets the requirements outlined in the final rule revising the OSHA Hazard Communication Standard (29 CFR 1910.1200) to be consistent with the United Nations Globally Harmonized system of Classification and Labeling of Chemicals.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of this Health and Safety Standard (HSS) is to inform employees, contractors, and subcontractors about potential hazards associated with routinely used chemicals/products. A checklist that will assist in evaluating conformance with this standard is found in Exhibit 2.

Each office or job site that is subject to the HazCom standard shall have a written program regarding chemical use and storage. The program should describe how the requirements of this standard will be met. The program should address the following:

- Master Inventory List (MIL)
- SDS
- Container Labeling
- Chemicals in Pipes
- Contractor Requirements
- Training

The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

2.2 Scope

This HazCom HSS applies to office locations and job sites that store or use hazardous chemicals/products on site (office or field) in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency. Use of a hazardous chemical includes generation of that chemical as a byproduct.
3. DEFINITIONS

There are a number of definitions associated with this standard and its associated procedures. These definitions are presented in Exhibit 1 of this document.

4. RESPONSIBILITIES

4.1 Corporate Health & Safety

Corporate H&S staff are responsible for assisting the locations and project sites with the development and implementation of the required HazCom program. In addition, provide the tools and resources for employees to have access to information on hazardous chemicals. In addition, Corporate H&S shall review the program for effectiveness periodically and when program deficiencies are identified.

4.2 Location Leaders and Office H&S Coordinators

Location Leaders and H&S Coordinators are responsible for the development and implementation of a HazCom program in their location.

As applicable, local H&S Coordinators are responsible for ensuring that employees are provided with training and information about specific labeling systems in use at their office (e.g., HMIS III, NFPA, etc.).

4.3 Employees

Employees are responsible for reviewing SDS of the substances they are going to work with and make sure they understand all relevant information as well as take necessary precautions. They are responsible for ensuring that containers of hazardous chemicals they are using are appropriately labeled and if not, for obtaining the proper labeling.

4.4 Supervisors

Supervisors (or Group Leaders) are responsible for providing the necessary resources for the appropriate development and implementation of an appropriate HazCom program and to ensure the company is operating in accordance with this policy by performing periodic reviews, task observations and/or conformance assessments.

4.5 Project Managers and Principals in Charge

Project Managers (PM) and Principals in Charge (PICs) are responsible for ensuring that a HazCom program is developed and implemented on projects where hazardous chemicals are used or encountered. PMs and PICs are also responsible for understanding their clients’ requirements for HazCom and that hazardous chemical information is shared with the client and other affected contractors/subcontractors on site. In addition, PICs and PMs are responsible for ensuring their project staff has had training in HazCom per this HSS.

As applicable, PMs and PICs are responsible for ensuring that employees are provided with training and information about specific labeling systems in use at project sites (e.g., HMIS III, NFPA, etc.).
4.6 Site Safety Officers

Site Safety Officers (SSOs) will act as the HazCom Program Coordinator for the project sites and shall maintain the MIL of hazardous chemicals kept on the job site. The SSO is responsible for maintaining SDS on site for those hazardous chemicals being used by Arcadis staff on site. The SSO is responsible to communicate the location of the SDS and the hazards associated with these chemicals to project Site Arcadis employees and potentially affected subcontractors during the initial tailgate safety meeting and/or safety orientation. The SSO shall ensure that all containers of chemicals (bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like) are labeled appropriately and will provide additional details regarding any specific labeling system in use at the project location (e.g., HMIS III, NFPA, etc.).

Note: In those instances where an Arcadis subcontractor is using a hazardous chemical on site, the SSO shall obtain a copy of the SDS and maintain in the on-site project file for reference by Arcadis employees, contractor employees or client/facility staff.

When working at a multi-employer work-site in which Arcadis and/or our subcontractor will produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s), including but not limited to facility management and/or our client’s employees, may be exposed, then the SSO shall ensure the following is addressed:

- A copy of the applicable SDS has been provided to those employers;
- Discuss any necessary precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and
- The labeling system that will be used in the workplace.

5. PROCEDURE

5.1 Written Program

Every office within Arcadis shall develop and maintain a written HazCom program specific to their location and activities. The program should be developed using the template provided in Exhibit 3 of this standard. The program shall be reviewed annually. The written program shall be maintained in a location that is accessible to each employee when they are in the office. Employees shall be notified of its presence and how to access it.

For project sites, the project H&S plan (HASP) shall serve as the documented written HazCom program for that site. The HASP shall provide information about the chemicals present on the site (inventory), the location of the SDS on site, and the labeling of containers. In addition, the required training shall be part of the site orientation and the daily or more frequent tailgate meetings at the project site.
5.2 Master Inventory List

A Master Inventory List (MIL) is an inventory of all chemicals/products found on-site. At each office location or project site, an inventory of the hazardous chemicals present shall be completed at least once per year, or as new chemicals are introduced to or removed from the location and more often as necessary. This inventory shall be developed into a MIL of hazardous chemicals. This inventory includes hazardous chemicals present in piping and those that may be generated as a byproduct of other activities.

Upon completion of the inventory, it shall be determined if any of the chemicals/products identified are exempt from the appropriate HazCom standard that is applicable to the location. If the chemicals/products at the location are exempt from HazCom, it shall be noted on the MIL. The MIL shall be made available to all employees and should be kept current and accurate. The MIL for a project will be found in the HASP. A sample MIL form for office use is found in Exhibit 4.

Common chemical exemptions include:

1. Foods, drugs, or cosmetics intended for personal consumption by employees;

2. Any consumer product or hazardous substance used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers; and

3. Office products to which office workers would have non-route exposure.

Exhibit 5 provides a listing of those chemicals which are commonly determined to be exempt in Arcadis offices. However, each office and project site must determine what is exempt by using the exemption descriptions above.

The MIL shall be reviewed periodically. Any new chemicals/products will be added and those no longer in use or kept at the office or job site shall be deleted.

5.3 GHS Labeling Requirements

All primary and secondary containers of hazardous chemicals/products listed on the MIL must be labeled. Labels or other forms of warning will be legible, in English, and prominently displayed on the container, or readily available in the work area. For employees who speak another language(s), information may be added in their language to the label or other form of warning. Exhibit 6 provides examples of GHS compliant labels.

5.3.1 Labels on Shipped Containers

The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided on containers shipped to Arcadis:

- Product Identifier;
5.3.2 Workplace Labeling

Arcadis shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

- A product identifier, a signal word (either “Danger” or “Warning”), hazard statement(s), standard pictogram(s), and precautionary statement(s); or
- Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

**Note:** Arcadis may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by the hazardous chemicals in the workplace labeling requirement. Arcadis must also ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

The supervisor of each work area must ensure that secondary chemical containers are properly labeled. Secondary chemical container labeling can be labeled with the same shipping container labels, or information that communicates the following:

- Identity of the chemical.
- Hazards of the chemical.

The label may use a combination of words, symbols or pictures to communicate this information. The company will use a standard labeling method for all secondary containers.

**Note:** Arcadis is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer, however, best management practice would be that all portable containers, even those intended only for the
immediate use by employees, should be labeled with chemical identity and hazard information, where feasible.

5.3.3 Hazard Communication Standard Pictograms

The Hazard Communication Standard pictograms and hazards are defined as follows:

![Hazard Communication Standard Pictograms](image)

5.3.4 Hazard Classifications

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Type of Hazard</th>
<th>Hazard Category</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Not Otherwise Classified</td>
<td></td>
<td></td>
<td>Added for hazards like combustible dust</td>
</tr>
<tr>
<td>Flammable Liquids</td>
<td>Physical</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>Flammable Solids</td>
<td>Physical</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Self-Reactive Substances</td>
<td>Physical</td>
<td>A-G (types)</td>
<td></td>
</tr>
<tr>
<td>Pyrophoric Liquids</td>
<td>Physical</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pyrophoric Solids</td>
<td>Physical</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Self-Heating Substances</td>
<td>Physical</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Substances – emit flammable gas with</td>
<td>Physical</td>
<td>1-3 and not</td>
<td></td>
</tr>
<tr>
<td>contact with water</td>
<td></td>
<td>classified</td>
<td></td>
</tr>
<tr>
<td>Hazard Class</td>
<td>Type of Hazard</td>
<td>Hazard Category</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------</td>
<td>-----------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Oxidizing Liquids</td>
<td>Physical</td>
<td>1-3</td>
<td>Based on results</td>
</tr>
<tr>
<td>Oxidizing Solids</td>
<td>Physical</td>
<td>1-3</td>
<td>Based on results</td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Physical</td>
<td>A-G (type)</td>
<td>A = detonate as packaged</td>
</tr>
<tr>
<td>Substances Corrosive to Metal</td>
<td>Physical</td>
<td>1</td>
<td>Based on results</td>
</tr>
<tr>
<td>Acute Toxicity</td>
<td>Health</td>
<td>1-5</td>
<td>Further divided by oral, dermal, gases, vapors, dust/mist</td>
</tr>
<tr>
<td>Skin Corrosion</td>
<td>Health</td>
<td>1a – 1c; 2-3</td>
<td></td>
</tr>
<tr>
<td>Skin Irritation</td>
<td>Health</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Eye Effects</td>
<td>Health</td>
<td>1; 2a – 2b</td>
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</tr>
<tr>
<td>Sensitization</td>
<td>Health</td>
<td>Respiratory 1-2 Skin 1</td>
<td></td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>Health</td>
<td>1a – 1b; 2</td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Health</td>
<td>1a – 1b; 2</td>
<td></td>
</tr>
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<td>Reproductive Toxicity</td>
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<td>Health</td>
<td>Single Exposure: 1-3 Repeated Exposure: 1 - 2</td>
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<td>Aspiration Hazard</td>
<td>Health</td>
<td>1-2</td>
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<td>Acute Aquatic Toxicity</td>
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<td>1-3</td>
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<tr>
<td>Chronic Aquatic Toxicity</td>
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<td>Explosive</td>
<td>Physical</td>
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<td>1.1 most severe</td>
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<td>Flammable Gasses</td>
<td>Physical</td>
<td>1-2</td>
<td>Based on results</td>
</tr>
<tr>
<td>Flammable Aerosols</td>
<td>Physical</td>
<td>1-2</td>
<td>Based on results</td>
</tr>
<tr>
<td>Oxidizing Gases</td>
<td>Physical</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Gasses Under Pressure (e.g., compressed gas)</td>
<td>Physical</td>
<td>1-4</td>
<td>1 = entirely gaseous</td>
</tr>
</tbody>
</table>
5.3.5 Missing Labels

Labels on received chemicals must not be removed or defaced. Missing, defaced or illegible labels shall be replaced immediately with clean, properly marked ones. Shipments that show damage/leak/or spill are to be refused.

5.4 Safety Data Sheets

A SDS shall be obtained and then maintained for each chemical subject to the Hazard Communication standard. It shall be readily available to all employees who may use or be exposed to the applicable chemicals. The SDS is the principal means of conveying chemical-specific information to the user. SDS’s must be present for each hazardous chemical used in the field.

SDS for those hazardous substances purchased or obtained by Arcadis or are in their original container from the manufacturer or have been transferred from their original container to a secondary container, shall be those specific SDS developed and provided by the manufacturer for that specific substance. Manufacturer SDS often are found on the manufacturer’s website. SDS for hazardous substances identified in the environmental media as contaminants can be obtained as generic SDS from an on-line or web-based source.

The SDS shall contain at least the following:

1. Identification
   - Product identifier used on the label;
   - Other means of identification;
   - Recommended use of the chemical and restrictions on use;
   - Name, address, and telephone number of the manufacturer, importer, or other responsible party; and
   - Emergency phone number

2. Hazard(s) identification
   - Classification of the chemical in accordance with paragraph (d) of §1910.1200;
   - Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones);
   - Describe any hazards not otherwise classified that have been identified during the classification process;
   - Where an ingredient with unknown acute toxicity is used in a mixture at a concentration = 1% and the mixture is not classified based on testing of
the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.

3. Composition/information on ingredients

For Substances

- Chemical name;
- Common name and synonyms;
- CAS number and other unique identifiers; and
- Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.

For Mixtures

In addition to the information required for substances:

- The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and are present above their cut-off/concentration limits; or present a health risk below the cut-off/concentration limits.
- The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with §1910.1200(i), when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures with similar chemical composition. In these cases, concentration ranges may be used.

For All Chemicals Where a Trade Secret is Claimed

Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage of composition (concentration) has been withheld as a trade secret is required.

4. First-aid measures

- Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion.
- Most important symptoms/effects, acute and delayed.
- Indication of immediate medical attention and special treatment needed, if necessary.

5. Fire-fighting measures

- Suitable (and unsuitable) extinguishing media.
6. Accidental release measures
   • Personal precautions, protective equipment, and emergency procedures.
   • Methods and materials for containment and cleaning up.

7. Handling and storage
   • Precautions for safe handling

8. Exposure controls/personal protection
   • OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
   • Appropriate engineering controls.

9. Physical and chemical properties
   • Appearance (physical state, color, etc.);
   • Odor;
   • Odor threshold;
   • pH;
   • Melting point/freezing point;
   • Initial boiling point and boiling range;
   • Flash point;
   • Evaporation rate;
   • Flammability (solid, gas);
   • Upper/lower flammability or explosive limits;
   • Vapor pressure;
   • Vapor density;
   • Relative density;
   • Solubility(ies);
   • Partition coefficient: n-octanol/water;
   • Auto-ignition temperature;
   • Decomposition temperature; and
   • Viscosity.

10. Stability and reactivity
    • Reactivity
    • Chemical stability;
    • Possibility of hazardous reactions;
    • Conditions to avoid (e.g., static discharge, shock, or vibration);
• Incompatible materials; and
• Hazardous decomposition products.

11. Toxicological information

Description of the various toxicological (health) effects and the available data used to identify those effects, including:

• Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
• Symptoms related to the physical, chemical and toxicological characteristics;
• Delayed and immediate effects and also chronic effects from short- and long-term exposure;
• Numerical measures of toxicity (such as acute toxicity estimates);
• Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA.

12. Ecological information (Non-Mandatory)

To be GHS-compliant the requirements for this section are provided.

• Ecotoxicity (aquatic and terrestrial, where available);
• Persistence and degradability;
• Bioaccumulative potential;
• Mobility in soil.

13. Disposal considerations (Non-Mandatory)

To be GHS-compliant the requirements for this section are provided.

• Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

14. Transport information (Non-Mandatory)

To be GHS-compliant the requirements for this section are provided.

• UN number;
• UN proper shipping name;
• Transport hazard class(es);
• Packing group, if applicable;
• Environmental hazards (e.g., Marine pollutant (Yes/No));
• Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);
• Special precautions, which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.

15. Regulatory information (Non-Mandatory)
To be GHS-compliant the requirements for this section are provided.

• Safety, health and environmental regulations specific for the product in question.

16. Other information, including date of preparation or last revision.
A master file of SDSs will be maintained and SDSs shall be made readily available to employees at a central office location or a readily available location at the project site. The SDS master file shall be reviewed, at a minimum, annually or any time the MIL is updated. Any obsolete or outdated SDSs shall be removed from the master file and maintained in a secondary “obsolete” or “outdated” SDS file that shall be retained for at least 30 years.

5.4.1 Multi-Employer Work Sites
If appropriate, the written program will include information regarding how other employers at the workplace will be provided the following:

• Access to SDSs for chemicals/products introduced to the workplace by Arcadis;
• Information on precautions that should be taken regarding these chemicals/products; and
• Information regarding any site-specific labeling system.

This information will be communicated as part of a contractor site safety orientation. In addition, clients frequently ask for us to provide SDS for the chemicals Arcadis will bring onto their sites. If Arcadis or our contractor will produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed, then the Arcadis SSO must provide the appropriate SDS to the client along with information on precautions that should be taken regarding these chemical products and information about our site specific labeling system.

As applicable, Arcadis field and office staff can also ask the client or other parties working in their vicinity for SDS of hazardous substances being used by client or other parties at a project or office location.
5.5 Chemicals in Pipes

Some work activities are performed by employees in areas where chemicals are transferred through pipes. Prior to starting work in these areas, employees should contact owner/operator for information regarding:

- The chemicals in the pipes, or the insulation material on the pipe;
- Potential hazards; and
- Safety and emergency evacuation precautions to be taken.

5.6 Laboratories

With the exception of the sections regarding “Labeling” and “Safety Data Sheets,” use of hazardous chemicals at Arcadis laboratories is exempt from the requirements of this hazard communication standard. Laboratories using hazardous chemicals must comply with the requirements of a Laboratory Chemical Hygiene Plan.

The following Hazard Communication requirements apply to Arcadis laboratories:

- Laboratory staff shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
- Laboratory staff shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each work-shift to laboratory employees when they are in their work areas;
- Laboratory employees must be provided with information and training in accordance with Section 6 of this standard, excluding information about the location and availability of the written hazard communication program; and
- Arcadis Laboratories that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with Section 5.3 of this Standard, and that a safety data sheet is provided to distributors and other employers.

6. TRAINING

All employees who may be exposed to hazardous chemicals/products under normal operating conditions, or in foreseeable emergency situations, shall receive Hazard Communication training. Arcadis shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training is designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information is always available to employees through labels and safety data sheets.
Training will be followed per the requirements and instruction outlined by the Corporate Training group and Corporate H&S.

Arcadis employees will be informed of:

- Any operations in their work area where hazardous chemicals are present;
- The location and availability of the written HazCom program; and
- The location of the MIL and SDS.

Initial HazCom training shall include the following elements:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;
- The measures employees can take to protect themselves from these hazards, including specific procedures Arcadis has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
- The details of the hazard communication program developed by Arcadis, including an explanation of the labels received on shipped containers and any office/project specific labeling system used by Arcadis, the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information. The training will reinforce that here at Arcadis the primary and secondary containers of hazardous chemicals/products listed on the MIL must be labeled.

Whenever a new chemical hazard the employees have not previously been trained about on is introduced into their work area, each employee of that area will be given information as outlined above.

7. REFERENCES


8. RECORDS - DATA RECORDING AND MANAGEMENT

The SDSs shall be kept at the office location or in the project files. The Hazard Communication Standard requires that Arcadis maintain copies of SDSs for each hazardous chemical used in the workplace. Arcadis may discard a SDS for a mixture, if the new data sheet includes the same hazardous chemicals as the original formulation. If the formulation is different, then Arcadis must maintain all versions of these SDS for at least 30 years. OSHA standard, 29 CFR 1910.1020, Access to Employee Exposure and Medical Records defines "employee exposure records" to
include SDSs. The Access to Employee Exposure and Medical Records standard requires all employee exposure records to be maintained for at least 30 years.

Once a SDS is deemed to be “obsolete”, Arcadis will indicate the date of last use on the SDS and then maintain a copy of these SDS be placing them into an “obsolete” SDS folder (paper copy or electronic file copy is acceptable) which will be maintained for at least 30 years past the date of last use by an Arcadis employee.

Employee training records will be kept in the corporate training database.

9. APPROVALS AND HISTORY OF CHANGE

Approved By:

Julie Santaniello, CSP - Corporate H&S, Manager of Technical Programs

History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
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<td>1 June 2009</td>
<td>01</td>
<td>Mike Thomas</td>
<td>Original document</td>
</tr>
<tr>
<td>18 April 2012</td>
<td>02</td>
<td></td>
<td>Executive Summary Added</td>
</tr>
<tr>
<td>3 December 2012</td>
<td>03</td>
<td>Amanda Tine/Tony Tremblay</td>
<td>Standard revised to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3; Detailed that as applicable, Local H&amp;S Coordinators and PM/PICs must ensure staff are trained/informed about office or project specific chemical labeling systems in use; Clarified SSO responsibilities as it pertains to multi-employer worksites; Definitions Added/Updated; HazCom Template in Exhibit 3 was revised; Exhibit 4 – Master Chemical Inventory List revised; Exhibit 6 labels updated</td>
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<td>Revision Number</td>
<td>Standard Developed/Reviewed By or Revised By</td>
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<tr>
<td>18 January 2013</td>
<td>04</td>
<td>Tony Tremblay</td>
<td>SDS Recordkeeping requirements defined in section 8</td>
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<tr>
<td>27 May 2016</td>
<td>05</td>
<td>Julie Santaniello</td>
<td>Modified Policy, Purpose and Scope (Sections 1, 2.1 and 2.2, respectively); Section 4.5 changed Supervisor to PIC; removed transition language from Sections 5.3.1 and 5.3.2; removed side by side comparison link and exhibit list in reference section; removed Tony Tremblay and added Julie Santaniello as reviewer; removed outdated labels in Exhibit 6; updated template and exhibits to new brand; updated hyperlinks in document.</td>
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Exhibit 1 – Definitions

Chemical - Any substance, or mixture of substances

Chemical name - the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification - to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

Container - any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of the Hazard Communication Standard, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

Employee - a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

Exposure or exposed - an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

Foreseeable emergency - means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Hazard category - the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard class - the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard not otherwise classified (HNOC) - an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

Hazard statement - a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
Hazardous chemical - any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health hazard - a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to §1910.1200 -- Health Hazard Criteria.

Label - an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Mixture - a combination or a solution composed of two or more substances in which they do not react.

Physical hazard - a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to §1910.1200 - Physical Hazard Criteria.

Pictogram - a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

Precautionary statement - a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Product identifier - the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Signal word - a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

Simple asphyxiant - a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

Substance - chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Use - means to package, handle, react, emit, extract, generate as a byproduct, or transfer.
<table>
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<th>Arcadis HS Procedure No.</th>
<th>Revision Number</th>
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<td>Hazard Communication</td>
<td>ARC HSGE007</td>
<td>05</td>
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<td>Revision Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 May 2016</td>
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**Workplace** - includes any office or job site where hazardous chemicals/products are stored or used.
### Exhibit 2 - Hazard Communication Program Compliance Checklist

**HAZARD COMMUNICATION PROGRAM COMPLIANCE CHECKLIST**

<table>
<thead>
<tr>
<th>Arcadis Office:</th>
<th>Jobsite (if applicable):</th>
<th>Completed By (name/job title):</th>
<th>Date:</th>
</tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Do you have a copy of 29 CFR 1910.1200?**
   - Have you read and understand the requirements?

2. **Do you have a written program?**
   - Have program responsibilities been assigned?
   - Does the program establish a procedure to review and evaluate program on an annual basis?

3. **Has a list of all hazardous chemicals/substances in the office/jobsite been prepared?**
   - Does the program contain a method for updating this list?

4. **Is there an SDS for each hazardous chemical/substance?**
   - Does the program ensure that incoming hazardous chemicals/substances have an SDS?

5. **Does the program ensure that all incoming hazardous chemicals/substances have labels?**

6. **Does the program address how to identify**

---

1 The Chemical Inventory Report Form should be used to complete this list.
<table>
<thead>
<tr>
<th>new chemicals/substances before they are used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does the program address how employees will be informed of new chemicals/substances?</td>
</tr>
<tr>
<td>7. Do employees understand how to detect the release of hazardous chemicals/substances?</td>
</tr>
<tr>
<td>8. Are employees:</td>
</tr>
<tr>
<td>• Aware of HazCom Standard requirements and information specific to this office/jobsite?</td>
</tr>
<tr>
<td>• Familiar with hazards of the chemicals/substances at this office/jobsite?</td>
</tr>
<tr>
<td>• Informed of the hazards of performing non-routine tasks?</td>
</tr>
<tr>
<td>9. Has training been provided in regard to proper work practices and PPE?</td>
</tr>
<tr>
<td>10. Does the training:</td>
</tr>
<tr>
<td>• Provide information on emergency procedures/first aid including symptoms of overexposure?</td>
</tr>
<tr>
<td>• Provide an explanation of labels and warnings that are used in the work area?</td>
</tr>
<tr>
<td>• Describe where employees can find the SDS?</td>
</tr>
<tr>
<td>• Describe how to read/use an SDS?</td>
</tr>
</tbody>
</table>

**COMMENTS:**

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Exhibit 3 - Written HazCom Program Template for Offices

Link to the Hazard Communication Program template

HAZARD COMMUNICATION PROGRAM

Arcadis Office:
Written By:
Revised By:
Date Created:
Date Revised:

APPLICABILITY

Where applicable, Arcadis shall comply with the OSHA Hazard Communication (HazCom) standard (29 CFR 1910.1200) by maintaining a hazardous chemicals list and associated Safety Data Sheets (SDS), by ensuring that containers are labeled, and by providing training to applicable employees. The written HazCom program applies to all work locations where there is potential for exposure to hazardous chemicals under normal working conditions or during an emergency situation. A copy of the written program may be obtained from the Program Coordinator.

The Program Coordinator will be available to answer questions regarding hazardous and appropriate protective measures, and shall ensure that:

- The written program is reviewed at least annually, updated as necessary, and that documentation of the reviews are kept with the plan;
- A Master Chemical Inventory List (MIL) is completed on the “Master Chemical Inventory List (MIL) Form” and updated as necessary (see Exhibit 3 of ARC HSGE007);
- SDS is available for all chemicals on the Chemical Inventory Report form except those that are exempt from the standard;
- SDS that are no longer applicable are archived and maintained for 30 years;
- All hazardous chemicals are properly labeled;
- All applicable employees and new hires have received training before they begin work to which this program applies; and
- Safe work practices are followed in regard to hazardous chemicals.

Exhibit 2 of ARC HSGE007 (Hazard Communication Standard) includes a checklist that may be used as a tool to assure compliance with the HazCom standard.
LIST OF HAZARDOUS CHEMICALS

The Program Coordinator shall make a list of all hazardous chemicals and will review the list at least annually, or more often as necessary, and maintain and update the list as necessary. Hazardous chemicals that are bought for and kept at a particular job site will not be included on this list, but shall be included in the site specific health and safety plan. The completed MIL for the ________ office can be found __________.

The Program Coordinator must be informed of all new hazardous chemicals purchased unless the chemical is being purchased for and kept at a particular job site. Upon receiving this information, the Program Coordinator will update the MIL within 10 business days. Employees in a position to purchase materials must adhere to purchasing department guidelines and assure new chemicals are not used until the SDS information has been obtained and appropriate employee training occurs.

SAFETY DATA SHEETS

SDS provide specific information on the chemicals used by this office. For each chemical listed on the MIL (other than those exempt from the HazCom standard), an SDS shall be kept on file in a location that is easily accessible and known to all applicable employees.

Copies of applicable SDS for this office can be found __________ in a [indicate if these are kept in a binder, folder, or electronically] that is labeled __________ [if your office maintains SDS for locations, such as a vehicle or job site, note this information here]. Applicable SDS should accompany the hazardous chemical/chemicals to the project site, and the Project Manager shall ensure that each work area has applicable SDS on hand and at the ready.

The Program Coordinator is responsible for acquiring and updating SDS and may contact the chemical manufacturer or vendor if additional research is needed or if an SDS has not been supplied with an initial shipment/purchase.

The Program Coordinator must be informed of all new hazardous chemicals purchased unless the chemical is being purchased for and kept at a particular job site.

LABELED AND OTHER FORMS OF WARNING

All primary and secondary containers of hazardous chemicals/products listed on the MIL must be labeled. Labels or other forms of warning will be legible, in English, and prominently displayed on the container, or readily available in the work area. For employees who speak another language(s), information may be added in their language to the label or other form of warning.

The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided on containers shipped to Arcadis:

- Product Identifier;
- A signal word, either “Danger” or “Warning”;
- Hazard statement(s);
- A standard pictogram(s);
- Precautionary statement(s); and
- The name, address, and telephone number of the chemical manufacturer, importer or other responsible party.

arcadis.com
Hazard Communication Standard (ARC HSGE007) Rev 5 27 May 2016

Page: 2/5
Workplace Labeling

Arcadis shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

- A product identifier, a signal word (either “Danger” or “Warning”), hazard statement(s), standard pictogram(s), and precautionary statement(s); or
- Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

NOTE: Arcadis may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by the hazardous chemicals in the workplace labeling requirement. Arcadis must also ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

The supervisor of each work area must ensure that secondary chemical containers are properly labeled. Secondary chemical container labeling can be labeled with the same shipping container labels, or information that communicates the following:

- Identity of the chemical.
- Hazards of the chemical.

The label may use a combination of words, symbols or pictures to communicate this information. The company will use a standard labeling method for all secondary containers.

NOTE: Arcadis is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use by or under the direct supervision of the employee who performs the transfer, however, best management practices would be that all portable containers, even those intended only for the immediate use by employees should be labeled with chemical identity and hazard information, where feasible.

Where applicable, the contents and piping systems shall be described in training sessions, and they should be labeled as containers. There may be site specific issues that should be addressed in site specific safety plans.

[If you utilize stationary containers within a work area, include the following information in this program: If stationary containers within a work area have similar contents and hazards, labels shall be posted on them to convey hazard information.]

NON-Routine TASKS

Where applicable, site specific health and safety plans shall address the chemical hazards associated with non-routine tasks (e.g., cleaning tanks, entering confined spaces, etc.). The site specific plan will inform applicable employees of the hazardous chemicals to which they may be exposed and the precautions they must take to reduce or avoid exposure. It will also address any additional training that may be required.

TRAINING

All employees who may be exposed to hazardous chemicals/products under normal operating conditions, or in foreseeable emergency situations, shall receive Hazard Communication training. Arcadis shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment.
and whenever a new chemical hazard the employees have not previously been trained on is introduced into their work area. Information and training is designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information is always available to employees through labels and SDS.

The Program Coordinator __________ will conduct these training sessions in a __________ format. [Whether you are using an online or classroom program, information specific to your office must be part of the training. For example, who is the program coordinator, where is the chemical inventory form kept, where are the SDS located, etc.]

Whenever a new chemical hazard is introduced, additional information shall be provided to applicable employees.

Arcadis employees will be informed of:
- Any operations in their work area where hazardous chemicals are present;
- The location and availability of the written HazCom program, and
- The location of the MIL and SDS.

Initial HazCom training shall include the following elements:
- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;
- The measures employees can take to protect themselves from these hazards, including specific procedures Arcadis has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used, and
- The details of the hazard communication program developed by Arcadis, including a description of the labels received on shipped containers and the workplace labeling system used by Arcadis; the SDS, including the order of information and how employees can obtain and use the appropriate hazard information.

The Program Coordinator __________ will provide each employee with office specific information regarding the labeling of the MIL and SDS, any label specific information in use at the office and who to contact about questions. Additional information will be provided to employees when hazards change or when a new chemical hazard is introduced into the workplace.

CONTRACTORS

The Program Coordinator shall advise contractors performing work in Arcadis offices of any chemical hazards that may be encountered in the normal course of their work on the premises, the location of SDS, the labeling system in use, the protective measures to be taken, and the safe handling procedures to be used. Each contractor bringing chemicals on-site must provide the Program Coordinator with the appropriate hazard information for these substances, including SDS, labels, and precautionary measures to be taken when working with or around these chemicals.

Project Managers for Arcadis projects will follow the requirements of the project health and safety plan for communication with the contractors used on projects.
<table>
<thead>
<tr>
<th>Implementation Date</th>
<th>Arcadis HS Procedure Name</th>
<th>Arcadis HS Procedure No.</th>
<th>Revision Date</th>
<th>Revision Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 June 2009</td>
<td>Hazard Communication</td>
<td>ARC HSGE007</td>
<td>27 May 2016</td>
<td>05</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

Employees can obtain further information on this written program, the hazard communication standard, applicable SDS, and chemical information lists from the Program Coordinator.
Exhibit 4 – Master Chemical Inventory List Form

Link to the Master Chemical Inventory List Form

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Amount On Hand</th>
<th>Container Site</th>
<th>Container Type</th>
<th>Hazard Class</th>
<th>Type of Hazard</th>
<th>Hazard Category</th>
<th>SDS On Hand</th>
<th>Work Practice(s) Associated With The Chemical</th>
<th>Check If Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>An explanation of the offsite chemical</td>
<td></td>
</tr>
</tbody>
</table>

1 Indicates the amount that is usually kept on hand.
Exhibit 5 – List of Common Exemptions

The following chemicals are exempted from the labeling requirements of the HazCom program:

- Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
- Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
- Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;
- Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;
- Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and
- Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

For purposes of the Arcadis HazCom program and to comply with the Occupational Safety and Health Administration Hazard Communication Standard (HCS), the following categories of materials are exempted from the requirements of the HazCom program:

- Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
- Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations;
- Tobacco or tobacco products;
• Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

• Articles defined as:
  o Items that are formed to a specific shape or design during manufacture; and
  o Items that have end use functions dependent in whole or in part upon its shape or design during end use; and
  o Items that do not pose a physical hazard or health risk to employees; and
  o Items that, under normal use, do not release more than very small quantities (e.g., minute or trace amounts of a hazardous chemical).

  Note: If the use and/or repair of the article requires a modification that results in severe alterations of the article (e.g. grinding, cutting, welding, brazing, soldering, etc.), then the material that make up the article and any other material being used to alter the article ARE NOT exempted from the HazCom standard.

• Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

• Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

• Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

• Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;
  o Examples of products used at Arcadis that are used as a consumer would use them are:
    ▪ window cleaner
    ▪ paper correction fluid
    ▪ sealed containers of cartridge toner for copiers
    ▪ cleaning supplies in consumer-available quantities
    ▪ dry cell batteries that could be used in consumer equipment

  Note: The following are examples of products that are not exempt because they are used in a manner not considered consumer use:
    ▪ spray paint used for surveying, utility locates, etc,
- lab chemicals and supplies
- chemicals used for environmental testing equipment (pH buffers, chemical packets and dyes)
- cleaning supplies associated with lab work and decontamination (e.g., Alconox detergent)
- Cements and primers used for making PVC pipe connections
- Spray lubricants used for industrial equipment maintenance (e.g., WD-40 and rust removers)
- spray adhesives used as drafting supplies

- Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

- Ionizing and non-ionizing radiation.

- Biological hazards (e.g. bloodborne pathogens, snake venom, poison ivy/oak, etc.)
<table>
<thead>
<tr>
<th>Implementation Date</th>
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</tr>
</tbody>
</table>

Exhibit 6 – GHS Compliant Labels

### Elements

As of June 1 2015, HCS OSHA-GHS labels will be required to have the following six elements:

1. product identifier & code
2. pictogram(s)
3. signal word
4. hazard statements
5. precautionary statements
6. supplier identification

![GHS Compliant Labels Diagram]
Executive Summary

This Health and Safety Standard applies to ARCADIS projects where hazardous waste operations and emergency response (HAZWOPER) conditions will be encountered. It is the policy of ARCADIS to follow applicable federal, state and local regulations with regard to HAZWOPER operations.

HAZWOPER sites include the following:

- Cleanup operations at uncontrolled hazardous waste sites (e.g. Superfund sites)
- Corrective actions involving cleanup operations at sites covered by the RCRA
- Voluntary cleanup operations recognized by the regulatory agency
- Operations involving hazardous wastes that are conducted at treatment, storage and disposal facilities (TSDFs)
- Emergency response operations

Employees are required, in general, to recognize potential adverse exposures and notify health and safety staff, follow prescribed hazard reduction protocols and use PPE.

The SSO is key to the on-site health and safety compliance with regulations and conformance with ARCADIS and client requirements. The SSO is responsible for: reviews and works in accordance with the components of the HASP, ensures that the HASP is available to and reviewed by all site personnel including subcontractors during activities with potential for potentially harmful exposures.

HAZWOPER teams that work on a site-specific project must develop a HASP based on the site-specific work plan and address physical, chemical and biological hazards associated with the proposed work activities.

The HASP must include a section on monitoring for potential hazards. This section shall include the frequency and type of monitoring to be performed; sampling techniques; maintenance and calibration of equipment; and information on instrumentation.

Site control measures shall be developed in the work planning stage and modified as work progresses.

In general, HAZWOPER training will occur upon initial assignment and annually thereafter.
### 1. POLICY

ARCADIS operations shall meet or exceed all applicable federal, state, and local safety and health regulations pertaining to hazardous waste operations and emergency response (HAZWOPER). All HAZWOPER work performed or managed by ARCADIS shall be performed in accordance with the following requirements, which are intended to ensure compliance with 29 CFR 1910.120 (and equivalent state regulations—see Section 5.5). Conformance with this standard also covers operations associated with RCRA (Resource Conservation and Recovery Act) and CERCLA (Comprehensive Environmental Response Compensation and Liability Act) sites.

### 2. PURPOSE AND SCOPE

#### 2.1 Purpose

This standard sets forth the requirements for ARCADIS operations on a HAZWOPER site. As required by regulation, ARCADIS must develop and implement a written safety and health program for employees involved in hazardous waste and emergency response operations. This standard, as well as other referenced standards and documents, satisfies the program requirement for identification, evaluation, and control of health and safety hazards, and provides guidance requirements for emergency response for hazardous waste operations.

#### 2.2 Scope

This standard applies to employees who work at HAZWOPER sites (as defined) where there is the reasonable potential that employees will be exposed to health and safety hazards associated with the site.

HAZWOPER sites include the following:

- Cleanup operations at uncontrolled hazardous waste sites (e.g. Superfund sites). An uncontrolled hazardous waste site means an area with an accumulation of hazardous substance.
- Corrective actions involving cleanup operations at sites covered by the RCRA;
- Voluntary cleanup operations recognized by the regulatory agency;
- Operations involving hazardous wastes that are conducted at treatment, storage and disposal facilities (TSDFs); or
- Emergency response operations.

### 3. DEFINITIONS

Definitions related to HAZWOPER and Emergency Response can be found in Exhibit 1.
4. RESPONSIBILITIES

4.1 Employees

Employees are required, in general, to recognize potential adverse exposures and notify health and safety staff, follow prescribed hazard reduction protocols and use Personal Protective Equipment (PPE) during activities with potential for potentially harmful exposures. In addition, employees have the responsibilities to adhere to this HSP and to communicate H&S concerns, issues and questions to their supervisor or their respective Health and Safety resource. Employees are required to participate in the medical monitoring program, including annual audiogram and chemical and client-specific training as applicable based on their job duties.

On project sites, all employees have the responsibility to:

- Use the TRACK process prior to any activity.
- Follow all ARCADIS and client requirements.
- To understand and appropriately utilize the “Stop Work Authority” concept.
- Read and work in accordance with the components of the site-specific HASP.
- Report all unsafe working conditions to the Site Safety Officer (SSO).
- Report all injuries, no matter how minor, to the SSO.

4.2 Managers

In planning and preparation of projects affected by HAZWOPER requirements, the project manager and/or task manager must complete the project-specific H&S Stewardship Checklist & Project Hazard Analysis Worksheet.

Note: The project Hazard Analysis Worksheet uses the Hazard Analysis Risk Control (HARC) ranking process (ARCADIS H&S Standard ARC HSMS002) (see Section 5.2.1 of this Standard). Additional responsibilities of the project manager and task manager are as follows:

- 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-losses to the Client H&S Resource or Project H&S Manager (PHSM), lead incident investigations, and ensure that any recommendations made are implemented.
● Communicating with and appropriately managing subcontractors, ensuring that employees have appropriate training and qualifications, and for ensuring all client H&S requirements are met.

● Involving the appropriate ARCADIS H&S Staff and project client staff, as necessary.

● Ensuring that all subcontractors have been communicated with concerning the minimum H&S requirements for the project.

● Providing adequate resources and budget for PPE.

4.3 Principals in Charge (PICs)

Have the responsibility to know and follow all applicable ARCADIS and client H&S requirements, for ensuring work is conducted under the H&S policy and for implementing the standard requirements provided for in this standard on any project that pose hazards to ARCADIS employees or employees of its subcontractors, clients, and other organizations present in the vicinity of work controlled by ARCADIS. In addition, PICs responsibilities also include determining and communicating any specific client requirements that are applicable.

4.4 Corporate H&S Staff

Have the responsibility for:

● Communicating the policy and standard requirements in this standard with all offices within ARCADIS – US.

● Ensuring that offices are aware of this standard.

● Ensuring this standard is being implemented effectively.

● Provide required training or guidance on approved training options.

● Providing the necessary suppliers and criteria for selection of H&S equipment.

● Assuring the development and implementation of this standard.
4.5 Project Health and Safety Manager (PHSM)

The PHSM oversees all aspects of the site safety program, and prepares site-specific health and safety guidance documents or addenda to the HASP. The PHSM does not report to the Project Manager, and is separately accountable to the ARCADIS project team for site health and safety. The PHSM acts as the sole contact to regulatory agencies on matters of safety and health. Other responsibilities include:

- Overall authority for health and safety compliance and HASP conformance for the project.
- General health and safety program administration.
- Conducts project health and safety audits as warranted.
- Determines the level of personal protection required.
- Updates equipment or procedures based on information obtained during site operations.
- Establishes air-monitoring parameters based on expected contaminants.
- Assists in injury, illness and near-miss investigations and follow-up.

4.6 Site Safety Officer (SSO)

The SSO is key to the on-site health and safety compliance with regulations and conformance with ARCADIS and client requirements. The SSO is responsible for: reviews and works in accordance with the components of the HASP, ensures that the HASP is available to and reviewed by all site personnel including subcontractors.
5. PROCEDURE

To comply with regulation and conform to this standard, the following sections describe the ARCADIS requirements associated with HAZWOPER projects.

5.1 General Requirements

The health and safety program to meet the HAZWOPER requirements shall include the following components:

• Organization structure and responsibilities (included in Section 4.0-Responsibilities and included as part of the site-specific Health and Safety Plan-HASP),
• Comprehensive site work plan (contained in the site-specific HASP and site-specific Work Plan),
• Site specific HASP which includes an emergency response component (included in Section 5.2),
• Medical surveillance program (refer to Section 5.3),
• Training program (refer to Section 6),
• Standard operating procedures (see Reference Section 7).
5.2 Health and Safety Plan (HASP) Development

HAZWOPER teams that work on a site-specific project must develop a HASP based on the site-specific work plan and address physical, chemical and biological hazards associated with the proposed work activities. The plan shall address the necessary engineering controls, administrative controls, and personal protective equipment required to mitigate the site hazards. For all ARCADIS HAWOPER work and unless otherwise required by clients, the E-HASP template is used as the basis of the site-specific HASP. In general, the HASP is required to contain:

1. A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions).

2. A summary of the work activities to be performed under ARCADIS’ scope of activities.

3. A safety and health risk or hazard analysis for each on-site task, which will be performed. Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task. (NOTE: this is accomplished through the HARC process-see summary of the process below).

4. Summarized protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses.

5. Summarized PPE requirements.

6. Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used.

7. Site control measures.

8. Decontamination procedures (or references).

9. An emergency response plan addressing actions to be taken in the event of a credible incident which might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

It is preferred that there only is one HASP per work site. If multiple HASPs exist for a work site, then a copy of other contractor/subcontractor HASPs should be obtained by ARCADIS prior to starting work. Responsibilities of the client and site safety supervisors between HASPs should be coordinated and understood. In the event that there are conflicts between HASPs, the most conservative HASP should be followed.

The SSO is given authority to correct health and safety deficiencies of any contractor and stop work as necessary until deficiencies are corrected.

The HASP should include a signature page that contains signatures of those who wrote or edited the plan and, when required by a client or regulatory body, the signature of an authorized ARCADIS HASP Reviewer.
5.2.1 Hazard Assessment and Risk Control (HARC)

The HARC process is a tool to help evaluate the relative risks of tasks to determine the type of control to implement to minimize exposure. The HARC tool assists in assessing the hazards identified during the TRACK process, Job Safety Analysis (JSA) development, Tailgate safety meetings, PM/TM hazard analysis and H&S Planning, ranking hazards as high, medium, and low with standardized criteria. The process can be used to easily assess routine and non-routine hazards in the office and field environments. A full explanation on how to use the HARC process can be found in the ARCADIS H&S Standard – ARC HSMS002.

This process helps evaluate to determine ultimate control of hazards. In general, the following hierarchy of controls must be considered:

- **Engineering Controls** – design and use of controls through physical means or modification to the work. **Engineering controls also includes Substitution or Elimination** – replacing or elimination of the hazard/exposure.

- **Administrative Controls** – design and use of procedural steps, training, warning labels and employee rotation. For the purpose of the HASP examples include JSAs, using TRACK and providing appropriate orientation and training to employees.

- **Personal Protective Equipment** – specification for and use of appropriate PPE to reduce and control exposures. Examples of PPE on HAZWOPER sites include respiratory protection for inhalation exposure, coated coveralls and chemical resistant gloves for dermal exposure and use of cooling vests for heat stress. Until such time that ARCADIS institutes the above controls or is such controls are not practical, feasible or effective, employees or subcontractors who are exposed to agents that have a potential for negative health effects and/or that are over occupational exposure guidelines (OEGs) will be required to wear appropriate PPE.

5.2.2 Monitoring

The HASP must include a section on monitoring for potential hazards. This section shall include the frequency and type of monitoring to be performed; sampling techniques; maintenance and calibration of equipment; and information on instrumentation. Air monitoring may need to be conducted at each site prior to and during each work task. The results are used to determine actual employee exposures, the adequacy of designated protection levels, engineering controls and safe work practices. In addition, action levels must be established for each type of measurement taken. These action levels shall be based on the specifics of the work task and published exposure standards (PELs, TLVs, etc.). The most conservative value should be used if multiple values exist.

5.2.3 Site Control/Decontamination Measures

Site control measures shall be developed in the work planning stage and modified as work progresses. Site control elements may include the following, but need not be repeated if covered under other parts of the HASP:
• A site map;

• Work zones and exclusion zones (See Exhibit 2 for information on these zones);

• A buddy system;

• Site communications including a means to alert employees for emergencies; and

• Identification of the nearest medical assistance facility.

Decontamination Procedures

Decontamination procedures shall be developed and implemented before employees or equipment enters areas of the work site where the potential for exposure exists. Procedures used are dependent on the level of contamination and the level of protection used by employees at the site. Decontamination situations will vary depending on the complexity of the site and chemicals of concern (COCs). Decontamination procedures shall be monitored by the SSO who will correct any deficiencies noted.

All personnel, clothing, equipment, and samples leaving the Exclusion Zone of a hazardous waste site must be decontaminated to remove any harmful chemicals that may have adhered to them. Decontamination methods can be (1) physically remove contaminants, (2) inactivate contaminants by chemical detoxification or disinfection/sterilization, or (3) remove contaminants by a combination of both physical and chemical means.

Contaminants can be located either on the surface of personal protective equipment or permeated into the PPE material. Surface contaminants may be easy to detect and remove; however, contaminants that have permeated a material are difficult or impossible to detect and remove. If contaminants that have permeated a material are not removed by decontamination, they may continue to permeate to either surface of the material where they can cause an unexpected exposure. Five major factors affect the extent of permeation:

• Contact time. The longer a contaminant is in contact with an object, the greater the probability and extent of permeation. For this reason, minimizing contact time is one of the most important objectives of a decontamination program.

• Concentration. Molecules flow from areas of high concentration to areas of low concentration. As concentrations of wastes increase, the potential for permeation of personal protective clothing increases.

• Temperature. An increase in temperature generally increases the permeation rate of contaminants.

• Size of contaminant molecules and pore space. Permeation increases as the contaminant molecule becomes smaller, and as the pore space of the material to be permeated increases.
Physical state of wastes. As a rule, gases, vapors, and low-viscosity liquids tend to permeate more readily than high-viscosity liquids or solids.

If permeated materials cannot be completely decontaminated they must be disposed of in an appropriate manner according to the site-specific HASP.

5.2.4 Emergency Response Plan

Regulations require that an emergency response plan be developed for work at all HAZWOPER, CERCLA (Superfund) and RCRA Corrective Action sites. As the emergency plan will be dependent on the site, COCs present, surrounding facilities, etc., the HASP must contain specific information addressing emergencies and equipment. In general, the plan shall include the following information not already contained elsewhere in the HASP:

- Methods and procedures for alerting employees to the emergency;
- Evacuation routed and procedures;
- Safe distances and places of refuge;
- Site security and control;
- PPE and emergency equipment.
- Availability and location of regular showers and change rooms, as applicable
- Additional elements may include general site topography and layout, prevailing wind direction, and procedures for reporting incidents to authorities. The plan requirements should be rehearsed regularly, reviewed periodically and amended as necessary to keep them current with site conditions and information. The plan shall be available for inspection and copying by employees and government.

5.3 Medical Surveillance Requirements

The medical surveillance program shall be incorporated into the HASP. Details of the medical surveillance program are included in ARC HSGE010.

6. TRAINING

Work shall not be performed by employees on HAZWOPER sites or on emergency response projects until they have been trained to the applicable level of their job function/responsibility. In general, the training will occur upon initial assignment and annually thereafter, and will cover:

- Recognizing hazards and how to prevent them;
- The names of personal and alternates responsible for site health and safety;
- Selection, care of and use respirators and other PPE;
- Engineering controls, medical surveillance requirements, emergency response procedures, spill containment procedures, confined space entry procedures, and any other work practices appropriate to a site; and

- Proper decontamination procedures.

Training will be provided by competent ARCADIS staff or qualified outside vendors whose credentials have been approved by Corporate H&S.

See below for HAZWOPER and Emergency Response training requirements.

**Hazardous Waste Clean-Up Sites**

<table>
<thead>
<tr>
<th>Staff</th>
<th>Hours of Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Site Employees</td>
<td>40 hours initial</td>
</tr>
<tr>
<td></td>
<td>24 hours on the job</td>
</tr>
<tr>
<td></td>
<td>8 hours annual refresher</td>
</tr>
<tr>
<td>Routine Site Employees</td>
<td>24 hours initial</td>
</tr>
<tr>
<td>(minimal exposure)</td>
<td>8 hours on the job</td>
</tr>
<tr>
<td></td>
<td>8 hours annual refresher</td>
</tr>
<tr>
<td>Non-routine site employees</td>
<td>24 hours initial</td>
</tr>
<tr>
<td></td>
<td>8 hours on the job</td>
</tr>
<tr>
<td></td>
<td>8 hours annual refresher</td>
</tr>
<tr>
<td><strong>Supervisor/Managers of</strong></td>
<td><strong>Hours of Training</strong></td>
</tr>
<tr>
<td>Routine site employees</td>
<td>40 hours initial</td>
</tr>
<tr>
<td></td>
<td>24 hours on the job</td>
</tr>
<tr>
<td></td>
<td>8 hours Supervisors</td>
</tr>
<tr>
<td></td>
<td>8 hours annual refresher</td>
</tr>
<tr>
<td>Routine site employees</td>
<td>24 hours initial</td>
</tr>
<tr>
<td>(minimal exposure)</td>
<td>8 hours field</td>
</tr>
<tr>
<td></td>
<td>8 hours Supervisor</td>
</tr>
<tr>
<td></td>
<td>8 hours annual refresher</td>
</tr>
<tr>
<td>Non-routine site employees</td>
<td>24 hours initial</td>
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### Treatment, Storage, and Disposal Sites

<table>
<thead>
<tr>
<th>Staff</th>
<th>Hours of Training</th>
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</thead>
<tbody>
<tr>
<td>General Site Employees</td>
<td>24 hours initial or equivalent</td>
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<tr>
<td></td>
<td>8 hours annual refresher</td>
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### Emergency Response

<table>
<thead>
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<th>Staff</th>
<th>Hours of Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 - First Responder (awareness level)</td>
<td>Sufficient training or proven experience in specific competencies. Annual refresher Note (1)</td>
</tr>
<tr>
<td>Level 2 - First Responder (operations level)</td>
<td>Level 1 competency and 8 hours initial or proven experience in specific competencies. Annual refresher Note (2)</td>
</tr>
<tr>
<td>Level 3 - HAZMAT Technician</td>
<td>24 hours of Level 2 and proven experience in specific competencies. Annual refresher Note (3)</td>
</tr>
<tr>
<td>Level 4 - HAZMAT Specialist</td>
<td>24 hours of Level 3 and proven experience in specific competencies. Annual refresher Note (4)</td>
</tr>
<tr>
<td>Level 5 - On-the-scene incident commander competencies</td>
<td>4 hours of Level 1 and additional competencies. Annual refresher Note (5)</td>
</tr>
</tbody>
</table>

### Notes:

1. **Witness or discovers a release of hazardous materials and who are trained to notify the proper authorities.**
2. **Responds to releases of hazardous substances in a defensive manner, without trying to stop the releases.**
3. **Responds aggressively to stop the release of hazardous substances.**
4. **Responds with and in support to HAZMAT technicians, but who have specific knowledge of various hazardous substances.**
5. Assumes control of the incident scene is beyond the first-responder awareness level.

If an employee misses their anniversary date on their 8 hour refresher course, and that time is less than two years since they last had their refresher training, they can be certified by completing the 8 hour refresher course designated by Corporate H&S. If an employee has missed their refresher training for more than 2 years, the following criteria and actions apply:

- Greater than 2 years and less than 4 years – The employee will complete the Competency Exam and if 90% is achieved, can take just the refresher; less than 90%, retake 40 hour training at a course designated by Corporate H&S
- Greater than 4 years: Retake the 40 hour course at a course designated by Corporate H&S

7. REFERENCES

ARCADIS Employee Field Health and Safety Handbook
ARC HSMS001 H&S Organization, Roles and Responsibilities
ARC HSMS002 Hazard Assessment and Risk Control
ARC HSGE010 Medical Surveillance
ARC HSGE015 Personal Protective Equipment
ARC HSGE017 Respiratory Protection
ARC HSIH009 Industrial Hygiene Health and Safety Standard

8. Records

None

9. APPROVALS AND HISTORY OF CHANGE

Approved By:

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

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Reason for change</th>
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<tr>
<td>7 September 2009</td>
<td>01</td>
<td>Creation of Document</td>
</tr>
<tr>
<td>1 October 2011</td>
<td>02</td>
<td>Format change; Executive Summary added; Previous Exhibit text removed; Definitions relocated to Exhibit 1; Exhibit 2 work zone diagram/definitions added</td>
</tr>
<tr>
<td>12 February 2013</td>
<td>03</td>
<td>Added more specific information about decontamination procedures into Section 5.2.3 and added bullet item regarding availability and location of regular showers and change rooms into Section 5.2.4</td>
</tr>
<tr>
<td>15 August 2013</td>
<td>04</td>
<td>Added information on competency of trainers to section 6.0</td>
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Exhibit 1 – Definitions

**Clean-up operation** – an operation where hazardous substances are removed, contained, incinerated, neutralized stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

**Emergency response or responding to emergencies** – a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

**Exposure or exposed** – that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure; subjected is in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption).

**Hazardous substance** – any substance designated or listed under below, exposure to which results or may result in adverse effects on the health or safety of employees:

- Any substance defined under section 101(14) of CERCLA;
- Any biologic agent and other disease causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;
- Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and
- Hazardous waste as defined below.

**Hazardous waste** – a waste or combination of wastes as defined in 40 CFR 261.3, or those substances defined as hazardous wastes in 49 CFR 171.8.

**Hazardous waste operation** – any operation conducted within the scope of this standard.

**Hazardous waste site or "Site"** – any facility or location within the scope of this standard at which hazardous waste operations take place.

**Health hazard** – a chemical, mixture of chemicals or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes, or...
mucous membranes. It also includes stress due to temperature extremes. Further definition of the terms used above can be found in Appendix A to 29 CFR 1910.1200.

**Site Safety Officer (SSO)** – the individual located on a hazardous waste site who is responsible to ARCADIS and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

**Uncontrolled hazardous waste site** – an area identified as an uncontrolled hazardous waste site by a governmental body, whether Federal, state, local or other where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands such as those created by former municipal, county or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous substance wastes. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms. Normal operations at TSD sites are not covered by this definition.

**Definition – Hazardous Waste Operations (HAZWOPER) Site**

For the purposes of identifying a **HAZWOPER site** and training requirements for ARCADIS personnel, the following considerations must be determined and met:

- Does the site meet the definition of HAZWOPER site; and
- Will ARCADIS personnel be performing HAZWOPER defined activities?

A HAZWOPER site **must meet all three** of the following criteria:

1) A site where **HAZWOPER activities** are conducted. **HAZWOPER activities** are defined as follows:

   - Corrective actions and Clean-up operations activities required or known by a governmental body, whether Federal, state, local or other involving hazardous substances (including, but not limited to, contaminant removal; treatment; remediation; etc.); or
   - Site investigation activities where the presence or potential presence of hazardous substances exist (activities include, but are not limited to, intrusive soil activities including soil boring and sampling, trenching, coring, hand augering; Phase I Environmental Site Assessments; Phase II Site Investigations; Building or Geological Surveys; Well Monitoring/Sampling; etc.)

2) Where employee **exposure** or the reasonable possibility for employee exposure to safety or health hazards exists. **Exposure** is defined as follows:

   - Exposure or exposed means that in the course of work, an employee is “subjected” to, or has the potential to be “subjected,” to a hazardous substance that is a physical or health hazard (includes accidental exposure).
   - “Subjected,” in terms of health hazards, includes any route of entry (e.g. inhalation, ingestion, skin contact and/or absorption) without regard to the use of personal protective equipment.
3) Where the presence or potential presence of **hazardous substance** exists.

- Hazardous substance is any substance to which exposure results, or may result, in adverse effects to the health or safety of employees (including biologic agents, substances listed by the US Department of Transportation as hazardous materials and hazardous waste).
Exhibit 2 – Work Zones

Exclusion Zone (EZ) – area where contamination does or could occur. The EZ can be subdivided into different areas of contamination based on the known or expected type and degree of hazard or on the incompatibility of waste streams.

Contamination Reduction Zone (CRZ) – the area where decontamination takes place. Any potentially contaminated clothing, equipment and samples must remain in the CRZ until decontaminated.

Support Zone – the uncontaminated area where workers should not be exposed to hazardous conditions.
EXECUTIVE SUMMARY

Illness related to heat stress (Heat Illness) can be controlled and minimized through the use of engineering controls, safe work practices, and personal protective equipment (PPE). This Health and Safety Standard (HSS) identifies responsibilities, risk factors for heat illness, signs and symptoms, first aid procedures, and ARCADIS training requirements.

Personal risk factors for heat illness include poor health, age, weight, and pre-existing medical conditions; inadequate acclimation to working in the heat; and experience with previous heat illness. Environmental risk factors include workload severity and duration, high temperature and humidity, direct sun exposure, and air movement. Heat stroke is a life-threatening condition, and emergency personnel should be contacted immediately.

Preventive safe work practices involve avoidance of working in the heat when possible, taking regularly scheduled shade breaks, acclimatization, rotating personnel, avoiding beverages containing caffeine or sugar, staying appropriately nourished, and providing readily available fresh, pure ("fresh and pure" defined as being free of odors), and suitably cool potable water access at all times.

Engineering controls that should be implemented include monitoring and measuring temperature and heat index factors, designing appropriate work/rest cycles, and choosing clothing that allows for wicking of perspiration.

Training for heat stress prevention shall be provided to all supervisory employees prior to project assignment. Topics will include the importance of acclimatizing, risk factors, signs and symptoms of various heat illnesses, and procedures to follow in the event of an emergency.

Principals-in-charge (PICs), project managers (PMs), and task managers (TMs) are responsible for addressing heat stress in project planning, ensuring that personnel have proper training, and that the site-specific Health and Safety Plan (HASP) and Heat Illness Prevention Plan HASP Supplement has been developed to document and communicate the site-specific heat illness prevention provisions for projects in California and Washington State (Best Management Practice for other locations). The Site Health and Safety Officer (SHSO) is responsible for coordinating and verifying that the provisions for shade and adequate water are available at a job site.

Supervisory Personnel (e.g., SHSOs, PMs, or TMs) who are managing staff on site and are responsible for ensuring that affected personnel, who might reasonably be anticipated to have exposure to the risk of heat illness, have received the proper training on heat illness prevention and ensuring that the requirements in this HSS are followed. Staff working in California, Washington, or other states with specific heat illness standards must receive documented training prior to assignment. Other affected employees not working in these states must be familiar with this HSS and the information detailed in the Field Health & Safety Handbook. Corporate H&S recommends that all staff that might be reasonably be anticipated to have exposure to the risk of heat illness complete the online heat stress training course.

Project personnel are responsible for understanding the conditions, signs, and symptoms that can lead to heat stress and adhere to the prescribed control and mitigation and methods. Personnel will report to the SHSO and/or PM any signs and symptoms of heat stress exhibited by themselves or by other personnel.
1. **POLICY**

It is ARCADIS policy that employees who are required to work in hot, outdoor places of employment or in other areas at times when the environmental risk factors for heat illness are present, are at risk for developing heat illness if they do not protect themselves from the hazards.

Heat-related illness may be prevented through the use of safe work practices, engineering controls, and/or use of PPE.

2. **PURPOSE AND SCOPE**

2.1 **Purpose**

The purpose of this procedure is to provide employee awareness regarding heat illness symptoms, direction on the controls and prevention of heat-related illnesses, and guidance on appropriate response actions if symptoms do occur.

2.2 **Scope**

This procedure applies to ARCADIS projects which include, but are not limited to: outdoor operations conducted in hot weather such as construction, refining, oil and gas extraction, asbestos removal, and hazardous waste site activities, especially those that require employees to wear semipermeable or impermeable protective clothing that are likely to cause heat stress among the exposed. California and Washington enforce specific occupational heat illness prevention requirements which are addressed in this HSS. It should be noted that for all other states and US territories, the information provided in this HSS will be used as Best Management Practices (BMPs) for addressing Heat Stress and heat related illness prevention.

Project sites located in California and Washington must comply with the requirements set forth in this HSS, which has been developed to comply with the California Occupational Safety and Health Administration (Cal/OSHA) Title 8 California Code of Regulations (CCR) 3395 Heat Illness Prevention Standard and the Washington State Outdoor Heat Exposure Regulations 296-62-09510 thru 09560. Project sites in California and Washington State must complete the Heat Illness Prevention HASP Supplement and include this HSS as an attachment to the field copy of the HASP, along with the completed HASP Supplement.

3. **DEFINITIONS**

Definitions relating to Heat Stress Prevention are provided in Exhibit 1.

4. **RESPONSIBILITIES**

4.1 **Project Managers and Task Managers**

Are responsible for ensuring that heat stress is considered and addressed in project task hazard analysis, risk assessment, and project planning.

Ensure that the project HASP addresses the need for adequate water, provisions for shade are available at a job site, and that time is available for staff to eat when the environmental risk factors for heat illness are present.
Ensure that the HASP addresses the need for affected employees to receive applicable training on heat illness prevention and that staff are provided time to complete the training prior to starting work.

### 4.2 Supervisory Personnel

Supervisory personnel (e.g., SHSOs, PMs, and/or TMs who are supervising employees working on site and in the heat) must review this HSS and complete training in the prevention of heat related illnesses prior to supervising employees that work in the heat (risk of heat illness). Supervisory personnel will be trained in heat illness prevention and procedures to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures. Supervisory personnel must ensure personal risk factors that contribute to heat-related illness are considered before assigning a task where there is the possibility of a heat-related illness occurring (See Section 5.2 for risk factors) and plan for and implement preventive measures and controls when heat advisories are issued for those areas in which staff will be working.

Ensure that effective communication by voice, observation, or electronic means is maintained so that site employees can contact a supervisor, WorkCare or emergency medical services when necessary. Devices, such as radios or a cell phone, may be used for this purpose only if reception in the area is reliable. If an electronic device will not furnish reliable communication in the work area, the project team must ensure a suitable means of summoning emergency medical services is available.

Ensure that affected employees working on site have received proper training on heat illness prevention.

Ensure that the requirements in this HSS are documented and followed.

Ensure that staff working in the heat have constant access to suitably cool, fresh, pure potable water and access to shade.

### 4.3 Corporate Health and Safety

Corporate H&S is responsible for keeping this HSS up-to-date with regulatory requirements and best work practices.

As requested, provide training to potentially impacted employees and their supervisors on the risks and prevention of heat illness, including how to recognize symptoms and how to respond when they appear.

### 4.4 Affected Employees

Employees are responsible for understanding the conditions, signs, and symptoms that can lead to heat stress and for using and adhering to the prescribed control and mitigation and methods. Personnel will report to the SHSO and/or PM any signs and symptoms of heat stress exhibited by themselves or by other personnel on the project site.

If site personnel have not received heat stress training prior to conducting work, then site personnel will be educated on heat stress prevention by reviewing this HSS, reading the site HASP (including the site-specific Heat Illness Prevention HASP Supplement as
required for California and Washington States), and by attending the daily tailgate meeting.

Employees must review and comply with the provisions of this HSS.

Employees must ensure they have suitably cool, fresh, pure (potable) water available at all times and that they eat prior to starting work and during the day when the environmental risk factors for heat illness are present.

Employees will ensure they have constant access to a shaded area to prevent or recover from heat-related symptoms.

5. PROCEDURE

5.1 Safe Work Practices

ARCADIS staff shall follow these general safe work practices when working in the heat:

- Staff will avoid working in the heat when possible. This can be accomplished by avoiding work in the hottest parts of the day or working in cooled enclosures or cooling units provided in the work area. Severe heat conditions can be cause for stopping or not starting work.
- Allow personnel to acclimatize and adapt to the heat; specifically those employees new to the project or working in high heat areas.
- The SHSO will be particularly watchful of the condition of new employees and stay alert to the onset of heat-related symptoms. New employees will be assigned a “buddy” or experienced co-worker for the purpose of monitoring each other closely for symptoms of heat illness.
- Whenever possible, rotate personnel in/out of working conditions in which heat is a factor.
- Personnel shall have constant access to suitably cool, fresh, pure (potable) water. Where the supply of water is not plumbed or otherwise continuously supplied, water shall be provided at no cost to the employee(s) (or employee will be reimbursed) in sufficient quantity at the beginning of the work shift and for the shift duration.

Note: Thirst cannot be relied on as a guide for hydration. Employees need to drink cool, fresh water throughout the day (four 8-oz cups per hour) during hot weather. Electrolyte replacement drinks or “Sports Drinks” can be used to replace essential minerals lost during sweating. Generally, such drinks should supplement water intake such as one “sports drink” to every two bottles of water. Also, a teaspoon of salt added to every gallon of water could also be used. Electrolyte replacement and/or “Sport Drinks” should never be used as the primary or substitute source of fluid intake or as a substitute for food.

- Employees will be notified of the location(s) of the closest drinking water supplies.
- Employees should choose non-carbonated water over sodas or other beverages containing caffeine or sugar.
- Employees should eat prior to work and then during the work rotation.
Employees and SHSO must understand the individual, pre-disposing susceptibilities to heat illness.

Employees must understand the signs and symptoms of heat illness including: discomfort, excessive sweating, headache, poor concentration, muscle pain, cramping, dizziness, fatigue, irritability, loss of coordination, vomiting, blurry vision, confusion, lack of sweating, fainting, and seizures.

Employees must understand first aid and emergency response procedures associated with heat illness.

5.2 Risk Factors for Heat-Related Illnesses

The personal and environmental risk factors for heat-related illness must be considered as part of the TRACK process before performing a task.

Personal Risk Factors

- No recent exposure to high heat work areas is a risk factor because the individual is not acclimatized to working in the heat.
- Individual susceptibilities such as age, weight, degree of physical fitness, use of medications, and certain medical conditions such as hypertension and diabetes all affect the potential to experience a heat-related illness.
- A person is at greater risk for heat illness when they are in poor health, are dehydrated, have not eaten, have not been acclimated to working in the heat, and have experienced previous heat illness.
- Working in a hot environment tends to lower the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger, and other emotional states which have the potential to cause personnel to overlook safety procedures or to divert attention from hazardous tasks.
- Wearing PPE that increases the potential for the onset of heat illness symptoms.

Environmental Risk Factors

- High temperature and humidity, direct sun exposure, no breeze or wind
- Radiant heat, air movement
- Workload severity and duration

Heat tends to promote accidents due to the slipperiness of sweaty palms, dizziness, or the fogging of safety glasses. The frequency of accidents, in general, appears to be higher in hot work environments than in more moderate environmental conditions.

5.3 Administrative and Engineering Controls

When feasible, ARCADIS staff shall implement the following administrative and engineering controls:

- Monitor and measure temperature and heat index factors so the magnitude of the heat hazard is understood. This can be accomplished with on-site instrumentation or by monitoring conditions through the internet, radio, or local weather bureaus. See Section 5.3.3.
• Encourage personnel to wear appropriate clothing that allows for the wicking away of perspiration.

• Implement appropriate work/rest cycles to allow for adequate cool-down periods.

• Employees suffering from heat illness related symptoms must be allowed and shall be encouraged to take a preventative cool down rest in an area with shade that is either open to the air or provided with ventilation or cooling. While taking a preventative rest the employee will be monitored for heat illness symptoms and encouraged to remain in the shade and not return to work until the symptoms are gone. Access to shade shall be permitted at all times.

5.3.1 Procedure for Acclimatization

Supervisors, SHSOs, and employees will be trained on the importance of acclimatization, how it is developed, and how to implement an acclimatization process that is consistent with applicable regulations and the guidelines set forth in this HSS. An employee is at risk of heat illness during a sudden rise in temperatures if not given time to adjust to the changing conditions. Acclimatization (the physiological process of becoming accustomed to changing conditions) is necessary, especially in conditions of high heat and physical stress. In addition to acclimatization, other factors can affect employees working at sites where high temperatures are anticipated, such as: poor general health, age, weight, pre-existing medical conditions, and having previously experienced heat illness. Employees are not required to share personal information about some factors such as pre-existing medical conditions. However, including these factors in the Tailgate Safety Meeting discussion of heat illness raises awareness of the risks involved with heat illness.

A gradual acclimatization period will be implemented for new employees that have not been exposed to a work environment where high temperatures are present (e.g., employees not accustomed to the conditions of the work site will be given slower paced, less physically demanding tasks during the hot parts of the day and given the heavier tasks during cooler parts of the day). New employees will be closely monitoring during their acclimatization period which can last up to two weeks. The steps taken to reduce the workload intensity for employees not yet acclimated to working in high heat conditions will be documented in the field copy of the HASP Supplement.

The SHSO or designee is responsible for implementing the following procedures for acclimatization. These procedures include, but are not limited to, the following:

• Observing employees closely for signs of heat illness. Specific site conditions warranting close observation include but are not limited to any day where the temperature is 80 degrees Fahrenheit or greater and is at least 10 degrees F higher than the average daily temperature for the preceding five days.

• Providing effective acclimatization procedures for employees during exposure to a sudden increase in temperature; and

• Weather will be monitored daily by the SHSO, who will be on the lookout for sudden heat wave(s) or increases in temperatures that employees haven't been exposed to for several weeks or longer per Section 5.3.5 Weather Monitoring Procedures, detailed in this HSS.
5.3.2 Provisions for Water at the Site

At the start of work, the importance of drinking water, the signs and symptoms of heat illness, the location(s) of the water/water coolers, and the schedule of water/rest breaks will be communicated to all staff during each Tailgate Safety Meeting. The SHSO or the designated alternate shall provide for distribution of suitably cool, fresh, clean potable (drinking) water at the project site. An adequate supply of suitably cool, fresh, clean potable water will be maintained on site at all times to allow each employee to consume one quart of water per hour (e.g., 2 gallons per employee for an 8-hour shift). Where unlimited drinking water is not immediately available from a plumbed system or otherwise continuously supplied, water will be provided to staff via coolers containing bottled water, or insulated drinking water dispensers (verify coolers/dispensers are of a sufficient capacity to support the amount of field staff present) accompanied with disposable cups to maintain sanitary conditions for potable water consumption. SHSOs and/or supervisors shall encourage employees to drink water before they "feel" thirsty. Ideally, drinking 8 ounces of water every 15 minutes will allow the body to remain properly hydrated while working in high temperature conditions.

If the decision is made not to provide all site employees the full-shift quantity of drinking water at the start of a work shift (e.g., 2 gallons per employee for an 8-hour shift), then effective procedure(s) must be documented and implemented to ensure drinking water replenishment to allow each employee to drink 1 quart per hour. This means a sufficient quantity of water must always be present and readily accessible to allow every employee to consume at least 1 quart of water per hour until the water supply has been replenished.

- The Heat Illness Prevention Plan HASP Supplement provides a formula to calculate the number of quarts of water required per employee per hours worked per shift.
- Coolers containing bottled water or drinking water coolers should be maintained to provide for a minimum of 3 hours of water per employee (at least 1 quart / 32 ounces of water will be made available per employee per hour) to account for a sufficient quantity of water to always be present.
- Water coolers will be positioned within 50 feet of employee activity or in vehicles used by employees to gain access to individual work areas; however, coolers will be stationary when employees are essentially stationary.
- Coolers will be inspected and replenished with water and ice for cooling periodically (e.g., every 30 minutes, every hour based on site temperature and number of employees present) by the SHSO or designee.
- Ice will be added to the coolers, as necessary, during the required inspections.

**Note:** When the temperature exceeds 90 degrees F, inspections will be increased in frequency and ice will be added as need to keep water cool.

- Ice will be distributed from a separate cooler or service and added to coolers to ensure that the drinking water remains potable and appropriately cool for employee consumption. Ice used to chill the water will be stored separately to remain sanitary. Sanitary ice storage can include storage of ice in bags when bottled water is used or use of separate storage coolers when using drinking water dispensers.
- Coolers will be inspected and cleaned at the conclusion of each work shift or prior to starting work each shift. The SHSO will oversee cooler maintenance and provide appropriate cleaning supplies in support of this effort.
• The SHSO or designee will document the weekly review of the Heat Illness HASP Supplement and make the necessary adjustments each week for weather changes or when new employees are introduced to the project. The reminder may include water ordering information if purchased in bulk from appropriate supplier.

5.3.3 Access to Shade

The project team is responsible for making sure the necessary equipment to provide shade is available at the project site. The temperature threshold for shade to be in place is when site temperatures exceed 80 degrees Fahrenheit. The SHSO or designee is responsible for directing how shade will be coordinated and placed. The term "shade", for the purposes of complying with applicable regulations shall be defined as "The blockage of sunlight to the extent that no shadow is cast while sitting in the designated area". Flecks of sunlight are acceptable as long as, overall, the shade provides substantially complete blockage of sunlight. Where trees or other vegetation are used to provide shade, the thickness and shape of the canopy must cast sufficient shadow, given the changing angles of the sun, to protect employees from the sun during the entire shift. At the start of each shift, the importance of taking shade breaks, recognizing the signs and symptoms of heat illness, the schedule of shade breaks (> 5 minutes per break), and the shade location will be addressed during each Tailgate Safety Meeting. Access to shade must be allowed at all times.

Establishing adequate shaded areas for employees involves:

• If the temperature at the site exceeds 80 degrees Fahrenheit, shade structures will be opened and made available to employees.
• Shaded areas must be able to accommodate all employees taking a recovery or rest break including those employees who are on meal breaks. This doesn’t mean that the shaded area(s) must provide shade to accommodate all employees on a site or working a shift at the same time. An example includes rotating routine breaks among employees. Also, additional portable shade structures can be erected on an “as-needed” basis.  
• Employees must have enough shaded space to sit comfortably while fully shaded and to allow for sitting without being in physical contact with each other.  

Note: When establishing shade, it is important to ensure that employees who desire access to shade will not be deprived of it due to lack of space. One such procedure to address this point would be to rotate employees in and out of shaded areas to ensure all have sufficient access for the 5-minute interval required. Another option would be to have additional shade structures on hand to deploy as needed.

• Shade structures will be relocated to follow along with the crew for moving tasks.
• Shade structures will be placed within 50 feet of the work area, if practical. A key consideration when placing a shade structure is that it is a short walk away (e.g., 2 to 3 minutes) from the work area. This consideration becomes critical as the temperature rises above 80 degrees Fahrenheit.
• In situations where it is not safe or feasible to provide shade, notes will be made to the HASP Supplement of the unsafe or unfeasible conditions. The SHSO will also document the steps taken to provide alternative cooling measures equivalent to
providing shade, such as vehicles equipped with air conditioning or air conditioned office trailers.

- An employee who takes a preventative cool-down rest
  - Shall be monitored and asked if they are experiencing symptoms of heat stress;
  - Shall be encouraged to remain in the shade;
  - Shall not be ordered back to work until any signs or symptoms of heat illness have abated.
  - If an employee exhibits signs or symptoms of heat illness while taking a preventative cool-down rest the SHSO will provide appropriate first aid or emergency response.

5.3.4 Monitoring of Weather and Procedures for Heat Waves

The SHSO or designee will be trained in consulting weather forecasting resources and is responsible for checking the extended weather forecast weekly in advance of work. Work schedules will be adjusted in advance, considering whether high temperatures or a heat wave is expected. The SHSO will be responsible for obtaining a thermometer prior to the start of the project and ensuring that it is readily accessible or posted on site so it can easily be monitored throughout the course of the day. The following web pages are considered accurate and reliable sources for checking weather forecasts:

- [http://www.noaa.gov/](http://www.noaa.gov/)
- [http://www.weather.com/](http://www.weather.com/)

Prior to each work day, and before starting each shift, the SHSO or designee will review the forecasted temperature and humidity for the work site and compare conditions against the National Weather Service Heat Index (See Table 1) to evaluate the risk level for heat illness. A “heat wave,” as defined by the National Oceanic and Atmospheric Administration (NOAA), is a period of abnormally and uncomfortably hot and unusually humid weather.” Typically, a heat wave lasts 2 or more days.
Table 1

NOAA's National Weather Service

Heat Index
Temperature (°F)

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Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
- Extreme Caution
- Danger
- Extreme Danger

Use the information in Table 1 to determine if employees will be exposed to a combination of temperature and humidity that pose a risk for heat illness. If the site conditions are characterized as falling inside the ranges for “Extreme Caution,” “Danger,” or “Extreme Danger” for heat illnesses, additional steps must be taken. It is important to note that the temperature at which these warnings occur must be lowered as much as 15 degrees Fahrenheit if the employees under consideration are working in direct sunlight.

5.3.5 Procedures for High Heat and Heat Waves

High Heat Procedures:

- The Tailgate Safety Meeting will review the high heat procedures, encourage employees to drink plenty of water, and remind employees of the importance to take a preventative or recovery cool-down rest when necessary.
• High heat procedures will be put in effect when the temperature rises above 95 degrees Fahrenheit.

• ARCADIS will ensure effective employee observation and monitoring procedures are put in place including:
  o SHSO or designee will supervise 20 or fewer employees,
  o The "Buddy System" is mandatory;
  o Regular communication with SHSO or designee via mobile phone or radio;
  o Designating one or more employees as authorized to contact emergency medical services and communicating that if no designate is identified and the SHSO is unavailable that any employee can call for emergency medical assistance.

• Employees will be reminded throughout the shift to drink plenty of water.

• The "Buddy System" must be implemented, especially for new employees or employees who have yet to acclimate to high heat conditions. Additionally, frequent communication will be maintained with employees working by themselves (via cell phone or two-way radio), to be on the lookout for possible symptoms of heat illness.

• During high heat conditions, employees will be provided with a minimum 10-minute cool-down period every two hours.

• Employees will be observed for alertness and signs and symptoms of heat illness at regular intervals to be documented in the field book or field log.

• When the SHSO is not available, an alternate responsible person must be assigned to look for signs and symptoms of heat illness. Such a designated observer will be trained to know what steps to take if heat illness occurs.

Heat Wave Procedures:

A “heat wave” as defined by the National Oceanic and Atmospheric Administration (NOAA), is a period of abnormally and uncomfortably hot and unusually humid weather.” Typically, a heat wave lasts 2 or more days. A "Heat Wave" as defined for the purposes of this HSS is when temperatures are sustained above 80 degrees F , or if site conditions indicate the potential for “Extreme Caution,” “Danger,” or “Extreme Danger” per Table 1, the following steps will be taken:

• The SHSO or designee, in coordination with the project team, will use their Stop Work Authority; evaluate the following actions; and document the action in the daily field log:
  − Modify the work shift or cut the work day short (e.g., 12:00 pm).
  − Reschedule the work (e.g., conduct the remaining work during cooler times of the day) or suspend tasks that are strenuous.
  − Use Stop Work Authority to cease work for the day.

• If schedule modifications are not possible, the Heat Illness Prevention Plan will be reviewed before work resumes. At a minimum, procedures for heat illness prevention, the provisions for high heat procedures, the weather forecast, and emergency response protocols will be reviewed.
• Employees will be provided with additional water and rest breaks and will be observed more frequently. They will also be reminded throughout the shift to drink plenty of water.
• During work activities and rest breaks, employees will be observed for signs and symptoms of heat illness.
• All employees will maintain frequent communication with the SHSO or designee, who will be monitoring employees for possible symptoms of heat illness.

Note: In the event of large project sites where the SHSO is unable to be near the employees (to directly observe or communicate with them), then communication via a cell phone or radio may be used for this purpose provided that reception in the area is reliable.

5.4 Heat Exhaustion and Heat Stroke First Aid and Emergency Procedures

Emergency procedures include recognizing the symptoms of heat related illness. A critical step also involves ensuring that effective communication is established either through voice, direct observation or electronic means such as via mobile phones or 2-way radios. In an emergency situation it is critical that employees understand the process and contact information for requesting emergency medical support. The reception coverage for the site must be evaluated and understood to ensure adequate communication is in place across the project site.

5.4.1 Heat Exhaustion and Heat Stroke Symptoms

Signs of Heat Exhaustion:
• Cool, moist, pale, or flushed skin
• Heavy sweating
• Headache
• Nausea, dizziness, and exhaustion
• Normal or below normal body temperature.

Signs of Heat Stroke
• Hot, red skin which can be dry or moist from exercise
• Changes in consciousness
• Rapid, weak pulse
• Rapid, shallow breathing, vomiting
• A person experiencing heat stroke can have a very high body temperature—sometimes as high as 106°F (41° C).

5.4.2 First Aid Procedures for Heat Exhaustion

1. Move the person to a cooler place.
2. Remove or loosen tight clothing and apply cool, wet cloths, such as towels or sheets soaked in water.
3. If the person is conscious, give him or her cool water to drink. Make sure the person drinks slowly. Give a half glass of cool water every 15 minutes.
4. Contact the employees supervisor, the project manager and Work Care 1-800-455-6155 (US) and 1-888-449-7787 (Canada).
5. Let the person rest in a comfortable position.
6. Watch carefully for changes in his or her condition.

**Do not give liquids that contain alcohol or caffeine because they can cause further dehydration, making conditions worse.**

5.4.3 First Aid and Emergency Procedures for Heat Stroke

Heat stroke is a life-threatening situation. If you suspect someone is suffering from heat stroke, call 9-1-1 or the local emergency number immediately.

1. Move the person to a cool place.
2. Loosen tight clothing.
3. Remove perspiration-soaked clothing.
4. Apply cool, wet cloths to the skin.
5. Fan the person.
6. If conscious, give small amounts of cool water to drink.
7. Place the person on his or her side.
8. Contact the employees supervisor, the project manager and Work Care 1-800-455-6155 (US) and 1-888-449-7787 (Canada).
9. Continue to cool the person by using ice or cold packs on the wrists, ankles, groin, and neck and in the armpits.
10. Continue to check breathing and circulation.

**Do not give liquids that contain alcohol or caffeine because they can cause further dehydration, making conditions worse. Ensure 9-1-1 or the local emergency number is called if the person refuses water, vomits, or starts to lose consciousness.**

Emergency contact telephone numbers and hospital directions/map must be included in each site-specific HASP for employee reference.

6. TRAINING

The ARCADIS Heat Illness Prevention online training offered though the ARCADIS training Center is required to be completed before staff working in California or Washington States will be permitted to begin work. Project teams conducting work in locations other than California or Washington States are expected to complete the training prior to conducting work as defined in the H&S training matrices specific to each Division. Completion of the training once is generally considered sufficient to satisfy the training requirement; however, the training may be required to be completed again as determined by ARCADIS policy or management, or by client or specific state requirements. Refresher training is encouraged for all staff that infrequently conducts or supervises work where heat stress is a hazard.

6.1 Supervisory Personnel

Supervisory personnel supervising staff on a California or Washington State site who might reasonably be anticipated to be exposed to the risk of heat illness shall be provided training in the following topics prior to assignment:

- The environmental and personal risk factors for heat illness
• The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties

• The importance of staying appropriately nourished

• The importance of acclimatizing

• The different types of heat illness and the common signs and symptoms

• The importance for employees to immediately report to the employer, directly or through the employee’s supervisor, symptoms or signs of heat illness in themselves or in co-workers

• The procedures to follow for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary

• The procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider

• The procedures for ensuring that, in the event of emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders

In addition, these supervisory personnel must review and understand:

• This Heat Stress Prevention HSS and the associated HASP Supplement

• How to implement the emergency response procedures detailed in the site-specific HASP when an employee exhibits symptoms consistent with possible heat illness

• Weather monitoring reports as detailed in the field Health & Safety Handbook

• How to monitor weather reports and how to plan for and respond to hot weather advisories

This training will be documented with details on the subject matter covered and date of training recorded.

6.2 Affected Employees

For those employees who work in California or Washington, or when using this HSS as a Best Management Practice in any other state and might reasonably be anticipated to be exposed to the risk of heat illness, training in the following topics is required prior to assignment:

• The environmental and personal risk factors for heat illness

• The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties
• The importance of acclimatizing
• The different types of heat illness and the common signs and symptoms
• The importance for employees to immediately report to the employer, directly or through the employee’s supervisor, symptoms or signs of heat illness in themselves or in co-workers
• The procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary
• The procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider
• The procedures for ensuring that, in the event of emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders

This training will be documented within the Training Team database along with details on the subject matter covered and date of training recorded.

Note: For those staff who are not working in California, Washington, or other states that have specified heat illness training requirements, staff that might reasonably be anticipated to be exposed to the risk of heat illness shall at a minimum review the information detailed in the Field Health & Safety Handbook and this HSS. Corporate H&S recommends that all staff that might be reasonably be anticipated to be exposed to the risk of heat illness complete the online heat stress training course.

7. REFERENCES (regulation citation, technical links, publications)
• OSHA Technical Manual – Section III Chapter 4
• National Institute of Occupational Safety and Health (NIOSH) Publication Number 86-112
• American Conference of Governmental Industrial Hygienists (ACGIH) 1992
• American Red Cross 2007
• Cal/OSHA Title 8 CCR 3395 Heat Illness Prevention Standard and Title 8 CCR 3202 Injury and Illness Prevention Program
• Washington State Outdoor Heat Exposure Regulations 296-62-09510 thru 09560
• See Exhibit 2 for links to additional regulatory resources.

8. RECORDS - DATA RECORDING AND MANAGEMENT
This HSS will be reviewed routinely and revised as appropriate. When revised, the revision date/number will be documented under “History of Change” and the prior plan archived per company policy.

Heat illness training records will be maintained by the ARCADIS Training Team.
9. APPROVALS AND HISTORY OF CHANGE

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

![Signature]

History of Change

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<th>Standard Developed/Reviewed by</th>
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<tr>
<td>31 August 2011</td>
<td>01</td>
<td>Tony Tremblay &amp; Mija Coppola</td>
<td>Original document</td>
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<tr>
<td>13 March 2012</td>
<td>02</td>
<td>Tony Tremblay</td>
<td>Detailed Supervisory Personnel requirement to plan/detail preventive measures/controls when heat advisories are issued; clarified training requirements for staff and supervisory personnel; inserted heat advisory and excessive heat warning definitions</td>
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<tr>
<td>19 June 2012</td>
<td>03</td>
<td>Pat Vollertsen</td>
<td>Information added in regard to nourishment</td>
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<tr>
<td>16 June 2014</td>
<td>04</td>
<td>Pat Vollertsen &amp; Alec MacAdam/Tony Tremblay</td>
<td>Revised standard format and History of Change Section. Updated to include specific prescriptive language to address Cal OSHA and Washington State requirements. Inclusion of HASP supplement and preparation guidance. Clarification of the use of sports/electrolyte drinks</td>
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<tr>
<td>7 August 2014</td>
<td>05</td>
<td>Alec MacAdam</td>
<td>Update guidance for use of “Sports Drinks”</td>
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<tr>
<td>6 April 2015</td>
<td>06</td>
<td>Alec MacAdam</td>
<td>Revise temperature threshold from 85 to 80 deg. F, provisions for shade, guidance for preventative rest breaks, revised high heat procedures and clarification of acclimatization procedures</td>
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Exhibit 1 – Definitions

**Acclimation** – a process by which the body adjusts to increased heat exposure. The body needs time to adapt when working in hotter environments. Employees working in a hot environment are more likely to develop heat illness if not allowed or encouraged to allow their body to acclimate when a heat wave strikes or when starting a job that newly exposes them to heat. Acclimatization is fully achieved in most people within 4 to 14 days of regular work involving at least 2 hours per day in the heat.

**Excessive Heat Warning** - Extreme heat index making it feel very hot, typically above 110 °F (43 °C) for 3 hours or more during the day for two consecutive days or above 110 °F (43 °C) at any time. Specific criteria vary over different county warning areas.

**Heat Advisory** - Issued when the "heat index" is expected to exceed 105 degrees Fahrenheit or 40 degrees Celsius during the day and 80 degrees Fahrenheit or 27 degrees Celsius during the night for at least two consecutive days.

**Heat Cramps** – normally caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. Salt tablets should not be taken.

**Heat Collapse** – Also referred to as Heat Syncope. Heat Collapse (fainting) is the condition where the brain does not receive enough oxygen because blood pools in the extremities. To prevent heat collapse, the employee should gradually become acclimatized to the hot environment.

**Heat Exhaustion** – less severe than heat stroke, but the victim must be treated as soon as possible. Symptoms include clammy and moist skin, pale or flushed complexion, sweating along with extreme weakness or fatigue, giddiness, nausea or headache may occur and, in more serious cases, vomiting or loss of consciousness.

**Heat Fatigue** – The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

**Heat Index** – an “apparent temperature” that is a measure of how hot it feels when relative humidity is added to the actual air temperature.

**Heat Rashes** – the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive.

**Heat Stress** – a physiological condition induced when high temperatures and humidity compromise the body’s ability to cool itself, resulting in heat-related illness.

**Heat Stroke** – the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. **Heat stroke is a medical emergency.** The primary signs and symptoms of heat stroke include confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin and an abnormally high body temperature.
Heat Wave - A "heat wave" as defined by the National Oceanic and Atmospheric Administration (NOAA), is a period of abnormally and uncomfortably hot and unusually humid weather." Typically, a heat wave lasts 2 or more days. A "Heat Wave" as defined for the purposes of this HSS is when temperatures are sustained above 80 degrees Fahrenheit.

Provision of Water - Employees shall have access to potable drinking water meeting the requirements of Section 5.3.2 of this HSSs including but not limited to the requirements that it be fresh, pure (water must be potable and free of odors), suitably cool (the water must be cooler than the ambient temperature but not so cool as to cause discomfort), and provided to employees free of charge. The water shall be located as close as practicable to the areas where employees are working. Where drinking water is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Employers may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink one quart or more per hour. The frequent drinking of water shall be encouraged. The purpose of requiring that water is "fresh, pure, suitably cool, and provided to employees free of charge" and "located as close as practicable to the areas where employees are working" is to encourage workers to drink water often and avoid making the workers interrupt their work in order to do so. To ensure that water is fresh, pure, and suitably cool, Cal/OSHA advises employers or supervisors visually examine the water and pour some on their skin.

Shade - the blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in direct sunlight does not provide acceptable shade to a person inside it, unless the car engine is operating with air conditioning on. Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.

Transient Heat Fatigue – the temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. Employees unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness and vigilance.
Exhibit 2 – Heat Stress Links

Heat Illness Symptoms

Heat Illness Thermometer and PPE

OSHA Working Outdoors Fact Sheet

OSHA Worker Protection from Heat Stress

California Heat Illness Prevention Enforcement Q&A

Washington State Outdoor Heat Exposure Enforcement Procedures
Exhibit 3 Heat Illness Prevention HASP Supplement Template

**Hyperlink to Heat Illness Prevention HASP Supplement**

A copy of the Heat Illness HASP Supplement is also available by right clicking on the lower toolbar of the excel HASP template and selecting “Unhide” the “CA WA Heat Plan”.

Page E4 of E4
EXECUTIVE SUMMARY

The purpose of reporting and investigating incidents is to prevent similar or more serious incidents from recurring.

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

- Work-related injuries and illnesses
- Near misses
- Motor vehicle accidents
- Utility Strikes
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies or losses

This standard is followed for any of the above-listed incidents incurred by Arcadis employees, Arcadis subcontractors, temporary agency workers contracted by Arcadis, clients or third parties associated with or in the vicinity of Arcadis activities, which would affect the health and safety of the Arcadis work area or activities. All employees receive Incident Reporting and Investigation training during Health & Safety Orientation training.

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.

The employee is responsible for reporting any near miss or incident, including reporting to the Supervisor/PM and/or the client as outlined in the project H&S Plan.

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.

All incidents are recorded and stored in the Health & Safety database and maintained per Arcadis recordkeeping requirements.

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 U.S. policy that:

- All incidents, including near misses, are reported.
- Reporting of incidents is every employee’s responsibility.
• Incidents involving non-emergency work-related injury are reported to WorkCare first to ensure proper medical care and management.

• All near misses and incidents are investigated (Exhibit A-2 and B-2).

• The level of investigation is based on the severity of the outcome or the potential outcomes of the incident or near miss.

• All investigations result in learning that is communicated to appropriate staff.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of reporting and investigating near misses and incidents is to prevent similar or more serious incidents from recurring. This is completed by determining the contributing factors to the incident and/or the root causes of those factors using the Root Cause Analysis and Solution Development HSS (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 misses

Motor vehicle accidents

Utility strikes

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 temporary agency workers contracted by Arcadis, clients or third parties associated with or in the vicinity of Arcadis activities, which would affect the health and safety of the Arcadis work area or activities.

The investigation team may include subcontractor workers and a subcontractor supervisor. Arcadis personnel will 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

Definitions can be found in Exhibit A of ARC HSMS000 – Arcadis US HS Management System.

4. RESPONSIBILITIES

All employees will refer to the Near Miss Reporting and Near Miss Investigation Process Flow or Incident Reporting and Incident Investigation Process Flow diagrams in Exhibit A and Exhibit B.

4.1 Employees and Arcadis Contracted Temporary Agency Workers

Employees are required to report all workplace near misses, incidents and any event that may generate media coverage that involves Arcadis employees and Arcadis subcontractors.

**Note:** As the "host employer" of temporary staffing workers, Arcadis would be responsible for reporting incidents of temporary workers when Arcadis provides day-to-day supervision. For additional information, refer to Exhibit C.

4.2 Project Managers and Supervisors

Project Managers and Supervisors are required to be involved in the reporting and investigation process for incidents and near misses as defined in Exhibits A-1, A-2, B-1 and B-2. Ensure all near misses and incidents are recorded in the H&S Database.

4.3 Leadership

Leadership will be notified of certain near misses and incidents as presented in the Exhibit A-1 or B-1, respectively. Business Line Leadership may have specific reporting and investigation requirements that exceed the minimum requirements presented in the process flow diagrams.

Leadership may be involved in the reporting and investigation of significant near misses Level 2 and Level 3 incidents.

4.4 Corporate Services (Legal, Communications and Human Resources)

Depending on the Incident Level or significance of the near miss, Corporate Legal, Communications and Human Resources may be notified during the reporting process and included in the investigation process.

4.5 Corporate Health and Safety

Corporate H&S Staff have the responsibility for:

- Communicating the policy and standard requirements in this HSS to Arcadis staff;
• Notifying Leadership, other Corporate Services or Global Health & Safety, as appropriate, and keeping them informed;

• Participating in Near Miss and Incident Investigations as required or as requested; and

• Reviewing, evaluating and maintaining this HSS on a routine basis.

5. PROCEDURE

The reporting and investigation procedures discussed in this section are broken down into the following components:

• Stop Work

• Reporting and Notification

• WorkCare Intervention and Case Management

• Investigation Team

• Incident Investigation Process

• Description of Incident

• Determine Contributing Factor(s)

• Determine Root Cause(s) of Key Contributing Factor(s)

• Develop Solution(s)

• Review Process

• Validation and Verification

5.1 Stop Work

It is Arcadis policy that during the conduct of their work, Arcadis, and subcontractor employees and temporary workers have the authority and responsibility to Stop Work immediately in any situation when the Health, Safety, Security and Environment hazards and risks associated with the work being performed is not clearly established or controlled.

Immediately following a near miss or incident, STOP Work until it is determined that it is safe to resume. Refer to the Stop Work Authority HSS (ARC HSGE009).

If a person sustains a major injury, or if the incident is classified as a significant near miss, the operation must be stopped and the investigation initiated immediately.
5.2 Reporting and Notification

The Arcadis employee, subcontractor employee and/or temporary workers is responsible for reporting any near miss and incident including reporting to the Supervisor/PM and/or the client as outlined in Exhibit A-1, Exhibit B-1 and the project H&S Plan. Incidents and near misses will be categorized as follows:

- Level 1 - First aid/self-treated, work-related injury (contact WorkCare as soon as possible); minor property or equipment damage (less than or equal to $100); vehicle loss event (no injuries, no third-party involvement or other vehicle involvement – refer to Motor Vehicle Safety Program HSGE024).

- Level 2 - Professional Medical Treatment (if non-emergency injury or illness, employee must contact WorkCare as soon as possible); moderate property or equipment damage (greater than $100 but less than or equal to $5,000); ANY utility strike incident, any motor vehicle accident (including injury or third-party involvement – refer to Motor Vehicle Safety Program HSGE024).

- Level 3 - Immediately report fatality, severe or catastrophic injury and/or overnight hospitalization required; significant property or equipment damage (greater than $5,000); missing person or incident that generates media coverage.

- Near Miss - Potential for an incident that could have resulted in illness, injury or damage to assets, but did not.

- Significant Near Miss - Potential for severe injury or damage of greater than $5,000.

Reporting and notification times vary depending on the Incident Level, 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 B-1. This reporting will be completed via telephone to the appropriate person.

Note: Some California OSHA (CalOSHA) Districts are requiring that employers report any serious injury or fatality that occurs at the workplace regardless of whether it is work-related or not. CalOSHA defines a serious injury as any incident requiring inpatient hospitalization in excess of 24 hours (for other than medical observation) or in which an employee suffers a body part loss or serious degree of permanent disfigurement. Therefore, staff in California must report to Corporate H&S any serious injury or fatality that occurs at a California workplace.

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

5.2.1 OSHA Notification Requirements

The ANA HS Director will notify OSHA in the event of the following:

- Work-related fatality;
• Work-related inpatient/overnight hospitalizations;
• Amputations; or
• Loss of an eye.

All notifications to OSHA or state agencies will be completed by the ANA H&S Director or his/her designee.

A fatality must be reported to OSHA within 8 hours.

An in-patient/overnight hospitalization, amputation, or eye loss must be reported to OSHA within 24 hours.

5.3 WorkCare Intervention and Case Management

WorkCare must be contacted for every non-emergency, work-related injury or illness to an Arcadis employee via their reporting hotline number (888-449-7787) 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. A flowchart of the WorkCare Intervention process is shown in Exhibit D.

5.4 Investigation Team

Team composition varies depending on the type of near miss or Incident Level. The recommended members of the investigation team are listed in the Near Miss Investigation Process flowchart (Exhibit A-2) or Incident Investigation Process flowchart (Exhibit B-2).

5.5 Near Miss and Incident Investigation Process

5.5.1 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.

5.5.2 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 involved 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 investigation team to revisit the incident site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

For damaged equipment or property incidents, photographs or videos of the scene 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.

5.5.3 Starting an Investigation

The Project Manager or Supervisor, as it relates to the activity being conducted at the time of the incident, is responsible for initiating the investigation process. Depending on severity, the Business Line Corporate H&S Director will initiate the investigation process at their discretion. The incident investigation is initiated once the area is secure, injured people have received appropriate medical attention, and appropriate notifications have been made.

5.5.4 Investigation Documentation

Near Miss and incident investigations are maintained in the H&S database. Prior to entry in the H&S database, utility strikes and 3rd Party incidents will be discussed with Corporate H&S and other Corporate Services.

5.6 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”.

5.7 Determining Contributing Factor(s)

Contributing factors are things, events, circumstances, actions that led up to the incident. Facts can be contributing factors.

Once all contributing factors have been identified, determine which contributing factor(s) were primary in the event occurring (key contributing factor). Contributing factors are not root causes.

5.8 Determining the Root Cause(s) of the Key Contributing Factor(s)

For each key contributing factor, follow the Root Cause Process Flow presented in the Root Cause Analysis and Solution Development HSS (ARC HSMS011).

Any near miss or incident may have one or more root causes that will be categorized based on the Arcadis Root Cause Categories presented in Exhibit 3 of ARC HSMS011.
5.9 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. Refer to the Solutions Actions Table in Exhibit 4 of ARC HSMS011.

5.10 Review Process

The roles and responsibilities of the investigation and review processes are outlined in the Near Miss Investigation Process and Incident Investigation Process flowcharts presented in Exhibit A-2 and B-2, respectively. Review and follow-up on incident investigations is important to verify the effectiveness of the process.

Quality reviews of incident investigations offer an opportunity to provide positive feedback or constructive advice for continued improvement.

5.11 Validation and Verification

Employees have the opportunity to follow-up on near miss and incident investigations by verifying that the solutions have been implemented and validating that the solutions have adequately addressed the root cause(s) of the incident.

6. TRAINING

All employees receive Incident Reporting and Investigation training during Health & Safety Orientation training.

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

ARC HSMS000 – Health & Safety Management System
ARC HSMS011 – Root Cause Analysis and Solution Development
ARC HSGE009 - Stop Work Authority

8. RECORDS - DATA RECORDING AND MANAGEMENT

Near Misses and Incidents are recorded and stored in the H&S database and maintained per Arcadis recordkeeping requirements.

9. APPROVALS AND HISTORY OF CHANGE

Julie Santaniello, CSP – Corporate Health & Safety, Manager of Technical Programs
<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
</tr>
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<tbody>
<tr>
<td>22 October 2007</td>
<td>01</td>
<td>Pat Vollertsen/Mike Thomas</td>
<td>Original document</td>
</tr>
<tr>
<td>9 June 2009</td>
<td>02</td>
<td>Pat Vollertsen</td>
<td>Revision and update to include WorkCare intervention which has been implemented since 2006 but documented in separate document. Also update new LPS terminology</td>
</tr>
<tr>
<td>26 June 2009</td>
<td>03</td>
<td>Pat Vollertsen</td>
<td>Revision includes language that, when necessary, an injured employee will be accompanied to medical care by authorized employee</td>
</tr>
<tr>
<td>6 October 2010</td>
<td>04</td>
<td>Sue Byers</td>
<td>Change name from Procedure to Standard; revision to section 5.2 &amp; App A to clarify client must be notified when required by the HASP</td>
</tr>
<tr>
<td>24 March 2015</td>
<td>05</td>
<td>Pat Vollertsen/Tony Tremblay/Julie Santaniello</td>
<td>Executive Summary added; removed LPS terminology and updated with current BBS language; updated Section 4 and 5; updated Exhibits A, B and C</td>
</tr>
<tr>
<td>6 August 2015</td>
<td>06</td>
<td>Tony Tremblay</td>
<td>Section 5.2 note added to detail that California OSHA Districts are requiring that employers report any serious injury or fatality that occurs at the workplace regardless of whether it is work-related or not</td>
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<td>Revision Date</td>
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<td>Reason for change</td>
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<tr>
<td>26 April 2016</td>
<td>07</td>
<td>Denis Balcer/Tony Tremblay/Pat Vollertsen/Julie Santaniello</td>
<td>Expanded reporting required for incidents incurred by in Section 2.2; added Temp Agency Worker information to Section 4.1 and Exhibit C; defined Incident Levels in Section 5.2; added OSHA reporting Section 5.2.1; updated Exhibits A-1, A-2, B-1 and B-2 and clarified text; WorkCare Incident Intervention flowchart moved to Exhibit D; rebranded standard.</td>
</tr>
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</table>
Near Miss Reporting Process

Near Miss: Potential for and incident that could have resulted in illness, injury or damage to assets, but did not.

![Diagram of Near Miss Reporting Process]

- Work-related Near Miss has occurred to Arcadis employee, Arcadis subcontractor, Arcadis temporary worker, client or third party associated with or in vicinity of Arcadis activity.

**STOP WORK**

- Notify: Employee involved or other Arcadis employee notify Project Manager or Supervisor within 8 hours. Project Manager, Supervisor or designee must oversee process.

- Is it a Significant Near Miss (potential for severe injury or damage of greater than $5,000) or could the Near Miss result in media coverage?

  - Yes
    - Notify: Corporate H&S, Business Line Leadership, Communications and Legal, as advised by Corporate H&S
  
  - No
    - Proceed to Near Miss Investigation flowchart
Near Miss Investigation Process

Near Miss: Potential for an incident that could have resulted in illness, injury or damage to assets, but did not.

Followed Near Miss Reporting Process Flowchart?

Yes

Near Miss

Required Investigation Team: Employee Involved, Witness. Recommended: Project Manager, Task Manager or Supervisor

No

Go Back to Near Miss Reporting Process

Significant Near Miss (potential for severe injury or damage of greater than $5,000)

Required Investigation Team: Employee Involved, Witness, Project Manager, Task Manager or Supervisor (if non-project related). Recommended: Corporate H&S, Business Line Leadership as recommended during the reporting process or Legal, as advised.

Gather Facts

Determine Contributing Factors

Identify Root Cause(s) and assign Root Cause Categories

Identify and Implement Action Item(s)

Input information into H&S Database

Communicate Near Miss to project team. Create Safety Share or Safety Moment, as appropriate.
Incident Reporting Process

Incident Levels

Level 1: First aid/self-treated, work-related injury (contact WorkCare as soon as possible); minor property or equipment damage (less than or equal to $100); vehicle loss event (no injuries, no third-party involvement or other vehicle involvement).

Level 2: Professional Medical Treatment (if non-emergency injury or illness, employee must contact WorkCare as soon as possible); moderate property or equipment damage (greater than $100 but less than or equal to $5,000); any utility strike incident; any motor vehicle accident (including injury or third-party involvement).

Level 3: Immediately report fatality, severe or catastrophic injury and/or overnight hospitalization required; significant property or equipment damage (greater than $5,000); missing person or incident that generates media coverage.

* Refer to Motor Vehicle Safety Program HSGE024

Work-related incident has occurred to Arcadis employee, Arcadis subcontractor, Arcadis temporary worker, client or third party associated with or in vicinity of Arcadis activity.

If Emergency Call 911

If non-emergency, assess immediate hazards and control. For a non-emergency Arcadis employee injury, contact WorkCare (888-449-7787). Notify LIFELine (443-569-8585) as appropriate.

Notify: Employee involved or other Arcadis employee notify Project Manager or Supervisor as soon as possible.

Supervisor/Project Manager determines Incident Level (refer to definitions above).

Level 1 and Level 2 (notify within 8 hours)

Injury: Notify Corporate H&S and if non-emergency call WorkCare (888-449-7787), if not already contacted.

Any Motor Vehicle Incident, Equipment or Property Damage: Notify Corporate H&S and Legal Claims Manager.

ANY Utility Strike: Notify Corporate H&S and Legal, as advised; complete the Utility Line Strike Investigation Form.

Could the incident result in media coverage?

Yes

Immediatly notify and follow the direction of the Business Line H&S Director

Business Line H&S Director to notify: ANA H&S Director, Global H&S Advisor, Business Line Operations Director and Business Line President

水平 3

No

Follow direction of Corporate H&S and Legal, if applicable. Notify client and Senior Leaders, as required by Business Line Leadership.

Proceed to Incident Investigation Flowchart

Refer to Level 3 notification process

Once approval is issued, proceed to Investigation flowchart

Refer to Exhibit B-1 – Incident Reporting Process (Hyperlink to standalone document)
Incident Investigation Process

Incident Levels

Level 1: First aid/self-treated, work-related injury (contact WorkCare as soon as possible); minor property or equipment damage (less than or equal to $100); vehicle loss event* (no injuries, no third-party involvement or other vehicle involvement).

Level 2: Professional Medical Treatment (if non-emergency injury or illness, employee must contact WorkCare as soon as possible); moderate property or equipment damage (greater than $100 but less than or equal to $5,000); ANY utility strike incident, any motor vehicle accident* (including injury or third-party involvement).

Level 3: Immediately report fatality, severe or catastrophic injury and/or overnight hospitalization required; significant property or equipment damage (greater than $5,000); missing person or incident that generates media coverage.

* Refer to Motor Vehicle Safety Program HS0624

Did you complete Incident Reporting Process Flowchart?  

No  
Go Back to Incident Reporting Process

Yes

Incident Level 1
Required Employee Involved, Witness, Project Manager or Supervisor and Corporate H&S, as applicable

Gather Facts

Determine Contributing Factors

Select Key Contributing Factor(s)

Conduct Root Cause Analysis for each Key Contributing Factor and identify applicable Root Cause Categories

Determine applicable action items and assign a person responsible for each

Input information into H&S Database

Assign Reviewers

Incident Level 2
Required: Employee Involved, Witness, Project Manager or Supervisor (if non-project related) Corporate H&S, Senior Leaders as recommended during the reporting process, and Legal, as applicable.

Incident Level 3
Required: Employee Involved, Witness, Project Manager, or Supervisor (if non-project related) Corporate H&S, Senior Leaders as recommended during the reporting process, Legal and Human Resources, as advised.

Level 1: Project Manager or Supervisor

Level 2: PIC or Business Line Manager and Corporate H&S

Level 3: Advised by Corporate H&S

Reviewers Approve

Implement Action Items

Communicate Incident to project team. Create Safety Moment or Safety Share, as appropriate.
Exhibit C – Arcadis Temporary Workers

National Labor Relations Board (NLRB) Expansion of Joint Employer Doctrine and Potential OSHA Liability

Background

A recent NLRB decision expanded the definition of “joint employer.” Arcadis project teams should be aware that this ruling potentially could expand liability under OSHA. Though OSHA’s definition of “employer” still differs from the NLRB definition, the ruling is likely to influence OSHA’s approach to inspections and citations involving temporary employees (and contractors).

Under the NLRB’s new test, two or more otherwise-unrelated employers may be found to be a joint employer of the same employees if they “share or co-determine those matters governing the essential terms and conditions of employment.” The focus, however, is not merely on the authority you may actually exert, but rather how much power you potentially have.

Temporary Labor Staffing Agencies

For some time, OSHA’s published position has been that temporary staffing agencies and host employers share control over the employee, and are therefore jointly responsible for temp employees’ safety and health; and that it is essential that both employers comply with all relevant OSHA requirements. With the new rule, it is likely that both the staffing agencies and the host employer will be more broadly exposed to the risk of OSHA citations.

Arcadis project teams have a responsibility to maintain safe working conditions onsite including temporary staffing agency employees. While the staffing agency and host company can be, and in many circumstances are, both cited by OSHA for violations potentially impacting the safety of temp agency workers, because the host company controls the workplace and generally supervises the work, the host company is primarily responsible for complying with applicable regulations, maintaining the safety and health of the workers, and accurate recordkeeping.

As such, as the “host employer” of temporary staffing workers, Arcadis would be responsible for recording the injuries and illnesses of temporary workers when day-to-day supervision occurs, and reporting these injuries to clients. “Day-to-day supervision” is when “…in addition to specifying the output, product or result to be accomplished by the person’s work, the employer supervises the details, the means, methods and processes by which the work is to be accomplished.” Thus, when providing day-to-day supervision of temporary staffing agency employees, Arcadis should record the workplace injuries or illnesses for those staff on the Arcadis OSHA logs.

Contractors

Similar to temporary agency employees, contractors may face increased exposure to OSHA citations. OSHA’s multi-employer worksite citation policy allows OSHA to cite an employer for hazards that other employers’ employees were exposed to when OSHA finds that the employer either 1) controlled the hazard, 2) created the hazard or 3) was responsible for correcting the hazard. As a result, the NLRB’s expanded definition of “joint employer” could also expand the number of employers cited within this context, treating multiple contractors as controlling employers regardless of whether they had any real control over the hazards at the worksite.
Conclusion

When acting as the “host employer”, Arcadis should ensure that temporary staffing agency workers receive appropriate training prior to work. For instance, if Arcadis regular employees go through training programs before being allowed to perform a certain job position or job function, then a temporary worker must undergo the same regulatory agency required training, either through the temporary agency or Arcadis, before the worker can begin performing the job (e.g., OSHA Hazard Communication, HAZWOPER, MSHA, Confined Space, etc.).

Moreover, when selecting personal protective equipment (PPE), as the host employer, Arcadis likely is primarily responsible for selecting, providing and ensuring the adequate use of PPE by temporary agency workers.

In the event of a work related injury or illness to an Arcadis temporary agency worker, Arcadis will be promptly notified and the appropriate reporting procedures followed as detailed in the Arcadis Incident Reporting and Investigation Standard (ARC HSMS010). A 4-Sight entry must be completed by the Project Manager/Department Manager in order to document the injury or illness of a temporary agency worker when Arcadis is providing day-to-day supervision.

When Arcadis is providing day-to-day supervision of temporary agency workers, the total hours worked by the temporary agency works must be recorded and reported by Arcadis annually, therefore, we are currently working with Accounting to best determine how to capture these hours worked.
Exhibit D – WorkCare Incident Intervention

24/7 Toll Free Number: 888-449-7787
For Non-Emergency Injuries/Illnesses

ARCADIS EMPLOYEE INFORMATION

- Notify Supervisor
- Contact WorkCare’s Incident Intervention Hotline to speak with a clinician
- The approximate average call duration will run 30 - 60 minutes

Intake

- Intake Coordinator will ask a series of questions to identify employer, injured employee, supervisor and contact information
- Once the initial intake is completed the call is transferred to a Nurse

Assessment

- The Nurse will assess the injuries and offer self-care measures and recommendations
- If a clinic visit is needed the nurse will consult with the WorkCare physician who may speak directly with the injured worker.

Self Care

Employee and clinician agree to self care measures and a follow up schedule

The nurse follows up with the injured worker until symptoms are resolving and the WorkCare case is closed

Clinic Visit

The Nurse will make arrangements for injured worker to be seen at a local provider approved by the company

The WorkCare clinician will make contact with the treating provider and identify outcomes of visit. Once Medical care is provided the WorkCare case will be closed.

Company Corporate H&S will work with the injured worker to file Workers’ Compensation claim and Workers Compensation will manage provider payments and follow up as needed.
EXECUTIVE SUMMARY

This Injury and Illness Prevention Program (IIPP) has been developed as part of the overall ARCADIS Health and Safety Program in an effort to provide our employees with a safe and healthful working environment. This program is a supplement to the ARCADIS Health and Safety program with the specific intent of meeting the requirements of the State of California Code of Regulations, Title 8, Section 3203.

This standard serves as the ARCADIS written program for compliance with the requirements of an IIPP as contained in Title 8 of the California Code of Regulations, Section 3203 (8 CCR 3203). While it is required to be maintained by ARCADIS offices and project sites within the State of California, it is recommended that it be maintained in other ARCADIS US offices and project sites as a Best Management Practice (BMP).

The Director of Health and Safety has the authority and responsibility for the overall development and implementation of the ARCADIS IIPP.

The H&S Coordinator is responsible for implementing the IIPP at his/her office and notifying workers of updates or changes in the IIPP.

The Site Health and Safety Officer (SHSO) is responsible for implementing the IIPP at the project site and notifying site employees and subcontractors of updates or changes in the IIPP.

The ARCADIS office Location Leader, manager, and supervisor will be responsible for periodically reviewing the health and safety needs of employees under their direction, and will serve as the initial contact for their employees’ health and safety-related questions.

Employees are responsible for immediately reporting unsafe conditions in the workplace to their supervisors so that potentially hazardous situations can be addressed and in a timely fashion.

No specific training is required on this Health & Safety Standard (HSS); however, Section 5.8 defines training and competency requirements for other parts of the ARCADIS H&S program.

Documentation and records required by the IIPP standard will be maintained for a minimum of 1 year in the following locations:

− The written IIPP HSS will be maintained on The Source, which is accessible by all employees of the company.

− H&S Training will be documented in the ARCADIS training system.

− The Source, H&S team sites, and 4-Sight will be used to maintain records of inspections, incident investigations, Task Improvement Process (TIPs), Job Safety Analyses (JSAs), and other documentation.

− Site Health and Safety Plans (HASPs) and tailgate safety meeting documentation will be kept on site and in the project file at the office where the project is managed.
1. POLICY

It is ARCADIS US policy that, prior to the conduct of any task or work-related activity, hazards will be recognized and identified, analyzed, and assessed for the level of risk associated with those hazards, and that appropriate controls are implemented to assist in the prevention of injuries and illnesses to ARCADIS staff.

2. PURPOSE AND SCOPE

2.1 Purpose

This Injury and Illness Prevention Program (IIPP) has been developed as part of the overall ARCADIS Health and Safety Program in an effort to provide our employees with a safe and healthful working environment. This program is a supplement to ARCADIS’ program for the purposes of meeting the requirements of State of California Code of Regulations, Title 8, Section 3203. It references other standards and documents within the ARCADIS program to help ensure that we identify, evaluate, and correct occupational hazards or unsafe acts in the workplace that may lead to employee illness or injury.

2.2 Scope

This standard serves as ARCADIS’ written program for compliance with the requirements of an IIPP as contained in Title 8 of the California Code of Regulations, Section 3203 (8 CCR 3203). While it is required to be maintained by ARCADIS offices and project sites within the State of California, it is recommended that it be maintained in other ARCADIS US offices as well. All ARCADIS employees working in the State of California are required to be informed of their responsibility under Labor Code 6407.1, which requires them to comply with occupational safety and health standards applicable to their own actions and conduct.

For ARCADIS project sites in California, the project Health and Safety Plan (HASP) – ARC HSFS010 must include the IIPP HASP Supplement. This IIPP supplement shall be prepared to provide staff working at the site or field office with specific details on injury and illness prevention. The IIPP supplement within the HASP meets the requirements of the California CCR regulation (See Exhibit 1).

Preparation of the IIPP supplement shall be a best management practice (BMP; not a requirement) in those states where preparation of a specific IIPP is not required.

3. DEFINITIONS

Definitions of terms used with the ARCADIS H&S program are presented in ARC HSMS000 – ARCADIS H&S Management System.

4. RESPONSIBILITIES

4.1 Director of Health and Safety

The Director of Health and Safety has the authority and responsibility for the overall development and implementation of the ARCADIS IIPP. The Director of Health and
Safety and corporate H&S staff will also assist in resolving health and safety-related issues and questions as they arise.

4.2 Location Leaders, Managers, and Supervisors

In each ARCADIS California office, each Location Leader, manager, and/or supervisor will be responsible for periodically reviewing the health and safety needs of employees under their direction, and will serve as contacts for their employees' health and safety-related questions. If an issue arises that cannot be adequately addressed by the supervisor, he or she will contact the Director of Health and Safety or designate as soon as practical to resolve the issue. The supervisor is also responsible for notifying Corporate H&S within the timeframe designated by the Incident Reporting and Investigation standard (ARC HSMS010) following their being notified by an employee of a work-related injury or illness.

4.3 Office H&S Coordinators

An H&S Coordinator is designated in each office. In ARCADIS California offices, this employee is responsible for implementing the IIPP at his/her office and notifying workers of updates or changes in the IIPP. H&S Coordinators will forward employee suggestions, concerns, complaints, and other contacts regarding Health and Safety to the Corporate Health and Safety group as issues arise.

4.4 Project-Specific Site Health and Safety Officers

Similar to the Office H&S Coordinator role for ARCADIS offices, ARCADIS project sites will have a designated Site Health and Safety Officer (SHSO). The SHSO will be identified by name in the HASP and is responsible for implementing the site-specific HASP and components of this IIPP, as applicable. The SHSO will notify site workers of changes to the HASP, IIPP, and any other site-specific health and safety documents. The SHSO will forward employee, suggestions, concerns, complaints, and site-specific observations regarding site health and safety to the project H&S manager (if applicable) or to the Corporate Health and Safety group.

4.5 ARCADIS Employees

Employees are responsible for immediately reporting unsafe conditions in the workplace to their supervisors so that potentially hazardous situations can be addressed in a timely fashion. Employees must also report incidents per ARC HSMS010 to their supervisors so they can be investigated, root causes determined, and appropriate corrective and preventive actions implemented.

Employees are encouraged to communicate with their supervisors or with the Director of Health and Safety or designate whenever they have a health and safety question, concern, or suggestion.

5. PROCEDURE

5.1 General Requirements

All ARCADIS employees will conduct themselves in accordance with the ARCADIS H&S Vision and Policy as described in ARC HSMS000 – ARCADIS H&S Management System. The ARCADIS Global H&S Vision Policy describes the commitment by
ARCADIS management to align health and safety with the company’s core values of integrity, entrepreneurship, and agility. ARCADIS is committed to preventing injuries and illness for the benefit of all employees, clients, partners, and all other stakeholders.

Employees are frequently advised that they are expected to comply with the ARCADIS H&S program, including all rules, policies, and standards concerning health and safety in the workplace. Positive reinforcement and recognition of safety-conscious employees will be an integral part of the strategy to promote compliance. The company will periodically distribute discretionary awards to employees who display exemplary safety attitudes or contribute to ARCADIS’ health and safety efforts. This recognition can come from a variety of sources including supervisors, managers, H&S staff, or others.

Health and safety performance will be reviewed as a part of each employee's performance evaluation. Failure to comply with ARCADIS’ code of conduct may result in disciplinary action per the ARCADIS discipline program as administered in cooperation with the Human Resources Department.

A definition of health and safety violations includes, but is not limited to the following actions: an employee not following ARCADIS or client-specific verbal or written safety procedures, guidelines or rules, engaging in horseplay on the job, failure to wear required personal protective equipment (PPE) or abuse of selected PPE, or other such activity.

### 5.2 Communication

Employees will be informed regarding health and safety issues in the following ways:

- During initial orientation of new hires, employees will be informed of the procedures associated with this standard and ARCADIS' Hazard Communication Program (ARC HSGE007).
- New hires will be informed of the location of ARCADIS H&S standards and documents which are housed on The Source.
- H&S communications will be distributed during regular staff meetings at the project, group, or office level.
- H&S communications will be distributed via the conduct of H&S Moments at the beginning of meetings and conference calls.
- H&S communications will be distributed through regular communications via email, weekly announcements, The Source, and other vehicles.
- H&S communications will be distributed through the regular distribution of health and safety shares and lessons learned.
- H&S communications will be distributed through the ARCADIS Field Employee H&S Handbook.
- H&S communications will be distributed through periodic Health and Safety webinars or informational memoranda distributed by Corporate Health and Safety.
- Daily tailgate safety meetings will be conducted during field operations including review of the site HASP and or related Job Safety Analyses (JSAs).
• H&S communications will be distributed during various training courses provided for employees based on their job function.

Employees are encouraged to communicate directly with managers and supervisors in verbal or written form about hazardous health and safety conditions. Internal communication processes include mechanisms to ensure that employees have a way to communicate their H&S concerns, questions, suggestions, comments, or other issues. Once appropriate action is taken, the employee raising the issue is (at a minimum) provided a response within a practical timeframe.

Internal communication may be accomplished through a variety of vehicles, including but not limited to company newsletters, H&S moments, emails, Safety Shares, and Snap Communications. In addition, through the ARCADIS risk management tools, feedback is provided to discuss safe and questionable behaviors when appropriate.

Additionally, communications resulting from regulatory requirements are distributed to ensure employee access to the information.

It is the policy of ARCADIS that employees who report a hazardous situation or make a suggestion for improving health and safety conditions in the workplace will not be subject to any type of retaliation. In addition, anonymous reporting of concerns, complaints, or suggestions is also available through the ARCADIS Employee Assistance Program (EAP).

5.3 Hazard Recognition, Identification, Assessment, Communication, and Control

Hazard recognition, identification, assessment, communication, and control processes are defined by the following ARCADIS HSS:

ARC HSMS000 – ARCADIS H&S Management System
ARC HSMS002 – Hazard Assessment and Risk Control
ARC HSFS010 – Health and Safety Plans
ARC HSMS010 – Incident Reporting and Investigation
ARC HSGE007 – Hazard Communication

All project sites are required to have a HASP prepared in accordance with the above referenced HSS. The HASP will include a detailed hazard assessment identifying hazards and hazard controls for each planned task and scope of work specific to the project.

All employees are empowered, authorized, and expected to use their Stop Work Authority if they feel their health and safety is or is perceived to be compromised.

Unsafe or unhealthy conditions and work practices must be corrected expeditiously, with the most hazardous exposures given correction priority.

5.4 Incident Reporting and Investigation
Per ARC HSMS010, loss and near miss incidents will be reported and investigated. Through the use of the 4-Sight database, these investigations will determine the contributing factors and root causes of incidents, and the identification and implementation of corrective and preventive actions. Contributing factors, root causes, and corrective actions will be communicated to appropriate staff related to lessons learned developed from the incident investigation.

5.5 H&S Procedures

ARCADIS employees will follow the ARCADIS H&S standards and/or the ARCADIS Employee Field H&S handbook as published on the H&S section of The Source. These HSS form the basis for the code of conduct expected by ARCADIS staff including supervisors, managers, and leaders.

5.6 H&S Inspections

Periodic inspections of the workplace (office or project site) will be conducted by performing Task Improvement Process (TIP), evaluations, ARCADIS global/Third Party/Client-led assessments, and H&S site visits per the ARCADIS audit and assessment processes described in ARCADIS H&S Standard ARC HSMS009 – H&S Conformance Assessments. For the purposes of this HSS, the primary criteria for completing H&S inspections include inspections based on hours worked at the project site and/or the risk ranking of hazards present. The frequency of these inspections depends on the operations involved, the magnitude of the hazards, the proficiency of employees, changes in equipment or work processes, and the history of work-place injuries and illnesses. Inspections should be conducted by personnel who, through experience or training, are able to identify actual and potential hazards and understand safe work practices. The project site or office is expected to complete routine H&S inspections. An inspection must be completed when an injury or incident has occurred or where a hazard analysis has not been completed.

5.7 Corrective and Preventive Action

Root causes will be determined for deficiencies identified during inspections, issues identified during incident investigations, and questionable behaviours identified during TIPs. Based on these root causes, the appropriate solutions will be determined and implemented per ARC HSMS011.

5.8 Competency, Training, and Experience

ARCADIS US defines and documents the necessary competence levels that their employees require to work in conformance with the ARCADIS H&S Vision and Policy. A training matrix is provided to assist supervisors and managers in selecting training that employees need to maintain the defined competencies required for their job responsibilities. Competency is achieved through a variety of mechanisms including:

- Training
- Education
- Experience
In addition, ARCADIS defines and implements methods to evaluate the effectiveness of training provided to employees. These methods may include but are not limited to:

- Written or oral testing
- Auditing and review
- Hands-on demonstrations
- Behavioral observations and feedback

ARCADIS ensures that training is completed to meet company, legal, and client requirements within our areas of operation. In addition, ARCADIS US trains its employees and makes them aware of:

- The importance of conforming to the H&S Vision and Policy and any standards provided them to conduct their work in a healthy and safe way
- The H&S consequences of their work and the benefits of completing their work in a safe and healthful fashion
- The employees' roles and responsibilities within the HSMS
- The safe behaviors for completing job tasks and the at-risk or unsafe behaviors that could result in employee injury or illness

Documentation of health and safety training for each employee is maintained for at least 1 year.

5.9 Emergency Planning, Preparedness, and Response

Each location will develop and implement an emergency preparedness and response plan per ARC HSMS008.

6. TRAINING

No specific training is required on this HSS; however, Section 5.8 defines training and competency requirements for other parts of the ARCADIS H&S program.
7. REFERENCES

H&S Page on The Source

ARC HSFS010 – Health and Safety Plans

ARC HSGE007 – Hazard Communication

ARC HSMS000 – ARCADIS H&S Management System

ARC HSMS002 – Hazard Assessment and Risk Control

ARC HSMS008 – Emergency Preparedness and Response

ARC HSMS010 – Incident Reporting and Investigation

ARC HSMS009 – H&S Conformance Assessments

8. RECORDS

Consistent with the ARCADIS Human Resources Records Retention policy HR 2.12, documentation and records required by the IIPP standard will be maintained for a minimum of 1 year in the following locations:

- The written IIPP will be maintained by the Director of Health and Safety on The Source, which is accessible by all employees of the company.

- H&S Training will be documented in the ARCADIS training system.

- The Source, H&S team sites, and 4-Sight will be used to maintain records of inspections, incident investigations, TIPs, Job Safety Analyses (JSAs), and other documentation.

- Site HASPs and tailgate safety meeting documentation will be kept on site and in the project file at the office where the project is managed.

9. APPROVALS AND HISTORY OF CHANGE

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

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 January 2010</td>
<td>01</td>
<td>Mike Thomas</td>
<td>Original document</td>
</tr>
<tr>
<td>16 April 2012</td>
<td>02</td>
<td>Sue Byers</td>
<td>Executive Summary added; terminology changed from JLA to JSA, LPO to TIP</td>
</tr>
<tr>
<td>25 June 2014</td>
<td>03</td>
<td>Alec MacAdam/Tony Tremblay</td>
<td>Updated Header/Footer; updated online reference from APEX to The Source; updated for CalOSHA CCR Title 8 3203 compliance; section 5.6 clarifies “project site or office inspections will be conducted based on the operations involved, the magnitude of the hazards, the proficiency of employees, changes in equipment or work processes, and the history of workplace injuries and illnesses”, and inclusion of the IIPP HASP Supplement</td>
</tr>
</tbody>
</table>
EXHIBIT 1 – IIPP HASP Supplement Template

Link to IIPP HASP Supplement

IIPP HASP Supplement for Project Sites and Offices

The purpose of the ARCADIS Illness and Injury Prevention Program (IIPP) is to establish location specific written guidelines to ensure the safety of employees working at ARCADIS offices or project sites located in the state of California (best management practice for other locations). It is the intention of ARCADIS to provide a safe and healthy working environment for all of its employees.

All ARCADIS employees and subcontractors will be offered a copy and are required to implement and follow the principles set forth in this IIPP.

The purpose of this HASP Supplement is to communicate the specific details of the IIPP associated with the specific California office or project site for which this supplement has been prepared.

A copy of the ARCADIS H&S Standard ARC HSGE008 (Injury and Illness Prevention Program) must be included as an attachment to all California project site HASPs or office Emergency Response Hazard Communication Plans to meet the requirements of CCR Title 8 3203.

The programmatic details of the ARCADIS H&S Standard ARC HSGE008 are incorporated by reference.

This IIPP HASP supplement has been prepared to be used as a location specific IIPP template to address the required components of the IIPP as mandated by CCR Title 8, Section 3203.

Scope and Application:
This document serves as the written Injury Illness Prevention Plan for ARCADIS activities for the following ARCADIS office and/or project site:

ARCADIS Office or Project Site: __________________________________________________________________________

This HASP supplement is supported by the following documents, which are presented as references supporting this supplement:

ARCADIS Office or Project Site Documents:
(e.g., HASP or Office Emergency Response & HazCom Plan, Field Sampling Plan, SOPs, etc.)

Responsibility §3203(a)(1):
Roles and responsibilities are detailed in the office/site HASP. See the "Emergency Information" and "Tasks, Roles & Training Sections".

ARCADIS California IIPP Program Administrator:
ARCADIS Office H&S Coordinator / Site Health and Safety Officer: __________________________________________________________________________
Compliance §3203(a)(2):
All employees are responsible for applying the ARCADIS TRACK process in evaluating hazards and assessing risk for all work tasks, using safe work practices, following all directives, policies and procedures, and for assisting in maintaining a safe work environment. See the ARCADIS H&S Standard ARC HSGE008 for the steps detailing compliance with the ARCADIS H&S program.

Communication §3203(a)(3):

ARCADIS recognizes the importance of two-way communication between management and staff to address health and safety issues with the objective of planning for and maintaining an injury-free, productive workplace. A description of the policy and procedures developed to facilitate a continuous flow of health and safety focused communications between management and staff is provided in the ARCADIS H&S Standard ARC HSGE008.

Office/site specific workplace hazard methods of communication include the following:

- Site Health & Safety Plan
- Tailgate Safety Meetings
- Job Safety Analysis (JSA)
- Safety Data Sheets (SDS)
- Task Improvement Process (TIPs)
- Emergency Response & HazCom plan
- Safety Committee Meetings
- Safety bulletins/Client procedures
- Other:

Workplace Hazard Assessment §3203(a)(4):
Initial workplace hazard analysis is completed during the preparation of the project site HASP or office HazCom plan. Periodic inspections will be performed to identify and evaluate workplace hazards in all areas of the office or project site. Inspections and the associated observations will be conducted in accordance with the ARCADIS H&S Standard ARC HSGE008. Periodic inspections will consist of identification and evaluation of workplace hazards using the H&S management assessments, H&S compliance assessments, TIPs, site/office inspections or ARCADIS global/Third Party/Client-Led H&S assessments to identify and evaluate workplace hazards.

Note: The primary criteria for conducting inspections are the number of hours worked at the site or office and the risk ranking of the hazards present. See the project specific HASP "Signatures" tab or office Emergency Response and Hazard Communication plan for a detail of proposed TIPs, assessments and inspections.

Accident Investigations §3203(a)(5):
All near misses, calls to WorkCare, and injuries must be reported to ARCADIS Corporate H&S as soon as possible. Procedures for investigating workplace accidents, incidents and injuries are described in the ARCADIS H&S Standard ARC HSGE008 and documents referenced therein. For incidents involving third parties the ARCADIS Legal Counsel must be contacted. Approval from legal counsel is required before a 4-Sight incident investigation entry is prepared.
Hazard Correction and Communication §3203(a)(6):
Unsafe or unhealthy work conditions, practices or procedures shall be corrected in a timely manner based on the severity of the hazard(s). Hazards shall be corrected according to the procedures outlined in the ARCADIS H&S Standard ARC HSGE008.

Note: When an imminent hazard exists which cannot be immediately abated without endangering employee(s) and/or property, All ARCADIS employees and subcontractors will Stop Work and leave the area. Employees identified to correct the hazardous condition will do so only when provided with the necessary training and protection to address the hazard safely.

Training and Instruction §3203(a)(7):
All employees, including managers and supervisors, shall have training and instruction on general and job-specific health and safety practices. Project site specific training requirements are communicated in the site specific HASP under the "Tasks, Roles and Training" tab. A detailed discussion of the competency, training requirements and training process for the IIPP are covered in the ARCADIS H&S Standard ARC HSGE008.

Record Keeping §3203(b)(1) & (2):
Records of workplace hazard assessments and inspections will be maintained in accordance with the ARCADIS Human Resources policy HR 2.12 for record retention. Project teams or office staff who are responsible for recording of the assessment or inspection will include at a minimum; the person(s) conducting the inspection, any unsafe conditions and work practices that have been identified and the action taken to correct the identified unsafe conditions and work practices.
Also, Documentation of health and safety training for each employee including the employees name, training dates, training program, and training providers are recorded and maintained by the ARCADIS Training Center. All employees receiving training conducted via third party training vendors are required to send a certificate of completion or similar record to the Training Center.

Labor - Management Safety Committee §3203(a)(3):
Establishment of a "Labor - Management Safety Committee" is a recommendation of §3203(c) when working in facilities with unionized employees and as such is not required for an IIPP to be complete. If establishment of a Labor - Management Safety Committee is not applicable the process and procedures to formalize, document and communicate the health and safety related reporting is described in this IIPP. The components of the ARCADIS H&S Communications program is provided in the ARCADIS H&S Standard ARC HSGE008.

Notes:
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 (ug/m³) lead in air 8-hour time weighted average (TWA).

- **OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)**
  - TWA - 50 ug/m³ lead in air averaged over an 8-hour period.

- **ACGIH THRESHOLD LIMIT VALUES (TLVs)**
  - TWA – 50 ug/m³ 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.
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 affected 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. RESPONSIBILITY

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 have the appropriate and applicable training for lead prior to those staff beginning work.
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 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.

4.5 Competent Person

Competent Person duties include identifying lead hazards and taking corrective action. For example, to ensure employee exposure to lead is below the OSHA PEL, Competent Person duties may include:

- Determine prior to the performance of the job whether lead is present in the workplace,
- Ensure the adequacy of any employee monitoring data and exposure assessments,
- Ensure that all employees wear required protective work clothing and personal protective equipment (PPE) and are trained in and use appropriate exposure control methods,
- Ensure that proper hygiene facilities are provided and that employees are trained and use those facilities,
- Ensure that engineering controls are designed, operated and maintained properly,
- Demarcate lead work areas, and
- Take effective measures to reduce lead hazards.

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 workplace 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

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

- OSHA ACTION LEVEL – 30 micrograms per cubic meter of air (µg/m³) lead in air 8-hour time weighted average (TWA).

- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
  - TWA - 50 µg/m³ lead in air averaged over an 8 hour period.

- ACGIH THRESHOLD LIMIT VALUES (TLVs)
  - TWA – 50 µg/m³ 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.

5.1.2 Exposure Limits and Regulated Areas

Protective Devices (e.g., locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware) are provided to staff. These devices are used for isolating, securing or blocking of machines or equipment from electrical energy sources.
PPE as specified by NFPA 70E is provided to ARCADIS staff and staff are advised that PPE must be used for the intended part of the body to be protected and for the work to be performed. PPE requirements shall be specified in the Electrical Task Hazard Assessment sheet (refer to template in Exhibit 8), and must be used by ARCADIS personnel. PPE is used during servicing (trouble-shooting) of equipment, and as specified in the THA developed.

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.
- 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 at 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 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.

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

5.1.6 Exposure Monitoring

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:

```
DANGER
LEAD WORK AREA
POISON
NO SMOKING OR EATING
```

[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:

```
CAUTION
ITEMS CONTAMINATED WITH LEAD
DO NOT REMOVE DUST BY BLOWING OR SHAKING
DISPOSE OF LEAD CONTAMINATED MATERIALS AND WASH WATER IN ACCORDANCE WITH LOCAL, STATE (PROVINCIAL) OR FEDERAL REGULATIONS
```
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, the Project Health and Safety Staff, and/or the Competent Person 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
  - 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.

- 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
- If employee personal exposures are reasonably expected to exceed the PEL on at 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 the ARCADIS Medical Surveillance Program Health and Safety Standard (ARC HSGE010). 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 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

7. REFERENCE DOCUMENTS AND ASSOCIATED STANDARDS

• OSHA 29 CFR 1910.1025 – Lead
• OSHA 29 CFR 1926.62 – Lead
• ACGIH TLV 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

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

<table>
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<tr>
<th>Revision Date</th>
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<td>26 March 2007</td>
<td>01</td>
<td>Mike Thomas/Pat Vollertsen</td>
<td>Original Document</td>
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<td>6 September 2007</td>
<td>02</td>
<td>Mija Coppola</td>
<td>Changing to new template format</td>
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<tr>
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<td>Sue Byers</td>
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<tr>
<td>17 April 2012</td>
<td>04</td>
<td>Camille Carollo/Tony Tremblay</td>
<td>Added Executive Summary</td>
</tr>
<tr>
<td>12 February 2014</td>
<td>05</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>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</td>
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<td>5 October 2014</td>
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<td>Tony Tremblay</td>
<td>Header/Footer title correction, History of Change format update and Standard Review</td>
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<td>18 May 2015</td>
<td>07</td>
<td>Sharon Lingle/Tony Tremblay/Sheila Drew</td>
<td>Executive Summary, Section 4.5 and Section 5.1.7 adds competent person definition and duties. Added Competent Person to Exhibit 1 – Definitions. Reformatting.</td>
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</table>
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.

**Competent Person** means one who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them. By way of training and/or experience, a competent person is knowledgeable of the lead standards, is capable of identifying workplace lead hazards and has the authority to correct them.

**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.

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.
EXECUTIVE SUMMARY

The purpose of the medical surveillance program is to monitor the health of employees who are or may be exposed to occupational hazards including but not limited to airborne materials, physical hazards and noise and to provide clearance for the employee to perform the duties of their job.

Minimally, the following Arcadis employees will be included in the program:

- Individuals who are on project sites performing work where there is a potential for exposure to hazardous substances/chemicals and will be on such sites performing such work for 30 days or more a year;

- Sites with hazardous substances/chemicals include HAZWOPER sites and may include plants, facilities, manufacturers, warehouses or construction sites where there is a potential for exposure to hazardous substances or health hazards;

- Those who will/may be required to wear an air purifying respirator;

- Those who become ill or develop signs or symptoms indicative of a possible overexposure involving hazardous substances or health hazards;

- Those exposed to occupational noise levels at or above 85 decibels (A scale) as averaged over an 8 hour workday or who have been diagnosed with occupational noise induced hearing loss, and

- Those working on a site in which the client requires participation in the program.

Operations Managers ensure that employees have access to obtain proper medical clearance prior to assuming the duties for which the clearance is required.

Project Managers/Supervisors ensure that all Arcadis project personnel (including temporary agency workers contracted by Arcadis) have valid medical clearances prior to starting an Arcadis work activity.

Employee ensures that his/her medical and respiratory clearances are current before entry on a site which requires such clearances.

Medical examinations, as well as any necessary follow-up examinations, will be scheduled by a third party administrator (TPA) for the Arcadis medical surveillance program (currently WorkCare (1-800-455-6155)) directly with the employee.

All employees must have the appropriate medical clearance prior to respirator fit testing and use of any respiratory protective equipment.

Medical records will be maintained by the Arcadis TPA in compliance with the Occupational Safety and Health Administration. Employees may obtain a copy of their complete medical record by contacting the medical surveillance TPA directly and a copy will be provided at no cost to the employee.
1. POLICY

Arcadis considers the health and safety of its employees of utmost importance. It is the policy of Arcadis to provide a Medical Surveillance Program to employees in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1910.95 Occupational Noise Exposure, 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER), 29 CFR 1910.134 Respiratory Protection, 29 CFR 1910 subpart Z, and as identified in this program.

This policy details the necessary provisions for administering and coordinating the Arcadis Medical Surveillance Program.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of the medical surveillance program is to monitor the health of employees who are or may be exposed to occupational hazards including but not limited to airborne materials, physical hazards and noise and to provide clearance consistent with the OSHA 1910.120 HAZWOPER regulations for the employee to perform the duties of their job.

This Health and Safety Standard (HSS) provides standard practices for Arcadis employees participating in the Medical Surveillance Program.

2.2 Scope

Minimally, the following Arcadis employees will be included in the program:

- Individuals who are on project sites performing work where there is a potential for exposure to hazardous substances/chemicals and will be on such sites performing such work for 30 days or more a year;
  - Sites with hazardous substances/chemicals include HAZWOPER sites and may include plants, facilities, manufacturers, warehouses or construction sites where there is potential exposure to hazardous substances or health hazards.
- Those who will/may be required to wear an air purifying respirator;
- Those who become ill or develop signs or symptoms of possible overexposure involving hazardous substances or health hazards;
- Those exposed to occupational noise levels at or above 85 decibels (A scale) as averaged over an 8 hour workday or who have been diagnosed with occupational noise induced hearing loss; and
- Those working on a site in which the client requires participation in the program.
Employees included in the Medical Surveillance Program must have the appropriate medical clearances prior to performing any field activity that falls under 29 CFR 1910.120 and this program. Individuals not having the appropriate clearances are not permitted to enter an Exclusion Zone (EZ) or Contaminant Reduction Zone (CRZ). Employees not having the appropriate medical clearances may, however, enter the Support Zone (SZ) unless otherwise prohibited by the client.

3. DEFINITIONS

There are no definitions specific to this HSS.

4. RESPONSIBILITIES

4.1 Operations Manager

Provide resources to ensure that employees have access to obtain proper medical clearance prior to assuming the duties for which the clearance is required.

4.2 Project Managers/Supervisors/Group Leaders

- Ensure that all project personnel have valid medical clearances prior to starting an Arcadis work activity.

- Using the Medical Surveillance Program Decision Flowchart (Exhibit 1), complete the Medical Surveillance Determination and Request Form (Exhibit 2) with each employee when hired and periodically as job functions change.

- Ensure that an individual employee does not exceed, or is subjected to, a condition which would breach any medical restriction identified by the Medical Surveillance Program.

4.3 Corporate Director of Health and Safety Administration

- Overall program coordination including assurance that a review of this HSS with necessary changes is done routinely.

- Works with the Business Line H&S Directors to ensure appropriate communication of this HSS to Arcadis employees.

4.4 Corporate H&S Medical Surveillance Program Administrator

- Overall program coordination, including maintaining necessary communications with the medical surveillance TPA, Arcadis employees and Arcadis Business Line H&S Directors.

- Follow-up on medical clearance reports that indicate a medical restriction or deferment requiring action on the part of the employee and/or supervisor.
4.5 Employees

- Reviews medical surveillance program Not Qualified "NQ" reports provided by the medical surveillance TPA identifying Arcadis employees who are overdue for their surveillance physicals and provides status reports to Business Line H&S Directors.

- Ensures that his/her medical and respiratory clearances are current before entry on a site which requires such clearances. If not current, notifies the PM or appropriate Arcadis employee before entering the site.

- Ensures that his/her field activities are within the constraints of any identified medical restriction.

- Completes, in full, the medical and occupational questionnaires provided by the medical surveillance TPA prior to the medical examination.

- Honors the scheduled medical examination appointment. At least 24-hour notice is expected if the appointment must be cancelled. Failing to provide advance appointment cancellation will result in “No Show” fees being charged to Arcadis by the clinic. Appointment re-scheduling fees assessed by the medical surveillance TPA also apply following the initial re-scheduling of a cancelled appointment.

- Maintains the medical clearance wallet card provided by the medical surveillance TPA on their person at job sites that require medical clearance.

- Provides feedback to the medical surveillance TPA via the FAQ information included in the exam appointment protocol if the employee experiences difficulties with the exam including but not limited to; a delay of more than 20 minutes for their exam, poor or painful blood draws, poorly operated, or malfunctioning equipment, or if the clinic suggests or requests any additional exam components or is not able to complete all of the components as ordered on the date of the exam.

4.6 Medical Surveillance Program Third Party Administrator

- In conjunction with Arcadis, establishes the examination protocol and occupational and medical history questionnaires.

- Establishes quality clinics for administering medical examinations.

- Reviews exam results submitted by clinics to determine medical clearance.
  
  - As necessary, works with individual employees to clarify medical information so as to determine medical clearance.

- Provides appropriate medical clearance in the form of a “Wallet Card” or similar document. An alternative Work Status Report also referred to as a “Medical Clearance” will be provided upon request (See Exhibit 3).

- Answers questions in regard to specific exam protocol (e.g., tests for particular chemicals).
The current Arcadis TPA is WorkCare (1-800-455-6155 for Medical Surveillance Program and 1-888-449-7787 for the Incident Intervention Program Hotline).

5. PROCEDURE

5.1 Medical Surveillance Management

Arcadis has retained a medical surveillance TPA for administration of the Medical Surveillance Program. No additional medical examinations, clinics, protocols, etc., for the purpose of medical monitoring as it relates to this program are permitted unless necessary to meet site or client specific conditions or as agreed to by the Director of Health and Safety.

- Any occupational exposure or biological monitoring required to be conducted by a project team that is not included the established exam protocols, (e.g. project specific testing of employees for constituents such as benzene, lead etc.) needs to be discussed with the Corporate H&S Medical Surveillance Program Administrator and/or the medical surveillance TPA occupational health physician, prior to an exam appointment.

- Any project specific occupational exposure or biological monitoring program deemed to be necessary will be charged back to the client. Project teams are to provide the medical surveillance TPA with the appropriate charge number at the time of implementing the monitoring.

- Any testing or monitoring associated with an occupational exposure or possible occupational exposure needs to be communicated to the TPA’s Incident Intervention Program Hotline (WorkCare (1-888-449-7787)) as soon as possible.

5.2 Medical Examinations

5.2.1 Medical Surveillance Examinations

The following types of medical surveillance exams are offered at no cost to the employee and are tailored based on the occupational hazard exposure being monitored:

- Baseline Examination

- Periodic Examinations (Annual, Biennial or as determined by the employee based on their role, by physician or by regulation)

- Occupational Exposure / Possible Occupational Exposure

- Exit Exams

Medical examinations, as well as any necessary follow-up examinations, will be scheduled by the medical surveillance TPA. The medical surveillance TPA will notify employees via e-mail within 30-45 days of the due date of their periodic examination. Periodic examinations must be scheduled and completed prior to the due date. If a periodic examination is not completed within the appropriate time, the medical surveillance TPA will contact the employee via email.
documenting the employee is not qualified “NQ” to work on any HAZWOPER site or other site requiring medical clearance until the examination has been completed. The medical surveillance TPA will also routinely provide a list to the Corporate H&S Program Administrator of employees who are currently listed as having NQ status.

5.2.2 Exams Following Occupational Exposure / Possible Occupational Exposure

In the event of an occupational exposure or possible occupational exposure, the person on site responsible for safety:

- Contacts TPA’s Incident Intervention Program Hotline (WorkCare (1-888-449-7787)) unless it is a medical emergency in which case emergency treatment should be sought immediately. An occupational health physician will assist in determining what medical steps need to be taken.

- Notifies the Arcadis Corporate H&S group.

- Conducts the incident investigation per ARC HSMS010 Incident Reporting and Investigation HSS.

For sound exposure equal to or exceeding an 8-hour time-weighted average of 85 decibels. Arcadis will maintain an audiometric testing program as follows:

- Audiometric testing will be carried out within 6 months of an employee's first exposure at or above the action level;

- Arcadis will establish a valid baseline audiogram against which subsequent audiograms can be compared; and

- At least annually after obtaining the baseline audiogram, Arcadis will obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

5.2.3 Changing Frequency of Required Exams and OSHA HAZWOPER Compliance

Individuals may request to change from an annual exam to a biennial (every two years) exam without limiting the ability to complete HAZWOPER site work. An occupational health physician may establish the required frequency for periodic medical examinations for covered employees to less than annually, but not greater than every 2 years, if the physician believes it is appropriate. The process to change exam frequency will begin with an evaluation between the individual and their direct supervisor or group leader discussing the conditions listed below. Using the Medical Surveillance Program Decision Flowchart (Exhibit 1), complete the Medical Surveillance Determination and Request Form (Exhibit 2). Submit the form to the medical surveillance TPA to initiate review by the occupational health physician. The employee may change exam frequency if ALL of the following conditions are met:
• Supervisor approves (documentation of approval via email to be provided to the medical surveillance TPA);

• Defined frequency is not required by a client;

• Defined frequency is not required by relevant regulation(s);

• 30 days or less per year for potential chemical/hazardous exposure;

• No possibility of respirator use; and

• The medical surveillance TPA occupational health physician gives medical approval for the individual to change to biennial. The completion of the medical history questionnaire and/or a final medical examination may be required prior to making the determination.

If any of the above conditions are not met, the employee will maintain an annual exam schedule.

5.2.4 Changing Frequency of Required Exams for Programs Other Than HAZWOPER

Medical surveillance monitoring for other programs (i.e. hearing conservation, asbestos, benzene, etc.) is typically offered annually only with no biennial option. Refer to the individual Health & Safety Standards for additional requirements.

5.2.5 Medical Surveillance Program Opt Out

Individuals may request to opt out of the program entirely. A medical surveillance TPA occupational health physician will determine if an individual can opt out of medical surveillance. The process to opt out will begin with an evaluation between the individual and their direct supervisor or group leader discussing the conditions listed below. Using the Medical Surveillance Program Decision Flowchart (Exhibit 1), complete the Medical Surveillance Determination and Request Form (Exhibit 2). Submit the form to the medical surveillance TPA to initiate review by the occupational health physician. The employee may exit the program if ALL of the following conditions are met:

• Supervisor approves (documentation of approval via email to be provided to the medical surveillance TPA);

• Participation in a surveillance program is not required by a client;

• No possibility of respirator use;

• Ongoing surveillance is not required by regulations;

• Any previous exposures are below regulatory limits; and

Page 7 of 13
• The medical surveillance TPA occupational health physician gives medical approval for the individual to opt out.

• If the employee has had an examination within the prior six (6) months, the medical surveillance TPA occupational health physician may require the completion of the medical history questionnaire and/or a final medical examination prior to making the determination.

If any of the above conditions are not met, the employee will stay in the medical surveillance program.

Note: Employees can enter back into the medical surveillance program at any time if required in the future. Therefore, employees who need to maintain their OSHA HAZWOPER training compliance are not, by default required to maintain their “Qualified” status in the medical surveillance program. Those employees should consider maintaining certification within the HAZWOPER program by completing the annual 8-hr HAZWOPER Refresher training.

5.2.6 Occupational Health Physician Acknowledgement of Exam Changes

If the medical surveillance TPA is in agreement, the occupational health physician will issue an acknowledgement via email approving the employee can opt out or change the exam frequency.

If the doctor determines that it is not medically appropriate, the employee will be notified. Questions regarding this determination will be addressed to the occupational health physician who made the decision.

5.2.7 Medical Surveillance Program Exit Examinations

Exit examinations are offered for the following scenarios:

• To employees who still work for Arcadis but are no longer conducting work that requires medical surveillance;

• To individuals participating in the medical surveillance program during exit proceedings who voluntarily or involuntarily terminate their employment at Arcadis and have not had an examination in the preceding six (6) months and within 30 days of termination; and

Exiting employees are asked to complete the Exit Exam Declination or Acceptance Form (See Exhibit 4) noting whether they wish to pursue or decline the examination.

5.3 Respirator Certification

All employees must have the appropriate medical clearance prior to respirator fit testing and use of any respiratory protective equipment. See the Arcadis Respiratory Protection H&S Standard ARC HSGE017 for a full discussion.
5.4 Medical Work Status Report “Wallet Cards” (Clearance)

The medical surveillance TPA provides examination findings and a separate “Wallet Card” Medical Work Status Report (“Clearance”) to employees at their home addresses. The wallet card is the default “clearance” document issued. An alternative Work Status Report can be requested from the medical surveillance TPA. The wallet card or Work Status Report documents whether the employee is “Qualified”, “Not Qualified”, or “Qualified – With Limitations” to perform the work.

The medical surveillance TPA provides a copy of the Medical Work Status Report when it involves a “Notification of Limitation” to the Arcadis Corporate H&S Program Administrator that addresses an employees Qualified – With Limitations or permanent deferment work status. In cases of Qualified - With Limitations or permanent deferment, Arcadis is notified and the Program Administrator will contact the employee and his/her supervisor or Group Leader to ensure that all are aware of the limitations or deferment. Personal identifiers (home address, date of birth, social security number, payroll number, etc.) are removed from notifications of limitations before being provided to the program administrator (see example in Exhibit 3).

If medical exam results indicate conditions exceeding regulatory limits (i.e., blood lead levels), the employee will be notified within the time frame required in the regulation and consistent with the guidelines set forth in the Arcadis ARC HSIH009 Industrial Hygiene H&S Standard.

6. TRAINING

There is no specific training required by this HSS.

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

29 CFR 1910.95 Occupational Noise Exposure
OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER)
29 CFR 1910.134 Respiratory Protection
29 CFR 1910 subpart Z
Arcadis ARC HSMS010 Incident Reporting and Investigation H&S Standard
Arcadis ARC HSIH009 Industrial Hygiene H&S Standard
Arcadis ARC HSGE017 Respiratory Protection H&S Standard
Arcadis ARC HSIH 003 Benzene
Arcadis ARC HSIH006 Cadmium
Arcadis ARC HSIH 008 Hearing Conservations Health & Safety Standard
8. RECORDS - DATA RECORDING AND MANAGEMENT

Medical Records

- Comprehensive medical records will be maintained by the medical surveillance TPA in compliance with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.95, 29 CFR 1910.120, 29 CFR 1910.134, 29 CFR 1910.95 and 29 CFR 1910 subpart Z. Employees may obtain a copy of their complete medical record by contacting the medical surveillance TPA directly and a copy will be provided at no cost to the employee.

- Upon an employee's first entering into employment, and at least annually thereafter, information must be given to current employees of the existence, location, availability and the person responsible for maintaining and providing access to records and each employee's rights of access to these records.

Personal Exposure Monitoring Results Notification

- All records regarding occupational exposure measurements will be provided to employees by the project manager, Site H&S Officer or the qualified person responsible for administering the exposure monitoring program, maintained in the applicable project team file and copies of such exposure monitoring records provided to both Corporate H&S (4-sight-support@arcadis-us.com) and Human Resources (HRSolutionsCenter.ANA@arcadis.com) for file retention. See the Arcadis ARC HSIH009 Industrial Hygiene HSS for additional information.

9. APPROVALS AND HISTORY OF CHANGE

Julie Santaniello, CSP - Corporate H&S, Manager of Technical Programs
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<td>02</td>
<td>Lauren Edwards</td>
<td>Executive Summary Added; Updated Exhibit 1 with new contact information</td>
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<td>01 October 2013</td>
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<td>Ketzia Betancourt/Lauren Edwards</td>
<td>Section 5.2 – audiometric testing required within 6 months of exposure to noise exceeding 85 dBA as an 8-hour TWA.</td>
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<td>Tony Tremblay/Alec MacAdam/Sharon Lingle</td>
<td>Header/footer format update; history of change table format update; document format revised; Section 4.3 HSS timeline review changed from annual to routinely; Section 5.2 audiometric testing requirements clarified for employee noise exposure; Section 5.2.2 chemical exposure revised to indicate that employees must have 30 days or less per year for potential chemical/hazardous exposure; Section 7 references hyperlinked; Section 8 reference to 29 CFR 1910.95 added; Section 8 Clarifying process for employees right of access to medical records from WorkCare and what information is included in the records. Added Exhibit 1 Copy of WorkCare Work Status Report Example and revised contact information for Exhibit 2.</td>
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<td>6 October 2015</td>
<td>05</td>
<td>Alec MacAdam</td>
<td>Template Update. Section 5.1 clarification of billing for project specific biological monitoring; Sections 5.2.2 &amp; 5.2.3 clarify documentation of supervisor approval; Section 7 ARCHSIH009 reference; Section 8 Personal Exposure Monitoring Results Notification reference.</td>
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<td>Alec MacAdam/ Tony Tremblay/ Julie Santaniello</td>
<td>Section 5.1 WorkCare IIP Hotline updated; Section 5.2 clarified exposures as “occupational” updated IIP Hotline number; Section 5.4 clarified Wallet cards are default clearance document; Exhibit 2 updated contact info.</td>
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<td>30 June 2016</td>
<td>07</td>
<td>Denis Balcer/Alec MacAdam/ Julie Santaniello</td>
<td>Generalized “WorkCare” references; Section 5.2.3 inserted statement about occupational physician establishing exam frequency; added section on “Changing Frequency of Required Exams for Programs Other Than HAZWOPER” as section 5.2.4; clarified requirements of exiting an MSP in Section 5.2.5; moved section on “Occupational Health Physician Acknowledgement of Exam Changes” to Section 5.2.6; added links to Benzene, Cadmium, Hearing Conservation, Asbestos and Lead HSS to References; Medical Surveillance Program Decision Flowchart inserted as Exhibit 1; Medical Surveillance Determination and Request Form inserted as Exhibit 2; Example Work Status Report and Exit Exam Acceptance/Declination moved to Exhibit 3 and 4, respectively; Exhibit text references updated; HSS reviewer changed from Tony Tremblay to Julie Santaniello.</td>
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Exhibit 1 – Medical Surveillance Program Decision Flowchart

Do you go to sites where potential exposure is possible to chemical hazards, metals, substances and/or noise?

Yes

Do you perform HAZWOPER work?*

Yes

Do you perform work under any other program that requires medical surveillance?*

No

Opt out or no MSP required

No

Follow the MSP for the specific standard and discuss with WorkCare or Corporate H&S

Medical Surveillance Program (MSP) required per HAZWOPER Standard

Is hazardous exposure occasional?*

Yes

Biennial frequency

No

Annual frequency

Do you have the potential in the future?

No

Opt out or no MSP required

Notes:

1 HAZWOPER work includes:
   - Cleanup operations at uncontrolled hazardous waste sites (e.g. Superfund sites)
   - Corrective actions involving cleanup operations at sites covered by the RCRA and initial investigations for suspected impacts
   - Voluntary cleanup operations recognized by the regulatory agency
   - Operations involving hazardous wastes that are conducted at treatment, storage and disposal facilities (TSDFs)
   - Emergency response operations
   - Respirator use
   - Client requirement

2 The following apply:
   - 30 days or less per year for potential chemical/hazardous exposure
   - No possibility of respirator use
   - No client requirement

3 Other programs with MSPs include:
   - Asbestos
   - Hearing Conservation (noise exposure > 85 decibels as time-weighted average (TWA))
   - Lead
   - Benzene
   - Cadmium
   - Respiratory Protection
   - Client/Project Specific (drug/alcohol testing)

4 Biennial frequency can be requested by following the steps below:
   - Supervisor completes the Medical Surveillance Determination and Request Form
   - E-mail form directly to WorkCare (team.global@workcare.com) and Alec MacAdam (Alec.Macadam@arcadis.com)
   - In subject line put "Medical Surveillance Determination and Request Form – employee name"
   - WorkCare physician makes the final determination.
Exhibit 2 – Medical Surveillance Determination and Request Form

This checklist is intended to be used as a guide for Supervisors to evaluate the Medical Surveillance Program (MSP) needs of their staff. Supervisors will complete this checklist upon hire and periodically as the employee’s job function changes. Upon completion, submit the checklist and appropriate approvals to WorkCare (exam.global@workcare.com) and Alec MacAdam (Alec.Macadam@arcadis.com) to initiate an MSP or changes to an MSP.

Contact the Business Line Health & Safety Director or Specialist for questions regarding MSPs. Document the conversation at the end of this form and make the appropriate yes/no selection next to each program option.

Responses required in all fields to ensure proper processing

Date
Employee Name & ID Number
Employee E-mail & Phone Number
Office Location & Employee Overhead Code
Supervisor Name & Phone Number

Choose One:
- New employee
- Current employee with job change
- Active employee opting out of MSP

Note: If a new employee was in an MSP with a previous employer, records can be submitted to WorkCare for evaluation and possible substitution for the baseline exam.

The following questions assess federally mandated medical screenings and surveillance requirements. Circle the appropriate answer.

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<th>MSP Required?</th>
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<td></td>
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</tr>
<tr>
<td>( instantiation, laboratory work)</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
| Will the employee be performing work that includes:
  a. Cleanup operations at uncontrolled hazardous waste sites and initial investigation conducted prior to absence of hazardous substances as designated by the RCRA and/or investigation of significant impacts
  b. Corrective action involving some operations at sites designated by the RCRA
  c. Operations involving hazardous waste that are conducted at treatment, storage, and disposal facilities (TSDFs)
|                           |                |     |    |
| Respiratory Protection     |                | Yes | No |
| Will the employee be required to wear a respirator or to be certified for non-HAZWOPER and non-asbestos respirator use? |
| Hearing Conservation       |                | Yes | No |
| Will non-HAZWOPER work be performed in an environment where noise levels equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels? |
| Asbestos                   |                | Yes | No |
| Does the employee’s work require:
  a. A combined total of 30 days or more per year engaged in Class I, II or III work
  b. Exposure above the permissible exposure limit (PEL) for asbestos exposure
  c. Employees otherwise required by OSHA asbestos standard to wear a negative pressure respirator |
<p>| Lead                      |                | Yes | No |
| Will the employee be potentially exposed to lead concentrations exceeding the OSHA Action Level (30 micrograms per cubic meter of air [μg/m³] of lead over 8-hr TWA)? If yes, contact Corporate H&amp;S for additional MSP guidance and summarize the final decision below. |
| Cadmium                   |                | Yes | No |
| Will the employee be potentially exposed to cadmium concentrations exceeding the OSHA Action Level (2.5 micrograms μg/m³ as an 8-hour TWA)? If yes, contact Corporate H&amp;S for additional MSP guidance and summarize the final decision below. |
| Benzene                   |                | Yes | No |
| Will the employee be potentially exposed to benzene concentrations exceeding the OSHA Action Level (0.5 ppm as an 8-hour TWA)? If yes, contact Corporate H&amp;S for additional MSP guidance and summarize the final decision below. |</p>
<table>
<thead>
<tr>
<th>Medical Surveillance Program</th>
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### Arcadis HS Standard No. ARC HSGE010

### Revision Number 07

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**Commercial Motor Vehicle Driver**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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**Scientific Diving**

<table>
<thead>
<tr>
<th>Yes</th>
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**Client-specific or Project-specific Screening**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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</table>

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*Will the employee be operating a Commercial Motor Vehicle?*

*If yes, approval from Allison Chapin (Allison.Chapin@arcadis.com) or Nick Kautzman (Nicholas.Kautzman@arcadis.com) is required prior to authorization of this MSP. Attach approval e-mail to form and provide to WorkCare.*

---

*Conversation/Approval (if applicable)*

- By checking this box I, *(insert employee name)*, have reviewed this form with my Supervisor and concur with the selected MSP.

- By checking this box I, *(insert supervisor name)*, have reviewed this form with my Employee and concur with the selected MSP.
Exhibit 3 - Example Copy of Work Status Report

![WorkCare logo]

**WORK STATUS REPORT**

**Employer Copy**

<table>
<thead>
<tr>
<th>TYPE OF EXAMINATION:</th>
<th>Annual Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAM CLASSIFICATION:</td>
<td>Periodic Examination</td>
</tr>
</tbody>
</table>

**EMPLOYEE:** Sample, ARCADIS  
**COMPANY:** ARCADIS

**ID:**  
**DATE OF EXAM:** 08/08/2014  
**LOCATION:** ARCADIS Highlands Ranch, CO

**EXPIRATION DATE:** 08/08/2015  
**SITE:**

The following recommendations are based on a review of one or all of the following: a basic history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?  
[ ] Yes  
[ ] No  
[ ] Undecided

Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?  
[ ] Yes  
[ ] No  
[ ] Undecided

**STATUS**

[ ] QUALIFIED  
The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

[ ] QUALIFIED - WITH LIMITATIONS  
The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

[ ] NOT QUALIFIED

[ ] DEFERRED  
The examination indicated that additional information is necessary. The employee has been given the following instructions.

**COMMENTS:**

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Scott Hardy, MD  
Date: 09/10/14

Signature:
Exhibit 4 - Medical Surveillance Exit Exam – Acceptance or Declination

MEDICAL SURVEILLANCE EXIT EXAMINATION - ACCEPTANCE OR DECLINATION FORM

This form applies only to employees who participated in the ARCADIS Medical Surveillance Program

If you have been part of this program and have not had a medical surveillance exam within the last six months, in accordance with 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER), an exit examination is offered at no cost to you. We encourage you to contact Team Global at WorkCare (800-456-6155 (US) or 888-449-7787 [Canada]) - to schedule the exit examination as soon as possible.

Please select an option below:

☐ I have not had a medical surveillance examination within the last six months and have or will schedule an exit examination through WorkCare.

☐ I have had a medical surveillance examination within six months, therefore I acknowledge that I am not eligible for an exit examination.

☐ I have not had a medical surveillance examination within the last six months and choose to decline the offer of an exit examination.

Sign and date this form and either scan it and e-mail to HRSolutionsCenter@arcadis-us.com or mail it to: ARCADIS Attn: Human Resources Solution Center, 630 Plaza Drive Highlands Ranch CO 80129

Thank you for your cooperation and please contact 4Sight Support if you have any questions.

__________________________
Employee's Name (Print)

__________________________  ________________
Employee's Signature Date
EXECUTIVE SUMMARY

The following is a requirements summary applicable to the Motor Vehicle Safety Program (MVSP):

- The MVSP applies to all Arcadis drivers operating Arcadis owned, leased, rented, or personal motor vehicles used for business purposes and all Arcadis owned, leased or rented motor vehicles used for non-business (personal) purposes.
- Arcadis expects 100 percent compliance with all applicable driving laws and regulations.
- Employees operating Arcadis owned, leased or rented vehicles for personal use must have written supervisor’s approval.
- All Arcadis drivers with an assigned driving function for Arcadis may have their Motor Vehicle Record (MVR) reviewed by approved representatives of Corporate Human Resources, Health and Safety and/or Legal Departments.
- Newly hired drivers with an assigned driving function for Arcadis and a clean MVR must complete, at a minimum, on-line defensive driving training within 30 days of hire.
- Existing Arcadis drivers with an assigned driving function for Arcadis must participate, at a minimum, in on-line defensive driving training at intervals prescribed by Health and Safety.
- Weekly vehicle inspections are required for all Arcadis owned, leased, or rented vehicles used during the previous 7 days. Inspections will be documented.
- All Arcadis owned, leased, or rented motor vehicles will be properly maintained in accordance with manufacturer’s recommendations. All defects affecting safe operation of the motor vehicle will be promptly repaired.
- Arcadis employees are prohibited from modifying Arcadis owned or leased vehicles unless the modification is approved in writing by Corporate Health and Safety and/or Corporate Procurement.
- Arcadis prohibits use of cellular phones, including hands free mode, while driving any vehicle for Arcadis.
1. **POLICY**

It is the policy of Arcadis to implement sound defensive driving training and education to employees. It is also Arcadis policy to provide administrative management that ensures vehicles are well maintained and driven by qualified employees.

2. **PURPOSE AND SCOPE**

2.1 **Purpose**

Arcadis is committed to providing a healthy and safe work environment for our employees, subcontractors, clients and visitors. To this end, Arcadis embraces this Health and Safety MVSP Standard.

This standard and accompanying requirements provides consistent practices with regards to defensive driving and vehicle administration for Arcadis vehicles.

2.2 **Scope**

2.2.1 **Business Driving** – This MVSP applies to the operation of any motor vehicle during the conduct of Arcadis business. It applies to every Arcadis Driver operating an Arcadis, rental, leased or personal vehicle used for company business.

2.2.2 **Area Involved** – This MVSP applies to the operation of motor vehicles for company business in any country in which Arcadis employees or temporary agency employees are working.

2.2.3 **Exceptions**

2.2.3.1 **Operation of Commercial Motor Vehicles**

Additional requirements apply to operation of commercial motor vehicles (CMVs). Refer to the Arcadis Transportation Safety Program for Commercial Motor Vehicles (CMV Program) for additional information. When client requirements are more restrictive than this MVSP, the more restrictive requirement will apply for all work activities involving driving for that client.

2.2.3.2 **Drivers without an Assigned Driving Function for Arcadis**

Drivers without an assigned driving function for Arcadis are still subject to the requirements of the Arcadis Vehicle Use Policy maintained by Human Resources.
3. DEFINITIONS

Definitions relating this MVSP can be found in Exhibit 1.

4. RESPONSIBILITIES

The following have responsibilities under this standard:

4.1 Corporate Health and Safety Department (Health and Safety) – Has the responsibility for: revising and updating this standard, communicating MVSP requirements to employees. They also ensure this MVSP is being implemented effectively. Health and Safety has a primary focus of identifying defensive driving education and training resources. Health and Safety is also responsible for stewarding programs involving vehicle inspections and maintenance requirements. Health and Safety has the authority to request and evaluate motor vehicle reports on Arcadis drivers at any time.

4.2 Health and Safety MVSP Specialist (MVSP Specialist) – Is the primary contact for all issues related to implementation of this MVSP, including reporting of all accidents and incidents involving a motor vehicle. The MVSP Specialist will coordinate with other Corporate departments, as required, related to MVSP implementation requirements.

4.3 Corporate Human Resources Department (Human Resources) – Has the responsibility to review applicable portions of this standard for the purposes of ensuring consistency with Human Resource’s policies and procedures regarding motor vehicle operation. Human Resources have a primary focus of ensuring administrative procedures concerning vehicle use are followed by employees. Human Resources has the authority to request and evaluate motor vehicle reports on Arcadis drivers at any time.

4.4 Corporate Legal Department (Legal) – Has the responsibility to provide oversight of the requirements stipulated in this standard to ensure Arcadis risks are properly managed. Legal has the authority to request and evaluate MVRs on Arcadis drivers at any time.

4.5 Corporate Purchasing (Purchasing) – Has the responsibility to oversee leasing and maintenance management vendors and facilitate maintenance issues associated with Arcadis owned or leased vehicles. Purchasing will also work with Health and Safety on safety equipment needs for owned or leased vehicles.

Contact the MVSP Specialist for all MVSP related reporting, questions or concerns.
4.6 **Health and Safety Managers and Specialists** – Are responsible for facilitating and educating staff on MVSP requirements. These individuals may also perform audits or conformance assessment to ensure compliance with the requirements of this standard.

4.7 **Arcadis Managers and Supervisors (including project and task managers)** – These managers and supervisors provide stewardship concerning the requirements of this standards to lower tier managers and employees. In addition, they assure that appropriate time is provided to ensure implementation of MVSP requirements and facilitate maintenance request approvals.

4.8 **Arcadis Employees** – Each employee has the responsibility to adhere to this MVSP and to communicate Health and Safety concerns, issues and questions to their supervisor or to Health and Safety staff. In addition, all employees have the responsibly to use TRACK prior to any driving activity and will follow all applicable Arcadis, federal, state, provincial, and local jurisdiction regulatory; and client requirements when driving an Arcadis owned, leased, rented vehicle.

5. **PROCEDURE**

5.1 **General Procedure and Requirements**

Only Arcadis Drivers as defined in Section 3.0 are permitted to drive Arcadis vehicles. Exceptions to this policy are limited only to individuals authorized by the Arcadis Driver or fleet administrator to perform short term driving and parking activities involving Arcadis vehicles such as maintenance employees and valets. Use of joint venture and temporary agency employees working with or for Arcadis to operate Arcadis vehicles requires pre-approval of the Business Line President and Legal.

Arcadis Drivers who drive Arcadis vehicles or personal vehicles used for Arcadis business will maintain a valid driver’s license, appropriate for the vehicle they are operating, that is free from any driving restrictions or suspension. An Arcadis Driver who is asked to drive for business purposes in any type of vehicle, shall notify their supervisor or designated Arcadis contact by the next business day if:

- Their license is suspended, revoked, or restricted;
- They receive a moving violation while driving for Arcadis-related business; or

Employees must report all moving violations that may affect their driving status for Arcadis
• Receive a moving violation during non-business related driving in any type of motor vehicle that might affect their driving status with Arcadis.

If one of these issues occurs, the employee’s supervisor will contact the MVSP Specialist. The MVSP Specialist (or his/her designate), in cooperation with Human Resources and Legal, as deemed necessary, will evaluate the employee’s driving status (especially in instances of license suspension, revocation or restriction) and, as appropriate, corrective action recommendations will be made.

Employees who fail to report a driving violation to their supervisor that might affect their driving status for Arcadis purposes (a restricted driver) will face disciplinary action which may include termination if the conviction is discovered through routine MVR pulls, criminal background checks or other official documentation transmitted or made available to Arcadis. Arcadis will work to the extent practical with employees who report driving violations that might affect their driving status for Arcadis purposes if Arcadis operations management can accommodate a driving restriction for the driver or other suitable arrangement is made consistent with Human Resources (HR) and Legal policies.

All Arcadis Drivers driving an Arcadis motor vehicle or personal vehicle for Arcadis business will:

• Wear seat belts at all times in any vehicle with seat belts (this includes taxis and shuttle buses equipped with seat belts);
• Have a valid unrestricted operators license appropriate for the vehicle being driven;
• Operate and license the vehicle in accordance with applicable laws;
• Operate the vehicle consistent with client driving rules, speed limits, and requirements when operating the vehicle on project sites;
• Drive defensively as learned through training, education, and experience;
• Exercise caution when taking any prescription or over-the-counter medication that may cause drowsiness or an altered mental state;
• Not use controlled substances, illegal drugs, or be under the influence of alcohol while driving on Arcadis business;

Arcadis prohibits use of cellular phones, including hands free mode, when driving vehicles for Arcadis.
• Not drive in a manner that could be deemed reckless or aggressive by other drivers;
• Not use radar/laser-type detectors;
• Not pick up hitchhikers;
• Not smoke in company vehicles; and
• For drivers with an assigned driving function for Arcadis, if permanently assigned an Arcadis motor vehicle will ensure the vehicle is maintained as directed by the Arcadis maintenance vendor.

Use of headlights at all times, even during daylight hours is recommended. Additionally, Arcadis expects all drivers to use pull through parking or back into parking places consistent with their defensive driving training specified in this standard and as permitted by local laws.

5.2 MVR Review

5.2.1 New Hire MVR Review

Human Resources will perform a MVR review on potential new hires of positions that have an assigned driving function for Arcadis. The MVR review process for potential new hires follows an established review process that will result in a Pass, Conditional, or Restricted status. A MVR review resulting in restricted status will prevent hiring of the candidate unless excepted as specified in section 5.2.5. Human Resources will communicate the MVR review results to the hiring manager prior to finalizing the new hire process.

5.2.2 Existing Employee MVR Review

Human Resources may perform a MVR review on existing employees with an assigned driving function for Arcadis at a frequency stipulated by Corporate. The MVR review process for existing employees follows an established review process that will either result in a Pass, Conditional, or Restricted status. Human Resources will communicate the MVR review results to the supervisor of any employee having a Conditional or Restricted status resulting from the MVR review.

MVSP Guide-005 provides details of the MVR review process.
5.2.3  Post-Accident MVR Review

Any vehicle related accident classed as a preventable Motor Vehicle Accident (MVA) will require a MVR review for the employee involved in the MVA. Preventable VLEs are not generally subject to the MVR review process; however, Corporate reserves the right to perform a MVR review on any employee involved in a vehicle related accident regardless of accident classification. The MVSP Specialist will report the need to run a MVR to HR upon determination of a preventable MVA and HR will communicate the MVR results to the employee and their supervisor.

5.2.4  Commercial Motor Vehicle MVR Reviews

Detailed requirements concerning MVR review and evaluation for drivers participating in the Arcadis CMV Program is not addressed in this standard. MVR reviews related to CMV drivers are performed by Arcadis Director of Transportation Safety or his/her approved designate.

5.2.5  Appeals

MVR reviews that result in restricted driving status for a potential new hire or existing employee may be appealed to the applicable Business Line President through the applicable business line H&S Director. The Business Line President may elect to maintain the restriction or overturn the restriction. An overturned restriction may be referred by the Business Line President to the Accident Review Committee for additional corrective action based on the circumstances of the restriction.

5.3  Defensive Driving Training, Evaluation, and Education Requirements

5.3.1  New Hire Defensive Driving Training

All new hires (regardless of driving assignment) with an active driver's license will complete on-line defensive driving training prescribed by Health and Safety within 30 days of employment.

New hires with conditional driving status may be required to complete on-line defensive driving training prior to operating a vehicle for Arcadis.
5.3.2 Existing Employee Defensive Driving Training

On a frequency defined by Corporate Health and Safety, in cooperation with operations senior management, employees who have an assigned driving function for Arcadis shall complete an online defensive driving training course designated by Health and Safety or an equivalent course approved by Health and Safety.

**Note:** For existing employees hired before the implementation date of this policy, the supervisor will determine if the employee drives on average 5 or more days per month to warrant participation in this training.

In furtherance of Arcadis’ goal of promoting safe driving, employees who do not have an assigned driving function for Arcadis are also eligible to voluntarily participate in the same online defensive driving training concurrent with prescribed timeframes for any assigned Arcadis driver training.

If a client requires classroom or hands-on defensive driver’s training, the Arcadis Training Center will arrange for the required classroom training. The Arcadis required on-line training will not be required for those driving employees who attend classroom training (hands-on or subject matter training) consistent with a Health and Safety recognized defensive driving system during the same calendar year.

All Arcadis drivers are expected to review and be familiar with the contents of the Operator’s Manual(s) for the vehicles they will be operating. Additional training may be provided or required at the request of an employee’s supervisor, Health and Safety, or as required by a client.

5.3.3 Inexperienced Drivers

New hires or existing employees having an assigned driving function for Arcadis and known to have only possessed a valid drivers license for less one year or experienced drivers that are unfamiliar with driving large vehicles may warrant additional evaluation and training in the operation of the vehicle(s) they are expected to drive while working for Arcadis. Supervisors are encouraged to review with their direct reports their license and driving history to ensure the driver is comfortable and
knowledgeable of expected vehicle operation. If determined by the supervisor that additional evaluation is warranted, a Commentary Drive (see Section 5.4) should be considered. The supervisor may schedule an additional TIP at a later date to ensure safe driving of larger vehicles is being performed.

Supervisors may opt to enroll drivers in additional defensive driving on-line training or hands-on defensive driver training if the driver expresses concerns about their ability to safely drive a vehicle.

5.3.4 Drivers Requiring Training or Evaluation due to Corrective Action from MVR Review

Any driver subject to Corrective Action arising from an MVR review will be trained or evaluated as prescribed in the MVR evaluation process (MVSP Guide-005).

5.3.5 Additional Defensive Driving Training and Education Requirements for Employees Involved in a Vehicle Loss Event

Corrective actions associated with an employee involved in a preventable or non-preventable VLE will be determined by the supervisor based on the severity and circumstances of the incident as determined by the Incident Reporting and Investigation H&S Standard (ARC HSMS010).

5.3.6 Additional Criteria for Temporary Agency Employees

Temporary agency employees are only permitted to drive Arcadis Vehicles or Rental Vehicles under the following requirements:

- The temporary agency employee’s MVR is clear of any violation for the prior three (3) years and lists no prior critical violations. Critical violations include such issues as:
  - Alcohol-related offenses
  - Driving while impaired or under the influence of alcohol or drugs
  - Homicide, negligent homicide, or manslaughter by vehicle
  - Fleeing or attempting to elude police officer
  - Hit and run
- If a temporary agency employee receives a convicted violation or has an accident while driving, regardless of fault or preventability, on Arcadis business, they are
immediately prohibited from driving Arcadis vehicles, rental vehicles or a personal vehicle for Arcadis business unless otherwise permitted by the applicable Business Line President or the ANA Director of Health and Safety.

5.4 Sources for On-Line and Video Based Defensive Driving Training

The on-line defensive driving training or equivalent training will be provided by, or based on, a nationally recognized defensive driving training company such as Smith System or other recognized provider as approved by Health and Safety and arranged through the Arcadis Training Center. Video based defensive driving training modules will be arranged through the Arcadis Training Center.

5.5 Commentary Drive Program

The Commentary Drive evaluates driver understanding of safe driving behaviors by having the driver verbalize their observations to the Commentary Drive observer when operating the vehicle. The observer will use a standard Commentary Drive Evaluation Form to document driver understanding of safe driving principles such as the Smith System “5 Keys”. The observer will also provide real time feedback on questionable driving behaviors. Commentary Drives are expected to last a minimum of 1 hour behind the wheel driving time.

Employees performing observer functions for Commentary Drives must be current on Health and Safety defensive driving on-line training obligations as described in Section 5.3 above and meet additional criteria approved by Health and Safety.

5.6 Driving TIPs

The driving TIP may be used to evaluate driver performance and provide solutions related to questionable driving behaviors for routine driving evaluations under the Arcadis Behavior Based Safety (BBS) Program. Solutions generated using the TIP process will be consistent with the expectations of the Arcadis BBS Program.
5.7 Sources of Hands-On Defensive Driving Training

When used, hands-on defensive driving training will be provided by, or based on, a nationally recognized defensive driving training course such as Smith System or other provider approved by Health and Safety. The trainer must be certified in the program upon which they are instructing and can be either internal or external to Arcadis. Arrangements for hands-on defensive driving courses are handled by the Arcadis Training Center.

5.8 Additional Training and Education for Other Driving Conditions

Working together, supervisors, managers, and Health and Safety have the responsibility of determining additional training for employees driving under special conditions such as CMVs, towing trailers, riding and operating all-terrain vehicles or other non-routine driving conditions. Training approved by Health and Safety will be arranged through the Arcadis Training Center.

5.9 Driving Distractions and Cell Phone Use While Operating a Motor Vehicle

Arcadis strictly prohibits employee use of personal or company-provided cellular phones (including but not limited to voice communication, texting, video, internet browsing and gaming) either in hands-on or hands free mode, speaker, or use of similar devices while the employee is operating any motor vehicle for Arcadis purposes.

5.10 Additional Defensive Driving Procedures

Arcadis promotes additional defensive driving techniques to assist in the elimination or minimization of MVAs and VLEs. These techniques include:

- When a second Arcadis employee is available, and where it is safe to do so, all vehicle backing operations should use a spotter to assist with the backing operation.
- As a best practice, use of the cone program to promote awareness of hazards around parked vehicles.
- To assist drivers in their potential lack of familiarity with the location in which they are driving, one of the following should be utilized by drivers traveling to unfamiliar locations:
  - The use of GPS systems in rental cars, and/or
  - Pre-Trip Route Planning through the use of Google® Maps or MapQuest®, and/or

MVSP Guide-007 provides best practices for spotting and cone placement
Preparation of a Journey Management Plan (JMP) using the template provided in the Excel Standard HASP Template

5.11 Vehicle Inspections and Maintenance

All company owned or leased vehicles will be maintained in safe operating condition. To ensure vehicles are properly maintained, a daily pre-trip visual inspection must be informed prior to operating the vehicle. The pre-trip inspection should include, but is not limited to:

- Seat belts;
- Doors and door locks;
- Lights;
- Mirrors;
- Horn;
- Back up alarms, if equipped;
- Parking brake;
- Instrument panel;
- Steering;
- Windows;
- Windshield wipers;
- Tires; and
- Emergency equipment.

A more comprehensive weekly documented inspection (daily if required by the client, manager or supervisor or if vehicle is operated in harsh environments) is also required. Rental vehicles operated by Arcadis for more than one week also must also use the documented weekly inspection process. Inspections are required to be documented on the Weekly Vehicle Inspection Checklist or equivalent.

Deficiencies identified in inspections or at any other time will be managed through the Arcadis vehicle leasing company vendor or maintenance provider specified by Corporate Purchasing. Routine maintenance (gasoline, oil, etc.) will also be managed through these vendor(s) using
approved fuel cards. Use of assigned fuel cards is critical to help ensure maintenance schedules are maintained for the vehicle. Records of vehicle inspections should be maintained at the office or project location where the vehicle is assigned.

Employees operating company owned or leased vehicles (including qualifying rental vehicles) required to be maintained under the CMV program will follow inspection and maintenance requirements specified in the CMV program. Use of Weekly Vehicle Inspection checklist for CMV operation is not permitted.

5.12 Safety Equipment for Arcadis Vehicles

All Arcadis owned or leased vehicles are expected to have, at a minimum, a 2.5 lb. A,B,C fire extinguisher (permanently mounted), first aid kit and an orange strobe or oscillating light. The orange oscillating light/strobe may be permanently affixed or removable; however, owned or leased vehicles obtained after April 4, 2016 must have permanently installed amber warning lights installed in or on the vehicle. Rental vehicles and Arcadis owned, leased, or rented vehicles will be subject to equivalent requirements, if used for field work unless otherwise excepted from a specific safety equipment requirement by the project specific HASP or Job Safety Analysis. Rental vehicles are not required to have fire extinguishers permanently mounted.

All Arcadis owned or leased vehicles obtained on or after June 1, 2012 will be required to be equipped with back up alarms. Arcadis owned or leased vehicles obtained prior to June 1, 2012 will be required to have a functioning back up alarm if used for project work with client mandated back up alarm requirement.

All Arcadis owned or leased pickup trucks with an open bed obtained on or after April 4, 2016 will be required to be equipped with a rear window protector.

Refer to MVSP Guide-010 for additional recommendations for safety and emergency equipment that may be required for specific project needs.

All Arcadis vehicles managed under the Arcadis approved vendor maintenance program have Emergency Roadside Assistance. Documentation, including the phone number, for the vendor providing assistance must be maintained in the glove box of the vehicle.
5.13 Securing Loads in Vehicles

All luggage, equipment and supplies loaded into a vehicle operated by Arcadis will be stowed in a manner that will prevent appreciable movement. Luggage, equipment and supplies placed in the passenger compartment of vehicles will be placed in a manner that will prevent rapid forward movement in the event of a hard stop or frontal collision. Objects will not be placed on the dashboard of vehicles unless they are secured in place by friction mats, suction cups, or similar securing device.

Securing straps, tiesdowns (all types) and securing nets used to secure loads on trucks must be inspected prior to each use. Damaged, worn or frayed securing straps or tiedowns must not be used.

Chemicals transported in Arcadis vehicles must conform to the requirements of the Arcadis Transportation Safety Program for HazMat Shipping and Transportation including, but not limited to, securement provisions of DOT Facts-108a, “Materials of Trade”.

Arcadis CMVs are subject to additional load securement requirements specified by the Arcadis Transportation Safety Program for CMVs.

5.14 Vehicle Modification

Arcadis employees are prohibited from modifying Arcadis owned or leased vehicles unless the modification is approved in writing by Corporate Health and Safety and/or Corporate Procurement.

5.15 Special Considerations for Rental Vehicles

Rental vehicles will be treated and driven in a manner equivalent to an Arcadis owned or leased vehicle. Additionally, Arcadis employees renting vehicles will plan and select a vehicle appropriate for the conditions anticipated when driving. Careful planning is required to preferentially use Arcadis owned or leased vehicles for off road use instead of using rental vehicles when reasonable, practical and permitted under contract (client or rental company) terms. Due to operating unfamiliarity typically encountered when renting vehicles, use of TRACK to identify and mitigate atypical or unfamiliar vehicle functionality or performance is required.

MVSP Guide-006 provides safety best practices information for rental vehicles. Arcadis drivers must be 21 years of age to rent vehicles.
6. VEHICLE USE AND INSURANCE

6.1 Non-Business Use of Company Vehicles

Non-business use during business hours and/or having non-business related passengers in an Arcadis Vehicle or Rental Vehicle during such business use is prohibited. In the event of an accident in these situations, the employee is personally liable for injuries and damages associated with such an accident and the employee, and not Arcadis, will be responsible for all rental charges. Operating an Arcadis Vehicle or Rental Vehicle for strictly personal use on weekends, evenings and holidays is prohibited, unless prior approval by the employee’s supervisor is given, and the vehicle possession is necessary due to remote location and assignments, and the employee has all required personal automobile liability insurance. Supervisors should assess the requirement and may place any other appropriate limitations on such use.

Use of an Arcadis Vehicle or Rental Vehicle to commute to and from work should be limited to those situations where there is a sound business reason to do so and must be authorized by the operations manager.

6.2 Insurance

Arcadis has vehicle insurance coverage for Arcadis Vehicles and Rental Vehicles. If an accident occurs or damage is sustained, there is a $2,000 deductible for damage to the Arcadis Vehicle or Rental Vehicle ("collision") and a $10,000 deductible for damage to another vehicle, property damage or injury to another party ("liability"). These deductibles are paid by the relevant Arcadis office.

If an accident should occur during non-business hours while an employee is driving an Arcadis Vehicle or Rental Vehicle, in accordance with state law, the Arcadis employee could be personally liable for injuries and damages associated with such an accident.

6.2.1 Vehicle Rental in the United States

As stated above, Arcadis has insurance for all Arcadis Vehicles. When renting for business in the United States, the rental should be arranged through World Travel, and there is no need to accept the insurance coverage offered by Arcadis preferred rental car vendors (currently Enterprise and National).
6.2.2 Vehicle Rental Outside of the United States

If an Arcadis employee is renting a vehicle for business outside of the United States, the employee must accept the insurance offered by the local rental car company in order to be fully covered under the company's Foreign Package policy. In addition, check with Corporate H&S about any additional coverage that may be needed for the country in which you are renting.

6.2.3 Personal Vehicles

Employees who drive their own vehicle for company business, as a condition for performance of his or her duties, shall comply with all minimum state requirements for auto insurance as required by their state. This requirement includes auto liability insurance with the minimum amounts of coverage meeting or exceeding that state's requirements. If requested, employees shall provide a current insurance card which indicates the amount of coverage as adequate proof of insurance coverage.

If a personal vehicle is damaged or involved in an accident while being driven for company business, the insurance covering that personal vehicle is primary. Arcadis does not reimburse employees for personal auto insurance deductibles.

7. TRAINING

See section 5.3 of this standard for training requirements.

8. REFERENCES

Arcadis Transportation Safety Program for Commercial Motor Vehicles

MVSP Guide-001, Staff Approved for Conducting Commentary Drives

MVSP Guide-002, Guidelines for Conducting Commentary Drives

MVSP Guide-003, Automated Enforcement Conviction Evaluation Criteria

MVSP Guide-004, Criteria for Defining a Motor Vehicle Accident

MVSP Guide-005, Guide for MVR Corrective Actions
9. RECORDS

Records will be maintained as follows:

- MVRs pulled as required under this MVSP and associated notifications, approvals, releases, and findings information will be maintained by Human Resources.
- TIP results, incident reports and near miss reports related to MVSP activities will be maintained in the 4-Sight database.
- Commentary Drive documentation will be provided to the employee unless otherwise specified by the MVSP Specialist.
- Any training certificates or documentation arranged through the Arcadis Training Center (hands-on defensive driving, defensive driving on-line, defensive driving videos, etc.) will be maintained by the Arcadis Training Center.

10. APPROVALS AND HISTORY OF CHANGE

Approved By: Julie Santaniello, CSP, Corporate H&S, Manager of Technical Programs

Signature
<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
</tr>
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<tbody>
<tr>
<td>26 March 2007</td>
<td>01</td>
<td></td>
<td>Original document</td>
</tr>
<tr>
<td>18 August 2007</td>
<td>02</td>
<td></td>
<td>Change in required on-line defensive drivers training</td>
</tr>
<tr>
<td>22 October 2007</td>
<td>03</td>
<td></td>
<td>Changing over to new template format and addition of the “Comments on My Driving?” program</td>
</tr>
<tr>
<td>21 January 2008</td>
<td>04</td>
<td></td>
<td>Change to new template; change to 2008 organization job titles; change to prohibit texting/emailing while driving</td>
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<tr>
<td>13 June 2008</td>
<td>05</td>
<td></td>
<td>Addition of Sections 5.10 and 5.11 on other defensive driving techniques and cone placement.</td>
</tr>
<tr>
<td>6 October 2008</td>
<td>06</td>
<td></td>
<td>Clarified who is required to complete online training in Section 5.3 and modified section on when hands-on defensive driving is required after an accident.</td>
</tr>
<tr>
<td>8 April 2009</td>
<td>07</td>
<td></td>
<td>Incorporated references to the CMV program and vehicle inspection requirements. Incorporated Vehicle Use Policy. Added fatigue management requirements. Deleted references to the Commentary Drive which is obsolete.</td>
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<tr>
<td>3 November 2009</td>
<td>08</td>
<td></td>
<td>Incorporated Smith System videos as a corrective action, Commentary Drive Program and revised Exhibit 2 and added new Exhibit 4.</td>
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<tr>
<td>1 November 2010</td>
<td>09</td>
<td></td>
<td>Deleted Comments on my driving section as program was discontinued.</td>
</tr>
<tr>
<td>Revision Date</td>
<td>Revision Number</td>
<td>Standard Developed/Reviewed By or Revised By</td>
<td>Reason for change</td>
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<tr>
<td>25 May 2011</td>
<td>10</td>
<td></td>
<td>Revised content and restructured selected exhibits and standard sections. Most content duplicated in the Vehicle Use policy removed. Vehicle Use policy incorporated by reference</td>
</tr>
<tr>
<td>August 16, 2011</td>
<td>11</td>
<td></td>
<td>Replaced section 5.7, added new definitions and guide references, clarified fatigue management recommendations, modified terminology for BBS program, provided MVR report clarifications.</td>
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<tr>
<td>May 2, 2012</td>
<td>12</td>
<td></td>
<td>Comprehensive restructuring, Revisions to training and MVR processes, expanded rental vehicle safety, inclusion of additional MVSP guidance documents, roles and responsibilities clarification. Inclusion of vehicle safety equipment information. Formalization of the ARC process.</td>
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<tr>
<td>14 March 2013</td>
<td>13</td>
<td></td>
<td>Clarified MVR review and training for new hires. Clarified standard conflict with other corporate department policies. Restructuring of section 5.2. Removal of assigned driving function. Revision to headlight use. Section 4.2 MVSP Specialist e-mail link address updated</td>
</tr>
<tr>
<td>8 December 2013</td>
<td>14</td>
<td></td>
<td>Added definition for assigned driving function, Restructured MVR review requirements, Newly licensed driver requirements, and add references to new MVSP Guides. Title changes and minor editing throughout.</td>
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<tr>
<td>29 January 2014</td>
<td>15</td>
<td>Sam Moyers</td>
<td>Addition of new section 5.13 addressing load securement to harmonize with other H&amp;S standards and guidance. Addition of pre trip visual inspection information to harmonize with other H&amp;S standards and guidance. Clarification of expectations in the cone and spotter program. Revised header and footer to current standard and modified revision history table.</td>
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<td>4 February 2014</td>
<td>16</td>
<td>Sam Moyers</td>
<td>Section 5.1 was modified to clarify Arcadis parking expectations</td>
</tr>
<tr>
<td>22 September 2015</td>
<td>17</td>
<td>Sam Moyers</td>
<td>Revised appeal process and relinked revised MVSP Guide-005. Rebranding. Revised signature block</td>
</tr>
<tr>
<td>6 May 2016</td>
<td>18</td>
<td>Sam Moyers</td>
<td>Revised with new section 6 dealing with insurance issues. New section 5.3.6 dealing with temporary agency employees. Both were included from integrated HR Vehicle Use Policy. Revised sections 5.3.5, 5.9 and 5.12 to clarify current policy. Added a definition for field work in Exhibit 1. Added additional references concerning cell phone prohibition.</td>
</tr>
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</table>
EXHIBIT 1 - DEFINITIONS

Arcadis vehicle or Arcadis motor vehicle: Any motor vehicle owned or leased by Arcadis employee.

Arcadis driver or driver: Any Arcadis US employee or temporary agency employee who drives an Arcadis vehicle, leased vehicle, rental vehicle, or personal vehicle for business reasons whether the use of the vehicle includes operation from the local office or for travel while away from the local office.

Arcadis employee: Any full-time, part-time, temporary, as needed employee, and interns employed by Arcadis US.

Assigned Driving Function for Arcadis: Any Arcadis driver who drives on average 5 or more days per month in the interest of Arcadis.

Business use of Arcadis owned, leased, rented, or personal motor vehicle: For the purposes of this standard, business use of an Arcadis, rental, leased or personal vehicle including but not limited to: attending meetings; driving to and from a client location; driving to dinner while out of town on business; and driving to an office supply store to pick up office supplies. Use of the vehicle for business would not include personal use as described below.

Corporate: As used in this standard and materials incorporated by reference, the term “Corporate” means Corporate Health and Safety, Corporate Human Resources, and/or Corporate Legal departments unless otherwise specified.

Field Work: As used in this standard means any Arcadis work activity outside of an office environment.

Manager: The employee’s administrative supervisor or an Operations Manager

Motor vehicle accident (MVA): Any incident on a reasonably anticipated route during the course of work where an Arcadis owned, leased, or rented motor vehicle is:

- On a public or established private roadway or parking area involving a third party motor vehicle, excluding load securement failures by a third party motor vehicle.

- On a public roadway involving damage to public or private property, excluding road debris damage.

- Involved in any type of pedestrian impact resulting in injury or property damage.

- Involved in an Arcadis load securement failure or mechanical component failure on a public or established private roadway involving a third party motor vehicle or public property damage.

- On a public roadway involving damage or injury associated with another Arcadis operated vehicle, including load securement failures.
Personal use of Arcadis vehicle, leased vehicle or rented motor vehicle: For the purposes of this standard, personal use of an Arcadis vehicle, leased vehicle or rental vehicle include but are not limited to supervisor approved: driving to dinner with a non-business-related person(s) in the vehicle; driving for the purposes of personal entertainment or personal business; using an Arcadis vehicle or rental vehicle for staying over period of time not required for business (e.g., staying over a weekend to visit friends, etc.).

Potential New Hire or Candidate: For the purpose of this standard means an individual who has had an written offer made and accepted for employment with Arcadis.

Preventable MVA: A MVA where the Arcadis driver was as fault or was determined through the Arcadis LNL Investigation process failed to exercise reasonable care while driving an Arcadis vehicle. The classification of Preventable MVA is assigned by Corporate Health and Safety.

Rental vehicle: For the purposes of this policy, any motor vehicle rented from an established rental car company for Arcadis business whether the use of the vehicle is operated from the local office or for travel while away from the local office.

Supervisor: The employee’s administrative supervisor (project supervisor if approved by the administrative supervisor).

Temporary agency employee: A temporary agency employee utilized by Arcadis for temporary work. Temporary Employee Agency agreements shall provide for standard automobile insurance and other terms consistent with this policy.

Vehicle loss event (VLE): Any incident involving a motor vehicle that does not meet the definition of a MVA. VLEs may be preventable or non-preventable based on findings of the Arcadis LNL Investigation process and is assigned by Corporate Health and Safety.
EXECUTIVE SUMMARY

Through the use of personal protective equipment (PPE), ARCADIS employees are protected from occupational hazards in the event that engineering and administrative controls are not sufficient or practical. PPE will be provided to ARCADIS full time and permanent part time employees who regularly conduct field work or visit project sites outside of office environments at no cost following training on the proper use and maintenance of PPE.

Project managers are responsible for assessing potential hazards on a worksite and determining the applicable PPE.

Project personnel are responsible for understanding and utilizing “Stop Work Authority” should a hazard present itself that was not previously identified or has been identified in concentrations that are higher than anticipated.

This minimum level of PPE (hard hat; safety glasses; class II high-visibility vest, shirt or coat; and protective footwear with safety toe cap) is expected to be worn on all project sites unless in a field trailer or vehicle, unless a specific exemption has been established within an approved HASP or modification to a task specific JSA or Permit to Work upon completion/review of the hazard analysis.

PPE selection will be based on an evaluation of the performance characteristics of the PPE relative to the following:

- The requirements and limitations of the tasks or work environment
- The task-specific conditions and duration of the work
- The hazards and potential hazards identified at the site

PPE may be categorized into levels A, B, C or D.

- Level A offers the highest skin and respiratory protection
- Level B offers a high degree of respiratory protection with lesser levels of skin protection
- Level C is used when the concentration and type of airborne substance is known, and the criteria for using an air purifying respirator are met
- Level D offers the least skin and respiratory protection

PPE training will include, at minimum:

- When and what PPE is necessary
- How to put on, adjust, wear and take off the PPE
- Limitations of the PPE
- Proper care, maintenance, useful life, and proper disposal of PPE
1. POLICY

It is the policy of ARCADIS to assess the workplace to identify and assess hazards in order to appropriately implement controls for those hazards. In addition, it is ARCADIS policy to supply personal protective equipment (PPE) for employees in a working environment where engineering and administrative controls are not feasible or effective in the control of hazards. ARCADIS will train and supply this PPE at no cost to the employee.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of PPE is to shield or isolate individuals from the chemical, physical and biologic hazards that may be encountered in their work environment. A hazard analysis or assessment will be performed before a job task is begun to evaluate if PPE is necessary to protect an employee from identified hazards and determine the type of PPE required. This analysis will include the identification of hazards/suspected hazards and their routes of exposure.

Combinations of protection may be needed to provide the appropriate level of protection for any given work environment. The level of PPE may change during a job, so periodic task evaluation will be conducted to ensure that the most appropriate PPE is being used. Over-protection, as well as under-protection, can create additional hazards and should be avoided where possible.

Subcontractors and other non-ARCADIS employees must supply their own PPE. ARCADIS will not supply PPE to any non-ARCADIS employees unless specific arrangements and agreements are made with the other party.

This Health and Safety Standard (HSS) provides guidance on the proper selection, use, care and maintenance of PPE.

2.2 Scope

Whenever possible, engineering, substitution and administrative controls will be used to reduce or eliminate hazards. When such controls are not feasible, practical or adequate, PPE will be used to protect employees from exposure to hazards during ARCADIS-related work tasks.

3. DEFINITIONS

Definitions related to personal protective equipment can be found in Exhibit 1.
4. RESPONSIBILITIES

4.1 ARCADIS Management

ARCADIS Management is responsible for providing resources for the acquisition of PPE and for the conduct of hazard assessments.

4.2 Project Managers

Project Managers are responsible, as part of the project hazard assessment, for determining PPE necessary to complete the project. In addition, the Project Manager is responsible for determining client requirements with respect to PPE. Project Managers notify health and safety staff of biological, chemical and physical hazards present or potentially present on the site, as well as verifying that any specific state and/or local requirements for PPE have been identified. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for PPE use prior to those staff beginning work.

4.3 Corporate Health and Safety

Corporate Health and Safety is responsible for keeping this standard up-to-date with current regulatory requirements and best practices and for assisting in determining the appropriate PPE for a particular task and work environment and for assisting in the identification of appropriate vendors of such PPE.

4.4 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 physical, chemical and biological hazards expected to be encountered on project facilities.

It is the responsibility of the Site Safety Officer (SSO) to verify that any employee-owned PPE brought to the job site is adequate for the task, properly fitted to the employee, and has been properly maintained and is cleaned in accordance with this standard.

4.5 ARCADIS Staff

ARCADIS staff is responsible for completing PPE 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. Employees must choose appropriate, properly fitted PPE where required, and are responsible for inspecting their PPE for wear, damage and effectiveness. Employees that bring their own PPE to the job site must ensure that the equipment is adequate for the task (e.g., meets minimum ANSI requirements, AUS requirements and client requirements), and has been properly maintained in a sanitary and reliable condition in accordance with this standard.

If project personnel believe that a hazard 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 **Minimum PPE Requirements**

All full time and permanent part time employees that regularly conduct field work or visit project sites outside of office environments will be issued a field bag that contains, at a minimum, the following PPE:

- An ARCADIS branded hardhat
- Two pair of safety glasses, one clear pair and one tinted pair, or one pair of prescription safety glasses with transitional lenses
- Hearing protection
- A minimum, Type 2 reflective vest in either orange, lime green or yellow

Office locations will stock extra bags with the equipment listed above for use by other staff that do not regularly go to field locations. Additional PPE and H&S equipment will be issued to staff based on the hazards they face on specific projects (i.e. respirators, goggles, chaps, etc.).

ARCADIS has established the following minimum PPE requirement for field activities that must be worn unless excepted by the HASP, JSA or Permit to Work:

- Type I Hardhat (Class G rating if there is potential danger of contact exposure to low voltage conductors)
- Safety Glasses (Z87.1)
- Class 2 reflective traffic vest, coat or shirt in either orange, lime green or yellow
- Protective Footwear, e.g. steel toe safety shoes (minimum I/50 Impact resistance for the toe area which is an impact resistance rating of at least 50-foot pounds; C/50 Compression resistance for the toe area which correlates to 1750 pounds of compression resistance).

This minimum level of PPE is expected to be worn on all project sites unless in a field trailer or vehicle, unless a specific exemption has been established within an approved HASP or modification to a task specific JSA or Permit to Work upon completion/review of the hazard analysis.

The goal in this section is to specify PPE for work that is not governed by a JSA or Permit to Work to avoid conflicts in PPE requirements. The PPE specified in a JSA/Permit to Work is automatically the PPE requirement for all work governed by the JSA/Permit to Work. As a result, it is critical to take the time during JSA/Permit development to consider and identify the proper PPE required for the activity. Please note that the template JSA
PPE information may not be the appropriate PPE for your project and should be adjusted accordingly.

Note: Project Teams must check and comply with state, local and/or client requirements for specific minimum PPE requirements and adjust the HASP, JSA or Permit to Work process accordingly.

Temporary full time/part time employees (temp staff) will be provided all of the above PPE; however, standard steel toed safety boots will only be provided to temp staff employees with the approval of the administrative supervisor and Project Manager. If the administrative supervisor or Project Manager elects to not provide protective footwear or other non-specialty required footwear to temp staff, the employee will be informed of the requirement to provide their own footwear meeting project health and safety requirements prior to hire.

No ARCADIS staff should arrive at a field or project site without this minimum PPE.

5.2 The PPE Program

The basic objectives of a PPE program are to protect the wearer from safety and health hazards; and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. This document serves as the overall ARCADIS PPE program and is used as guidance for the development of a project-specific PPE program which becomes part of a project-specific health and safety plan. A project-specific PPE program in combination with this HSS will address the following:

- PPE selection based upon site hazards (Hazard Identification/Assessment).
  - Identify the hazards/suspected hazards and their potential routes of exposure (e.g., skin, inhalation, ingestion or eye contact).
- The use and limitations of the equipment including limitations during temperature extremes and under certain medical conditions;
- The work mission duration;
- Maintenance, storage, decontamination and disposal of PPE;
- Training including proper fit and how to properly put on and take off PPE;
- PPE inspection procedures prior to, during, and after use; and
- Periodic evaluation of the effectiveness of the PPE program.

5.3 PPE Selection

The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress and impaired vision, mobility and communication. Over-protection, as well as under-protection and poor fit, can be hazardous and should be avoided where possible. Site or project-specific health and safety plans take into
consideration engineering, substitution, and administrative controls first as a means to eliminate/reduce the need for PPE. When it is not feasible or practical to eliminate the use of PPE, PPE must be properly fitted to each affected employee, and PPE selection will be based on an evaluation of the performance characteristics of the PPE relative to the following:

• The requirements and limitations of the tasks or work environment;

• The task-specific conditions and duration; and

• The hazards and potential hazards identified at the site.

The level of protection will be increased whenever it is shown that increased protection is necessary to reduce employee exposures to the hazards. It may be decreased when it is shown that this will not result in hazardous exposure to employees.

5.4 Levels of PPE Protection

For work on hazardous sites, a combination of PPE may be categorized into levels A, B, C, or D with level A offering the highest level of protection and D the lowest. Monitoring the effectiveness of PPE will be done throughout a project to ensure that the appropriate level of protection is being worn. These levels of protection are described below.

5.4.1 Level A Protection

Level A PPE offers the highest level of respiratory and skin protection and should be worn when:

• The hazardous substance has been identified and requires the highest level of protection of the skin, eyes, and respiratory system based on either:
  
  – The measured (or potential) high concentrations of atmospheric gases, vapors, or particulates; or

  – If site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates which are harmful to skin eyes, or the respiratory system.

• There is a known or suspected high degree of hazard to the skin and skin contact is possible.

• Conducting work in a confined, poorly ventilated area and the other criteria requiring Level A PPE have not been determined.

Level A equipment includes:

• NIOSH approved positive pressure, full-face piece self contained breathing apparatus (SCBA), or positive pressure supplied airline respirator with escape SCBA;

• Totally encapsulating chemical-protective suit (material based on the hazard);
• Chemical resistant outer and inner gloves (type and material based on the hazard);

• Chemical resistant boots with steel toe and shank;

• Disposable protective suit, gloves and boots (depending on suit construction, may be worn over the totally encapsulating suit);

• Coveralls (optional, as applicable);

• Long underwear (optional, as applicable); and

• Hard-hat - under suit (optional, as applicable).

5.4.2 Level B Protection

Level B PPE offers a high degree of respiratory protection with lesser levels of skin protection. Level B PPE should be worn when:

• The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection;

• The atmosphere contains less than 19.5 percent oxygen; or

• The presence of incompletely identified vapors or gases is indicated by direct reading organic vapor detection instruments, but the vapors and gases are not suspected of containing high levels of chemical harmful to the skin or capable of being absorbed through the skin. Level B is the minimum level of protection that should be worn when there is insufficient information to determine the hazards or potential hazards of the substance.

Level B PPE equipment includes:

• NIOSH approved positive pressure, full face piece self contained breathing apparatus 1 (SCBA), or positive pressure supplied air respirator with escape SCBA;

• Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);

• Chemical resistant outer and inner gloves (material based on the hazards);

• Chemical resistant boots with steel toe and shank;

• Coveralls (optional, as applicable);

• Outer chemical resistant boot covers (optional, as applicable);

• Hard hat (optional, as applicable); and
• Face shield (optional as applicable).

5.4.3 Level C Protection

Level C PPE is used when the concentration and type of airborne substance is known, and the criteria for using an air purifying respirator are met. It should be worn when:

• Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;

• The types of air contaminants have been identified, concentrations measured, and an air purifying respirator is available that can remove the contaminants; and

• All criteria for the use of an air purifying respirator are met.

*Level C PPE equipment includes:*

• NIOSH approved full face or half mask air purifying respirator (with appropriate cartridges based on the hazards);

• Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);

• Chemical resistant outer and inner gloves (select appropriate materials based on the hazards);

• Chemical resistant boots with steel toe and shank;

• Coveralls (optional, as applicable);

• Outer chemical resistant boot covers (optional, as applicable);

• Hard hat (optional, as applicable);

• Escape mask (optional, as applicable); and

• Face shield (optional, as applicable).

5.4.4 Level D Protection

Level D PPE offers the least skin and respiratory protection and should be worn when the atmosphere contains no known hazards, and work functions preclude splashes, immersions or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D PPE equipment may include any or all of the following depending on the hazards of the site:
• Chemical resistant boots with steel toe and shank (optional, as applicable);
• Coveralls (optional, as applicable);
• Gloves (optional, as applicable);
• Outer chemical resistant boots (disposable) (optional, as applicable);
• Safety glasses or chemical splash goggles (optional, as applicable);
• Hard hat (optional, as applicable);
• Escape mask (optional as applicable); and
• Face shield (optional as applicable).

5.5 Combinations of Protection

Combinations of protection are acceptable if the task hazard analysis and the site conditions warrant modification of PPE levels.

5.6 Equipment List

5.6.1 Eye/Face Protection

All employees engaged in or working in or adjacent to areas with eye-hazardous activities or operations, such as but not limited to flying objects and hazardous chemicals shall wear appropriate eye protection.

It is strongly encouraged that eye protection be worn when present on any project site, including construction sites

• Safety glasses with side shields are required for impact protection and shall meet ANSI Standard Z87.1 requirements.
• Chemical goggles (for protection against chemical splash).
• Face shields (for face protection from chemical splash and are not a substitute for primary eye protection).
• Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles or face shields.
• Shaded eye protection meeting the minimum shade requirements established in 29 CFR 1910.133 (for employees exposed to sources of injurious light radiation [e.g., welding, cutting, lasers]).
• For prescription eye protection contact your supervisor to fill out an AOSafety order form available on the ARCADIS Health and Safety website (The Source). For temporary staff, standard prescription safety glasses will be provided with the
approval of the administrative supervisor and Project Manager. If the administrative supervisor or Project Manager elects to not provide standard prescription safety glasses to temp staff, the employee will be informed of the requirement to provide their own prescription safety meeting project health and safety requirements prior to hire.

5.6.2 Respiratory Protection

Respirators will be provided and used in accordance with the ARCADIS Respiratory Protection Policy/Standard ARC HSGE017 and 29 CFR 1910.134.

5.6.3 Hearing Protection

Hearing protection will be provided and used in accordance with the ARCADIS Hearing Conservation Policy/Standard ARC HSIH008 and 29CFR 1910.95.

5.6.4 Foot Protection

Basic foot protection is required for all ARCADIS job sites and industrial locations. Specialized footwear will be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.

One pair of leather safety boots will be provided as necessary by ARCADIS. The employee purchasing the footwear is required to ensure that it meets any of the consensus standards as specified by OSHA 29 CFR 1910.136 which include:

- ASTM F2413-11 Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear

  Note: ASTM F2413-11 Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear contains performance requirements for footwear to protect workers’ feet from the following hazards by providing:

  1. Impact resistance (I) for the toe area of footwear (75 foot-pounds);
  2. Compression resistance (C) for the toe area of the footwear (75/ 2,500 pounds);
  3. Metatarsal impact protection (Mt) that reduces the chance of injury to the metatarsal bones at the top of the foot (75 foot-pounds);
  4. Conductive properties (Cd) which reduce hazards that may result from static electricity buildup; and reduce the possibility of ignition of explosives and volatile chemicals (electrical resistance zero â€“ 500,000 ohms);
  5. Electric hazard protection (EH) to protect the wearer when accidental contact is made by stepping on live electrical wire (capable of withstanding the application of 18,000 volts at 60 hertz for one minute
with no current flow or leakage current in excess of one milliampere, under dry conditions);

6. Static dissipative properties (SD) to reduce hazards due to excessively low footwear electrical resistance that may exist where SD footwear is required (must have a lower limit of electrical resistance of 106 ohms and an upper limit of 108 ohms when tested at 50-volts); and

7. Puncture resistance (PR) (when viewed at a 90° angle, the test pin tip must not visually penetrate beyond the face of the material nearest the foot after an applied force of 270 pounds, no signs of de-lamination or cracking after 1.5 million flexes and no sign of corrosion, de-lamination or deterioration after being exposed to a five percent salt solution for 24-hours.)


Safety shoes worn by ARCADIS staff during field work must be equipped with protective (safety) toe cap that has a minimum I/50 Impact resistance rating for the toe area which is an impact resistance rating of at least 50-foot pounds and a C/50 Compression resistance rating for the toe area which correlates to 1750 pounds of compression resistance.

Puncture resistant soles or in-soles equipped in the safety boots are project driven based on the Hazard Assessment. Some clients may require puncture resistant soles or in-soles.

The maximum expenditure or reimbursement for approved safety shoe purchases will be $150. Reimbursement requests must be approved by the employee’s supervisor.

It should be noted that some clients may prohibit the use of athletic-style safety shoes (“safety sneakers”) due to the difficulties created by these styles in supervising proper use of protective footwear.

5.6.5 Head Protection

Hard hats meeting ANSI Z89.1 will be provided to protect employees from impact, penetration, falling objects and/or limited electrical shock and burn, as appropriate for work site hazards. A hard hat must be replaced when it becomes damaged, contaminated (and contamination cannot be removed) or it has been struck by an object of sufficient size to potentially compromise its integrity.

Hardhats must resist penetration by objects, be water resistant and slow burning, and have a chin strap if it is worn while working at elevation. It must be worn square on the head and not be pushed back, to the side or forward.
Baseball-style caps will interfere with the ability of a suspension to work properly during an impact; they should not be worn under protective headgear.

There are two types and three classes of head protection described in ANSI standard.

Other hazard situations to consider are:

- In areas of heavy vegetation or in any area where hunters may be present, it is recommended that some type of brightly colored head protection be worn. For example, a bright orange or yellow baseball cap or stocking cap.

- If cold exposure is an issue, hardhat liners are available (made specifically for the particular hardhat) or if a hardhat is not required, some type of insulated head protection such as a stocking cap should be worn.

- Because it can degrade headwear material and reduce the level of protection, insect repellent should not be applied to or inserted into headwear. The headwear manufacturer should be consulted for instructions on the use of insect repellents and other chemicals on its' products.

5.6.6 Hand Protection

Appropriate hand protection will be provided if employee’s hands are exposed to hazards while on the job.

Such as:

- pinch points
- sharp/pointed tools or objects
- incorrect or inadequate tool use
- improper use
- rotating/energized/automated parts
- abrasive materials
- inadequate job planning
- lack of/inadequate protection
- changing weather conditions and extreme temperatures
- hazardous material
- Jewelry and loose clothing.

Once these hazards are identified, the appropriate glove or hand protection must be selected. When choosing gloves, keep in mind:
- Hazardous Chemicals/Substances to be Contacted
- Nature of Contact (total immersion, splash, etc.)
- Duration of Contact
- Area of Protection (hand only, forearm, arm)
- Equipment (rotating, sharp edges, etc.)
- Grip (dry, wet, oily)
- Thermal Protection
- Abrasion/Cut/Puncture Resistance
- Tear/Tensile Strength
- Ergonomics (size, heat stress, dexterity)
- Decontamination/Disposal

In selecting chemically protective gloves, the toxic properties of the chemical(s) will be determined. Information provided on the manufacturer’s label or by chemical compatibility charts regarding breakthrough time, permeation rate and degradation should be considered during selection.

5.6.7 Body Protection

Protective clothing, gloves, boots, and other protective equipment will be provided as appropriate for the hazards associated with the tasks being performed.

Long pants are required for all field work unless approval is granted by corporate H&S. Additional protection such as cooling vests may be required. In environments with potential biological hazards such as ticks, plants or snakes, gloves and long sleeves should be worn along with head protection of some kind to protect the scalp. In areas of roadway work or other vehicle traffic high visibility Class II safety vests will be worn.

Chemically Protective Clothing (CPC) will be selected by evaluating the performance characteristics of the CPC against the requirements and limitations of the site and task-specific conditions. This selection should be performed by an employee with training and experience taking into consideration:

- Permeation, degradation, penetration of the CPC by the chemical and;
- Durability, flexibility, fit, temperature effects, ease of decontamination, compatibility with other necessary equipment (e.g., hardhats, SCBA, etc.); and duration of use that could affect the employees ability perform the task.

Where required, appropriate Fire Resistant (FR) protective clothing must be used where there is a potential for electrical arc flash hazards (refer to the ARCADIS Electrical Safety
Jobs that expose workers to fire dangers require the use of FR protective clothing.

5.6.8 Specialized Equipment

All other specialized safety equipment required for an assignment (e.g., work gloves, specialized protective clothing, hip boots, field rain gear, personal floatation devices) will be provided by ARCADIS as specified in the HASP.

5.6.9 Extreme Cold Environments

Supervisors are responsible for ensuring that staff is properly equipped to protect themselves while working in extreme cold environments. The following is suggested as appropriate PPE for cold conditions:

- Hats/hat liners and gloves
- Thermal clothing
- Hi-Visibility clothing
- Winter footwear

Use of specialized equipment will be charged to projects in accordance with established policy and rental rates.

5.7 Maintenance/Storage/Disposal

5.7.1 PPE Maintenance and Disposal

PPE must be inspected by the user before and after each use for defects, rips, tears and/or damaged parts. Damaged or compromised PPE will not be used and must be repaired before re-use or disposed. PPE must be disposed of according to the HASP and other project plans for the site. If non-disposable, PPE must be decontaminated and sanitized before being reused according to the HASP. Contaminated PPE which cannot be properly decontaminated by normal procedures must be disposed of accordingly.

Employees are responsible for using and maintaining PPE in a sanitary and reliable condition.

5.7.2 PPE Storage

All PPE must be stored to protect against dust, sunlight, extreme heat and cold, excessive moisture and damaging chemicals. Storage must be in accordance with the manufacturer’s specifications and OSHA requirements.

5.7.3 Contaminated Boots

Single-use boots or boot covers which become contaminated on the job will be waste profiled, as necessary, and properly disposed. Work boots will be properly decontaminated upon exiting contaminated work zones (exclusion zones). Work boots that are damaged on the job must be replaced.
6. TRAINING

Training in the proper use of PPE will generally be provided in conjunction with HAZWOPER training or via coursework selected and approved by Corporate H&S. Training will be completed prior to the employee’s use of PPE, when changes in the work place alter the use or type of PPE, and when inadequacies in the employee’s knowledge or use of PPE are noted.

The training will include at a minimum:

• When and what PPE is necessary;
• How to put on, adjust, wear and take off the PPE;
• Limitations of the PPE; and
• Proper care, maintenance, useful life, and proper disposal of PPE.

Retraining will be conducted when the workplace changes making the earlier training obsolete, the type of PPE changes or when the employee demonstrates lack of use, improper use, or insufficient skill or understanding.

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

29 CFR 1910 Subpart I “Personal Protective Equipment”
29 CFR 1910.136 Foot Protection
29 CFR 1910.6 Incorporation by reference

8. RECORDS - DATA RECORDING AND MANAGEMENT

Records of the PPE training are retained by the employee and in the ARCADIS training database. Medical clearance for respirator use is maintained by the employee and ARCADIS’ medical vendor.
9. APPROVALS AND HISTORY OF CHANGE

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

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<td>20 February 2009</td>
<td>01</td>
<td>Miriam Koesterich/Mike Thomas</td>
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<td>19 August 2011</td>
<td>02</td>
<td>Sue Byers/Mija Coppola</td>
<td>Updated footwear protection consensus standards, clarified contaminated work boot section and updated document format</td>
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<td>2 February 2012</td>
<td>03</td>
<td>Tony Tremblay</td>
<td>Clarified temp staff PPE issues in sections 5.1 and 5.6.1</td>
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<td>16 January 2013</td>
<td>04</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>Added hand protection to section 5.1, added to employee responsibility in section 4.5, and added information on when eye protection should be worn in section 5.6</td>
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<tr>
<td>12 February 2013</td>
<td>05</td>
<td>Amanda Tine/Tony Tremblay</td>
<td>Added that PPE must be properly fitted. Added requirements for employees that bring their own PPE; Added Retraining information into Section 6</td>
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<tr>
<td>23 June 2014</td>
<td>06</td>
<td>Tony Tremblay</td>
<td>Identified minimum PPE requirements for ARCADIS field work in section 5.1 of HSS; Updated footwear protection consensus standard information in Section 5.6.4; and updated foot protection definition</td>
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Exhibit 1 – Definitions

**Eye/Face Protection** - Equipment designed to provide eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

**Foot Protection** - Footwear designed to provide foot and toe protection when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and/or where an employee’s feet are exposed to electrical hazards. These include such measures as safety toe cap and puncture resistant soles.

**Hand and Body Protection** - Equipment designed to provide protection to the hands and body during exposures to potential hazards such as potential for skin absorption of harmful substances, sharp objects, abrasive surfaces, punctures, temperature extremes and chemical contact.

**Hazard Assessment** - The process utilized to identify hazards in the workplace and to select the appropriate PPE to guard people against potential hazards.

**Head Protection** - Equipment designed to provide protection to the head during exposure to potential hazards such as falling objects, striking against objects or electrical hazards.

**Hearing Protection** - Equipment designed to provide protection to an individual’s hearing during exposure to excessive noise levels and any 8hr work day with noise levels consistently 85dB or above.

**Personal Protective Equipment (PPE)** - Equipment designed to provide protection to the wearer from potential hazards to the eyes, face, hands, head, feet, ears, extremities and respiratory system.

**Respiratory Protection** - Equipment designed to provide protection to the wearer from potential inhalation hazards such as vapors, mists, particulates and gases.
EXECUTIVE SUMMARY

It is ARCADIS policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. Accordingly, any work on project sites involving the potential for exposure of our employees to radioactive materials and/or ionizing radiation in excess of their natural background exposure will be accomplished at a minimum in accordance with this Standard of Practice. ARCADIS staff who could potentially receive an occupational dose shall be provided with radiation safety instructional training commensurate with the degree of potential radiological exposure present in the work place.

This Health & Safety Standard (HSS) establishes the minimum requirements for project planning documents (See Exhibit 2), specific training requirements (See Exhibit 3 & Exhibit 4 Training Outlines) and record keeping that applies to employees of ARCADIS North America (ANA).

The term Radiation Safety Officer (RSO) may be used to refer to a professional level health physicist of a non-licensed site. In the parlance of the NRC and/or NRC Agreement States, for license sites, however, the term RSO refers to an individual who has health physics experience and training commensurate with the site / facility radiological hazards and has been placed in that capacity with regulatory approval.

When ARCADIS employees and/or ARCADIS subcontractors are working on radiological sites, a professional level health physicist will be designated as Radiation Safety Officer (RSO) or project Health Physicist (HP) and will be responsible for ensuring compliance to this HSS and for developing applicable radiation protection sections of the project H & S Plan as well as a Radiation Protection Plan (RPP), if necessary. The qualifications and experience of individuals to be designated as RSO / Project HPs (including those of subcontractors) shall be reviewed and approved by the TKI Radiological Discipline Lead or designee (e.g., radiological services sub-discipline lead or qualified Health Physicist (e.g., CHP or equivalent).

All staff working on a licensed radiological site (including individuals having direct day to day supervisory responsibility) will be provided with instructions and training commensurate with their assigned duties as part of the Radiation Protection Program license requirements under 10 CFR Part 20 Standards for Protection Against Radiation. Training requirements for conducting work in Canada are published under the Canadian Nuclear Safety and Control Act, Section 44 (k). ARCADIS employees who have received prior radiological training have the opportunity to complete a Proficiency Exam administered by the TKI Radiological Services Lead or designee to qualify for having completed the General Awareness training component of the required training. Completion of the General Awareness training is the pre-requisite needed for enrolling in additional training.

Records related to the assignment of radiological dose to workers (under licensed activities) are required by US Atomic Energy Act implementing regulations (USNRC and equivalent Agreement State regulations, e.g. 10 CFR 20 Subpart L) to be maintained for a minimum of 3 years following exposure. In accordance with the ARCADIS Human Relations Records Retention and Management Policy 2.12 and associated ARCADIS Legal Policy, employee radiation exposure monitoring documents are to be maintained permanently. Also, it has been the general practice in the US nuclear industry, in the interest of liability protection and risk management, to maintain these records and those related to training of radiation workers in a centralized repository indefinitely or until it is known the individual is deceased.
1. POLICY

It is ARCADIS policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. Accordingly, any work on project sites involving the potential for exposure of our employees to radioactive materials and/or ionizing radiation in excess of their natural background exposure will be accomplished at a minimum in accordance with this Standard of Practice.

Additionally, it is ARCADIS’ policy that ARCADIS staff who could potentially receive an occupational dose shall be provided with radiation safety instructional training commensurate with the degree of potential radiological exposure present in the work place. Individuals with responsibility for performing radiological surveys for purposes of characterizing levels of radioactive material at the work location and / or the levels of ionizing radiation to which our employees may be exposed will be provided formal training in the basics of radiological science and radiation protection principles to be provided by a qualified training vendor or a professional health physicist (see definitions in Exhibit 1).

Note: It should be understood that natural background levels of radiation and radioactivity will vary from location to location depending on factors such as local geology and elevation. Generic guidance on the range of natural background can be found in publications such as Report 160 “Ionizing Radiation Exposure of the Population of the United States” of the National Council on Radiation Protection and Measurements (NCRP). See Definitions in Exhibit 1.

2. PURPOSE AND SCOPE

2.1 Purpose

This HSS establishes accepted practice and requirements for radiation safety training and health physics monitoring for employees and subcontractor personnel. The purpose of this HSS is to ensure that occupational radiation exposure of our employees is maintained as low as reasonably achievable (ALARA). Furthermore, an objective of this HSS is to ensure that protection from radiological hazards is implemented consistently and associated documentation is maintained in accordance with applicable regulatory requirements. See Section 8 References for a list of the regulatory agencies and regulations applicable to this HSS.

2.2 Scope

This HSS establishes the minimum requirements for project planning documents (See Exhibit 2), specific training requirements (See Exhibit 3 & Exhibit 4 Training Outlines) and record keeping that applies to employees of ARCADIS North America (ANA). Additional requirements established at the State or Canadian Province level need to be addressed by the project teams with the assistance of the ARCADIS TKI Radiological Services Group. Only properly trained and authorized ARCADIS employees and subcontractors are permitted to work on sites that may involve occupational exposure to radioactive materials and ionizing radiation and therefore require radiological monitoring commensurate with the anticipated exposures (e.g., one or more of gamma radiation scans, personal dosimetry, contamination surveys, air sampling and related radiological...
surveys and assessments) as required by the site or project specific Radiation Protection Manual and/or Health and Safety Plan.

3. DEFINITIONS

Exhibit 1 includes relevant definitions of some important terms used in this HSS including those applicable for radiation safety staff qualifications.

4. RESPONSIBILITIES

4.1 TKI Radiological Services Group and Corporate H&S

- On a routine basis, review and update this HSS, as necessary.
- Ensure that the radiation safety qualifications and training/retraining requirements remain current with professional standards of practice and are met.
- Conduct evaluations of individuals as necessary in order to approve and designate them as qualified radiation safety staff.
- For each project to be conducted at radiological sites, determine if a project specific Radiation Protection Plan is required (See Section 4.2 below) and provide peer review and approval of it.
- Provide technical assistance regarding radiation safety and survey protocols, assignment of radiation safety staff, choice and use of equipment used for personal protection (PPE), for characterization and monitoring of local radiation fields and radioactivity, for hazard and dose assessments and to provide assistance in evaluating unusual hazards.
- Audit project-specific radiation safety protocols and records for compliance with this HSS.

4.2 Project Radiation Safety Officer (RSO) or Health Physicist (HP)

The term RSO may be used to refer to a professional level health physicist of a non-licensed site. In the parlance of the NRC for license sites, however, the term RSO refers to an individual who has health physics experience and training commensurate with the site / facility radiological hazards and has been placed in that capacity by regulatory approval.

- Verify adequacy of instruction, training and experience of ARCADIS employees and those of subcontractors.
- Verify compliance with the safety procedures identified in this HSS and the site specific Health and Safety and/or Radiation Protection Plans, as well as applicable regulatory requirements as required to minimize the radiation exposure of employees. A general example of the content of a typical Radiation Protection Plan for the types of radiological sites under the purview of this HSS is provided in Exhibit 2.
• Prepare site specific sections of the Health and Safety Plan (HASP) and/or prepare the project Radiation Protection Plan applicable to radiation safety and characterization protocols.

• Ensure project specific Radiation Protection Plans and protocols have been reviewed and approved by the TKI Radiological Services Group prior to implementation.

• Ensure provision of personal dosimetry to workers and/or use monitoring results and associated calculations to assess and document exposures of employees or to demonstrate that worker personnel dosimetry is not required.

• Immediately report to Corporate H & S any unusual or unplanned exposure.

• Prepare radiation work permits for activities not addressed in the Radiation Protection Plan, with a copy to the Radiological Services TKI discipline lead or designee assigned to the project.

4.3 Radiation Protection Technicians (RPT)

• On-site RPTs will ensure project specific Radiation Protection Plan and HASP protocols are implemented as approved.

• Perform radiological surveys and monitoring in accordance with approved protocols (Radiation Protection Plan and associated Standard Operating Procedures) under the direction of the Project RSO / Health Physicist.

• Ensure correct use of PPE and radiation survey and monitoring equipment.

• Ensure untrained personnel are escorted during site visits. These should only include visitors or short-term subcontractors (e.g., utility locators).

• Immediately report to the Project RSO/HP suspected unusual or unplanned exposure conditions and assist in follow up as directed.

4.4 Project Manager (PM), Associate Project Manager (APM), Task Manager (TM)

• Verify divisional, client portfolio or project team employees have received the proper instruction and training provided by TKI Radiological Services, Corporate Health & Safety or approved and qualified external training source (approved by these groups) prior to conducting work at radiological sites (See Section 6).

• Verify with the TKI Radiological Services Group, that any ARCADIS employee acting as a Radiation Protection Technician (RPT), Project Radiation Safety Officer (RSO) or Health Physicist (HP) has been designated and authorized by the Group to perform his/her function as outlined in this HSS.

• Ensure that the necessary proper equipment, including radiological monitoring, personal protective and safety equipment is available for use by designated and approved radiation safety staff.
- Ensure project specific Radiation Protection Plans and/or applicable sections of the HASP have been reviewed and approved by the TKI Radiological Services Group prior to implementing.

- Request that the TKI Radiological Services Group review project survey and monitoring records during project execution at frequencies designated in the Radiation Protection Plan and HASP commensurate with site specific radiological hazards and risks.

4.5 Employees

- Once aware of their project task and the associated training requirements, notify the TKI Radiological Services Group, PM and/or TM or Project RSO/HP if they have not received required radiation safety instructions and training as outlined in this HSS.

- Be familiar with sections of the site specific Radiation Protection and Health and Safety Plans as necessary for the safe and efficient performance of their job functions.

- Use PPE and monitoring and testing equipment as directed by the Project RSO / HP or RPTs.

- Maintain an awareness of known site hazards and associated means of control and consult with Health and Safety and / or Radiation Safety staff as necessary.

- Request and review their personal, site-specific radiological monitoring results, as applicable.

5. PROCEDURE

When ARCADIS employees and/or ARCADIS subcontractors are working on radiological sites, a professional level health physicist will be designated as RSO or project Health Physicist (HP) and will be responsible for ensuring compliance to this HSS and for developing applicable radiation protection sections of the project HASP as well as a RPP if necessary. The qualifications and experience of individuals to be designated as the project RSO or project HPs (including those of subcontractors) shall be reviewed and approved by the TKI Radiological Discipline Lead or designee (e.g., radiological services sub discipline lead or qualified Health Physicist (e.g., American Board of Health Physics Certified HP or equivalent).

Project personnel will comply with this HSS, other applicable H&S Standards and project operating procedures, the site specific Radiation Protection Plan (if applicable) and the site specific HASP. Where deviations from this HSS are needed to ensure safe work practice, such deviations shall be prepared as a modification to this HSS as it applies to the particular project and will be reviewed with and approved by the project RSO / HP and documented as a project specific modification of this HSS.

Project specific radiation protection requirements and procedures (e.g., Radiation Protection Plans and associated standard operating procedures [SOPs] if applicable) prepared by the Radiation Safety Officer (RSO) or Project Health Physicist (HP) shall be reviewed and approved by TKI Radiological Discipline lead or designee prior to initiating work at a site at which ARCADIS employees or subcontractors could receive occupational radiation exposure.
5.1 Radiation Protection Plans (RPP)

Exhibit 2 provides a generic example of the Table of Contents for a typical project level Radiation Protection Plan. However, at a minimum, these project specific plans shall specify:

- The specific radiological conditions expected.
- Responsibilities of project personnel for radiation safety and monitoring.
- The radiological exposure limits for working in restricted areas, the radiological exposure monitoring required, at what frequencies and under what conditions.
- Decontamination procedures as applicable for personnel and equipment.
- The radiological instrumentation and methods to be used for characterization surveys of radiological conditions at the site, for maintaining of employee exposure ALARA and for measurement, assessment and documentation of the occupational exposure of employees.
- Requirements for listing the communication contact information, notification protocols and appropriate response actions if a suspected or known unusual exposure condition or contamination incident (area and/or personnel) has occurred.
- Training requirements for project personnel (See Section 6).

6. TRAINING

All staff working on a radiological site (including individuals having direct day to day supervisory responsibility) will be provided with instructions and training commensurate with their assigned duties. For licensed sites, this training will be part of the Radiation Protection Program license requirements under 10 CFR Part 20 Standards for Protection Against Radiation (or agreement State equivalent). Training requirements for conducting work at licensed sites in Canada are published under the Canadian Nuclear Safety and Control Act, Section 44 (k). ARCADIS employees who have received prior radiological training have the opportunity to complete a Proficiency Exam administered by the TKI Radiological Services Lead or designee to qualify for having completed the General Awareness training component of the required training. Completion of the General Awareness training is the pre-requisite needed for enrolling in additional required training. An example summary of radiological training requirements for several general project types and job functions is provided in Table 1. In general, employees will receive the following training:

- Radiological training as specified herein will be required prior to performing work at radiological sites at which ARCADIS employees or subcontractors could receive occupational radiation exposure. If subcontractors have provided their own training, ARCADIS health physics professionals will need to review and approve the training curriculum to verify it meets the minimum requirements established in this HSS.

- All employees working on radiological sites will receive general radiation safety instructional training as outlined in Exhibit 3 including site specific training on specific radiological conditions and associated radiation protection requirements.

- Radiation Protection Technicians shall receive training as outlined in Exhibit 4 and their qualifications will be approved by the TKI Radiological Discipline Lead or his/her designee.
• The training and experience of designated RSOs and RPTs at licensed sites shall comply with applicable license conditions and the applicable requirements and guidance of the licensing agency (USNRC or Agreement State, Canadian Nuclear Safety Commission [CNSC], etc.).

• Additionally, site specific radiation safety training that addresses the radiological hazards at each site (as identified by the Site Specific Radiation Protection Plan, will be provided by the Project RSO/ Health Physicist.

• Refresher training for general employees and Radiation Protection Technicians shall be provided whenever radiological site conditions have significantly changed (as determined by the Project RSO/ HP) but at a minimum annually. The content of this training will be based on site radiological conditions and risks in consultation with the TKI Radiological Discipline lead or designee.

• Content and methodology of external training programs must be approved by the ARCADIS Training Department and the TKI Radiological Services Group.

All radiological training must be developed and/or reviewed and approved by TKI Radiological Services in conjunction with Corporate H&S. Deliverance of this training will be managed and facilitated through the ARCADIS Training Center.

Documentation of training certification received by successful completion (at least 80% score on exam) for any radiation safety related training course, including externally provided training courses will be maintained by the employee with copies provided to the ARCADIS Training Center.
### Table 1: Summary of Radiological Training Requirements

#### Training Requirements for Sites Required to be Licensed Under the US Atomic Energy Act

- **RSO and RPTs:**
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.
  - Radiation Protection Technicians and RSO / HP Training (Exhibit 4) and as specifically required by regulation and/or license conditions.

**NOTE:** For example, US NRC Regulatory Guide 8.31, *Information Relevant To Ensuring That Occupational Radiation Exposures at Uranium Recovery Facilities Will Be As Low As Is Reasonably Achievable*, Section 2.4 Technical Qualifications of Health Physics Staff, Section 2.4.1 - Radiation Safety Officer and 2.4.2 – Radiation Protection Technicians (these requirements are typically incorporated by reference as a license condition in uranium recovery facility licenses).

- **ARCADIS employees and subcontractors performing field tasks (involving potential proximity to radiological materials):**
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent
  - Site / job specific radiological hazard recognition, ALARA protocols and exposure controls and notifications / instructions as required by the licensing agency (e.g., US NRC 10 CFR 19, *Notifications and Instructions to Workers*).

- **ARCADIS employees conducting non field tasks (e.g., project managers/ task managers or office based staff):**
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.

#### Training Requirements for Non Licensed Radiological Sites

- **Project Health Physicist and RPT:**
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.
  - Radiation Protection Technicians and RSO / HP Training (Exhibit 4); site-specific radiological hazards and controls.

- **Workers performing field tasks (involving potential proximity to radiological materials):**
  - General Employee Awareness Training (Exhibit 3).
  - Site / job specific radiological hazard recognition, ALARA protocols and exposure controls.

- **ARCADIS employees conducting non field tasks (e.g., project managers/ task managers or office based staff):**
  - General Employee Awareness Training (Exhibit 3).
Training Requirements for Use of Licensed Radiological Sealed Sources and Radiation Generating Devices (e.g., Density Gauges and other sealed source equipped devices and XRFs as well as X-Ray tube equipped devices used at non–radiological project sites)

- Sealed Source and X-Ray Tube Equipment Authorized Users (by Health and Safety or TKI Radiological Services):
  - General Employee Awareness Training (Exhibit 3) or acceptance by TKI Radiological Services of the instrument manufacture’s radiation safety training program as equivalent.
  - Device / application specific radiological hazard recognition, ALARA protocols and exposure controls.
7. **RECORDS - DATA RECORDING AND MANAGEMENT**

Records related to the assignment of radiological dose to workers (under licensed activities) are required by US Atomic Energy Act implementing regulations (USNRC and Agreement States, e.g. 10 CFR 20 Subpart L) to be maintained for a minimum of 3 years following exposure. In accordance with the ARCADIS Human Relations Records Retention and Management Policy 2.12 and associated ARCADIS Legal Policy employee radiation exposure monitoring documents are to be maintained permanently. Also, it has been the general practice in the US nuclear industry, in the interest of liability protection and risk management, to maintain these records and those related to training of radiation workers indefinitely or until it is known that the individual is deceased.

7.1 **Training Records**

All employee training records (including completion certificates and successfully completed exams) will be maintained by the individual employee with copies provided to the ARCADIS Training Center. Documentation of training course content and session dates will be maintained by the Training Center in a centralized repository indefinitely or until it is known the individual is deceased.

7.2 **Employee Occupation Exposure Monitoring Records**

Project site work that generates occupation exposure monitoring records associated with dosimetry monitoring badges or similar monitoring devices where an analytical report is generated are to be maintained by the employee and in a centralized repository where they can be made readily available upon request.

7.3 **Project File Records**

Documents and records to be maintained by the project team in a central project file include:

- The project specific HASP and Radiation Protection Plan
- Specific JSAs, SOPs, documentation of modified procedures or deviations from standard practices, and Best Management Practices (BMPs).
- Radiological site characterization data and site monitoring data documenting site radiological conditions,
- All personnel and exposure data and associated calculations and assessments that document the evaluation of employee exposure specific to the site radiological conditions.

8. **REFERENCES**

- ARCADIS Health and Safety Standard ARC HSFS010 – Health and Safety Planning
- US NRC 10 CFR Part 20 – Standards for Protection Against Radiation
- ANSI/HPS N13.6 Occupational Radiation Exposure Records Systems
• ANSI/HPS N13.65 Measurement and Evaluation of Radiation and Radioactive Sources Using Portable Radiation Detection Instruments
• ANSI/HPS N13.53 Control & Release of Technologically Enhanced NORM (TENORM)
• Council on Radiation Control Program Directors (CRCPD) - Part N: Regulation and Licensing of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
• ARCADIS Health and Safety Standard No. ARC HSIH011 – Sealed Source Instrument Radiation Safety Program

9. APPROVALS AND HISTORY OF CHANGE

Douglas Chambers, Phd - TKI Radiological Services Discipline Lead

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

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<td>Authors: TKI Radiological Services Group, Corporate H&amp;S Group Technical Review Group: Doug Chambers (TKI Radiological Group Lead), L Skoski &amp; D Carpenter (Operations Group), P Vollertsen (AUS Corporate H&amp;S Training)</td>
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Exhibit 1 – Definitions

**Absorbed Dose** – The amount of energy deposited by ionizing radiation in a unit of mass of tissue. Typically expressed in units of joule per kilogram (J/kg) and called “gray” (Gy) or historically referred to by the term radiation absorbed dose or “rad”. One gray is equal to 100 rad.

**Activity** – The rate of decay of a radioactive material expressed as the number of atoms breaking down per second measured in “Becquerel’s” or “curies”. A Becquerel is characterized as one disintegration per second. Also used to describe the quantity of radioactive material present at a given time.

**Air Dose** – The dose is measured by a properly calibrated appropriate instrument in air at or near the body surface in the region of the highest dosage rate. The air dose is used for determining exposures to X-, or gamma rays up to 3 million electron volts (meV). **ALARA** is an acronym for “as low as reasonably achievable”, i.e., maintaining doses to workers and members of the public as far below regulatory dose limits as is practicable, given the work that must be accomplished.

**Bioassay** – An assessment of radioactive materials that may be present inside a person’s body through analysis of the person’s blood, urine, feces, or sweat.

**Bq** – Becquerel – The amount of a radioactive material that will undergo one decay (disintegration) per second.


**Committed effective dose equivalent** – The dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

**Curie** – The traditional measure of radioactivity based on the observed decay rate of 1 gram of radium. One curie of radioactive material will have 37 billion disintegrations in one second.

**Decontamination** – The process of neutralization, washing, rinsing, and/or removing contamination to minimize the potential for contaminant migration outside of a radiation area.

**Dose** – The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body. When specifying a dose during a period of time, the dose is the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. The unit of measure for the dose could involve measurements of “Rad” or “Rem”.

**Dose coefficient** – The factor used to convert radionuclide intake into dose. Usually expressed as dose per unit intake (e.g., Sieverts per Becquerel).

**Dose equivalent** - (H+) A quantity used in radiation protection to place all radiation on a common scale for calculating tissue damage. Dose equivalent is the absorbed dose in grays (Gy) multiplied by the quality factor. The quality factor accounts for differences in radiation effects.
caused by different types of ionizing radiation. The units of dose equivalent are the rem and the Sievert (Sv).

**Dosimeter** – A small portable instrument such as a film badge, thermo luminescent dosimeter (TLD), or pocket dosimeter, used to measure and record the total accumulated dose of ionizing radiation a person receives.

**DOT** - US Department of Transportation

**Effective Dose** – A dosimetric quantity useful in comparing the overall health effects of irradiation of the whole body. The effective dose is used to express the overall health detriments when different radionuclides are present in a given mix. The unit of the effective dose is the Sievert (Sv); 1 Sv = 1 J/Kg

**EPA** - US Environmental Protection Agency

**Fixed Contamination** – Contamination which cannot be removed without affecting the removal of some portion of the surface that is contaminated or covering the contamination, or where the potential for surface contaminant migration is impossible to occur due to the non-intrusive work during property investigations. Examples of fixed contamination can be contaminated soil or building structures covered with physical barriers (i.e. grass, asphalt, concrete, brick, tiles, foundation rocks, paint, and wood) and contamination comimled with asphalt, concrete or building structures.

**Frisking** - Scanning of field personnel and equipment using a scaler/rate meter coupled to a Geiger - Mueller detector (“pancake” style), or equivalent, to identify the presence of contamination.

**Gray** – (Gy) a unit of measurement for absorbed dose typically expressed in units of joule per kilogram (J/kg). It measures the amount of energy absorbed in a material. The unit Gy can be used for any type of radiation, but it does not describe the biological effects of the different radiations. 1 Gy = 100 rad.

**High Radiation Area** – An area, accessible by individuals, in which radiation levels from radiations sources external to the body could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 mSv) in one hour at a distance of 12 inches (30 centimeters) from a radiation source or from any surface or shielding that the radiation penetrates.

**Individual monitoring device** – Also referred to as “individual monitoring equipment” means devices designed to be worn by a single individual for the assessment of dose equivalent such as film badges, thermo luminescence dosimeters (TLDs), pocket ionization chambers, and personal (“lapel”) air sampling devices.

**Licensed site** - A site (or portions thereof with designated licensed boundaries) and associated activities that must be conducted under the requirements of a radioactive material license in accordance with the US Atomic Energy Act (AEA). These licenses are issued by either the US
Natural Background Exposure - The ubiquitous ionizing radiation that people on the planet Earth are exposed to, including natural and artificial sources. It comes from outer space (cosmic), the ground (terrestrial), and even from within our own bodies. It is present in the air we breathe, the food we eat, the water we drink, and in the construction materials used to build our homes. For purposes of this H & S Standard, natural background exposure does not include additional exposure an individual could receive as a result of work on job sites at which they could receive an “occupational exposure” (See below)

NRC – United States Nuclear Regulatory Commission

Occupational Exposure (Dose) - Ionizing radiation exposure an individual receives at an ARCADIS client project job site over and above the natural background exposure they receive based on where they live and their personal lifestyles (i.e., if they were not on the site, they would not receive this exposure)

Radiation Protection Technician (RPT) - An individual, properly trained and qualified by academic background and/or experience, whose duty is to conduct radiological surveys and associated radiation safety monitoring of employees, equipment and areas and to implement the site specific Health & Safety and / Radiation Protection Plans.

Radiation - For the purposes of this HSS, the term “radiation” refers to ionizing radiation and is defined as any elementary particle or photon emitted from a radioactive atom or source and having sufficient charge and / or kinetic energy to impact (deposit energy in) tissues. Ionizing radiation includes particles such as alpha particles, beta particles, and electromagnetic waves such as gamma rays and x-rays.

Radiation Protection Plan – A project or site specific document developed for the purposes of minimizing radiation exposure of employees which defines professional standards of practice for conduct of radiological surveys, methods for assessment and assignment of dose and to define requirements and ensure compliance with applicable law.

Radiation Safety Officer / Project Health Physicist (RSO / HP) - A professional level, trained and qualified individual whose duty is to ensure the Radiation Protection Plan (and/or applicable sections of the Health and Safety Plan) is prepared and implemented properly, provides oversight and consultation and mentors the Radiation Protection Technicians. A Radiation Safety Officer (RSO) at a licensed site requires professional health physics experience, education and regulatory approval. The term “RSO” as used in this HSS as applied to work at non-licensed sites may deviate from the standard regulatory meaning; specifically required training and experience can be less rigorous than a RSO at a licensed site.

Radiological Site - Any work location at which radioactive materials and/or ionizing radiation are believed or known to exist at which employees could receive an occupational dose. Locations at which sealed radiation sources (e.g. density gages) and/or radiation generating machines (e.g., XRFs) are used are considered “radiological sites” for purposes of this HSS since use of such devices could result in employees receiving an occupational dose.
Exhibit 2 - Example Project Radiation Protection Plan Table of Contents

1.0 INTRODUCTION
   1.1 Radionuclides of Concern
   1.2 Project Organization
   1.3 As Low as Reasonably Achievable (ALARA) Policy
   1.4 Applicable H&S Standards

2.0 RADIATION PROTECTION PLAN
   2.1 Authorities and Responsibilities of Organizational Functions Important to Radiation Protection
   2.2 Worker Responsibility
   2.3 Standard Operating Procedures
   2.4 Minimum Training and Experience Requirements for Management Personnel
   2.5 Radiation Safety Training Program
   2.6 Site Work Zone Notifications and Postings (Radiation symbols, markings and placards)
   2.7 Emergency Response Planning and Communication

3.0 REGULATORY STANDARDS AND GUIDES
   3.1 Worker Dose Limits
   3.2 Release of Equipment and Land for Uncontrolled Use

4.0 RADIATION SURVEYS
   4.1 External Exposure and Exposure Rate Monitoring
   4.2 Particulate Air Monitoring
   4.3 Radon Monitoring
   4.4 Personal Contamination Surveys
   4.5 Equipment Contamination Surveys
   4.6 Instrument Calibration

5.0 RESPIRATORY PROTECTION PROGRAM

6.0 CONTROL OF RADIOACTIVE MATERIALS AND RADIATION EXPOSURE

7.0 SEALED SOURCE EQUIPPED DEVICES

8.0 FEMALE EMPLOYEES OF CHILD BEARING AGE AND PRENATAL RADIATION EXPOSURE

9.0 RADIATION PROTECTION WORK RULES – APPLICABLE TO ALL ARCADIS EMPLOYEES & CONTRACTORS

10. PERSONAL PROTECTIVE EQUIPMENT

11.0 CONTAMINATION CONTROL

12.0 PERSONAL DOSIMETRY PROGRAMS
   12.1 Personal Dosimeters (Direct Radiation Exposure Monitoring)
   12.2 Declared Pregnant Workers (DPW) Dosimetry
12.3 Bioassay (If applicable)
12.4 Calculation of Total Effective Dose Equivalent (TEDE)

13.0 RADIATION WORK PERMIT (RWP)

14.0 RECORDS

15.0 BIBLIOGRAPHY
Exhibit 3 – Example Course Outline of Training Requirements for “General Awareness” Employee Radiation Safety Training

The duration for the General Awareness training outlined below is approximately 4 hrs. The actual duration of the training will depend on the expected or known site specific radiological levels and associated H&S risks. The General Awareness training is a pre-requisite for the second level of training detailed in Exhibit 4.

1.0 Introduction to Radioactivity
2.0 Interactions of Radiation with Matter
3.0 Radiation Safety Principles
4.0 Radiation Quantities and Units
5.0 Surveys and Instruments
6.0 Biological Effects of Radiation
7.0 Special Considerations for Female Personnel and Fetal Exposures
8.0 Contamination Control
9.0 Regulations - Dose Limits and ALARA
10.0 Natural Background Radiation
11.0 External and Internal Dosimetry
12.0 Personnel Monitoring
13.0 PPE and Respiratory Protection
14.0 Radioactive Waste
15.0 Transportation of Radioactive Material
16.0 Exam
Exhibit 4 – Example Course Outline of Training Requirements for Radiation Protection Technicians (RPT) and Radiation Safety Officers (RSO) Health Physics Training.

The expectation for RSOs and RPTs is to complete additional training incorporating site specific details of the proposed work. The classroom training will require advance planning for proper staff preparation due to the extent of material to be covered as determined in part by the class attendee’s current level of understanding of the topic, prior training completed, and the nature of the work proposed. Coordination with the TKI Radiological Services Group and the ARCADIS Training Center is required for participating in these classes.

Example of Training Topics Covered

1.0 BASIC RADIATION PHYSICS
   1.1 Atomic Structure and Radioactive Decay
   1.2 Interaction of Radiation with Matter

2.0 RADIATION DOSE AND HEALTH RISKS
   2.1 Dosimetry
   2.2 Biological Effects

3.0 REGULATIONS
   3.1 Occupational Dose Limits
   3.2 Dose Limits for Members of the Public
   3.3 Transportation of Radioactive Material

4.0 POTENTIAL RADIATION HAZARDS
   4.1 Direct External Dose
   4.2 Internal Dose from Inhalation
   4.3 Internal Dose from Ingestion
   4.4 Internal Dose from Dermal Absorption
   4.5 Hazards in Perspective

5.0 BASIC RADIATION PROTECTION
   5.1 ALARA Policy
   5.2 Radiation Protection Program Management
   5.3 Protection from External Exposures
   5.4 Protection from Internal Exposures
      5.4.1 General Personal Protection Equipment (PPE)
      5.4.2 Respiratory Protection
   5.5 Female Personnel and Fetal Exposures
5.6 Working Area Designations
5.7 Dose Monitoring
  5.7.1 Worker Monitoring
  5.7.2 Environmental Monitoring
  5.7.3 Calculation of Dose
  5.7.4 Records
5.8 Control of Radioactive Materials
  5.8.1 Accidental Loss of Control
  5.8.2 Emergency Response
  5.8.3 Equipment Release Surveys
  5.8.4 Personnel Release Surveys
  5.8.5 Decontamination

6.0 INSTRUMENTATION
  6.1 Alpha Radiation Surveys
  6.2 Beta Radiation Surveys
  6.3 Gamma Radiation Surveys
  6.4 Air Sampling and Surveys
  6.5 Data Quality Control

7.0 COUNTING STATISTICS AND UNIT CONVERSIONS
  7.1 Determining instrument backgrounds
  7.2 Determining Absolute Activity
  7.3 Instrument Performance Verification in the Field
  7.4 Exposure vs. True Dose Rates

8.0 Practicum and Exam
  8.1 Hands on Use of Instruments and Measurement Protocols
  8.2 Measurement of a Variety of Radionuclides
  8.3 Determining External Exposure and Dose Rates
  8.4 Alpha vs. Beta vs. Gamma Measurements of Surfaces and Personnel
  8.5 Collection and Analysis of Air Samples
  8.6 Exam
EXECUTIVE SUMMARY

Identifying and addressing root cause(s) of incidents, questionable behaviors identified during a Task Improvement Process (TIP), and findings from inspections, audits, and reviews and developing appropriate solutions that match those root causes is essential in ARCADIS’ efforts to prevent incidents and recurrence of incidents.

Therefore, each near miss or incident will be investigated to identify contributing factors and the root cause(s). The investigation process is completed so that solutions can be identified, implemented and communicated to prevent similar incidents from occurring in the future. This standard provides guidance for conducting a root cause analysis and implementing appropriate solutions.

Root cause analysis and solution development procedures will be utilized for the following types of incidents reported and investigated:

- Work-related injuries and illnesses
  - fatality/permanent disability
  - lost time
  - restricted duty
  - medical treatment
  - first aid
- Near misses
- Motor vehicle accidents
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies

Supervisors are responsible for leading the investigation of an incident (per ARC HSMS010) for which the root causes are being determined, and is responsible for leading the investigation team in determining the appropriate root causes and the matching solutions.

Root cause analysis is used whenever a near miss, incident or injury is identified. It can also be used at times following TIPs, BBS field assessments and other H&S reviews when deficiencies are identified and require correction or prevention. Eight categories of root causes are used to guide the analysis process. ARCADIS uses the “5 Why” method for root cause analysis.

After identifying the root cause(s), solutions are developed with a responsible person identified and notified for solution implementation with a set due date for completion. Solutions must address and relate to the root cause(s) and contributing factor(s) in order to be effective. Solutions should be practical, cost beneficial and sustainable for the long term, and should focus on factors that can be controlled by the individual or supervisor.

All employees receive Root Cause Analysis and Solutions Development training during the Health & Safety Program Orientation training, which is received by all employees upon employment.
1. POLICY

It is the policy of ARCADIS to determine the Root Cause(s) of all incidents (as defined in ARC HSMS010) to allow for the proper development and implementation of solutions that will prevent similar incidents from occurring in the future.

2. PURPOSE AND SCOPE

2.1 Purpose

Identifying and addressing root cause(s) of incidents, questionable behaviors identified during a Task Improvement Process (TIP), and findings from inspections, audits, and reviews and developing appropriate solutions that match those root causes is essential in ARCADIS’ efforts to prevent incidents and recurrence of incidents.

2.2 Scope

Root cause analysis and solution development procedures will be utilized for the following types of incidents reported and investigated:

- Work-related injuries and illnesses
  - fatality/permanent disability
  - lost time
  - restricted duty
  - medical treatment
  - first aid
- Near misses
- Motor vehicle accidents
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies

While not mandatory, root cause analysis and solution development may be used whenever questionable behaviors are identified during the TIP process. It can also be used to address the findings resulting from audits, inspections, reviews, Behavior Based Safety (BBS) field assessments, or other activities.

This procedure is also followed for any of the above as they pertain to subcontractors providing services to ARCADIS. Additional client-specific and contract requirements may also be required and implemented. In such cases, 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.
3. DEFINITIONS

See Exhibit 1 of ARC HSMS000 – ARCADIS US Health & Safety Management System and Exhibit 1 of this Health and Safety Standard (HSS).

4. RESPONSIBILITIES

4.1 Supervisor

Leads the investigation of the incident (per ARC HSMS010) for which the root causes are being determined, and is responsible for leading the investigation team in determining the appropriate root causes and the matching solutions. Refer to Exhibit 1 for details on “Supervisor” role.

4.2 Employee

Participate in the investigation of an incident, and are responsible for following the solutions implemented and completing solutions as assigned.

4.3 Reviewers

Reviewers are responsible for reviewing root causes and ensuring appropriateness and for providing comment on the solutions to assist in ensuring they match the root causes identified.

4.4 Managers and Senior Leaders

Validate and verify the solutions.

5. PROCEDURE

Root cause analysis is used whenever a near miss, incident or injury is identified. It can also be used at times following TIPs, BBS field assessments and other H&S reviews when deficiencies are identified and require correction or prevention. Eight categories of root causes are used to guide the analysis process.

5.1 The Five Why’s

The “5 Why’s” is a simple method for structured root cause analysis. It is merely a question asking method used to explore the cause/effect relationships underlying a problem. The ARCADIS Investigation Team keeps asking the question “Why?”, What, How and/or When something happened until meaningful conclusions are reached. Why do we use the “5 Why?” method?

- To uncover issues that may be contributing to the incidents that occur;
- To identify questionable behaviors identified during an investigation;
- To assess observations/findings from a BBS Field Assessment; or
- To help identify a finding documented in a Project or Office H&S audit

For example, I tripped over the extension cord.

- Why did you trip? I caught my foot on it and lost my balance.
In this example, one contributing factor was that the individual was rushing to a meeting. This is what would be entered in the Contributing Factor section of the Investigation report. Then, the 5 Whys would be used to determine the second contributing factor: the position of the extension cord.

Once all contributing factors have been identified, determine which contributing factor(s) were primary in the event occurring (key contributing factor). Contributing factors are not root causes.

5.2 Root Cause Flow Chart

For each key contributing factor, follow the root cause process flow presented in Exhibit 2 to identify the root cause(s). There could be more than one root cause. The root cause categories are presented in Exhibit 3. Evaluate each category to determine the root cause(s) of each key contributing factor.

A positive outcome can be selected in the investigation report to recognize a positive behavior that prevented the event being investigated from becoming more serious.

5.3 Solutions

After identifying the root cause(s), solutions are developed with a responsible person identified and notified for solution implementation with a set due date for completion. If the investigation team cannot identify a root cause then make no recommendation to address it. Appropriate solutions can be developed using the Solutions and Actions Table presented in Exhibit 4.

Solutions address and relate to the root cause(s) and contributing factor(s) to be effective. Solutions should be practical, cost beneficial and sustainable for the long term, and should focus on factors that can be controlled by the individual or supervisor. Effective solutions typically are “SMART” solutions:

- Specific
- Measurable/observable
- Achievable
- Relevant
- Timely

Following the review and approval process (per the process being conducted that resulted in the activation of the root cause analysis process), the appropriate supervisor contacts
the person(s) responsible for implementing the solution(s). Personnel must agree to both the solution(s) and the due date(s).

6. TRAINING

All employees receive Root Cause Analysis and Solutions Development training during the Health & Safety Program Orientation training, which is received by all employees upon employment.

7. REFERENCES (regulation citation, technical links, publications, etc.)
   - ARC HSMS000 – ARCADIS US Health & Safety Management System
   - ARC HSMS010 – Incident Reporting and Investigation

8. RECORDS - DATA RECORDING AND MANAGEMENT

All Root Cause Analysis and Solutions Development records are recorded and stored in the 4-Sight database and maintained per ARCADIS recordkeeping requirements.

9. APPROVALS AND HISTORY OF CHANGE

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

History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
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<tbody>
<tr>
<td>22 October 2007</td>
<td>01</td>
<td>Pat Vollertsen/Mike Thomas</td>
<td>Original document</td>
</tr>
<tr>
<td>2 December 2013</td>
<td>02</td>
<td>Julie Santaniello and Lauren Edwards</td>
<td>Revised format; Added Executive Summary, Updated BBS language; “5 Whys” information added to Section 5.1</td>
</tr>
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</table>
Supervisor - As the employee’s administrative supervisor may not be the person involved in the employee’s day-to-day activities, the following defines what is meant by “supervisor” as it relates to the incident investigation, TIPs, and audits, inspections, reviews and assessments:

- For Field work/Client Site: The “supervisor” is whoever provides regular daily direction to the person being observed during a TIP or the person(s) involved in an incident. This could be the PM, TM or field supervisor.

- For Office/Non-Field or Client Site Work: The “supervisor” is the person to whom the employee reports administratively.
EXHIBIT 2 – FLOW CHART

Questionable Item or Incident Identified (near miss, property damage, injury) - Why?

1. Training/Competency
   - 2. Availability of standards, practices, procedures

3. Adherence to standards, practices, expectations

4. Communication (tailgate, kickoff meeting)

5. Tools/Equipment
   - 6. Factors out of our control

Development of Solutions

Review and approve by assigned reviewers

Communicate
   - Safety moments, Safety Shares, Alerts

Implement Solutions
   - (Supervisor ensures implementation)

Verification and Validation
   - Was the solution implemented?
   - Was it effective?

If solution not implemented.

If solution not implemented.
<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Root Cause for “Positive” Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training / Competency</strong></td>
<td><strong>Training / Competency</strong></td>
</tr>
<tr>
<td>- Did not recognize the risk</td>
<td>- Skill or proficiency to recognize the risk</td>
</tr>
<tr>
<td>- Did not have skill, competence, experience, or knowledge</td>
<td>- Had the necessary skill and training</td>
</tr>
<tr>
<td>- Has not completed required training</td>
<td></td>
</tr>
<tr>
<td>- Training inadequate or ineffective</td>
<td></td>
</tr>
<tr>
<td><strong>Adherence to standards, practices, expectations</strong></td>
<td><strong>Adherence to standards, practices, expectations</strong></td>
</tr>
<tr>
<td>- Did not use TRACK, PM or quality tools</td>
<td>- Identified process improvement that led to better outcome</td>
</tr>
<tr>
<td>- Did not use Stop Work Authority</td>
<td>- Used Stop Work Authority, TRACK, PM, and/or quality tools</td>
</tr>
<tr>
<td>- Not familiar with or did not follow standards, procedures (HASP, QA plan, JSA, etc.)</td>
<td>- Followed procedures</td>
</tr>
<tr>
<td>- Inadequate project planning, including budgeting and scheduling, and/or follow-up review</td>
<td>- Proper planning, budget and/or schedule</td>
</tr>
<tr>
<td>- Behavior encouraged or tolerated with no consequence by supervisor, co-workers, or other parties</td>
<td>- Positive behavior was discussed, encouraged and/or recognized by management</td>
</tr>
<tr>
<td>- Improper use of tools or equipment</td>
<td></td>
</tr>
<tr>
<td><strong>Availability of Standards, Practices, Procedures</strong></td>
<td><strong>Availability of Standards, Practices, Procedures</strong></td>
</tr>
<tr>
<td>- No standard, procedure or practice (QA Plan, HASP, JSA, standard)</td>
<td>- Effective procedures, standards, procedures are in place and implemented</td>
</tr>
<tr>
<td>- Inadequate standard, procedure or practice (QA Plan, HASP, JSA, standard)</td>
<td></td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td><strong>Communications</strong></td>
</tr>
<tr>
<td>- Inadequate management establishment and communication of expectations / culture</td>
<td>- Good communications with project team and/or client</td>
</tr>
<tr>
<td>- Inadequate team communication (i.e., tailgate, kickoff meeting, management of change)</td>
<td></td>
</tr>
<tr>
<td>- Inadequate communication with client</td>
<td></td>
</tr>
<tr>
<td><strong>Tools/Equipment</strong></td>
<td><strong>Tools/Equipment</strong></td>
</tr>
<tr>
<td>- Proper tools or equipment unavailable (including software)</td>
<td>- Proper tools or equipment available and used correctly</td>
</tr>
<tr>
<td>- Tools or equipment damaged</td>
<td></td>
</tr>
<tr>
<td>- Tools improperly maintained/calibrated equipment</td>
<td></td>
</tr>
<tr>
<td><strong>Factors out of our Control</strong></td>
<td><strong>Other (open field for free text)</strong></td>
</tr>
<tr>
<td>- Natural Forces - Events outside of human control</td>
<td></td>
</tr>
<tr>
<td>- Third party out of our control</td>
<td></td>
</tr>
</tbody>
</table>
# EXHIBIT 4 – SOLUTIONS/ACTIONS TABLE

<table>
<thead>
<tr>
<th>ROOT CAUSE CATEGORY</th>
<th>MATCHING ACTION ITEM DESCRIPTION</th>
<th>COMMON MISMATCH OR PROBLEM</th>
</tr>
</thead>
</table>
| • Training / Competency | Train or educate the individual or team  
  Implement testing and competency processes to better evaluate effectiveness and ensure knowledge transfer  
  Review/ improve training materials, methodologies or processes | Rewrite the procedure  
 Discuss general topic at safety meeting without developing the necessary skills for individuals. |
| • Adherence to standards, practices, expectations | Coach individual in hazard recognition and control assessment  
 Employee verbalizes worst case scenario if actions are repeated.  
 Coach any co-workers or supervisors who tolerated the unsafe act without intervention.  
 Performance evaluation/Disciplinary action, when applicable | Rewrite the procedure.  
 Review the procedure without any one on one coaching from supervisor.  
 Advising the individual to pay more attention  
 Often this is cited as a root cause whenever a short cut is taken, but the main point here is that the condition or unsafe act was tolerated or reinforced by others.  
 Reluctant to discipline employees for H&S issues, when applicable. |
| • Availability of Standards, Practices, Procedures | Write or update methods / procedures.  
 Communicate new procedure as relevant. | Review the procedure / method, without rewriting or fixing the inadequacy. |
| • Communications | Communicate all the expectations of safe and acceptable practices, methods and procedures and that they are to be followed at all times. | Communication is often too broad. This factor should rarely stand alone. |
| • Tools/Equipment | Identify and obtain the required proper tools/equipment, or indicate and obtain repairs needed for existing tools/equipment  
 Ensure the correct tools are maintained/calibrated, available and used correctly. | This factor should rarely stand alone. |
| • Factors out of our Control | No immediate solution as any controlling factors cannot be implemented by local management.  
 Focus on appropriate emergency planning to minimize loss to prepare for next event. | This factor should rarely stand alone. If no other root causes are listed with this one, the analysis may not have gone deep enough. |

Key words to look for in the actions are shown in bold.
EXECUTIVE SUMMARY

This Health and Safety Standard (HSS) describes the authority, obligation and responsibility to stop potentially unsafe work at the earliest stage possible. Every Arcadis and subcontractor employee is responsible for prevention of unsafe acts, behaviors or conditions, consequently preventing harm to people, the environment or property.

Every Arcadis and subcontractor employee has the authority and obligation to stop work that he or she considers to be unsafe. The Arcadis leadership team is committed to support anyone who exercises his or her ‘Stop Work’ authority. There will be no negative consequences as a result of ‘Stop Work’ actions.

This standard applies to all activities performed by Arcadis or on behalf of Arcadis. A stop work process will include the participation of all Arcadis, Arcadis subcontractors and other involved personnel as appropriate.

Senior Leaders shall establish the clear expectation for Arcadis employees and subcontractors to exercise ‘Stop Work Authority’.

Project managers and field supervisors are responsible for confirming that ‘Stop Work’ requirements and obligations are understood thoroughly by Arcadis and subcontractor employees.

‘Stop Work’ involves:

- Initiating a ‘Stop Work.’
- Notifying affected employees, other personnel (including client staff) and supervision.
- Assessing hazards and associated risks.
- Identifying and implementing controls.
- Resuming work once a hazard assessment and controls implementation (if applicable) are approved by a competent person and are satisfactory to all parties involved.

The “Stop Work” process will be included in employee induction, and in ongoing company communications and during Tailgate meetings.

Records will be maintained to include Tailgate Meeting forms and Incident Investigation reports.
1. POLICY

It is Arcadis policy that during the conduct of their work, Arcadis and subcontractor employees have the authority and responsibility to Stop Work immediately in any situation when the Health, Safety, Security and Environment hazards and associated risks associated with work being performed is not clearly understood, established or controlled. This standard presents the requirements to be observed if and when this situation occurs.

2. PURPOSE AND SCOPE

2.1 Purpose

This standard describes the authority, obligation and responsibility to stop potentially unsafe work at the earliest stage possible. Every Arcadis and subcontractor employee is responsible for prevention of unsafe acts, behaviors or conditions, consequently preventing harm to people, the environment or property.

Every Arcadis and subcontractor employee has the authority and obligation to stop work that he or she considers to be unsafe. The Arcadis leadership team is committed to support anyone who exercises his or her ‘Stop Work’ authority. There will be no negative consequences as a result of ‘Stop Work’ actions.

2.2 Scope

This standard applies to all activities performed by Arcadis or on behalf of Arcadis. A stop work process will include the participation of all Arcadis, Arcadis subcontractors and other involved personnel as appropriate.

3. DEFINITIONS

Definitions relating to this HSS can be found in Exhibit 1.

4. RESPONSIBILITIES

4.1 Senior Leaders (including Account Managers and company leadership)

In the scope of this HSS, senior leaders shall establish the clear expectation for Arcadis employees and subcontractors to exercise ‘Stop Work Authority’, create a culture where ‘Stop Work’ is exercised freely, resolve ‘Stop Work’ conflicts when they arise, and hold those accountable who do not to comply with established ‘Stop Work’ policies.

4.2 Project Managers and Field Supervisors

In the scope of this standard, project managers and field supervisors are responsible for confirming that ‘Stop Work’ requirements and obligations are understood thoroughly by Arcadis and subcontractor employees, creating a culture where ‘Stop Work’ is exercised freely, honoring and responding promptly to requests to stop work, working to resolve issues to the satisfaction of all involved parties before operations resume, recognizing proactive participation and verifying that all ‘Stop Work’ actions are properly reported with required follow-up, as necessary.
4.3 Arcadis and Subcontractor Employees

In the scope of this standard, Arcadis and subcontractor employees are responsible for understanding their authority and obligations under ‘Stop Work,’ initiating a ‘Stop Work’ intervention when warranted, supporting the intervention of others and properly reporting all ‘Stop Work’ actions as described in this standard. Arcadis and subcontractor employees are responsible for understanding the hazards of their activities, implementing the controls for the hazards and using ‘Stop Work’ authority if they don’t understand the hazards, their job tasks, or if they do not feel safe for any reason. In addition, employees will participate in determining and implementing the solutions for mitigating the unsafe issue.

5. PROCEDURE

5.1 General Requirements

Arcadis and subcontractor employees shall be made aware of their obligation to ‘Stop Work’ for issues that they consider to be unsafe.

Employees have the authority, obligation and responsibility to stop any task or operation where there are concerns or questions regarding the control of the hazards or risks associated with a task or operation that is being performed.

No work will resume until all ‘Stop Work’ concerns or questions have been adequately addressed and associated risks have been eliminated or mitigated to acceptable levels to the satisfaction of all parties involved.

All employees are made aware of the actions they shall take, including reporting, when stopping unsafe work.

All indications from personnel that the work is unsafe must be properly investigated as deemed appropriate for the situation. All instances of work being stopped for reasons of health and safety shall be recorded and appropriately investigated. This documentation may be completed using the Tailgate Meeting form or using the Arcadis Incident Investigation process.

Any form of retaliation or intimidation directed at any individual or company for exercising their authority as outlined in this standard will not be tolerated. Disregard for the requirements in this standard shall be addressed with disciplinary actions in accordance with Arcadis policy.

Before work begins, a responsible person shall be defined by the Project Manager for coordination of any ‘Stop Work’ activities, including hazard and risk assessment and mitigation actions following a ‘Stop Work’ intervention (refer to the Tailgate Meetings standard – ARC HSGE001).

5.2 Stop Work Process

In general terms, ‘Stop Work’ involves:

- Initiating a ‘Stop Work.’
5.2.1 Initiate a ‘Stop Work’

When a person identifies a perceived or actual unsafe condition, act, error, omission, confusion or lack of understanding that could result in harm to persons, the environment or property, he or she shall immediately initiate a ‘Stop Work’ intervention.

This intervention shall:

• Be initiated in a positive manner.

• Result in a stop of associated work activities, if there is an immediate risk of injury or accident; removal of all person(s) (also persons not directly related to the Arcadis Work Team) from the area; as appropriate to the issue; stabilization of the situation and making the area as safe as possible, until more permanent solutions can be developed and implemented as appropriate to the situation.

• If there is no immediate risk, address the potentially unsafe issue with the person(s) potentially at risk and/or the person(s) causing the risk. This includes all affected employees of Arcadis, subcontractor, client and other parties.

5.2.2 Notifying the Affected Parties

All personnel affected by the ‘Stop Work’ situation shall be notified as soon as possible.

5.2.3 Assessing Hazards and Associated Risks

A competent person (e.g. task manager, field supervisor, task or job expert, H&S resource) shall guide the assessment for potential hazards and risks by involving the affected parties to determine the hazards and assess the associated risks, so that appropriate controls can be identified. This information will be documented on the Tailgate Meeting form or an incident investigation form in 4Sight.

5.2.4 Identifying Controls

To identify controls that eliminate risk or mitigate it to an acceptable level and to decide on an appropriate course of action, the following questions and others shall be considered:

• How can the risk be controlled or otherwise mitigated to an acceptable level and to the reasonable satisfaction of the parties involved?
• Is a competent person approving the hazard and risk assessment and the identified controls in order to prepare to re-start work?

All affected parties should be in agreement with the hazard and risk assessment and controls identification.

The results of the hazard and risk assessment and controls identification resulting from the ‘Stop Work’ shall be reported, documented and maintained on either Tailgate Meeting form or the incident investigation form as appropriate for the issue.

5.2.5 Qualifiers for Stopping/Resuming Work

The following should be considered when stopping or resuming work as the result of a ‘Stop Work’ intervention:

• If the ‘Stop Work’ intervention is based on a perceived (but not an actual) risk as determined from the hazard and risk assessment, the affected person(s), as appropriate, should:
  o Show appreciation to the initiator for his or her awareness and concern.
  o Proceed with work.
  o Share the learnings with the initiator and involved parties.

• If the ‘Stop Work’ intervention is based on an actual risk that cannot be immediately assessed and/or controlled on site by the present employees and available resources, work shall be suspended. If the identified controls that mitigate the risk in the ‘Stop Work’ situation are not within the original scope of work, the change will be managed appropriately, and the JSA and HASP should be reviewed to include a hazard and risk assessment and identify subsequent controls.

• If the work is in the scope of a permit, the permit issuer shall review/reissue the permit with the necessary changes or modifications.

Work can be resumed only once a competent person with the appropriate level of authority approves the hazard and risk assessment and the implemented controls and all parties are satisfied with the controls.

5.3 Stop Work (“If Not Me, Then Who?”) Involving Parties Outside of Arcadis Control

The Arcadis H&S Vision and Policy and our culture of TRACK to 0 puts H&S first in all things. Yet, stopping work or intervening under the Arcadis “If Not Me, Then Who?” concepts when it involves parties outside of Arcadis control must be implemented in such a way to protect the health and safety of our staff members, but also to protect the company from any undue risk and liability. Consequently, a separate guidance document has been developed and included as Exhibit 2.
5.4 Reporting

All planned and unplanned ‘Stop Work’ interventions shall be documented on the Tailgate Meeting form, and/or in 4-Sight as a near miss report or incident investigation report, as appropriate to the issue.

Adequate descriptions shall be given of the act, behavior or condition that caused the ‘Stop Work’ intervention, its hazard and risk assessment and implemented risk mitigations.

Near miss and incident reports shall be reviewed by H&S personnel and reported to senior leaders to:

- Measure participation.
- Determine the quality of interventions and follow-up.
- Track common issues and identify trends and opportunities for improvement.
- Facilitate the sharing of learnings.
- Provide feedback from recognition programs.

The H&S team shall regularly communicate incident details reported by Business Line as well as details regarding common trends and learnings.

6. TRAINING

The “Stop Work” process will be included in H&S Orientation training, in ongoing company communications and reinforced during Tailgate meetings.

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

Arcadis Health and Safety Plan standard – ARC HSFS010

Arcadis Incident Investigation Standard – ARC HSMS010

8. RECORDS - DATA RECORDING AND MANAGEMENT

Stop Work actions shall be documented in:

- Tailgate Meeting forms; and/or
- Incident Investigation reports
9. APPROVALS AND HISTORY OF CHANGE

Approved By:

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

History of Change

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<td>15 February 2010</td>
<td>01</td>
<td>Mike Thomas</td>
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<tr>
<td>17 April 2012</td>
<td>02</td>
<td>Camille Carollo/Tony Tremblay</td>
<td>Executive Summary added</td>
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<tr>
<td>16 January 2013</td>
<td>03</td>
<td>Pat Vollertsen/Tony Tremblay</td>
<td>Revised section 6.0 and Executive summary in regard to training</td>
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<td>22 October 2015</td>
<td>04</td>
<td>Tony Tremblay/Julie Santaniello</td>
<td>Section 3 Definitions moved to Exhibit 1; Section 5.3 Stop Work (“If Not Me, Then Who?”) Involving Parties Outside of Arcadis Control added and existing section 5.3 renumbered to Section 5.4; text updated in Section 5.4; Document template updated; Exhibit 2 If Not Me, Then Who guidance document added</td>
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Exhibit 1

**Planned ‘Stop Work’** is a ‘Stop Work’ situation previously identified in a Job Loss Analysis, HASP or other standard (e.g., ‘Stop Work’ trigger)

‘Stop Work’ is the stopping of all activities associated with a task, condition, situation, action or activity (issue) that anyone views as potentially unsafe. ‘Stop Work’ can be applied to the single issue, a group of issues, or an entire job project or site as applicable.
Exhibit 2 – If Not Me, Then Who? Guidance Document

IF NOT ME, THEN WHO?

-H&S SITUATIONS WHERE NO ARCADIS EMPLOYEES ARE INVOLVED OR WHEN ARCADIS DOES NOT HAVE HEALTH & SAFETY RESPONSIBILITY-

Effective: 1 March 2013

This document addresses the ‘If Not Me, Then Who?” concept in perceived or actual H&S situations (unsafe acts or behaviors, unsafe conditions, etc.) which do not involve our employees or partners and where we are not contractually or statutorily responsible for H&S.

For example, what does an Arcadis employee do, when Arcadis has no construction site responsibility but they see that a fence that was erected by a general contractor and is supposed to be protecting this site, has a gap that may allow an unauthorized person to enter the site where they could be injured?

The Arcadis H&S Vision and Policy, and our culture using TRACK to 0 concept put H&S first in all things. Yet we also have the need to protect ourselves from injury and the company from undue risk and liability:

1. Take a minute to think through the situation, related risks, and risks that would result from corrective action (TRACK).
2. Act immediately to safe lives if in your best judgment delay would cost lives or severe injuries (imminent danger).
3. If we see unsafe acts/behavior or conditions that are not imminent dangers: speak up and promptly notify the appropriate party. In a project: liaise with project manager about best person to address (consider H&S responsible person - contractor and client). In other situations, attempt to identify the person with H&S or overall responsibility for the activities.
4. Re-confirm the formal H&S responsibilities (law & contract) with H&S and legal department before doing anything else, or, if action could not be postponed for risk of losing lives/severe injuries, immediately after the action.
5. When having pointed out, or about to point out, areas of concern outside of our scope of responsibilities, accompany with a specific disclaimer.
6. Refrain from taking H&S responsibility through further action (actual corrections, audits, reviews or other).

It is noted that the above example actually occurred involving an Arcadis employee. Instead of notifying the appropriate parties of the situation, our employee attempted to fix the contractor fence and got seriously injured in doing so. This resulted in lost time to our employee and a recordable injury against the company.
EXECUTIVE SUMMARY

This standard describes the requirements for implementing an incident- and injury-free workplace by providing guidance on tailgate safety meetings to be performed prior to all projects performed by Arcadis staff outside of an office-setting or environment.

This standard applies to all non-office related activities performed by Arcadis or on behalf of Arcadis. If the site and project is controlled by Arcadis, tailgate meetings will include the participation of all Arcadis staff, Arcadis subcontractors and other involved site personnel as appropriate.

The designated field supervisor will lead or designate an alternative leader to lead the tailgate meeting.

Project and Task Managers are responsible for ensuring that all appropriate hazard assessments have been completed, that all project requirements have been communicated to the field supervisor and other responsible parties.

Employees are responsible for actively participating in the tailgate meetings, acknowledging their presence at the tailgate meetings, and participating in hazard assessments for the activities in which they will be involved.

Tailgate meetings will be held, at a minimum, at the start of each work day, shift or task change.

The Tailgate H&S Meeting Form (Exhibit 1 or one of the Single Page versions located in the Standard Health & Safety Plan Template on the Health & Safety Plan page of the Source NA) will be used to document the conduct of the tailgate H&S meeting.

Tailgate Meeting forms are to be kept on-site and then in project files per Arcadis project recordkeeping requirements.

1. POLICY

It is Arcadis US policy that Arcadis staff will participate in tailgate meetings to be held at least once daily on Arcadis project sites that occur outside of an office environment to ensure that the health and safety issues of the day's activities are understood by all affected parties and that appropriate controls are in place.

2. PURPOSE AND SCOPE

2.1 Purpose

This standard describes the requirements for implementing an incident- and injury-free workplace by providing guidance on tailgate safety meetings to be performed prior to all projects performed by Arcadis staff outside of an office-setting or environment.
2.2 Scope

This standard applies to all non-office related activities performed by Arcadis or on behalf of Arcadis. If the site and project is controlled by Arcadis, tailgate meetings will include the participation of all Arcadis staff, Arcadis subcontractors and other involved site personnel as appropriate. If the site is controlled by another party (e.g., a construction site on which Arcadis is providing a resident engineer or owner’s representative), then Arcadis staff should attend the tailgate meeting held by the controlling party, if one is held. If the tailgate meeting does not address Arcadis activities or is not deemed adequate, then the Arcadis staff will hold their own tailgate meeting following this standard.

If there is only one Arcadis staff on the site for the day, then the Project Manager (PM) and field staff will conduct the tailgate via phone as deemed appropriate.

It is also Arcadis U.S. policy that more than one tailgate meeting may be held as appropriate for the activities.

3. DEFINITIONS

Definitions applicable to this standard may be found in ARC HSMS000 – Health and Safety Management System.

4. RESPONSIBILITIES

4.1 Field Supervisor

In the scope of this practice, the designated field supervisor will lead or designate an alternative leader to lead the tailgate meeting. In addition, the field supervisor will verify that in the tailgate meeting, the following are clearly established, communicated and reinforced, and that the workforce understands them:

- A process for the transfer of control of work between work groups as appropriate and applicable

- Specific standards and policies that will be followed (e.g., Health and Safety Plan (HASP), Job Safety Analysis (JSA), H&S Standards, Field H&S Handbook, etc.)

- Assignment of other responsibilities based on the site activities and hazards to competent staff

4.2 Project and Task Managers

Project and Task Managers are responsible for ensuring that all appropriate hazard assessments have been completed, that all project requirements have been communicated to the field supervisor and other responsible parties, that competent personnel, based on the activities and hazards, have been assigned to the project, and
that all employees including Arcadis subcontractors and other site personnel know of their requirement and participation in tailgate meetings conducted for the project.

4.3 Health and Safety Staff and Project Site Safety Officers or Supervisors

Health and Safety Staff and Project Site Safety Officers or Supervisors shall assist with the completion of hazard identification and assessments as appropriate for the project. In addition, these staff will assist with determining the proper controls and provide information for the tailgate meetings that is relevant to the site activities and the hazards to be encountered by employees.

4.4 Employees

Employees are responsible for actively participating in the tailgate meetings, acknowledging their presence at the tailgate meetings, and participating in hazard assessments for the activities in which they will be involved. Employees are responsible for understanding the hazards of their activities, implementing the controls for the hazards and using Stop Work Authority if they don’t understand the hazards, their job tasks, or if they do not feel safe.

5. PROCEDURE

5.1 Tailgate Meetings

Tailgate meetings will be held, at a minimum, at the start of each work day, shift or task change. It may be necessary to hold tailgate meetings at other times based on the site, activities, and personnel on the site. Tailgate meetings are usually conducted by the field supervisor, the site safety officer or both. At times, the Project Manager or Task Manager may lead the tailgate meeting.

Tailgate meetings may also be conducted by a subcontractor, other consultant or client.

Work crews that include a lone worker will hold a tailgate meeting by telephone with the Project or Task manager as appropriate. The lone worker or small workgroup will call in at the end of the day to complete the tailgate meeting form per this standard.

Tailgate meetings will review the planned work activities for the work period, discuss and resolve the risks and mitigations, discuss any health, safety, security and environment concerns and raise the consciousness of each worker before they start work. Utilizing the Tailgate Meeting form in Exhibit 1 or one of the Single Page versions located in the Standard Health & Safety Plan Template on the Health & Safety Plan page of the Source NA will ensure that relevant topics are addressed.

5.2 Tailgate Meeting Form

The Tailgate H&S Meeting Form (Exhibit 1 or one of the Single Page versions located in the Standard Health & Safety Plan Template on the Health & Safety Plan page of the Source NA) will be used to document the conduct of the tailgate H&S meeting. Copies of the completed form will be kept in the project files. It will be completed by the designated
leader of the meeting during the completion of the meeting and for post day activities review as indicated on the form.

5.3 Participation and Preparation

Effective tailgate meetings require participation. When selecting the location of the meetings, the meeting leader will ensure it is in a place free from distraction and that allows for interaction and participant comfort. This will help encourage participation.

6. TRAINING

No specific training or competence is required related to the conduct of the Tailgate Meeting.

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

Arcadis Health and Safety Management System – ARC HSMS000

Arcadis Health and Safety Plan Standard – ARC HSFS010

8. RECORDS - DATA RECORDING AND MANAGEMENT

Tailgate Meeting forms to be kept on-site and then in project files per Arcadis project recordkeeping requirements.

9. APPROVALS AND HISTORY OF CHANGE

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

History of Change

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<td>1 February 2010</td>
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<td>Made minor edits to text. Also, made modifications to Tailgate Meeting form. Changed JSA to JLA.</td>
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<td>03</td>
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<td>26 April 2013</td>
<td>04</td>
<td>Pat Vollertsen / Tony Tremblay</td>
<td>Added Executive Summary; changed JLA to JSA; updated Tailgate Meeting form to reflect new terminology; Added who else can lead a tailgate to section 5.1; Format Update</td>
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<td>12 June 2015</td>
<td>05</td>
<td>Julie Santaniello</td>
<td>Updated contact phone numbers in Tailgate Meeting Form. Added text referencing additional acceptable single page Arcadis Tailgate Meeting Forms.</td>
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<tr>
<td>21 September 2015</td>
<td>06</td>
<td>Julie Santaniello</td>
<td>Updated HSS template and Tailgate Meeting Form brand. Added HSMS000 to references. Updated Exhibit 1 images.</td>
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Exhibit 1 – Tailgate Meeting Form
EXECUTIVE SUMMARY

Damaging an underground or aboveground 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 following steps be completed prior to beginning any subsurface intrusive work (i.e., any work or activity that breaks the plane of the ground surface):

- The presence of existing or known utilities will be investigated and cleared (to the extent feasible) by locating and marking before the start of any subsurface intrusive work and where appropriate, visually verifying through soft dig methods (referred to as potholing or daylighting) before the start of any subsurface intrusive activity.

- A minimum of three (3) reliable lines of evidence are required for an acceptable utility clearance. Each location of subsurface intrusive work must have at least 3 reliable lines of evidence. All lines of evidence used during the utility clearance procedure will be recorded on the Utility and Structures Checklist or equivalent client-provided checklist or permit. If a line of evidence is lost or not apparent, STOP WORK, and re-establish the line of evidence prior to resuming subsurface 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).

- Contact the State One Call or equivalent service (Nationwide “811”) as required by law. The State One Call or equivalent service (Nationwide “811”) can only be used as a reliable line of evidence when working within the public right-of-way or easement.

- For point clearance (single intrusive point, used as 1 of the 3 required reliable lines of evidence), the borehole must be cleared to 110% of the diameter of the intrusive device (e.g., 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. The Utility Structures and Checklist is valid for 15 business days from the date of completion. A copy of the completed Utility and Structures Checklist will remain on-site during all subsurface intrusive work.

- Employees overseeing utility clearance activities will:
  - Be familiar with the contents of this standard and ARC HSFS-019 Supplement 2;
  - Have one year of field experience in the visual identification of utilities; and
  - If operating equipment, have training and six months of experience in the proper operation and results interpretation of any clearance equipment, including without limitation, magnetometers and ground penetrating radar.

- A utility strike is an unplanned contact of a utility during the course of work that results in damage requiring repairs, making a report to the utility owner, or requiring further assessment to evaluate the potential for damage. All utility strikes must be reported 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.
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, submerged, 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, submerged, and aboveground utilities on project sites. Utility location standard operating procedures (SOP) for submerged 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

Definitions relating to Utility Clearance can be found in Exhibit 1.

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 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, public utility companies, and subcontractors to identify the nature of any utilities and to determine control processes that 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 4.2 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 Project Manager responsibilities and best practices, refer to [ARC HSFS-019 Supplement 1](#).

- Project Managers or designee must review the Utility and Structures Checklist with staff and Arcadis subcontractors conducting subsurface intrusive work (including “Sub-of-Subs” when conducting subsurface intrusive work) prior to staff beginning subsurface intrusive work. The Project Manager or designee review must be documented on the Utility and Structures Checklist prior to starting subsurface intrusive work.

### 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 and structures locate and clearance process.

- Complete a minimum of one year of utility clearance-related experience before accepting responsibility for any utility clearance tasks. This requires on-site training led by another Arcadis employee with detailed knowledge and experience in identifying utilities and structures.

- 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.

- Prior to beginning subsurface intrusive work, the Utility and Structures Checklist must be completed and signed by the staff member completing or overseeing the clearance. Confirm that the Utility and Structures Checklist was reviewed by the Project Manager or designee as discussed in Section 4.1 above. Review the Utility and Structures Checklist daily prior to starting subsurface intrusive activities to ensure all utilities are identified and markings are present. A copy of the completed Utility and Structures Checklist will remain on-site during all subsurface intrusive work (i.e., any work or activity that breaks the plan of the ground surface).

- 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 before 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 on-site.
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 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 subsurface intrusive work 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.

- If overhead utilities are present in areas where heavy equipment will be operated, ensure adequate clearance is provided. For heavy equipment that is extendable or telescoping (e.g., excavators, dump trucks, extendable lift trucks), evaluate whether the use of a spotter is necessary prior to operating heavy equipment when in proximity to the overhead utility.

- If a utility is damaged and repaired during the course of the field event, the field subcontractor must verify that the repair is competent and complete to prevent further damage to the site when the damaged utility is re-activated.

5. PROCEDURE

5.1 General

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

- Best Practices for Project Managers (or Their Delegates) Concerning Utility Clearance (ARC HSFS-019 Supplement 1).


• Best Practices for State One Call Procedures (ARC HSFS-019 Supplement 4).


• Utility Location Standard Operating Procedure for Aquatic Work Activities (ARC HSFS-019 Supplement 6).

5.2 Lines of Evidence

When locating underground utilities, three (3) reliable “lines of evidence” must be established to help determine where a subsurface utility may be located. A line of evidence may be a site drawing that shows where a utility is located, it could be anecdotal information obtained from owners or employees, it could be established using any number of non-intrusive geophysical methods [e.g., ground penetrating radar (GPR), electromagnetic survey (EM), radio-frequency methods (RF), etc.], or it could involve probing for or exposing the utility by soft dig technologies (i.e., daylighting or potholing). Some lines of evidence will identify utility locations with a high degree of certainty (e.g., direct connect radio-frequency technique, daylighting or potholing, sonde tracing, etc.). Other lines of evidence will identify utilities with less certainty (e.g., anecdotal reports, design drawings, etc.).

Effective utility locate practices must use multiple lines of evidence until there is a high degree of certainty that the underground services have been adequately located. Three (3) reliable lines of evidence are required for an appropriate utility clearance as defined in this standard. All reliable lines of evidence used during the utility clearance procedure will be recorded on the Utility and Structures Checklist or equivalent client-provided checklist or permit. If three (3) reliable lines of evidence have not established certainty in the location of a utility, STOP WORK and do not proceed. Additional reliable lines of evidence must be utilized until the presence or absence of the underground utility can be established. During work activities, if a line of evidence is lost or not apparent (e.g., paint markings have faded), STOP WORK, and re-establish the line of evidence prior to resuming subsurface intrusive work.

Generally, the following lines of evidence may be used to meet this minimum utility clearance requirement:

1. Contacting the State One Call or equivalent service (Nationwide “811”) is REQUIRED BY LAW regardless if it will be used as a line of evidence. Contacting the State One Call or equivalent service (Nationwide “811”) is an acceptable reliable line of evidence when working within the public right of way or easement. Note that the State One Call can provide valuable information regarding locations and types of utilities entering the private property.

Note: For work on private property or in areas not served by State One Call or equivalent service, consider using a reputable private utility locating company to locate and mark the utilities. Use of a reputable private utility locator is encouraged for all projects with subsurface or submerged utilities. When working with a private locater, it is best practice to pre-plan clearance areas, review required clearance equipment and the re-clearing/confirmation of any public utility mark outs (State One Call or equivalent service Nationwide “811”).
2. 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.

3. Interview(s) with knowledgeable site or client personnel. The following questions should be asked during the interview and answers documented on the Utility and Structures Checklist:

   o Employees(s) Name and Affiliation(s) with the site;
   o Types of utilities, including utility composition and location of utilities on-site;
   o Depths of known utilities; and
   o Any other pertinent information regarding utilities on the site.

4. Conduct a detailed visual site inspection of areas around all planned subsurface intrusive work points or areas 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:

   o At depths > 5 feet below ground surface; or
   o At very shallow depths (< 2 feet 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 submerged 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.

   Note: If a line of evidence is lost, utility markings are removed/worn, or area of previous clearance is not confirmed, STOP WORK and re-establish the

View the Utilities and Structures Checklist
line(s) of evidence prior to resuming subsurface intrusive work. Each location of subsurface intrusive work must have 3 reliable lines of evidence. All lines of evidence used during the utility clearance procedure will be recorded on the Utility and Structures Checklist of equivalent client-provided checklist or permit. If a line of evidence is lost or not apparent, STOP WORK, and re-establish the line of evidence prior to resuming subsurface intrusive work. The Utility Structures and Checklist is valid for 15 business days from the date of completion.

If and when any line of evidence reveals that planned subsurface work will be located inside the 30-inch Tolerance Zone of known/marked/located/observed utilities, the project team must Stop Work and contact Corporate H&S as early as possible for pre-approval.

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.

If utilities or subsurface anomalies are identified but the utility type or anomalies are not classified, it is recommend that a pink (Temporary Survey Marking) marking be used. Once the type of utility is established, the pink marks should be repainted/remarked to represent the correct type of utility.

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

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 subsurface 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 subsurface 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. Hydroknifing,
4. Probing,
5. Hand augering,
6. Hand digging, and
7. Posthole digging.

Single-Point clearance must be 110% of the proposed subsurface intrusive area or the diameter plus 2 inches, whichever is greater. Three-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. Three-Point clearance must be 110% of the proposed intrusive area or the diameter of the intrusive area plus 2 inches, whichever is greater. Each method of clearance should be documented on the Utility and Structure Checklist.

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 downward force, prying or use in poor/obstructed visibility conditions is prohibited as these tools can damage utilities.

Surface cover (e.g., asphalt) removal methods within the 30-inch Tolerance Zone that pose excessive downward 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 the 30-inch Tolerance Zone 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.
5.5.1 Temporary Backfilling of Pre-Cleared Boreholes

In some cases, it may be necessary to temporarily backfill a pre-cleared location until the remaining subsurface activities are performed. At these locations where subsurface intrusive work does not immediately follow pre-clearance, it is important to properly backfill and mark the pre-cleared location in order to relocate the pre-cleared location. In general, wooden stakes, survey markers, whiskers, paint marking or other surficial markings alone are inadequate because these markings can be easily removed, damaged or otherwise lost leading to uncertainty regarding the pre-cleared location. Although the specific steps for backfilling a pre-cleared location will depend on site-specific conditions, use the following additional steps to prevent loss of the pre-cleared location:

- Backfill a pre-cleared location with clean sand or other granular material that is significantly different than the surrounding subsurface native material. Native soil should not be used to backfill a pre-cleared location that may require further subsurface work.
- Backfill the top 2 feet of a pre-cleared location with dyed sand or gravel to facilitate re-location.
- Use hammered wooden stakes or delineators to mark locations as an additional measure, if practical.
- In the event that the pre-cleared borehole is located on asphalt or concrete and an asphalt cold patch is required, use white paint to mark the intrusive location with a circle over the asphalt cold patch.
- In some instances, such as projects potentially affected by unexploded ordinance (UXO), the pre-cleared borehole may require that a PVC of matching diameter pipe be inserted into the pre-cleared borehole, filled with clean sand and affixed with a matching cap. Contact the project manager to identify any client-specific requirements.
- Always use a physical subsurface marker such as described above to identify the pre-cleared borehole location. Never rely solely on field measurements or GPS coordinates.
- If a utility or anomaly/obstruction is encountered during the pre-clearing process, backfill the hole with the native soil and mark the location with a pink-painted X and/or NO.

In the event that a previously pre-cleared location cannot be located, the location must be re-cleared prior to performing subsurface intrusive work.

5.6 Clearance for Working in Vicinity of Subsurface Utilities

Prior to the start of subsurface intrusive activities (i.e., excavations, vertical drilling, installing grounding rod, and soil sampling), all utilities must be located and measures must be instituted to avoid subsurface utility hazards. See exemptions for subsurface intrusive work in Exhibit 1 (Definitions). Do not conduct subsurface work within 30 inches of a line marking in all directions. If the centerline of the utility is marked, the diameter of
the utility or utility bank (Exhibit 1) must be incorporated into the 30-inch Tolerance Zone, see Figure 1 located in Exhibit 2 for further instructions.

If and when any line of evidence reveals that planned subsurface work will be located inside the 30-inch Tolerance Zone of known/marked/located/observed utilities, the project team must Stop Work and contact Corporate H&S as early as possible for pre-approval.

If subsurface work must take place within the 30-inch Tolerance Zone of the line marking, the utility must be exposed (potholed) by soft dig/clearance methods prior to starting subsurface intrusive activities (see Section 5.5 for options); **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 Tolerance Zone of the utility, such activity must receive pre-approval by Corporate H&S, 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, to avoid striking a utility, damage from vibration, damage by pressure of the advancing boring, do not drill within 30 inches in all directions (3- Dimensional cylinder) of a line marking. Make sure to factor the diameter of the line or utility bank when computing 30-inch Tolerance Zone. When crossing a utility during horizontal drilling, it is recommend that the utility be exposed 30 inches in a 360°- direction. When exposing utilities for horizontal borings, the utility must be exposed (potholed) by soft dig/clearance methods. This recommendation 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 Tolerance Zone. If subsurface work must take place within the 30-inch Tolerance Zone of the line marking, the utility must be exposed (potholed) by soft dig/clearance methods prior to starting subsurface intrusive work (see Section 5.5 for options); **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 Tolerance Zone of the utility, such activity must receive pre-approval by Corporate H&S, 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.

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 by collecting sewer depth inverts from identified manholes and interpolating those depths to the area of the subsurface intrusive work.

During well installations and well abandonment via mechanical equipment, the 30-inch Tolerance 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, work proposed using mechanized equipment to work within the 30-inch Tolerance Zone will
require approval from Corporate H&S. For more information, see Exhibit 2 for further instructions.

5.6.1 Aboveground Activities causing Subsurface Disturbance in the Vicinity of Underground Utilities

Aboveground activities can cause damage to shallow underground utilities or structures. Plan the intended path/mobilization/operation of Heavy Equipment is cleared to ensure that shallow utilities are not damaged. If Heavy Equipment must cross over shallow utilities, the utilities will be protected. Other subsurface disturbances may lead to damage such as clearing trees/shrubs/vegetation as roots may be entangled with underground piping or structures. For more information, see Best Practices for Field Personnel Concerning Utility Clearance (ARC HSFS-019 Supplement 2).

5.7 Acceptable Clearance for Working in Vicinity of Overhead Power Lines and Other Overhead Lines and Structures

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 5A and 5B of ARC HSFS0006 Electrical Safety Standard.

<table>
<thead>
<tr>
<th>Power Line Voltage Phase to phase (kV)</th>
<th>Minimum Safe Clearance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 or below</td>
<td>10</td>
</tr>
<tr>
<td>Above 50 to 200</td>
<td>15</td>
</tr>
<tr>
<td>Above 200 to 350</td>
<td>20</td>
</tr>
<tr>
<td>Above 350 to 500</td>
<td>25</td>
</tr>
<tr>
<td>Above 500 to 750</td>
<td>35</td>
</tr>
<tr>
<td>Above 750 to 1,000</td>
<td>45</td>
</tr>
</tbody>
</table>

ANSI standard B30.5-1994, 5-3.4.5

5.7.1 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 feet (305 centimeters (cm)) is maintained. If the voltage is higher than 50 kilovolts (kV), the clearance shall be increased 4 inches (10 cm) for every 10 kV 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 feet (122 cm). If the voltage is higher than 50 kV, the clearance shall be increased 4 inches (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.

- If the equipment is an aerial lift that is 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 OSHA 1910.333(c)(3)(ii)(C) Table S-5. Reference information from OSHA 1910.333 Table S-5 and NFPA 70E Table 130.4(C)(a) for alternating-current systems and 130.4(C)(b) for the distances associated with direct-current voltage systems is included as Exhibit 5 of ARC HSFS0006 Electrical Safety Standard.

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.

5.7.2 Acceptable Clearance for Working in Vicinity of Non-Electrical Overhead Utilities and Structures

Arcadis field personnel will identify non-electrical overhead utilities and structures and where possible, work is not be conducted within the 30-inch Tolerance Zone of these overhead utilities and structures. It is recommended that if work will be completed in the vicinity of non-electric overhead utilities, the overhead utilities should be labeled with warning signs, protective barricades, and/or flags. Non-electrical overhead utilities and structures may include, but is not limited to, pipe chases, water lines, ceilings in buildings, etc. Arcadis field personnel will notify its site workers.
(employees, subcontractors, vendors, etc.) of known overhead utilities and structures during the tailgate safety meeting. See Exhibit 2 for additional details.

5.8 Reporting Utility Incidents

Arcadis field personnel involved with any subsurface, submerged, and aboveground utility strikes should immediately STOP WORK and contact the Project Manager to discuss the incident unless there are injuries, then call 911 or the available emergency services number for the area and then the Project Manager. 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 Business Line 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.

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

5.10 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, which can be found on the Legal Source site. 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 may provide awareness-level training regarding this utility location and clearance standard.
7. REFERENCES (regulation citation, technical links, publications, etc.)

- 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
- Figure 1 – 30-Inch Tolerance Zone
- ARC HSCS005 Excavation and Trenching
- ARC HSFS0006 Electrical Safety Standard
- One Call and State Law Directory

8. RECORDS - DATA RECORDING AND MANAGEMENT

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: Julie Santaniello, CSP – Corporate H&S, Manager of Technical Programs
### History of Change

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
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<tr>
<td>13 December 2006</td>
<td>01</td>
<td>Mike Thomas/Pat Vollertsen</td>
<td>Original document</td>
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<tr>
<td>26 March 2007</td>
<td>02</td>
<td>Mike Thomas/Pat Vollertsen</td>
<td>Put in new company format</td>
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<tr>
<td>15 May 2007</td>
<td>03</td>
<td>Mike Thomas/Pat Vollertsen</td>
<td>Added nation-wide 811 number</td>
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<tr>
<td>6 September 2007</td>
<td>04</td>
<td>Mike Thomas/Pat Vollertsen</td>
<td>Changing over to new template format</td>
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<tr>
<td>22 February 2008</td>
<td>05</td>
<td>Mija Coppola</td>
<td>Changing over to new template format</td>
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<tr>
<td>13 January 2009</td>
<td>06</td>
<td>Mija Coppola</td>
<td>Define lines of evidence</td>
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<tr>
<td>4 October 2010</td>
<td>07</td>
<td>Sam Moyers/Mija Coppola</td>
<td>Reformatting and addition of utility clearance information</td>
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<tr>
<td>13 February 2012</td>
<td>08</td>
<td>Sam Moyers/Mija Coppola</td>
<td>Modified link information for utility strike reporting, clarified local/state requirements in section 4.1 and 4.3</td>
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<tr>
<td>28 January 2013</td>
<td>09</td>
<td>Tony Tremblay</td>
<td>Utility and Structures Checklist revised; hyperlink updated</td>
</tr>
<tr>
<td>12 February 2013</td>
<td>10</td>
<td>Amanda Tine/Tony Tremblay</td>
<td>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</td>
</tr>
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<tr>
<td>15 March 2013</td>
<td>11</td>
<td>Kurt Merkle, Rebecca Lindeman / Tony Tremblay</td>
<td>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.</td>
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<tr>
<td>07 July 2013</td>
<td>12</td>
<td>Andrew McDonald/ Tony Tremblay</td>
<td>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 list. Removed Sam Moyers and added Andrew McDonald as author.</td>
</tr>
<tr>
<td>26 September 2014</td>
<td>13</td>
<td>Andrew McDonald/Tony Tremblay</td>
<td>Added Exhibit 1. Definitions and 30 inch tolerance zone. Clarified use of 811 or state one call as a reliable line of evidence. Added best practice to cover backfilling of pre-cleared boreholes. Updated USC list to cover soft dig termination depths and PM review.</td>
</tr>
<tr>
<td>23 February 2015</td>
<td>14</td>
<td>Tony Tremblay</td>
<td>Page number correction</td>
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<td>10 May 2016</td>
<td>15</td>
<td>Denis Balcer/Sharon Lingle/Alec MacAdam/Andrew McDonald/Tony Tremblay/Julie Santaniello</td>
<td>ES and Section 4.2 - define subsurface intrusive work; clarify employees providing oversight of utility contractors, Arcadis requirements of operating and interpreting results of utility clearance equipment, and utility clearance before all subsurface intrusive work. Sections 1 and 5.8-changed submarine to submerged. Section 4.1 – added contacting public utility companies to help clear utilities. Section 4.2 – Clarified requirement to complete one year of utility clearance-related experience. Section 4.2 and 4.3 - Added discussion on aboveground activities causing subsurface disturbances. Added responsibility to clear overhead utilities when heavy equipment will be used and to evaluate use of a spotter. Added that repairs to damaged utilities need to be verified as competent and complete. Section 5.2 – Clarified reliable lines of evidence for each subsurface intrusive work point and degrees of certainty. Added all work within 30-inch Tolerance Zone needs Corp H&amp;S preapproval. Section 5.6 and Exhibit 1- Clarify subsurface intrusive work and activity and exemptions for subsurface intrusive work. Section 5.6.1 – Add requirement to evaluate aboveground activities that may lead to subsurface disturbances that may cause damage to shallow underground utilities or structures.</td>
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### Revision Details

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<tr>
<td>10 May 2016</td>
<td>15</td>
<td>Denis Balcer/Sharon Lingle/Alec MacAdam/Andrew McDonald/Tony Tremblay/Julie Santaniello</td>
<td>Section 5.7.2 – added non-electric overhead utilities and structures other than power lines need to be identified and marked if working in that area. Section 9 – Changed reviewer from Tony Tremblay to Julie Santaniello. Exhibit 1 – added definitions of Utility Strike, Daylighting, Potholing, Subsurface Intrusive Work, Subsurface Intrusive Activities, and Utility Bank. Standard and Supplements placed on new Arcadis headers. Updated Supplement revision numbers to be consistent with standard. Supplement 2 revised. Utility Clearance and Structures Checklist and Utility Strike Investigation Form revised.</td>
</tr>
</tbody>
</table>
EXHIBIT 1 – DEFINITIONS

**Aboveground Utilities** - For the purpose of this procedure, aboveground utilities include, but are not limited to: any aboveground 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.

**Daylighting** – exposing underground utilities or structures through soft dig technology/clearance prior to completing subsurface intrusive activities.

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

**Overhead Utilities and Structures** – Overhead water lines, overhead pipe chases, ceilings in buildings.

**Potholing** – exposing underground utilities or structures through soft dig technology/clearance prior to completing subsurface intrusive activities.

**Subsurface Intrusive Activities** – For the purposes of this procedure, subsurface intrusive activities include, but are not limited to: excavations, vertical drilling, installing grounding rod, soil sampling, etc.

**Subsurface Intrusive Work** – Is any work or activity that breaks the plane of the ground surface. Exemptions include soil sampling using a non-conductive sampling tool to a depth of 6 inches below ground surface (bgs), placement of survey flagging to a depth of 6 inches bgs, and placement of non-conductive survey stake(s) to a depth of 6 inches bgs.

**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.

**Tolerance Zone** – The area within 30 inches in all directions from the outside diameter of a located/marked utility in which special care is to be taken. If the centerline of the utility is marked, the diameter of the utility or utility bank/trench must be incorporated into the 30 inches. This area must be hand cleared with non-mechanized equipment. Once the utility has been exposed, if mechanized equipment is planned for use within the 30-inch Tolerance Zone of the utility, such activity must receive pre-approval by Corporate H&S, to mitigate or accept the risk associated with the planned work. See Figure 1 – 30-inch Tolerance Zone.

**Utility Bank** – a structure containing two or more conduits. A conduit is a single enclosure containing one or more facilities.

**Utility Strike** – An unplanned contact of a utility (i.e., overhead and structures, aboveground, underground or submerged) during the course of work that results in damage requiring repairs, making a report to the utility owner or requiring further assessment to evaluate the potential for damage.
One Call Notification Process and Mark Outs

The purpose of this supplemental information is assist field workers with putting the Utility Clearance and Location Standard into practice. The following sections will provide best practices that can be utilized to improve the overall effectiveness of the implementation of the utility location and clearance process. This supplement will assist you with completing the proper notifications prior to starting intrusive work.

1. Intrusive Work Notifications

Prior to intrusive work on public property (i.e., right-of-ways, easements, etc.), the PM should ensure that the notification of a public one-call service center is completed a minimum of 48-72 hours (One-Call and State Law Directory) prior to initiating field activities (excluding Saturdays, Sundays, and legal holidays). Specific state or local laws related to utility location are evaluated with respect to notification and liability in the event of utility damage. During the call, the PM or his or her designated Task Manager:

- Provides an accurate description of the location of all areas of work that may affect utilities;
- Documents the utility locate request to record the time and date of the call, the area to be marked, the and list of utility companies and municipalities that the one call service center will notify;
- Records the associated ticket (or dig) number provided by the one call service center;
- Cross references the notification list provided by the one-call service center with the list of known or suspected utilities for the property; and
- Provides accurate contact (responsible party name and phone numbers) and access information to the one call service center so they can subsequently communicate potential questions and/or delays related to the utility location and marking.

In most cases, after receiving a request, the one-call service center sends separate requests to participating utility operators who have utilities in or near the work area. Each utility operator dispatches its own locator to mark its facilities, normally with paint or flags. The PM should attempt to have field staff and subcontractors present during the marking of the utilities by the locator to provide input on where the exact intrusive work will be performed. It is important to note:

- Not all utility operators and municipalities participate in one call programs. In some instances, one-call programs provide a list of utility providers that participate, and a list of those that do not. In such a case, the PM should directly contact the utility providers that do not participate in the one-call program and request they mark their own lines. The PM should document any correspondence with such utilities (date of call, person receiving call, and date lines will be marked, etc.) on the Utilities and Structures Checklist.
- Public utility locators are usually only required to mark utilities within the public spaces (e.g., right of ways) or at most up to a meter on private property. However, this can still provide valuable information about where utilities enter a site and their orientation. Where the work area is near a
property line, the One Call markings outside the work area can be used to help verify onsite markings completed by the PUL or other lines of evidence.

- Where One Call marks on private property and the work area is on private property – and therefore not marked by One Call – an additional line of evidence is required.

- Any knowledge of existing or suspected, but unmarked utilities should be documented by the PM and communicated to the field staff, applicable subcontractor(s), and the client prior to implementing field activities.

If a known or suspected subsurface utility does not participate in the state one-call program, and that utility owner has not been individually contacted prior to the start of intrusive work, then the field activities should be postponed until that utility owner or private utility locating company locates the utility.

In general, subsurface utility locations marked by public utility locators are only good for 2 weeks (the PM should research the applicable state-specific requirements). If intrusive work activities are not conducted during this time period, the One Call ticket must be renewed and the site must be remarked.

**NOTE:** At no time is utility clearance to be conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, or impacted in any way, the site must be remarked before work begins. When marking the approximate location of a utility, use a reasonably permanent marking means appropriate for the site such as flags or paint.

### 2. Nation-wide Utility Locate Call Number 811

State and local utility notification centers participate in a “Call Before You Dig” number for public safety and to protect underground infrastructure. This national number is: 811. The number is designed to help prevent excavators, drillers and homeowners from damaging underground utility lines, or causing an injury or service outage while digging/drilling. For more information about the 811 services, visit [www.call811.com](http://www.call811.com).

The number 811 is an FCC designated national “n-11” number. This quick and efficient one call service will notify the appropriate utilities, who participate in the one call program. **However,** the Project Manager should still verify who the one call service contacts, and then determine which utilities may need to be contacted directly (e.g. those utilities not participating in the one call service) by following the requirements outlined above in this procedure.

### 3. Understanding the Marks

Interpreting the marks left by locators during the 811 process is an important aspect of utility avoidance. In most cases the mark outs are completed while staff are not onsite. It is recommended that staff be onsite during the 811 process or speak with locators while onsite. Utility marks should follow proper standards as outlined in the Uniform Color Code and [Excavation Marking Guidelines](http://www.call811.com). Some questions you may ask are; are the marks of sufficient width, length and spacing to help you clearly understand the location and direction of the underlying facilities? Were standard colors used to help you determine which facilities have been marked? Are changes in facilities direction and lateral connections clearly indicated? If no conflict is noted in the pre-marked excavation area is “No Conflict” placed inside of the pre-marked excavation area?
Below are Common Color Code Identifiers and Abbreviations used during the mark out processes, the project team should verify each facilities color prior to starting intrusive work.

<table>
<thead>
<tr>
<th>FACILITY IDENTIFIER</th>
<th>UNDERGROUND CONSTRUCTION DESCRIPTION</th>
<th>INFRASTRUCTURE MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>Chemical</td>
<td>ABS Acrylonitrile-Butadiene-Styrene</td>
</tr>
<tr>
<td>E</td>
<td>Electric</td>
<td>ACP Asbestos Cement Pipe</td>
</tr>
<tr>
<td>F0</td>
<td>Fiber Optic</td>
<td>CI Cast Iron</td>
</tr>
<tr>
<td>G</td>
<td>Gas</td>
<td>CMC Cement Mortar Coated</td>
</tr>
<tr>
<td>LPG</td>
<td>Liquified Petroleum Gas</td>
<td>D Distribution Facility</td>
</tr>
<tr>
<td>PP</td>
<td>Petroleum Products</td>
<td>DB Direct Buried</td>
</tr>
<tr>
<td>RR</td>
<td>Railroad Signal</td>
<td>DE Dead End</td>
</tr>
<tr>
<td>S</td>
<td>Sewer</td>
<td>JT Joint Trench</td>
</tr>
<tr>
<td>SD</td>
<td>Storm Drain</td>
<td>HP High Pressure</td>
</tr>
<tr>
<td>SS</td>
<td>Storm Sewer</td>
<td>HH Hand Hole</td>
</tr>
<tr>
<td>SL</td>
<td>Street Lighting</td>
<td>MHD Manhole</td>
</tr>
<tr>
<td>STM</td>
<td>Steam</td>
<td>PB Pull Box</td>
</tr>
<tr>
<td>SP</td>
<td>Slurry System</td>
<td>R Radius</td>
</tr>
<tr>
<td>TEL</td>
<td>Telephone</td>
<td>RST Structure (vaults, junction boxes, inlets, lift station)</td>
</tr>
<tr>
<td>TS</td>
<td>Traffic Signal</td>
<td>RST Structure (vaults, junction boxes, inlets, lift station)</td>
</tr>
<tr>
<td>TV</td>
<td>Television</td>
<td>RST Structure (vaults, junction boxes, inlets, lift station)</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
<td>RST Structure (vaults, junction boxes, inlets, lift station)</td>
</tr>
<tr>
<td>W</td>
<td>Reclaimed Water (purple)</td>
<td>T Transmission Facility</td>
</tr>
</tbody>
</table>

Typical Premarked Excavation Area
Best Practices for Field Personnel Concerning Utility Location and Clearance

The purpose of this supplemental information is to assist field staff with the practical application of the Arcadis Utility Clearance and Location Standard. The following sections will provide best practices that can be utilized to improve the overall effectiveness of the implementation of the utility location and clearance process.

1. Pre-Job Planning and Preparation

Field team members should work with the project manager or their delegate on the following topics:

- Identifying project goals and define minimum H&S expectations.
- Obtain site access/permits, if required.
- Identify traffic control measures utilizing the Arcadis Field Guide to Roadway Work Zone Safety.
- Identify any utility critical areas (UST systems, product distribution lines, etc.).
- Identify “back up” drilling locations in case primary points are inundated with utilities.
- Develop a site plan showing relevant above- and below-grade features.
- Complete the Utilities and Structure Checklist (USC).
- Identify field staff – ideally the staff member qualified in utility location and clearance should be on-site during locating events (811, GPR, site walk, etc.) as well as during the intrusive activities.

2. Completion of the State One Call or Nationwide 811

As part of the Utility Standard and associated checklist, the One Call is a requirement prior to any intrusive activities. For detailed information on completing the One Call, refer to ARC HSFS -019 Supplement 4. Allow ample time for mark outs to be performed, 48-72 hours prior to intrusive activities.

Recognize that One Call/ 811 will only mark public areas and not private property. The work area should be clearly marked in white paint and with stakes/flagging for high vegetation or snow covered areas. For areas with constant snowfall, survey pins can be installed in pavement to mark location of utilities. For purposes of field personnel completing the US, the following items should be documented on the USC:

- Utility companies notified and responses as part of the One Call notification process.
- The One Call ticket number or attach ticket to USC.
- Type of device used to mark utilities (paint, pin, flags, other or none).
- Utility companies marked utilities or provided “no conflict” status.
- Name of utility providers that do not participate in the One Call system that require notification. Record call date and name of utility representative. Confirm they have marked the work area.
- Field staff should accompany the utility companies where possible, such that field staff can ask questions and provide work scope clarification.

Field staff must reconcile any discrepancies of utility company mark outs or absence of mark outs prior to starting subsurface intrusive work.
It has been identified that switching project personnel during the utility location and clearance phase and the intrusive activity phase may have contributed to past utility strikes and incidents. As a best practice, having the same project personnel completing the utility location and clearance and intrusive activities is recommended. This allows site knowledge and utility location/clearance information gathered during the utility clearance phase to be kept up to date and this historical perspective available to minimize the potential for a utility strike. If it is not feasible to have the same project personnel throughout the work activity, then a thorough knowledge transfer on the site utilities, locations and clearance results and proposed intrusive activities must be completed.

3. Review of site utility drawings and conduct interviews

Review all available site utility drawings, plans, and “as-builts” and/or interview site representatives. All utilities must be considered regardless of age or current use. Drawings provided to field staff should consider the following:

- The drawing should be large enough to use in the field.
- Field staff should be able to make a master drawing to incorporate utilities with color coding.
- Compare drawings to current site features to evaluate if conditions have changed (i.e., structures added or removed from site, etc.)
- Example drawings to be reviewed (i.e., tank dip charts, aerial photos, “as-builts”, easements/right of ways, fire insurance plans, etc.)
- Hold a review session with “persons of interest” (i.e., current or past site managers) to confirm accuracy of drawings.
- Document all interviews on the USC.

If discrepancies are noted in utility locations or any potential conflict exists with our planned subsurface work, STOP WORK and re-assess the situation. Call the Project Manager and/or engineer/geologist to re-evaluate.

4. In Field Utility Location and Clearance

4.1 Conducting the Visual Site Inspection

Verify mark out presence and approximate location of utilities on-site. This information can be documented on page 2 of the USC. In addition:

- Time your site visits prior to and after One Call mark outs (to visually confirm that mark outs have been performed).
- Identify and visually trace above-grade indicators of utilities (USTs, power poles, hydrants, utility warning markers, faucets, light poles, water meters, power transformers, manhole covers, linear ground depressions, soil/lawn scars, pavement cut marks/patching, etc.).
- Identify utility sources to receptors (a water faucet and the water meter).
- Include site/property managers in site inspection to provide site-specific information or utility locations based on historical knowledge.
- See the big picture, look outside your area for other utilities that may cross your area.
• Confirm utility color(s) marked match One Call responses. **Reconcile any discrepancies.**
• Check for overhead utilities and structures. The chart below provides minimum clearance distances for overhead power lines and heavy equipment.

Know the locations of all subsurface and above ground utilities before conducting any intrusive field activities. In addition, subsurface utility locations marked by public utility locators are typically only good for 2 weeks (research One-Call and State Law Directory) before they expire. If subsurface work activities are not conducted during this time period specified by state law, all lines of evidence must be re-verified, including but not limited to requesting that the public utility locators remark/verify the subsurface utility locations.

**NOTE:** At no time should subsurface work be conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, covered (e.g., mud or snow), or impacted in any way, the site should be remarked before subsurface intrusive work begins. When marking the approximate location of a utility, use a reasonably permanent marking means appropriate for the site, such as flags or paint.

### 4.2 Three Lines of Evidence

If any of the required three lines of evidence are not available or the level of confidence in the three lines of evidence is not sufficient to proceed with intrusive activities, additional methods can be utilized to gain more information about subsurface utilities. For further information refer to ARC HSFS-019 Supplement 3, Use and Limitations of Common Utility Location Technologies and Clearance Methods. Project team members should communicate the level of confidence of each line of evidence as they are collected. Any of these methods can be documented on the USC.

### 4.3 On-site Verification – Private Utility Locate

The private utility locator (PUL) is used to gain/confirm information on known utilities and investigate the presence of unknown utilities. The selection of the PUL should be based on:

- Their performance/reputation from colleagues that have utilized their services.
- Their knowledge of the area/facility including past work at the site, if any.
- Their capabilities and locating technologies.
- Adequate locating experience/training of their field personnel.

<table>
<thead>
<tr>
<th>Power Line Voltage (kV)</th>
<th>Minimum Safe Clearance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 or below</td>
<td>10</td>
</tr>
<tr>
<td>&gt;50-200</td>
<td>15</td>
</tr>
<tr>
<td>&gt;200-350</td>
<td>20</td>
</tr>
<tr>
<td>&gt;350-500</td>
<td>25</td>
</tr>
<tr>
<td>&gt;500-750</td>
<td>35</td>
</tr>
<tr>
<td>&gt;750-1,000</td>
<td>45</td>
</tr>
</tbody>
</table>

*Source: ANSI Standard B30.5-2004, 5-3.4.5*
5. PUL Field Implementation Considerations

The selection of the locating technology and the site conditions can be difficult. Utilize ARC.
HSFS-019 Supplement 3 to assist with selection. The following guidelines should also be
considered:

- The size and number of the areas to be scanned/located and general conditions of the
  areas (e.g., availability, traffic).
- Allow PUL personnel adequate time to thoroughly mark entire work area.
- Match utility location technologies with site conditions and subsurface characteristics, such
  as soil type, density, moisture, etc.
- Scan a known utility to confirm that equipment is functioning correctly, preferably a utility
  marked out from the One Call service would be a good example.

The location technologies utilized must be tracked on the USC:

Ground penetrating radar (GPR), Radiofrequency (RF), Metal detector, Electromagnetic
Detection (EM), Sonde.

6. Clearance Methods

Determine the clearance or soft dig method based on site conditions and utilize the least invasive
method possible. The following clearance methods are listed from least invasive to most:

Vacuum Extraction/Potholing (air or water-based), air knifing, hydroknifing, probing, hand
augering, hand digging and posthole digging. Each method of clearance must be documented on
the USC.

7. Paving/Concrete Surface Removal

Removing paving or concrete during subsurface intrusive activities adds risk. It has resulted in
several utility strikes. The method selected should ensure the least amount of downward force
into the subsurface to reduce the risk of collateral damage to subsurface utilities.

- Energize utilities where possible when an electronic survey is performed using a pipe and
cable locator in passive mode (i.e., detects 60 Hertz frequency but only if current is
  flowing).
- An electronic survey is recommended, where available, particularly for large surface cover
  area removals.
- Only cut or core as far as needed to penetrate the surface cover. Do not use a
  jackhammer.
- Large surface removals should begin at the perimeter of the removal area to identify
  utilities passing into the work zone.
- For a large area, a concrete saw may not be practical. Heavy equipment is often used. During
this process, a spotter should guide heavy equipment and look for warning signs
of utilities. Heavy equipment should not use “teeth” which could protrude into a utility.
Once cover is removed around the perimeter, vacuum or hand dig. The depth of the
vacuum or hand dig should be based on available information about the subsurface utility
depth below ground surface or a minimum of 5 feet below ground surface, whichever is
greater.
• Working inside buildings has the increase potential for utilities in the concrete or at the concrete/soil interface. Mini GPR units can be used to grid out rebar locations and other anomalies. When feasible, it is recommended to de-energize utilities and use LO/TO by a qualified staff member to minimize potential for electrical shock if subsurface activity results in electrical line strike.

• **For exposing utilities, no mechanical equipment can be used within a minimum 30-inch buffer zone. Soil removal must be completed by hand digging techniques or soft dig technologies, such as soil vacuum extraction.**

8. **The 30-Inch Rule**

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 (pothole or daylight) 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.

If and when any line of evidence reveals that planned subsurface work will be located inside the 30-inch Tolerance Zone of known/marked/located/observed utilities, the project team must Stop Work and contact Corporate H&S as early as possible for pre-approval.

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 the 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.

9. **Warning Signs**

Below is a list of visual indicators that may indicate a subsurface utility or structure. **STOP WORK IMMEDIATELY** and re-evaluate subsurface clearance approach/work locations if any of the indicators below are observed during clearance activities.

- Warning Tape (typically indicative of underground services), usually red in color.
- Pea Gravel/Sand/Non-Indigenous Material (typically indicative of tanks or lines).
- Red Concrete (typically indicates electrical duct banks).
- Surface or slightly subsurface whiskers.
• Abrupt absence of soil recovery in the hand auger, which could indicate non-cohesive utility backfill (pea gravel or sand), except in areas where native soil conditions typically result in poor hand auger recoveries.
• Patches in asphalt or concrete that do not match surrounding areas.
• Any unexpected departure from the native soil or backfill conditions as established by other onsite digging or drilling.

If unexpected conditions are encountered (refusal, debris, pea gravel, etc.) while completing the intrusive activity, all work should be immediately halted. Note that subsurface utilities at many industrial facilities are often placed in conduits or concrete to prevent damage. Additionally, non-native fill may have been placed at the site changing the depth of locations and change in stratification of soils. If a utility or subsurface structure is compromised, the field staff should initiate ARC HSFS-019 Supplement 5, Utility Strike Emergency Action Plan Guidelines; however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.

10. De-Energizing Utilities

If activities take place in the vicinity of an aboveground utility, the utility line can be rendered controlled (i.e., through ARC HSFS004 Control of Hazardous Energy (Lockout/Tagout)) or protected from damage (i.e., covering overhead power lines). Safe work distances described in the ARC HSFS019 Utility Location and Clearance Section 4.5 or Field Health and Safety Handbook must be followed without exception if the lines cannot be properly de-energized or covered by the owner or operator of the line.

If an aboveground utility on private property is discovered that has not been previously identified prior to mobilizing to the field, the field staff should notify the Project Manager who requests the client to assist in the identification of the utility and the implementation of control procedures as appropriate.

11. Special Considerations

11.1 Presence of Plastic Utilities

The presence of small diameter plastic piping (i.e., irrigation lines, storm drains, PVC/HDPE, etc.) can be very difficult to detect with locating technologies. In the case where irrigation lines are known to exist, the project team will work with the property manager or client to identify records/drawings of irrigation system layout. Potentially turning off the system during intrusive activities can also be option to utilize in case the system is damaged. Re-activation of the system to ensure no damage occurred is also recommended. This should be discussed with the client during the design phase of the project. Although the costs to make repairs to such a system are inexpensive, the potential for a water-based release can be costly and damaging to the property. Refer to the ARC HSFS019 Supplement 3 for further information on location of plastic type constructed utilities.

11.2 Work inside Buildings

When performing utility location and clearance activities inside of buildings, the project team should consider the following aspects:
• Potential de-energizing of portions of the building in order to reduce the level of risk of unknown utilities and documentation of the decision-making process.
• GPR scan of concrete and approximate thickness to soil interface (there have been a lot of utility strikes due to utilities being present at the soil-concrete interface).
• GPR scan of the rebar pattern in concrete to reduce coring efforts when rebar is cored through.
• Utilization of saw cutting techniques rather than jack hammering to reduce risk of utility damage at the concrete/subsurface interface
• Signal inference with rebar, concrete thickness or multiple layers, and other metal infrastructure.

11.3 Heavy Equipment

• Heavy equipment is sometimes used for work activities but not necessarily for intrusive work. Damage to shallow subsurface utilities or structures can result from the travel of heavy equipment across soft surface areas.
• Risk assessments should be conducted, and in some instances, controls put in place to protect the subsurface (i.e., planking, installation of additional cover for shallow utilities, or markings to avoid crossing sensitive areas with heavy equipment).
• If overhead utilities are present in areas where heavy equipment will be operated, ensure adequate clearance is provided. Heavy equipment that is extendable or telescoping (e.g., excavators, dump trucks, extendable lift trucks), the field staff will evaluate with the contractor if the use of a spotter is necessary prior to operating heavy equipment when in proximity to the overhead utility.

11.4 Vegetation

• Consider other subsurface disturbances that may lead to damage of shallow underground utilities, such as clearing trees/shrubs/vegetation as roots may be entangled with underground piping or structures.

12. Incident Response and Notification

• Stop Work authority must be utilized and Near Miss reports completed when any subsurface utility is encountered but not damaged while performing work. This provides an opportunity to evaluate why the utility was not found with locating technologies and/or missed during the data gathering process. All relevant information should be documented in the Near Miss report and communicated to the project manager.
• If a utility is struck or damaged, the utility provider should be notified first, followed by notification to the AUS PM to initiate the Investigation process. Refer to the site-specific HASP for emergency contact numbers and incident management procedures, if necessary
• If a utility or subsurface structure is compromised, the field staff should initiate the ARC. HSFS-019 Supplement 5, Utility Strike Emergency Action Plan Guidelines; however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.
• If an unknown utility is damaged and repaired during the course of the field event. The field staff must verify that the repair is competent and complete to prevent further damage to the site when the damaged utility is re-activated.
EXHIBIT 2 – FIGURE 1 – TOLERANCE ZONE

Ex. 1

30-inch Clearance required for outside edge of utility.
Ex. 1 – Cable or 1” diameter utility
Ex. 2 – 2” diameter utility
Ex. 3 – 12” diameter multi-utility group

Actual Tolerance required Zone in Green

Ex. 2

31”

30”

31”

Ex. 3

36”

30”

36”

Actual Tolerance required Zone in Green.

Figure 1 – Tolerance Zone
EXECUTIVE SUMMARY

Radiation is a form of energy transmitted either as electromagnetic waves or as particulate matter. Radiations are classified into two categories based on the effects that they produce when they pass through matter: The purpose of this sealed-source radiation safety program is to establish procedures and requirements for the safe handling of the X-Ray Fluorescence (XRF) analyzer(s) and Soil Nuclear Density Gauges used by authorized ARCADIS staff.

Under this program, ARCADIS employees receive specific instrument use and radiation safety training from the manufacturer. In addition, ARCADIS employees shall receive specific DOT training regarding the appropriate shipping and transporting requirements for XRF Analyzers and Soil Density Nuclear Density Gauges. Employees will:

- Ensure they have received proper training and are prepared to use the XRF Analyzer and/or Soil Density Nuclear Density Gauge safely in accordance with manufacturer requirements, ARCADIS’ radiation safety program and the XRF performance characteristic sheet, as applicable
- Ensure that instruments are transported and shipped in accordance with DOT requirements
- Ensure that personal dosimetry badges are worn during instrument use and handling.
  Employees shall report any radiation exposure or suspected radiation exposure to the RSO

For a given source of radiation, three factors will determine the radiation dosage you receive from the source: 1) Duration of Exposure; 2) Distance from Source; 3) Shielding.

Dosimeter badges, TLDs, Self Reading Dosimeters or equivalent monitoring device will be worn by Authorized Users when handling, using, transporting or inspecting the XRF and/or Nuclear Density Gauge instrument(s)

When not in use in the field, XRF instruments and Soil Density Nuclear Density Gauges will be primarily stored in a dedicated, locked and properly labeled storage area. The instrument storage area will be accessible to only Authorized Users and posted with the radiation caution symbol and the words, “Caution – Radioactive Material” in addition to any state required radioactive material postings. Device storage location must be locked at all times to ensure that access by non-authorized persons is controlled.

Transportation of radioactive material or delivery of radioactive material to a carrier for transport will be done in accordance with the provisions of 49 CFR Parts 170 through 189, 10 CFR Part 71 and applicable state regulations. The person transporting an XRF or Nuclear Density gauge must be properly trained in radiation safety, and maintain current and applicable licensing to operate vehicles(s) used for transport.

Emergency response information must accompany each shipment of an XRF. The document containing this information must be immediately accessible to the driver at all times during transportation on a public highway.

Sealed source radioactive devices must be leak tested every six months (or as mandated by state radioactive material license).
1. POLICY

Radiation is a form of energy transmitted either as electromagnetic waves or as particulate matter. Radiations are classified into two categories based on the effects that they produce when they pass through matter:

- **Ionizing Radiation**
  - have enough energy to ionize, that is remove electrons from the atoms of, the matter through which they pass,
  - they may be either electromagnetic (gamma and X-rays) or particulate (alpha and beta-particles) in nature, and
  - they have the potential to cause serious health effects, including cancer, if misused.

- **Non-ionizing Radiation**
  - these do not have enough energy to cause ionization in the matter through which they pass,
  - they are electromagnetic (e.g. ultra-violet radiation, microwaves, radio waves, etc.) in nature, and
  - they generally have less potential to cause serious health effects than ionizing radiations; their health effects are mainly due to internal body heating and induced electric currents.

ARCADIS is committed to the effective management of ionizing radiation. In all work with ionizing radiation the ALARA (As Low as Reasonably Achievable, economic and other factors being taken into account) principle is to be used to ensure that exposures to staff, the public and the environment are minimized.

2. PURPOSE AND SCOPE

2.1 Purpose

ARCADIS’ owned Niton X-Ray Fluorescence (XRF) Analyzers use a small amount of radioactive material, usually 10-50 millicuries of Cadmium-109 to detect and quantify the amount of metals (particularly lead) in paint or soil. The Troxler and Instrotek Nuclear Density Gauges use a small amount of radioactive material, usually 10-50 millicuries of Cesium-137 and Americium-37 to quantify Nuclear Density and moisture content.

The purpose of this sealed-source radiation safety program is to establish procedures and requirements for the safe handling of the X-Ray Fluorescence (XRF) analyzer(s) and Nuclear Density Gauges used by authorized ARCADIS staff.

Each office using these devices must modify this standard where indicated and a copy of this standard must be stored with other required documents specified in this standard.

If, after reading this program, you find that improvements can be made, please contact ARCADIS’ Director of Health and Safety. We encourage all suggestions because we are committed to creating a safe workplace for all our employees and a successful radiation
safety program is an important component of our overall safety plan. We strive for clear understanding, safe work practices, and involvement in the program from every level of the company.

2.2 Scope

This program applies to users of the Niton XRF instruments, Troxler Nuclear Density Gauge, the Instrotek Nuclear Density Gauge and any other test instrument equipped with a radioactive sealed source.

3. DEFINITIONS

**Authorized User** - Those employees that have completed the required manufacturer operator and radiation safety training and have read and signed this radiation safety program. Only Authorized Users who have completed the manufacturer’s radiation safety and operator course and have read the ARCADIS radiation safety program are authorized to use, transport or store the XRF and Nuclear Density Gauge equipment.

**Bq** - Becquerel

**DOT** - US Department of Transportation

**EPA** - US Environmental Protection Agency

**mREM** - milliREM

**NRC** - US Nuclear Regulatory Commission

**OSHA** - US Occupational Safety and Health Administration

**RSO** - ARCADIS Radiation Safety Officer

**uCi** - microcurie

**XRF** - Niton X-Ray Fluorescence Analyzer

4. RESPONSIBILITIES

4.1 Project Managers

Project Managers are responsible for:

- Ensuring that employees using sealed source radiation devices receive field operator training
- Ensuring that employees receive appropriate DOT training when transporting or shipping sealed source radioactive device(s)
• Ensure their employees are familiar with proper handling, use, storage and transportation requirements for XRF analyzers and/or Nuclear Density Gauges
• Ensure employees are wearing dosimeter badges, TLDs, Self Reading Dosimeters or equivalent monitoring device whenever they are handling or transporting a sealed-source radioactive device
• Ensuring equipment is properly maintained, as applicable
• Verifying and correcting deficiencies identified by the RSO or employees, as applicable

4.2 Radiation Safety Officers

Radiation Safety Officer (RSO) will:

• Be responsible to the organization management structure for ensuring the safe use of XRF analyzers and Nuclear Density gauges by ARCADIS employees
• Be responsible for compliance with NRC regulations and state licensing requirements.
• Be delegated the authority to halt any operation determined to be unsafe
• Provide advice and assistance to authorized users, as required, on matters pertaining to radiation safety requirements, procedures and ARCADIS radiation safety policy
• Maintain ARCADIS sealed-source device licensing and applications, prepare required amendments and renewal applications, as necessary, to update the radiation safety program
• Specify the individuals authorized to order radioactive material and ensure that requested radioactive material does not exceed the limits authorized by the radioactive materials license
• Conduct an annual review or the radiation safety program procedures and document the results, and corrective actions implemented, as needed
• Ensure that a physical inventory is conducted every six (6) months to account for sealed source radioactive devices received and possessed under license
• Investigate each known or suspected overexposure, loss of control, and noncompliance to determine the root cause and help identify corrective actions to prevent its recurrence. All sealed source radioactive device losses and near losses will be reported to the RSO
• Direct action to be taken in the event of an incident, damaged or leaking analyzer, or other emergency in concert with the manufacturer RSO and state NRC RSO
• Notify the proper authorities (i.e., State Radiation Control Program, local police, U.S. Department of Transportation, etc.) promptly in case of accident, damage, theft or loss
• Establish procedures for inspection, care and maintenance of equipment
• Ensure that personnel who use the XRF analyzers and/or Nuclear Density Gauges have completed the operator’s course and have been designated in writing as an authorized user
• Ensure that required leak tests are conducted and results reviewed and verified
• Ensure that authorized users have read and understand the radiation safety program
- Ensure that authorized users have had appropriate DOT training in order to transport, ship and handle the XRF and/or Nuclear Density Gauges
- Ensure that licensed material is returned to the instrument manufacturer for proper disposal

### 4.3 Employees

Under this program, ARCADIS employees receive specific instrument use and radiation safety training from the manufacturer. In addition, ARCADIS employees shall receive specific DOT training regarding the appropriate shipping and transporting requirements for XRF Analyzers and Nuclear Density Gauges. Employees will:

- Ensure they have received proper training and are prepared to use the XRF Analyzer and/or Nuclear Density Gauge safely in accordance with manufacturer requirements, ARCADIS’ radiation safety program and the XRF performance characteristic sheet, as applicable
- Ensure that instruments are transported and shipped in accordance with DOT requirements
- Ensure that personal dosimetry badges are worn during instrument use and handling. Employees shall report any radiation exposure or suspected radiation exposure to the RSO

### 4.4 Director of Health and Safety

ARCADIS’ Corporate Director of Health and Safety has overall responsibility for coordinating safety and health programs in this company. ARCADIS’ Director of Health & Safety shall:

- Establish and implement a radiation safety program for XRF analyzers and Nuclear Density Gauges
- Appoint in writing a qualified Radiation Safety Officer (RSO) and authorize said RSO direct access to manufacturer and state emergency response RSOs
- Assist in reviewing and updating the program, as necessary. Copies of the written program may be obtained from ARCADIS’ Director of Health and Safety, APEX or from the RSO

### 5. PROCEDURE

#### 5.1 Radiological Hazard

##### 5.1.1 General Information

The radioactive sources in the Nuclear Density gauge and XRF instrument produce up to four types of radiation:

- Alpha Particles
• Beta Particles
• Photons (Gamma Rays)
• Neutrons – Nuclear Density gauge

The alpha and beta particles are stopped by the source capsule. Only the photon (XRF and Nuclear Density gauges) and neutron (Nuclear Density gauge) radiation contributes to any occupational radiation exposure.

Photon (gamma) radiation is electromagnetic radiation, as are x-rays, radio waves, and visible light. Visible light and photons have no mass or electrical charge, and travel at the speed of light. Photons are energetic and penetrating. Photons originate from the nucleus of the radioactive source after radioactive decay. Dense materials (i.e., lead, cadmium, etc.) provide the best shielding against photon radiation.

Neutron radiation emitted by the Nuclear Density gauges allows measurement of the hydrogen (water) content in a material because the neutrons are slowed by collisions with materials containing hydrogen atoms (for example: water, polyethylene, etc.). Neutrons have no charge and are very penetrating.

Human exposure to radiation is typically measured in REMs, or in one-thousandths of a REM, called milliREMs (mREM). For a given source of radiation, three factors will determine the radiation dosage you receive from the source:

1. Duration of Exposure

The longer you are exposed to a source of radiation the more radiation strikes your body and the greater the dose you receive. Dosage increases in direct proportion to length of exposure.

2. Distance from the Source

The closer you are to a source of radiation, the more radiation strikes you. The dosage increases in inverse-squared relation to your distance from the source of radiation. For example, the radiation dose one inch from a source is nine times greater than the dose three inches from the source, and 144 times greater than the dose one foot (12 inches) from the source. For another example, the radiation dose one meter from the source of radiation is 100 times lower than the dose at 10 cm from the source of radiation. Keep your hand and all body parts away from the front end of the analyzer when the shutter is open to minimize your exposure.

3. Shielding

The Niton XRF instrument emits virtually no radiation with the shutter closed because the 109Cd and/or 55Fe and/or 241Am sources are thoroughly shielded in every direction. This shielding absorbs nearly all of the radiation produced by the source – except when the shutter is open during testing. With the shutter open, the instrument emits a maximum directed radiation beam of approximately 315 milliREM per hour (mREM/hr) intensity. Always hold your instrument so that the radiation beam is not aimed at yourself or at anyone else. Supplied or optional test stands add shielding for analysis.
Note: Wearing a dosimeter badge does not protect you against radiation exposure. A dosimeter badge measures your exposure.

The Nuclear Density gauges also have built-in shielding to reduce employee exposure. The radiation profile for the Nuclear Density gauge can be found in the operator manual.

Table 1 lists typical radiation doses encountered in daily life and lists the annual occupational radiation dosage limits for adults set forth by the NRC, OSHA and state regulatory agencies. Typical radiation dosage information was provided from the National Council on Radiation Protection and Measurements (NCRP).

### Table 1. Typical Radiation Dosages (NCRP, 1987)

<table>
<thead>
<tr>
<th>Category</th>
<th>Dose in mREMs</th>
<th>Dose in mSv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average total dose in US (annual)</td>
<td>360</td>
<td>3.6</td>
</tr>
<tr>
<td>Average worker exposure (annual)</td>
<td>210</td>
<td>2.1</td>
</tr>
<tr>
<td>Average exposure for underground miner (annual)</td>
<td>410</td>
<td>4.1</td>
</tr>
<tr>
<td>Exposure for airline crew (1,000 hours at 35,000 ft)</td>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>Additional from living in Denver at 5300’ (annual)</td>
<td>25</td>
<td>.25</td>
</tr>
<tr>
<td>Additional from 4 pCi/l radon in home (annual)</td>
<td>1,000</td>
<td>10</td>
</tr>
<tr>
<td>Typical chest x-ray</td>
<td>6</td>
<td>.06</td>
</tr>
<tr>
<td>Typical head or neck x-ray</td>
<td>20</td>
<td>.2</td>
</tr>
<tr>
<td>Typical pelvis/hip x-ray</td>
<td>65</td>
<td>.65</td>
</tr>
<tr>
<td>Typical lumbar spine x-ray</td>
<td>30</td>
<td>.30</td>
</tr>
<tr>
<td>Typical upper G.I. x-ray</td>
<td>245</td>
<td>2.45</td>
</tr>
<tr>
<td>Typical barium enema x-ray</td>
<td>405</td>
<td>4.5</td>
</tr>
<tr>
<td>Typical CAT scan</td>
<td>110</td>
<td>1.1</td>
</tr>
<tr>
<td>Minimum detectable dose on a standard film badge</td>
<td>5</td>
<td>.05</td>
</tr>
</tbody>
</table>

**Annual occupational dosage limits:**

| Maximum allowable for the general public (annual) | 100 | 1 |

**Annual Occupational Dose Limits for Adults:**

| Whole Body                             | 5,000 | 50 |
| For a pregnant worker (during gestation period) | 500  | 5  |
| For a minor                            | 500   | 5  |
| Eye dose equivalent                    | 15,000| 150|
| Shallow dose equivalent to the skin or any extremity or organ | 50,000 | 500 |
5.1.2 Monitoring Radiation Exposure

The instrument manufacturer reports that there is virtually no measurable radiation from a NITON XLp analyzer when its shutters are closed. The maximum dosage to which you are exposed when properly operating your NITON XLp is <0.1 mREM/hr on the fingers of the hand holding the instrument, with the shutters open.

According to the Nuclear Density gauge manufacturer, under average conditions a full time employee working with the Nuclear Density Gauge will receive a radiation exposure of less than 200 mREM per year. Refer to the Nuclear Density Gauge operator manual for a radiation emission profile for the Nuclear Density gauges.

Proper use of the XRF and Nuclear Density Gauge instruments and the shielding design of the instruments will keep the exposure levels at a minimum under normal conditions.

Film Badge Dosimeters

Dosimeter badges will be worn by Authorized Users when handling, using, transporting or inspecting the XRF and/or Nuclear Density Gauge instrument(s).

Dosimeters will be worn as recommended by the manufacturer. A dosimeter badge is usually worn close to the parts of your body that are most sensitive to radiation, including your reproductive organs and your eyes.

Dosimeters will be collected and sent for certified laboratory analysis on a quarterly basis. Results will be reported to employees within three working days of receipt of the laboratory results.

Dosimeters will be supplied and analyzed by:

Landauer, Inc.
2 Science Road
Glenwood, IL 60425-1586

5.1.3 Pregnant Workers

Pregnant workers should consult with their physician and consider the need to take special precautions to reduce their exposure to radiation. Qualified scientists have recommended that the radiation dose to pregnant women should not exceed a total of 500 mREM/gestation period. See U.S. NRC Regulatory Guide 8.13 "Instruction Concerning Prenatal Radiation Exposure".

Pregnant workers should consult with Human Resources and/or the corporate Director of Health & Safety regarding any questions with regards to the recommended radiation dose limit or use of a sealed source radioactive device.

5.2 Storage

When not in use in the field, XRF instruments and Nuclear Density Gauges will be primarily stored in a dedicated, locked and properly labeled storage area. The instrument storage area will be accessible to only Authorized Users and posted with the radiation caution.
symbol and the words, “Caution – Radioactive Material” in addition to any state required radioactive material postings.

All exterior doors leading to the storage area will be locked at all times to ensure that access by non-ARCADIS employees cannot be gained into the warehouse from the exterior of the building.

Except during use by Authorized Users, the XRF instruments and Nuclear Density Gauges will be stored in its shipping case. XRF instruments and Nuclear Density Gauges, when in an unrestricted area and not in storage, will be tended under constant surveillance and immediate control of the Authorized User.

A copy of this Radiation Safety Program will be posted on the outside of the dedicated and locked storage area.

A sign-out/in log shall be completed and shall contain:

- Name of Authorized User accepting custody of equipment
- Date and Time Authorized User took custody of instrument from locked storage area/container
- Destination for equipment (If being shipped to another location, then the name of the Authorized User who will receive the equipment must also be documented)
- Proposed use of equipment
- Date, Time and Name of Authorized User who returned equipment to locked storage area/container

For those offices/personnel that temporarily store a sealed source portable gauge, authorized user must ensure that a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal are used whenever portable gauges are not under the control and constant surveillance of the authorized user.

An up-to-date list of Authorized XRF and Nuclear Density Gauge users will be prepared by the RSO and posted on the exterior side of the locked storage area/container door. This posting will clearly define that only the listed Authorized Users are permitted to access the dedicated metal locked storage area/container containing the XRF and Nuclear Density Gauge instruments. The Key and/or Combination lock for the storage area/container will only be made available to Authorized Users.

**NOTE:** Each office using this sealed source rad material template must generate its own maximum annual dose calculation and update the following paragraph.

Based upon the storage of two (2) Niton XRF instruments and three (3) Nuclear Density gauges, ARCADIS calculated that the maximum annual dose to any member of the public (administrative staff working 6 feet away from the source devices in file storage room for 60 hours per year) would be 29.2 mREM, which is less than the annual allowable dose of 100 mREM. With information provided by the instrument manufacturer, ARCADIS calculated the maximum one hour dose outside of the restricted storage area at 1.944 mREM per hour which is less than the allowable limit of 2 mREM in any one hour for an “Unrestricted Area.”
Therefore, the one-hour dose limit for classification of the remaining portion of the ARCADIS warehouse as an unrestricted area has been met.

5.3 Instrument Use

Always be aware of the location of your instrument’s radioactive sources and the direction of their beam of radiation. Always treat radiation with respect. Never point your instrument at yourself or anyone else when the shutter is open.

It is important that the date and time information displayed on the instrument is correct. If either the date or time is incorrect, the information stored with your readings will be incorrect. In addition, an incorrect date prevents the instrument for properly compensating for normal source decay, which could cause erroneous analysis results.

With the exception of manufacturer defined maintenance activities, all service must be performed by the instrument manufacturer or manufacturer authorized dealer. Any maintenance on the devices involving dismantling, removal of radioactive source holder(s), repair, etc., must be performed only by the manufacturer or other persons specifically authorized to perform such repairs by your local State Radiation Control Program, another Agreement State, a Licensing State or the U.S. Nuclear Regulatory Commission.

Store XRF and Nuclear Density gauge instruments and spare battery packs in a cool place, away from direct sunlight.

Current copies of the following documents will be maintained with sealed source radiation devices at temporary job sites for radiological agency inspection:

1. The manufacturer's instruction manual with appropriate emergency procedures; and

2. A copy of the results of the latest test for leakage and/or contamination performed on the sealed source.

3. ARCADIS’s radioactive material license.

5.3.1 Radioactive Device Labeling

All sealed-source radioactive devices come labeled from the manufacturer. The RSO and Authorized Users will verify that manufacturer warnings and the radiation warning are present on each device and that there is also language that prohibits the removal of these warning labels on each device. Labels will comply with OSHA, DOT and NRC requirements.

5.3.2 XRF Use

Only Authorized Users may use an XRF instrument. Authorized Users must read and understand the literature covering radiation safety included in the instrument operating manual, and attend a radiation safety and applications training course offered by the manufacturer or other competent instructor.

Do not attempt to use an XRF analyzer without first reading and understanding the entire User’s Guide.
When not in use, the XRF must be switched to the off position.

When the XRF is not in storage, it shall be under constant surveillance and immediate control of an Authorized User.

Authorized users are never to leave a device unattended unless the device is secured from unauthorized access (e.g., locked within a transport vehicle to which only Authorized Users have a key).

When in use, the XRF will be pointed away from people.

When using the XRF device for testing, ARCADIS representative must have in his/her possession at such locations a current copy of the radioactive material license, the current leak test certificate and the instrument operating manual and emergency procedures.

The NITON XLp and XL-309 Analyzer is a single unit, hand held, high performance portable x-ray fluorescence (XRF) elemental analyzer.

**CAUTION:** NITON Analyzers are not intrinsically safe analyzers in regard to sparking. All pertinent Hot Work procedures should be followed in areas of concern.

NITON XLp and XL-309 Analyzers contain sealed Cd$^{109}$ and/or Fe$^{55}$ and/or Am$^{241}$ radioactive isotope sources. The sealed source is designed to remain secure even under extreme conditions, so that even if the instrument is broken, crushed or burned, there should be no leakage of radioactive material.

During manufacturing, each sealed isotope source is locked in place in a solid tungsten alloy source holder. The source is completely secure in its housing because the aperture at the closure end of the housing is smaller than the source and is completely sealed. The source assembly is secured in the instrument’s case, which is fitted with tamper-proof screws.

**CAUTION:** After being powered on, the NITON 300 Series Analyzer will perform an internal re-calibration before an analysis is initiated. The manufacturer recommends that you let the instrument warm up for ten minutes after start up, before testing is begun.

There are five different methods of operation for taking a sample measurement, and the XRF analyzer will be configured to use one of these methods, depending on the regulatory requirements of the locality. These methods are:

- **Trigger-Only method.** With the Trigger-Only method, you only need to place the measurement window close to the sample to be analyzed and pull the trigger for sample analysis to be initiated.

- **Trigger-and-Proximity-Sensor method.** With the Trigger-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger for sample analysis to be initiated.

- **Momentary-Trigger-Touch-and-Proximity-Sensor method.** With the Momentary-Trigger-Touch-and-Proximity-Sensor method, you must place the measurement window against the surface to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger. The trigger may be released and the reading will
• **Trigger-and-Interlock method.** With the Trigger-and-Interlock method, you need to place the measurement window close to the sample to be analyzed, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.

• **Trigger-Interlock-and-Proximity-Sensor method.** With the Trigger-Interlock-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.

With any of these methods, analysis will stop if any one of the preconditions are violated. For example, with the Trigger-Interlock-and-Proximity-Sensor method, if the trigger or the Proximity Sensor or the Interlock is released, the reading will stop immediately, and the shutters will close.

After the NITON XLp analyzer is calibrated, initiate a sample reading using the appropriate method. If you attempt to initiate a sample reading using a different method, the analyzer will inform you that one or more of the preconditions need to be met in order for sample analysis to begin.

**Note:** The three LED lights will blink during calibration or whenever there is a shutter open.

**WARNING!** The preconditions for operation must be continued for the duration of the reading. If the preconditions are violated, all the shutters will close, and the measurement will end. The three LED lights will stop blinking, the shutters will close, and the measurement will end. The flashing of the LED lights is not synchronized to minimize power consumption.

**WARNING!** The three LED warning lights are designed to blink only during a measurement, where one or more of the shutters are open and the trigger depressed. If the LED lights blink at any other time, disconnect the battery pack immediately, place the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Electron Corporation’s Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or local Authorized NITON Analyzers Service Center.

The NITON Analyzer will display the Results Screen throughout the duration of each reading. The Results Screen is updated regularly throughout the reading. When the reading is complete, a final screen update will appear, and the NITON analyzer will display the final results of the measurement which has just been completed.

**ARCADIS will maintain a calibration log for each instrument being used. The XRF instrument should be calibrated:**

(i) Before beginning testing.

(ii) At least once during testing phase.

(iii) At completion of testing phase.
5.3.3 Nuclear Density Gauge Use

Only Authorized Users may use a Troxler or Instrotek Nuclear Density gauge instrument. Authorized Users must read and understand the literature covering radiation safety included in the instrument operating manual, and attend a radiation safety and applications training course offered by the manufacturer or other competent instructor.

Do not attempt to use a Nuclear Density gauge without first reading and understanding the entire Operating Manual.

When not in use, the Nuclear Density gauge must be switched to the off position.

When the Nuclear Density gauge is not in storage, it shall be under constant surveillance and immediate control of an Authorized User.

When in use, the Nuclear Density gauge will be pointed away from people.

When using the Nuclear Density gauge for testing, ARCADIS representative must have in his/her possession at such locations a current copy of the radioactive material license, the current leak test certificate and the instrument operating manual and emergency procedures.

The Nuclear Density gauge operates by emitting radiation from two safety-sealed radioactive sources:

- Cesium-137, a gamma emitter for density measurement
- Americium-241:Beryllium, a neutron emitter for moisture measurement

To determine density, the Cesium-137 source emits gamma radiation into the test material. Some of the gamma radiation will pass through the material and be detected by the Geiger-Mueller detectors located within the Nuclear Density gauge. A material of low density will give a higher count per time of test. A material of high density will give a low count for the same period of time, as the high-density material absorbs more gamma radiation.

To determine moisture content, the Americium-241:Beryllium source emits neutron radiation into the test material. The high-energy neutrons are moderated by collision with hydrogen atoms in the moisture of the material. Only low-energy, moderated neutrons are detected by the Helium-3 detector. A material that is wet will give a high count per time of test. A material that is dry will give a low count for the same period of time.

While no radiation hazard is imposed on the operator(s) during normal use, a potential hazard does exist if improperly used.

Nuclear Density gauges should be inspected daily before use to ensure proper operation of all safety features. Push the source rod down into the backscatter position and then raise it back to the shielded position. Turn the gauge over and verify that the tungsten sliding block is completely shut. If the gauge base opening is not completely closed by the sliding block, clean the sliding block and verify proper operation before using, transporting, or storing the gauge.
When not taking readings, always keep the source rod in the safe position. For added operator safety, the source rod on the 3440 gauge automatically retracts to the safe position when the gauge is picked up by the handle.

If you do not hear a “click” when the source rod is raised to the safe position, look at the bottom of the gauge to verify that the tungsten sliding block is completely closed. If the gauge base opening is not completely closed by the sliding block, the sliding block may require cleaning.

The radioactive gamma source is located in the source road behind the shutter block. Do not touch the source rod or place yourself in front of the unshielded source rod.

The shutter should be cleaned and lubricated weekly during use or whenever the source rod becomes dirty and begins to stick. Refer to the operator manual or manufacturer supplied instructions for details.

Do not store or transport the gauge unless the tungsten sliding block is completely closed. Increased radiation levels may violate transportation regulations, and may cause excessive personnel exposure.

5.4 Transportation

Transportation of radioactive material or delivery of radioactive material to a carrier for transport will be done in accordance with the provisions of 49 CFR Parts 170 through 189, 10 CFR Part 71 and applicable state regulations, including but not limited to 105 CMR 120.770, “Transportation of Radioactive Material”.

The person transporting an XRF or Nuclear Density gauge will be properly trained in radiation safety, and maintain current and applicable licensing to operate vehicles(s) used for transport.

Third party custodians (Federal Express, courier, etc.) will be notified of radioactive materials as required by manufacturer and/or state and federal law.

ARCADIS personnel involved in the transport of the XRF and Nuclear Density gauge will wear dosimeter badges and have current DOT training.

5.4.1 XRF

The person(s) responsible for movement of equipment will complete the ‘Sign Out/In' log and are understood to have complete custody of unit until:

- it is returned to storage and signed in.
- it is signed for by an authorized user, who then accepts custody of the unit(s).

A transportation log will be maintained. The log will indicate:

- Date and time of transport.
- Destination
- Authorized user maintaining custody during transport.
Authorized Users must inform the RSO of planned transportation of any XRF Instrument.

Copies of the operator’s guide/manual will be stored in the shipping container and transported with equipment.

Ensure that a copy of the radioactive materials license, current wipe test result and US DOT transportation compliance statement is inside the shipping container before transport or shipping of any kind.

The Niton XRF must be transported in the manufacturer’s shipping container. According to Niton, the radiation level is less than 0.5 mREM per hour at the package surface.

The Niton XRF in its carrying case qualifies as instruments and articles in accordance with 49 CFR 173.422. The package must be certified as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. This notice must include the name of the consignee or consignor and the statement:

Radioactive Material, Excepted Package, Instruments & Articles, UN2911

DOT requires “clear and legible” marking of the UN number on the outside of an excepted package. The identification number (UN 2911) must be marked on the outside of the package.

Air Transport Labeling

ICAO/IATA (air transport – hand carried onto plane or offered up for transport) requires XRF to have a specific label to meet this requirement. The following label must appear on the exterior of the transport case for air transport:

What DOT calls “shipping papers”, IATA calls a “dangerous goods declaration”.

For XRF instrument(s) with $^{109}$Cd and $^{55}$Fe as radioactive source, no shipping papers or “dangerous goods declaration” are required for air transport.

For XRF instrument(s) with $^{241}$Am radioactive source, “RQ” (reportable quantity) label and “dangerous goods declaration” are required for air transport.
Instrument must always be shipped in the manufacturer provided case.

Always ship XRF instruments with the battery disconnected.

Here is an example of a Nature and Quantity of Dangerous Goods section completed for air transport of a XRF with $^{241}$Am sealed source:

<table>
<thead>
<tr>
<th>UN 2911, RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 2911, RQ</td>
</tr>
</tbody>
</table>

Here is an example of the UN2911, RQ labeling on exterior of XRF case (hand-carried by Ground or Offered Up for Ground Transport):

For XRF instruments with $^{109}$Cd and $^{55}$Fe as radioactive source, no shipping papers or “dangerous goods declaration” are required for hand carrying by ground or offering up for ground transport.

For XRF instruments with $^{241}$Am being hand carried by ground, no shipping papers or “dangerous goods declaration” are required.

For XRF instruments with $^{241}$Am being offered up for ground transport, shipping papers or “dangerous goods declaration” is required.
Instrument must always be shipped in the manufacturer provided case.

Always ship XRF instruments with the battery disconnected.

**Emergency Response Contact Information**

Emergency response information must accompany each shipment of an XRF. The document containing this information must be immediately accessible to the driver at all times during transportation on a public highway. A 24-hour emergency response telephone is maintained by Niton:

- During Regular Business Hours calling from within the USA: (800) 875-1578
- Calling from outside the USA: 1-978-670-7460

If you have a radiological emergency during Evenings and Weekends, call either of these Niton representatives from anywhere:

- Ken Martin - Mobile Phone Number: 617-901-3125
- Jim Blute - Mobile Phone Number: 978-790-8269

**Nuclear Density Gauges**

This section provides a brief overview of the hazardous material (HAZMAT) regulatory requirements for transporting Nuclear Density gauges. The Troxler Transportation Guide contains more detailed information, including sample shipping papers and other documentation. The InstroTek web page provides detailed information for shipping the CPN-3 Nuclear Density Gauge Instrument:

http://www.instrotek.com/shipping.php

The regulations governing the transportation of nuclear gauges are contained in *Title 49 of the Code of Federal Regulations*. Please refer to those regulations for complete details of transportation requirements. The following information summarizes some of the main requirements applicable to shippers of nuclear gauges.

**5.4.1.1 Security**

It is the responsibility of any person transporting a nuclear gauge to ensure that proper precautions are taken to prevent the theft of the gauge. Some commonsense suggestions and a security checklist can be found under Homeland Security on our website. To further enhance the security of gauges during transport Troxler also offers a special Mounted Transportation Box.

**5.4.1.2 Certificate of Competent Authority**

A copy of the IAEA Certificate of Competent Authority (sometimes referred to as "Special Form Certificate") must be on file for at least one year after the latest shipment of a nuclear gauge. ARCADIS has downloaded a copy from the Troxler web site and the InstroTek web site (http://www.instrotek.com/downloads.php). Please note that these certificates have expiration dates.
NOTE: The sources in some older Troxler gauges are no longer certified as Special Form because of the manufacture date. These sources may be subject to shipping restrictions or may require that you modify your shipping practices. Please refer to the Special Gauge Shipping Instructions for further details.

5.4.1.3 Type A Package Testing Results

A copy of the results of Type A package testing for the shipping case must be on file for at least one year after the latest shipment. This information can be found in the Troxler Transportation Guide or from the InstroTek web page (http://www.instrotek.com/7A.pdf).

The Troxler and Instrotek shipping case meets all Type A package standards (173.410 and 173.412).

5.4.1.4 DOT Hazardous Materials and Dangerous Goods Transportation Training

A certificate of training must be on file for each individual who transports or prepares a nuclear gauge for transport. Troxler's and the InstroTek Nuclear Gauge Safety Training course covers transportation requirements for nuclear gauges. Hazmat #1 refresher training is required every 2 years.

5.4.1.5 Marking and Labeling

The package must be marked with the proper shipping name and labeled on opposite sides. Most Troxler and InstroTek transport cases require the Yellow II label which must denote the radionuclide, activity, and transport index. In addition, Type A packages must be labeled "US DOT 7A Type A":

![US DOT 7A Type A label]

5.4.1.6 Emergency Response Contact Information

Emergency response information must accompany each shipment of a nuclear gauge. The document containing this information must be immediately accessible to the driver at all times during transportation on a public highway. A 24-hour emergency response telephone number must be listed on the shipping papers. Troxler provides this service to Troxler gauge users at no charge.

The Troxler emergency response phone number that must be listed on the shipping papers is:
Troxler Emergency Contact Number: 919-549-9539

The InstroTek emergency response phone number that must be listed on the shipping papers is:

InstroTek Emergency Contact Number: 800-535-5053

5.4.1.7 Shipping Papers

Whenever a nuclear gauge is shipped or transported it must be accompanied by properly completed shipping papers. ARCADIS staff must consult the Troxler Transportation Guide or InstroTek web page for details. When transported via highway, a properly completed bill of lading must be in the transport vehicle and immediately accessible to the driver.

Shippers and carriers must retain a copy of the shipping papers, or an electronic image thereof, for a period of two (2) years after the date the hazardous material is accepted by a carrier. An electronic image includes an image transmitted by fax machine, an image on the screen of a computer, or an image generated by an optical imaging machine. The copy (paper or electronic) must be accessible at or through the principle place of business and immediately available upon request by an authorized official of federal, state or local governments (172.201(e)).

Private carriers who use the same shipping paper for multiple shipments of the same hazardous material may retain a single copy of the permanent shipping paper, instead of a copy for each shipment made, if the carrier also retains a separate record of each shipment made, including:

- Shipping name (proper shipping name)
- Identification number (UN identification number)
- Quantity transported (activity in the shipment)
- Date of shipment

For any shipment offered for transport by common carrier, the shipping papers must include a signed and dated shipper’s certification statement:

This is to certify that the above-mentioned materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

For transportation by air, the following statement must be added to the above certification:

I declare that all of the applicable air transport requirements have been met.

No certification is required for a hazardous material transported by motor vehicle by a private carrier if the material will not be reshipped or transferred to another carrier (i.e., no certification is required when a gauge is transferred to and from a job site in a company vehicle) (177.204).
5.4.1.8 Sealing of Package

Each Type A package must contain a seal that is not readily breakable and provides evidence that the package has not been opened in transit. This seal is required when transporting a gauge to and from a work site, as well as when shipping the gauge by a common carrier (e.g. FedEx).

5.4.1.9 Inspection Prior to Shipment

Before transporting a nuclear gauge, the shipper must inspect the package (shipping case) to ensure it is in good physical condition other than superficial marks and that all closure devices are in good working order and secured.

5.4.1.10 Securing Packages in Vehicle

Any package of radioactive material must be secured against movement within the transport vehicle (177.834(a) and 173.448).

Packages bearing RADIOACTIVE YELLOW-II or YELLOW-III labels are not to be carried in compartments occupied by passengers. These packages must be kept a minimum distance away from vehicle occupants based on the transport index, as shown in the table below. If more than one package is present, the distance (measured from the nearest point on any package) must be based on the total transport index (TI) for all of the packages (177.842(b)).

<table>
<thead>
<tr>
<th>Total Transport Index</th>
<th>Minimum Distance (feet)</th>
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<tbody>
<tr>
<td>0.1 to 1.0</td>
<td>1</td>
</tr>
<tr>
<td>1.1 to 5.0</td>
<td>2</td>
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<tr>
<td>5.1 to 10.0</td>
<td>3</td>
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<tr>
<td>10.1 to 20.0</td>
<td>4</td>
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<tr>
<td>20.1 to 30.0</td>
<td>5</td>
</tr>
<tr>
<td>30.1 to 40.0</td>
<td>6</td>
</tr>
<tr>
<td>40.1 to 50.0</td>
<td>7</td>
</tr>
</tbody>
</table>

For example, a Troxler 3440 gauge with a TI of 0.6 must be kept at least one (1) foot away from the driver or passengers. Two (2) Troxler 3440s with a combined TI of 1.2 must be kept at least 2 feet from the driver or passengers.

5.5 Leak testing

5.5.1 XRF Leak Tests

The radioisotope source shielding on the NITON XLp analyzer is designed to hold up even under extreme conditions, including the instrument being crushed or burned. The continued effectiveness of the instrument's radiation shielding will be tested every six months by performing a leak test.

NOTE: Each office using this template must insert state specific license information and confirm leak test time frame in the following paragraph.

Thermo Electron Corporation's general license and ARCADIS’ Commonwealth of Massachusetts Radiation Control Program Materials License requires that leak tests be
conducted at intervals not to exceed six (6) months, or as specified in the specific sealed source and device registration.

Any source received from another person which is not accompanied by a certificate indicating that a test was performed within the six (6) months before transfer will not be put into use until tested.

Tests for leakage and/or contamination will be capable of detecting the presence of 185 Bq (0.005 uCi) of radioactive material on the test sample. If the wipe test reveals the presence of 185 Bq (0.005 uCi) or more of removable contamination, the source shall be removed from service and then decontaminated, repaired or disposed of by the instrument manufacturer. Any wipe test result exceedances will be filed with the appropriate state Director of the Radiation Control Program within five (5) days of the date the leak test result is known. This report will specify the source involved, the leak test result and corrective actions taken.

Records of leak test results will be kept in units of Bq or uCi and will be maintained for inspection by the Radiation Control Program.

Specific areas on each instrument must be wiped. Refer to the specific instrument User’s Guide for wipe test locations.

A commercially available leak test kit will be used to obtain leak test samples for subsequent analysis by a licensed service company:

- Wipe test kit LT-952 provided by Valley Safety Services is used to conduct the XRF instrument leak tests;
- Leak test kits will be used in accordance with the instructions provided; and
- Leak test kits will be supplied and tests analyzed by Valley Safety Services Associates of Belchertown, MA.

5.5.2 Nuclear Density Gauge Leak Tests

Leak tests for each Nuclear Density gauge is required every six months. Refer to the Owner manual or manufacturer instructions for leak test collection instructions.

General leak test procedure:

- Use leak test kit as specified by manufacturer to perform the required test for leakage of the source material from its capsule. Set the handle to the safe position.
- Remove the screws securing the display/keyboard/display panel. Set keyboard/display panel aside, leaving cables connected.
- Use the cotton swab in the leak test kit and swab the source holder inside the gauge. This will pick up any removable traces of the Am-214: Be source material.
- Reattach display/keyboard to the instrument with screws that were removed previously.
• Use the cotton swab in the kit to swab around the cleanout plate ring on the aperture at bottom of instrument. This will pick up any removable traces of the Cs-137 material.

• Break the swab stick in half and place in plastic envelope. Complete the form and stable envelope to it; mail to address on the kit.

5.5.2.1 Troxler Nuclear Density Gauge

A commercially available leak test kit will be used to obtain leak test samples for subsequent analysis by Troxler:

• Model 3880 leak test kit provided by Troxler is used to conduct the leak tests on the Troxler Nuclear Density Gauge instruments. The wipe tests will be returned to Troxler Electronic Laboratories, Inc. - P.O. Box 12057, Research Triangle Park, NC 27709 for analysis;

• Wipe test kit part number 401197 provided by CPN is used to conduct the leak tests on the Instrotek Nuclear Density Gauge instruments. The wipe tests will be returned to CPN International, Inc. - 4057 Port Chicago Highway, Suite 100, Concord, CA 94520 for analysis; and

• Leak test kits will be used in accordance with the instructions provided.

5.6 Emergency Procedures

These emergency instructions apply whenever a nuclear gauge is involved in an event that might cause damage to the source or its shielding or prevent the return of the source to the shielded position (e.g. when the gauge is struck by a piece of equipment, is contained in a vehicle involved in an accident or involved in a fire).

5.6.1 Gauge User or Operator

Immediately cordon off the area around the gauge (approximately 15 foot radius) and prevent unauthorized personnel from entering the area to minimize personnel exposure. The gauge operator should stand by outside the cordoned area and maintain constant surveillance of the gauge until emergency response personnel arrive.

Detain any equipment or vehicle involved in the accident and the operator until it is determined that no contamination is present. Gauge users and other potentially contaminated personnel should not leave the scene until they have been checked for contamination by emergency response personnel.

If the radioactive source or shielding is damaged or the shutter fails to return to the shielded position, notify the ARCADIS RSO. The RSO will notify appropriate emergency response personnel (e.g. NRC and/or State officials) and instrument manufacturer as soon as possible.
5.6.2 RSO and Licensee Management

Evaluate the condition of the gauge. Determine if the source(s) are present and if they are in the shielded position (if applicable). If the source(s) are out of the gauge they must be located immediately.

Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation. This person could be a licensee employee or a consultant competent in the use of radiation survey meters. Refer to the instrument radiation profile chart which gives the normal radiation levels near the instrument. The radiation survey readings can be compared to the radiation profile for the gauge contained in the gauge operation manual to determine if the readings are normal.

Make necessary notifications to local authorities as well as the NRC, as required. Even if not required to do so, you may report any incident to the NRC by calling NRC's Emergency Operations Center at 1.301.816.5100, which is staffed 24 hours a day and accepts collect calls. NRC or Agreement State notification is required when gauges containing licensed material are lost or stolen, when gauges are damaged or involved in incidents that result in doses in excess of 10 CFR 20.2203 limits (http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-2203.html), and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful. NRC reporting requirements and timeframes are found in 10 CFR 20.2201-2203.

In accordance with 171.15, notify at the earliest practical moment the US DOT at 1-800-424-8802 of an accident that occurs during the course of transportation (including loading, unloading and temporary storage) in which fire, breakage, spillage, or suspected contamination occurs involving shipment of radioactive material.

5.6.3 Returning Damaged Gauges to Manufacturer

When it is necessary to return a gauge that has been damaged to the manufacturer for repair or disposal, the following procedure must be followed:

- Conduct a standard wipe test of the gauge to verify the sources are not leaking and provide the test results to manufacturer.

- Send photographs showing the damage, especially damage affecting the shielding of the radioactive sources, to the attention of the manufacturer RSO. If the damage is extensive or the gauge cannot be shipped in the original shipping case, manufacturer will provide assistance or directions for packaging and shipment.

Upon review of the leak test results and photographs by the manufacturer’s RSO, a Returned Goods Authorization (RGA) number will be issued for return of the instrument to manufacturer.
5.6.4 Emergency Contact Information

**Niton XRF Contact Information**

- During Regular Business Hours calling from within the USA: (800) 875-1578
- Calling from outside the USA: 1-978-670-7460

If you have a radiological emergency during Evenings and Weekends, call either of these Niton representatives from anywhere:

- Ken Martin - Mobile Phone Number: 617-901-3125
- Jim Blute - Mobile Phone Number: 978-790-8269

**Nuclear Density Gauge Contact Information**

The Troxler emergency response phone number is:

**Troxler Emergency Contact Number:** 919-549-9539

The InstroTek emergency response phone number is:

**InstroTek Emergency Contact Number:** 800-535-5053

**General Emergency Response Information**

If the Niton XRF instrument or Nuclear Density gauge is lost, stolen, or damaged in a car accident, immediately notify the following:

**NOTE:** Each office using this template must insert office specific information.

ARCADIS Radiation Safety Officer (Braintree)  781-356-7300
(David Forrand – cell)  617-908-7174

State Police Telephone:  911

MA DPH Radiation Control Prog.  617- 427-2944
Emergency Number  617-427-9710
Nuclear Incident Advisory Team  617-242-3453

NRC Emergency Operations Center  301-816-5100

If your instrument is damaged in a fire or an explosion, also immediately, notify the local Fire Department and/or Emergency Management Agency:

Local Fire Dept. Telephone:  911
Nuclear Gauge Emergency Response Information for Transportation
Reference DOT p5800.5 ERG93, and 49CFR

Potential Hazard
1) Proper Shipping Name
- Radioactive Material Type A Package, special Form, Non-Fissile or Fissile-Excepted, 7, UN332 RQ

2) Health Hazards
- Radiation presents minimal risk to lives of persons during transportation accidents.
- Undamaged packages are safe; damaged packages or materials released from packages can cause external radiation hazards. Contamination is not suspected.
- Packages (cartons, boxes, drums, articles, etc.) identified as “Type A” by marking on packages or by shipping papers contain non-Life endangering amounts. Radioactive sources may be released if packages are damaged in moderately severe accidents.
- Packages (large and small, usually metal) identified as “Type B” by marking on packages or by shipping papers contain potentially life endangering amounts. Because of design, evaluation, and testing of packages, life endangering releases are not expected in accidents except those of utmost severity.
- Commonly available instruments can detect most of these materials.
- Water from cargo fire control is not expected to cause pollution.

3) Fire or Explosion
- Packaging can be consumed without content loss from sealed source capsule.
- Radioactive source capsules and Type B packages are designed to withstand temperatures of 1475°F (800°C)

Emergency Action
4) Immediate Precautions
- Priority response actions can be performed before taking radiation measurements.
- Priorities are life saving, control of fire and other hazards, and first aid.
- Isolate hazard area and deny entry. Notify Radiation Authority of accident conditions.
- Delay final cleanup until instruction or advice of Radiation Authority.
- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighter’s protective clothing will provide adequate protection against internal radiation exposure, but not external radiation exposure.
- Call the following numbers depending on the gauge model:
  - InstronTek, Inc. 1-800-535-5013

5) Fire
- Do not move damaged packages; move undamaged packages out of fire zone.
- Small Fires: Dry chemical, CO₂, water spray or regular foam.
- Large Fires: Water spray, fog (flooding amounts)

6) Spill or Leak
- Do not touch damaged packages or spilled material.
- Slightly damaged or damp outer surfaces seldom indicate failure of inner container.
- If source is identified as being out of package, stay away and await advice from Radiation Authority.

7) First Aid
- Use First aid treatment according to the nature of the injury.
- Persons exposed to special form sources are not likely to be contaminated with radiation material.

XRF Instrument Emergency Response Information
6. TRAINING

All authorized users (including the designated Radiation Safety Officer if he/she intends to use a device) must be trained to properly use the XRF device and/or Nuclear Density gauge, as applicable. All users must attend and submit certificates of completion for the manufacturer’s one day training class to Workforce Development. Training records will be maintained for all personnel authorized to use the sealed source radioactive device independently.
Attending a competitor’s instrument training will suffice for instrument training if the devices are comparable and use the same radioactive isotope.

Note: XRF users who intend to test residences for the presence of lead in paint must be an EPA certified lead inspector OR a state licensed lead inspector/technician or an inspector/risk assessor, as applicable. Contact each individual state designated LBP coordinator for further information regarding specific lead licensing requirements.

Employees that transport and/or ship XRF or Nuclear Density gauge instruments must also have current Hazardous Materials and Dangerous Goods Transportation Training as required by DOT Regulations 49 CFR 172.700 (Docket HM-126F specifically including Section 172.704 addressing DOT hazardous Materials Security Awareness) and IATA Dangerous Goods Regulations.

Authorized Users must also review, understand and comply with this sealed source radiation safety program.

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

- NRC Regulations
- OSHA PEL
- Instrotek CPN MC-3 Bill of Lading Example
- Instrotek MC-3 Operating Manual
- Instrotek Source Certificate
- Niton XL-309 Manual
- Niton XL-309 Performance Characteristic Sheet
- Niton_XLp 300 Performance Characteristic Sheet
- Troxler Shipping Guide
- Troxler 3440Guage – Bill of Lading Example
- Troxler Emergency Procedures
- Troxler IAEA Certificates of Competent Authority
- Troxler Licensing Guide
- Troxler Radioactive Materials License
- Troxler Shipping guide
- Valley Safety Laboratory License
- State Radioactive Material License
8. RECORDS - DATA RECORDING AND MANAGEMENT

8.1 Film Badge Dosimeters

Records of dosimetry readings will be maintained by ARCADIS for the length of the employee’s employment plus thirty (30) years or as prescribed by state specific regulations. These records will be accessible for inspection and kept on file for those affected employees, including those who have left the company.

8.2 Leak Tests

Each record of a test for leakage of radioactive material will be retained for three (3) years after the next required leak test is performed or until the sealed source is transferred or disposed of.

8.3 Shipping Records

Shipping and receiving records regarding the XRF and Nuclear Density gauges will be kept on file at the ARCADIS office. These records will be maintained to document proper maintenance and repair of the device in addition to insuring that all relevant U.S. Department of Transportation regulations regarding the shipping of radioactive materials are followed. ARCADIS will retain a copy of the shipping papers, or an electronic image thereof, for a period of two (2) years after the date the hazardous material is accepted by a carrier in accordance with DOT requirements.

8.4 Physical Inventory

ARCADIS will conduct a physical inventory every six (6) months to account for sealed source radioactive devices received and possessed under license. The records of these inventories will be maintained until inspection by the Radiation Control Agency and will include the quantities and kinds of radioactive material, the location of the sealed sources and the dates of the inventories.
9. APPROVALS AND HISTORY OF CHANGE

Tony Tremblay, CSP – Corporate Health & Safety, Director of Technical Programs

History of Change

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<td>04</td>
<td>Sue Byers/Tony Tremblay</td>
<td>Training requirement revisions and minor editorial changes</td>
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<td>5 October 2014</td>
<td>05</td>
<td>Tony Tremblay</td>
<td>Header/Footer Update, template format update and standard review</td>
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<td>7 October 2008</td>
<td>ARC HSIII011</td>
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**Exhibit 1**

Instrument Storage Diagram at Office

*(Insert specific location diagram here)*
Exhibit 2

Niton (Thermo0Electron) XL-309 User’s Guide

Niton XL-309 Manual

Niton XL-309 Performance Characteristics Sheet
<table>
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**Exhibit 3**

Thermo-Electron LXp 300 User’s Guide

Niton Thermo-Electron LXp 300 User’s Guide

Niton XLp 300 Performance Characteristic Sheet
Exhibit 4

Troxler Model 3440 Surface Moisture-Density Gauge

Manual of Operation and Instruction

Troxler 3440 Manual
Exhibit 5

XRF Transportation Training Slides and

Troxler Transportation Guide

Niton XRF Transportation Training

Troxler Transportation Guide
Exhibit 6

Instrotek CPN MC-3 Portaprobe User’s Guide

And Radiation Profile Supplement

Instrotek CPN MC-3 Portaprobe Users Guide

Instrotek CMP MC-3 Bill of Lading
### Exhibit 7

Instrument Use Log

**XRF Instrument Sign-Out Log**

<table>
<thead>
<tr>
<th>XRF Instrument (circle unit being signed out)</th>
<th>Date XRF Instrument Signed Out</th>
<th>Time XRF Instrument Signed Out</th>
<th>Authorized User (name/signature)</th>
<th>Destination/Use</th>
<th>Date XRF Instrument Returned to Locked Storage</th>
<th>Time XRF Instrument Returned to Storage</th>
<th>Authorized User (name/signature)</th>
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**Nuclear Density Gauge Sign-Out Log**

Page E7 of E17
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<tr>
<th>Nuclear Density Gauge (circle unit being signed out)</th>
<th>Date Nuclear Density Gauge Signed Out</th>
<th>Time Nuclear Density Gauge Signed Out</th>
<th>Authorized User (name/signature)</th>
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</tbody>
</table>
Exhibit 8

Sealed Source Physical Inventory Log

*Each office must modify this inventory log to match instruments owned at specific location.*

<table>
<thead>
<tr>
<th>Date Inventory Conducted</th>
<th>Name/Signature</th>
<th>Instrument Model</th>
<th>Instrument Serial #</th>
<th>Storage Location</th>
<th>Source 1</th>
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<tr>
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<td>Radionuclide</td>
<td>Activity (mCi)</td>
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<tr>
<td></td>
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<td>Cadmium-109</td>
<td>&lt;50</td>
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<tr>
<td></td>
<td>Niton XL 700 series</td>
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<td></td>
<td>Cadmium-109</td>
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<tr>
<td></td>
<td>Troxler 3440 (#1)</td>
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<td></td>
<td></td>
<td>Cesium-137</td>
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<tr>
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<td>Cadmium-109</td>
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<td>Niton XL 700 series</td>
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</tr>
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<td>Revision Date</td>
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<td>ARC HSIIH011</td>
<td>5 October 2014</td>
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</table>

Exhibit 9

Public Dose Calculation Worksheet

Public Dose Calculation Worksheet
Exhibit 10

State Radiation Control Program Materials License

Each RSO must insert local state specific radioactive materials license here.

MA Radioactive Material License included for reference ONLY.
Exhibit 11

Portable Gauge Audit Checklist
Exhibit 12

Wipe Test Analytical Laboratory License

And Wipe Test Instructions

*Site RSO must verify and validate against what is listed as test laboratory previously in this standard.*

XRF Leak Test Instructions

CPN Analytical Lab License

Troxler Rad Materials License

Valley Safety Laboratory License
Exhibit 13

Nuclear Density Gauge Bill of Lading Documents

Instrotek CPN MC-3 Bill of Lading

Troxler Bill of Lading-Template
<table>
<thead>
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<th>Revision Date</th>
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<tbody>
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<td>7 October 2008</td>
<td>ARC HSIH011</td>
<td>5 October 2014</td>
</tr>
</tbody>
</table>

Exhibit 14

IAEA Certificate of Competent Authority

- CPN IAEA Special Forms
- Troxler IAEA Certs of Competent Authority
The following ARCADIS employees have read the Sealed-Source Radiation Safety Program and fully understand its content:

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Employee Number</th>
<th>Date</th>
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<tbody>
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### Exhibit 16

**Authorized XRF Users and Nuclear Density Gauge Users**

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<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Employee #</th>
<th>Authorized User Category (complete for all that apply)</th>
<th>XRF Training Course (vendor/date)</th>
<th>Nuclear Density Gauge Training Course (vendor/date)</th>
<th>Dosimeter Badge Monitoring Conducted (check if yes)</th>
<th>DOT/IATA Training (date completed)</th>
<th>Radiation Safety Program has been read and understood (date completed)</th>
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</table>
EXECUTIVE SUMMARY

It is ARCADIS policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. Accordingly, any work on project sites involving the potential for exposure of our employees to radioactive materials and/or ionizing radiation in excess of their natural background exposure will be accomplished at a minimum in accordance with this Standard of Practice. ARCADIS staff who could potentially receive an occupational dose shall be provided with radiation safety instructional training commensurate with the degree of potential radiological exposure present in the work place.

This Health & Safety Standard (HSS) establishes the minimum requirements for project planning documents (See Exhibit 2), specific training requirements (See Exhibit 3 & Exhibit 4 Training Outlines) and record keeping that applies to employees of ARCADIS North America (ANA).

The term Radiation Safety Officer (RSO) may be used to refer to a professional level health physicist of a non-licensed site. In the parlance of the NRC and/or NRC Agreement States, for license sites, however, the term RSO refers to an individual who has health physics experience and training commensurate with the site / facility radiological hazards and has been placed in that capacity with regulatory approval.

When ARCADIS employees and/or ARCADIS subcontractors are working on radiological sites, a professional level health physicist will be designated as Radiation Safety Officer (RSO) or project Health Physicist (HP) and will be responsible for ensuring compliance to this HSS and for developing applicable radiation protection sections of the project H & S Plan as well as a Radiation Protection Plan (RPP), if necessary. The qualifications and experience of individuals to be designated as RSO / Project HPs (including those of subcontractors) shall be reviewed and approved by the TKI Radiological Discipline Lead or designee (e.g., radiological services sub-discipline lead or qualified Health Physicist (e.g., CHP or equivalent).

All staff working on a licensed radiological site (including individuals having direct day to day supervisory responsibility) will be provided with instructions and training commensurate with their assigned duties as part of the Radiation Protection Program license requirements under 10 CFR Part 20 Standards for Protection Against Radiation. Training requirements for conducting work in Canada are published under the Canadian Nuclear Safety and Control Act, Section 44 (k). ARCADIS employees who have received prior radiological training have the opportunity to complete a Proficiency Exam administered by the TKI Radiological Services Lead or designee to qualify for having completed the General Awareness training component of the required training. Completion of the General Awareness training is the pre-requisite needed for enrolling in additional training.

Records related to the assignment of radiological dose to workers (under licensed activities) are required by US Atomic Energy Act implementing regulations (USNRC and equivalent Agreement State regulations, e.g. 10 CFR 20 Subpart L) to be maintained for a minimum of 3 years following exposure. In accordance with the ARCADIS Human Relations Records Retention and Management Policy 2.12 and associated ARCADIS Legal Policy, employee radiation exposure monitoring documents are to be maintained permanently. Also, it has been the general practice in the US nuclear industry, in the interest of liability protection and risk management, to maintain these records and those related to training of radiation workers in a centralized repository indefinitely or until it is known the individual is deceased.
1. POLICY

It is ARCADIS policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. Accordingly, any work on project sites involving the potential for exposure of our employees to radioactive materials and/or ionizing radiation in excess of their natural background exposure will be accomplished at a minimum in accordance with this Standard of Practice.

Additionally, it is ARCADIS’ policy that ARCADIS staff who could potentially receive an occupational dose shall be provided with radiation safety instructional training commensurate with the degree of potential radiological exposure present in the work place. Individuals with responsibility for performing radiological surveys for purposes of characterizing levels of radioactive material at the work location and/or the levels of ionizing radiation to which our employees may be exposed will be provided formal training in the basics of radiological science and radiation protection principles to be provided by a qualified training vendor or a professional health physicist (see definitions in Exhibit 1).

Note: It should be understood that natural background levels of radiation and radioactivity will vary from location to location depending on factors such as local geology and elevation. Generic guidance on the range of natural background can be found in publications such as Report 160 “Ionizing Radiation Exposure of the Population of the United States” of the National Council on Radiation Protection and Measurements (NCRP). See Definitions in Exhibit 1.

2. PURPOSE AND SCOPE

2.1 Purpose

This HSS establishes accepted practice and requirements for radiation safety training and health physics monitoring for employees and subcontractor personnel. The purpose of this HSS is to ensure that occupational radiation exposure of our employees is maintained as low as reasonably achievable (ALARA). Furthermore, an objective of this HSS is to ensure that protection from radiological hazards is implemented consistently and associated documentation is maintained in accordance with applicable regulatory requirements. See Section 8 References for a list of the regulatory agencies and regulations applicable to this HSS.

2.2 Scope

This HSS establishes the minimum requirements for project planning documents (See Exhibit 2), specific training requirements (See Exhibit 3 & Exhibit 4 Training Outlines) and record keeping that applies to employees of ARCADIS North America (ANA). Additional requirements established at the State or Canadian Province level need to be addressed by the project teams with the assistance of the ARCADIS TKI Radiological Services Group. Only properly trained and authorized ARCADIS employees and subcontractors are permitted to work on sites that may involve occupational exposure to radioactive materials and ionizing radiation and therefore require radiological monitoring commensurate with the anticipated exposures (e.g., one or more of gamma radiation scans, personal dosimetry, contamination surveys, air sampling and related radiological
surveys and assessments) as required by the site or project specific Radiation Protection Manual and/or Health and Safety Plan.

3. DEFINITIONS

Exhibit 1 includes relevant definitions of some important terms used in this HSS including those applicable for radiation safety staff qualifications.

4. RESPONSIBILITIES

4.1 TKI Radiological Services Group and Corporate H&S

- On a routine basis, review and update this HSS, as necessary.
- Ensure that the radiation safety qualifications and training/retraining requirements remain current with professional standards of practice and are met.
- Conduct evaluations of individuals as necessary in order to approve and designate them as qualified radiation safety staff.
- For each project to be conducted at radiological sites, determine if a project specific Radiation Protection Plan is required (See Section 4.2 below) and provide peer review and approval of it.
- Provide technical assistance regarding radiation safety and survey protocols, assignment of radiation safety staff, choice and use of equipment used for personal protection (PPE), for characterization and monitoring of local radiation fields and radioactivity, for hazard and dose assessments and to provide assistance in evaluating unusual hazards.
- Audit project-specific radiation safety protocols and records for compliance with this HSS.

4.2 Project Radiation Safety Officer (RSO) or Health Physicist (HP)

The term RSO may be used to refer to a professional level health physicist of a non-licensed site. In the parlance of the NRC for license sites, however, the term RSO refers to an individual who has health physics experience and training commensurate with the site / facility radiological hazards and has been placed in that capacity by regulatory approval.

- Verify adequacy of instruction, training and experience of ARCADIS employees and those of subcontractors.
- Verify compliance with the safety procedures identified in this HSS and the site specific Health and Safety and/or Radiation Protection Plans, as well as applicable regulatory requirements as required to minimize the radiation exposure of employees. A general example of the content of a typical Radiation Protection Plan for the types of radiological sites under the purview of this HSS is provided in Exhibit 2.
- Prepare site specific sections of the Health and Safety Plan (HASP) and/or prepare the project Radiation Protection Plan applicable to radiation safety and characterization protocols

- Ensure project specific Radiation Protection Plans and protocols have been reviewed and approved by the TKI Radiological Services Group prior to implementation.

- Ensure provision of personal dosimetry to workers and/or use monitoring results and associated calculations to assess and document exposures of employees or to demonstrate that worker personnel dosimetry is not required.

- Immediately report to Corporate H & S any unusual or unplanned exposure.

- Prepare radiation work permits for activities not addressed in the Radiation Protection Plan, with a copy to the Radiological Services TKI discipline lead or designee assigned to the project.

4.3 Radiation Protection Technicians (RPT)

- On-site RPTs will ensure project specific Radiation Protection Plan and HASP protocols are implemented as approved.

- Perform radiological surveys and monitoring in accordance with approved protocols (Radiation Protection Plan and associated Standard Operating Procedures) under the direction of the Project RSO / Health Physicist.

- Ensure correct use of PPE and radiation survey and monitoring equipment.

- Ensure untrained personnel are escorted during site visits. These should only include visitors or short-term subcontractors (e.g., utility locators).

- Immediately report to the Project RSO/HP suspected unusual or unplanned exposure conditions and assist in follow up as directed.

4.4 Project Manager (PM), Associate Project Manager (APM), Task Manager (TM)

- Verify divisional, client portfolio or project team employees have received the proper instruction and training provided by TKI Radiological Services, Corporate Health & Safety or approved and qualified external training source (approved by these groups) prior to conducting work at radiological sites (See Section 6).

- Verify with the TKI Radiological Services Group, that any ARCADIS employee acting as a Radiation Protection Technician (RPT), Project Radiation Safety Officer (RSO) or Health Physicist (HP) has been designated and authorized by the Group to perform his/her function as outlined in this HSS.

- Ensure that the necessary proper equipment, including radiological monitoring, personal protective and safety equipment is available for use by designated and approved radiation safety staff.
• Ensure project specific Radiation Protection Plans and/or applicable sections of the HASP have been reviewed and approved by the TKI Radiological Services Group prior to implementing.

• Request that the TKI Radiological Services Group review project survey and monitoring records during project execution at frequencies designated in the Radiation Protection Plan and HASP commensurate with site specific radiological hazards and risks.

4.5 Employees

• Once aware of their project task and the associated training requirements, notify the TKI Radiological Services Group, PM and/or TM or Project RSO/HP if they have not received required radiation safety instructions and training as outlined in this HSS.

• Be familiar with sections of the site specific Radiation Protection and Health and Safety Plans as necessary for the safe and efficient performance of their job functions.

• Use PPE and monitoring and testing equipment as directed by the Project RSO / HP or RPTs.

• Maintain an awareness of known site hazards and associated means of control and consult with Health and Safety and/or Radiation Safety staff as necessary.

• Request and review their personal, site-specific radiological monitoring results, as applicable.

5. PROCEDURE

When ARCADIS employees and/or ARCADIS subcontractors are working on radiological sites, a professional level health physicist will be designated as RSO or project Health Physicist (HP) and will be responsible for ensuring compliance to this HSS and for developing applicable radiation protection sections of the project HASP as well as a RPP if necessary. The qualifications and experience of individuals to be designated as the project RSO or project HPs (including those of subcontractors) shall be reviewed and approved by the TKI Radiological Discipline Lead or designee (e.g., radiological services sub discipline lead or qualified Health Physicist (e.g., American Board of Health Physics Certified HP or equivalent).

Project personnel will comply with this HSS, other applicable H&S Standards and project operating procedures, the site specific Radiation Protection Plan (if applicable) and the site specific HASP. Where deviations from this HSS are needed to ensure safe work practice, such deviations shall be prepared as a modification to this HSS as it applies to the particular project and will be reviewed with and approved by the project RSO / HP and documented as a project specific modification of this HSS.

Project specific radiation protection requirements and procedures (e.g., Radiation Protection Plans and associated standard operating procedures [SOPs] if applicable) prepared by the Radiation Safety Officer (RSO) or Project Health Physicist (HP) shall be reviewed and approved by TKI Radiological Discipline lead or designee prior to initiating work at a site at which ARCADIS employees or subcontractors could receive occupational radiation exposure.
5.1 Radiation Protection Plans (RPP)

Exhibit 2 provides a generic example of the Table of Contents for a typical project level Radiation Protection Plan. However, at a minimum, these project specific plans shall specify:

- The specific radiological conditions expected.
- Responsibilities of project personnel for radiation safety and monitoring
- The radiological exposure limits for working in restricted areas, the radiological exposure monitoring required, at what frequencies and under what conditions.
- Decontamination procedures as applicable for personnel and equipment.
- The radiological instrumentation and methods to be used for characterization surveys of radiological conditions at the site, for maintaining of employee exposure ALARA and for measurement, assessment and documentation of the occupational exposure of employees.
- Requirements for listing the communication contact information, notification protocols and appropriate response actions if a suspected or known unusual exposure condition or contamination incident (area and/or personnel) has occurred.
- Training requirements for project personnel (See Section 6).

6. TRAINING

All staff working on a radiological site (including individuals having direct day to day supervisory responsibility) will be provided with instructions and training commensurate with their assigned duties. For licensed sites, this training will be part of the Radiation Protection Program license requirements under 10 CFR Part 20 Standards for Protection Against Radiation (or agreement State equivalent). Training requirements for conducting work at licensed sites in Canada are published under the Canadian Nuclear Safety and Control Act, Section 44 (k). ARCADIS employees who have received prior radiological training have the opportunity to complete a Proficiency Exam administered by the TKI Radiological Services Lead or designee to qualify for having completed the General Awareness training component of the required training. Completion of the General Awareness training is the pre-requisite needed for enrolling in additional required training. An example summary of radiological training requirements for several general project types and job functions is provided in Table 1. In general, employees will receive the following training:

- Radiological training as specified herein will be required prior to performing work at radiological sites at which ARCADIS employees or subcontractors could receive occupational radiation exposure. If subcontractors have provided their own training, ARCADIS health physics professionals will need to review and approve the training curriculum to verify it meets the minimum requirements established in this HSS.
- All employees working on radiological sites will receive general radiation safety instructional training as outlined in Exhibit 3 including site specific training on specific radiological conditions and associated radiation protection requirements.
- Radiation Protection Technicians shall receive training as outlined in Exhibit 4 and their qualifications will be approved by the TKI Radiological Discipline Lead or his/her designee.
• The training and experience of designated RSOs and RPTs at licensed sites shall comply with applicable license conditions and the applicable requirements and guidance of the licensing agency (USNRC or Agreement State, Canadian Nuclear Safety Commission [CNSC], etc.).

• Additionally, site specific radiation safety training that addresses the radiological hazards at each site (as identified by the Site Specific Radiation Protection Plan, will be provided by the Project RSO/ Health Physicist

• Refresher training for general employees and Radiation Protection Technicians shall be provided whenever radiological site conditions have significantly changed (as determined by the Project RSO/ HP) but at a minimum annually. The content of this training will be based on site radiological conditions and risks in consultation with the TKI Radiological Discipline lead or designee.

• Content and methodology of external training programs must be approved by the ARCADIS Training Department and the TKI Radiological Services Group.

All radiological training must be developed and/or reviewed and approved by TKI Radiological Services in conjunction with Corporate H&S. Deliverance of this training will be managed and facilitated through the ARCADIS Training Center.

Documentation of training certification received by successful completion (at least 80% score on exam) for any radiation safety related training course, including externally provided training courses will be maintained by the employee with copies provided to the ARCADIS Training Center.
Table 1: Summary of Radiological Training Requirements

Training Requirements for Sites Required to be Licensed Under the US Atomic Energy Act

- RSO and RPTs:
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.
  - Radiation Protection Technicians and RSO / HP Training (Exhibit 4) and as specifically required by regulation and/or license conditions.

 NOTE: For example, US NRC Regulatory Guide 8.31, *Information Relevant To Ensuring That Occupational Radiation Exposures at Uranium Recovery Facilities Will Be As Low As Is Reasonably Achievable*, Section 2.4 Technical Qualifications of Health Physics Staff, Section 2.4.1 - Radiation Safety Officer and 2.4.2 – Radiation Protection Technicians (these requirements are typically incorporated by reference as a license condition in uranium recovery facility licenses).

- ARCADIS employees and subcontractors performing field tasks (involving potential proximity to radiological materials):
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.
  - Site / job specific radiological hazard recognition, ALARA protocols and exposure controls and notifications / instructions as required by the licensing agency (e.g., US NRC 10 CFR 19, *Notifications and Instructions to Workers*).

- ARCADIS employees conducting non field tasks (e.g., project managers/ task managers or office based staff):
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.

Training Requirements for Non Licensed Radiological Sites

- Project Health Physicist and RPT:
  - General Awareness Training (Exhibit 3) or Proficiency Exam equivalent.
  - Radiation Protection Technicians and RSO / HP Training (Exhibit 4); site-specific radiological hazards and controls.

- Workers performing field tasks (involving potential proximity to radiological materials):
  - General Employee Awareness Training (Exhibit 3).
  - Site / job specific radiological hazard recognition, ALARA protocols and exposure controls.

- ARCADIS employees conducting non field tasks (e.g., project managers/ task managers or office based staff):
  - General Employee Awareness Training (Exhibit 3).
Training Requirements for Use of Licensed Radiological Sealed Sources and Radiation Generating Devices (e.g., Density Gauges and other sealed source equipped devices and XRFs as well as X-Ray tube equipped devices used at non-radiological project sites)

- Sealed Source and X-Ray Tube Equipment Authorized Users (by Health and Safety or TKI Radiological Services):
  - General Employee Awareness Training ([Exhibit 3](#)) or acceptance by TKI Radiological Services of the instrument manufacture’s radiation safety training program as equivalent.
  - Device / application specific radiological hazard recognition, ALARA protocols and exposure controls.
7. RECORDS - DATA RECORDING AND MANAGEMENT

Records related to the assignment of radiological dose to workers (under licensed activities) are required by US Atomic Energy Act implementing regulations (USNRC and Agreement States, e.g. 10 CFR 20 Subpart L) to be maintained for a minimum of 3 years following exposure. In accordance with the ARCADIS Human Relations Records Retention and Management Policy 2.12 and associated ARCADIS Legal Policy employee radiation exposure monitoring documents are to be maintained permanently. Also, it has been the general practice in the US nuclear industry, in the interest of liability protection and risk management, to maintain these records and those related to training of radiation workers indefinitely or until it is known that the individual is deceased.

7.1 Training Records

All employee training records (including completion certificates and successfully completed exams) will be maintained by the individual employee with copies provided to the ARCADIS Training Center. Documentation of training course content and session dates will be maintained by the Training Center in a centralized repository indefinitely or until it is known the individual is deceased.

7.2 Employee Occupation Exposure Monitoring Records

Project site work that generates occupation exposure monitoring records associated with dosimetry monitoring badges or similar monitoring devices where an analytical report is generated are to be maintained by the employee and in a centralized repository where they can be made readily available upon request.

7.3 Project File Records

Documents and records to be maintained by the project team in a central project file include:

- The project specific HASP and Radiation Protection Plan
- Specific JSAs, SOPs, documentation of modified procedures or deviations from standard practices, and Best Management Practices (BMPs).
- Radiological site characterization data and site monitoring data documenting site radiological conditions,
- All personnel and exposure data and associated calculations and assessments that document the evaluation of employee exposure specific to the site radiological conditions.

8. REFERENCES

- ARCADIS Health and Safety Standard ARC HSFS010 – Health and Safety Planning
- US NRC 10 CFR Part 20 – Standards for Protection Against Radiation
- ANSI/HPS N13.6 Occupational Radiation Exposure Records Systems
• ANSI/HPS N13.65 Measurement and Evaluation of Radiation and Radioactive Sources Using Portable Radiation Detection Instruments
• ANSI/HPS N13.53 Control & Release of Technologically Enhanced NORM (TENORM)
• Council on Radiation Control Program Directors (CRCPD) - Part N: Regulation and Licensing of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
• ARCADIS Health and Safety Standard No. ARC HSIH011 – Sealed Source Instrument Radiation Safety Program

9. APPROVALS AND HISTORY OF CHANGE

Douglas Chambers, Phd - TKI Radiological Services Discipline Lead

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

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Revision Number</th>
<th>Standard Developed/Reviewed By or Revised By</th>
<th>Reason for change</th>
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<tbody>
<tr>
<td>22 January 2015</td>
<td>0</td>
<td>Authors: TKI Radiological Services Group, Corporate H&amp;S Group Technical Review Group: Doug Chambers (TKI Radiological Group Lead), L Skoski &amp; D Carpenter (Operations Group), P Vollertsen (AUS Corporate H&amp;S Training)</td>
<td>Original Document</td>
</tr>
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</table>
Exhibit 1 – Definitions

**Absorbed Dose** – The amount of energy deposited by ionizing radiation in a unit of mass of tissue. Typically expressed in units of joule per kilogram (J/kg) and called “gray” (Gy) or historically referred to by the term radiation absorbed dose or “rad”. One gray is equal to 100 rad.

**Activity** – The rate of decay of a radioactive material expressed as the number of atoms breaking down per second measured in “Becquerel’s” or “curies”. A Becquerel is characterized as one disintegration per second. Also used to describe the quantity of radioactive material present at a given time.

**Air Dose** – The dose is measured by a properly calibrated appropriate instrument in air at or near the body surface in the region of the highest dosage rate. The air dose is used for determining exposures to X-, or gamma rays up to 3 million electron volts (meV). **ALARA** is an acronym for “as low as reasonably achievable”, i.e., maintaining doses to workers and members of the public as far below regulatory dose limits as is practicable, given the work that must be accomplished.

**Bioassay** – An assessment of radioactive materials that may be present inside a person’s body through analysis of the person’s blood, urine, feces, or sweat.

**Bq** – Becquerel – The amount of a radioactive material that will undergo one decay (disintegration) per second.


**Committed effective dose equivalent** – The dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

**Curie** – The traditional measure of radioactivity based on the observed decay rate of 1 gram of radium. One curie of radioactive material will have 37 billion disintegrations in one second

**Decontamination** – The process of neutralization, washing, rinsing, and/or removing contamination to minimize the potential for contaminant migration outside of a radiation area.

**Dose** – The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body. When specifying a dose during a period of time, the dose is the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. The unit of measure for the dose could involve measurements of “Rad” or “Rem”

**Dose coefficient** – The factor used to convert radionuclide intake into dose. Usually expressed as dose per unit intake (e.g., Sieverts per Becquerel)

**Dose equivalent** - (H\text{eq}) A quantity used in radiation protection to place all radiation on a common scale for calculating tissue damage. Dose equivalent is the absorbed dose in grays (Gy) multiplied by the quality factor. The quality factor accounts for differences in radiation effects
caused by different types of ionizing radiation. The units of dose equivalent are the rem and the Sievert (Sv).

**Dosimeter** – A small portable instrument such as a film badge, thermo luminescent dosimeter (TLD), or pocket dosimeter, used to measure and record the total accumulated dose of ionizing radiation a person receives.

**DOT** - US Department of Transportation

**Effective Dose** – A dosimetric quantity useful in comparing the overall health effects of irradiation of the whole body. The effective dose is used to express the overall health detriments when different radionuclides are present in a given mix. The unit of the effective dose is the Sievert (Sv); 1 Sv = 1 J/Kg

**EPA** - US Environmental Protection Agency

**Fixed Contamination** – Contamination which cannot be removed without affecting the removal of some portion of the surface that is contaminated or covering the contamination, or where the potential for surface contaminant migration is impossible to occur due to the non-intrusive work during property investigations. Examples of fixed contamination can be contaminated soil or building structures covered with physical barriers (i.e. grass, asphalt, concrete, brick, tiles, foundation rocks, paint, and wood) and contamination comingle with asphalt, concrete or building structures.

**Frisking** - Scanning of field personnel and equipment using a scaler/rate meter coupled to a Geiger - Mueller detector ("pancake" style), or equivalent, to identify the presence of contamination.

**Gray** – (Gy) a unit of measurement for absorbed dose typically expressed in units of joule per kilogram (J/kg). It measures the amount of energy absorbed in a material. The unit Gy can be used for any type of radiation, but it does not describe the biological effects of the different radiations. 1 Gy = 100 rad.

**High Radiation Area** – An area, accessible by individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 mSv) in one hour at a distance of 12 inches (30 centimeters) from a radiation source or from any surface or shielding that the radiation penetrates.

**Individual monitoring device** – Also referred to as “individual monitoring equipment” means devices designed to be worn by a single individual for the assessment of dose equivalent such as film badges, thermo luminescence dosimeters (TLDs), pocket ionization chambers, and personal ("lapel") air sampling devices.

**Licensed site** - A site (or portions thereof with designated licensed boundaries) and associated activities that must be conducted under the requirements of a radioactive material license in accordance with the US Atomic Energy Act (AEA). These licenses are issued by either the US
Nuclear Regulatory Commission (USNRC) or States authorized by the USNRC (referred to as “Agreement States”) in accordance with Section 274 of the AEA.

**Natural Background Exposure** - The ubiquitous ionizing radiation that people on the planet Earth are exposed to, including natural and artificial sources. It comes from outer space (cosmic), the ground (terrestrial), and even from within our own bodies. It is present in the air we breathe, the food we eat, the water we drink, and in the construction materials used to build our homes. For purposes of this H & S Standard, natural background exposure does not include additional exposure an individual could receive as a result of work on job sites at which they could receive an “occupational exposure” (See below)

**NRC** – United States Nuclear Regulatory Commission

**Occupational Exposure (Dose)** - Ionizing radiation exposure an individual receives at an ARCADIS client project job site over and above the natural background exposure they receive based on where they live and their personal lifestyles (i.e., if they were not on the site, they would not receive this exposure)

**Radiation Protection Technician (RPT)** - An individual, properly trained and qualified by academic background and/or experience, whose duty is to conduct radiological surveys and associated radiation safety monitoring of employees, equipment and areas and to implement the site specific Health & Safety and / or Radiation Protection Plans.

**Radiation** - For the purposes of this HSS, the term “radiation” refers to ionizing radiation and is defined as any elementary particle or photon emitted from a radioactive atom or source and having sufficient charge and / or kinetic energy to impact (deposit energy in) tissues. Ionizing radiation includes particles such as alpha particles, beta particles, and electromagnetic waves such as gamma rays and x-rays.

**Radiation Protection Plan** – A project or site specific document developed for the purposes of minimizing radiation exposure of employees which defines professional standards of practice for conduct of radiological surveys, methods for assessment and assignment of dose and to define requirements and ensure compliance with applicable law.

**Radiation Safety Officer / Project Health Physicist (RSO / HP)** - A professional level, trained and qualified individual whose duty is to ensure the Radiation Protection Plan (and/or applicable sections of the Health and Safety Plan) is prepared and implemented properly, provides oversight and consultation and mentors the Radiation Protection Technicians. A Radiation Safety Officer (RSO) at a licensed site requires professional health physics experience, education and regulatory approval. The term “RSO” as used in this HSS as applied to work at non-licensed sites may deviate from the standard regulatory meaning; specifically required training and experience can be less rigorous than a RSO at a licensed site.

**Radiological Site** - Any work location at which radioactive materials and/or ionizing radiation are believed or known to exist at which employees could receive an occupational dose. Locations at which sealed radiation sources (e.g. density gages) and/or radiation generating machines (e.g., XRFs) are used are considered “radiological sites” for purposes of this HSS since use of such devices could result in employees receiving an occupational dose.
Exhibit 2 - Example Project Radiation Protection Plan Table of Contents

1.0 INTRODUCTION
   1.1 Radionuclides of Concern
   1.2 Project Organization
   1.3 As Low as Reasonably Achievable (ALARA) Policy
   1.4 Applicable H&S Standards

2.0 RADIATION PROTECTION PLAN
   2.1 Authorities and Responsibilities of Organizational Functions Important to Radiation Protection
   2.2 Worker Responsibility
   2.3 Standard Operating Procedures
   2.4 Minimum Training and Experience Requirements for Management Personnel
   2.5 Radiation Safety Training Program
   2.6 Site Work Zone Notifications and Postings (Radiation symbols, markings and placards)
   2.7 Emergency Response Planning and Communication

3.0 REGULATORY STANDARDS AND GUIDES
   3.1 Worker Dose Limits
   3.2 Release of Equipment and Land for Uncontrolled Use

4.0 RADIATION SURVEYS
   4.1 External Exposure and Exposure Rate Monitoring
   4.2 Particulate Air Monitoring
   4.3 Radon Monitoring
   4.4 Personal Contamination Surveys
   4.5 Equipment Contamination Surveys
   4.6 Instrument Calibration

5.0 RESPIRATORY PROTECTION PROGRAM

6.0 CONTROL OF RADIOACTIVE MATERIALS AND RADIATION EXPOSURE

7.0 SEALED SOURCE EQUIPPED DEVICES

8.0 FEMALE EMPLOYEES OF CHILD BEARING AGE AND PRENATAL RADIATION EXPOSURE

9.0 RADIATION PROTECTION WORK RULES – APPLICABLE TO ALL ARCADIS EMPLOYEES & CONTRACTORS

10. PERSONAL PROTECTIVE EQUIPMENT

11.0 CONTAMINATION CONTROL

12.0 PERSONAL DOSIMETRY PROGRAMS
   12.1 Personal Dosimeters (Direct Radiation Exposure Monitoring)
   12.2 Declared Pregnant Workers (DPW) Dosimetry
12.3 Bioassay (If applicable)
12.4 Calculation of Total Effective Dose Equivalent (TEDE)

13.0 RADIATION WORK PERMIT (RWP)

14.0 RECORDS

15.0 BIBLIOGRAPHY
Exhibit 3 – Example Course Outline of Training Requirements for “General Awareness” Employee Radiation Safety Training

The duration for the General Awareness training outlined below is approximately 4 hrs. The actual duration of the training will depend on the expected or known site specific radiological levels and associated H&S risks. The General Awareness training is a pre-requisite for the second level of training detailed in Exhibit 4.

1.0 Introduction to Radioactivity
2.0 Interactions of Radiation with Matter
3.0 Radiation Safety Principles
4.0 Radiation Quantities and Units
5.0 Surveys and Instruments
6.0 Biological Effects of Radiation
7.0 Special Considerations for Female Personnel and Fetal Exposures
8.0 Contamination Control
9.0 Regulations - Dose Limits and ALARA
10.0 Natural Background Radiation
11.0 External and Internal Dosimetry
12.0 Personnel Monitoring
13.0 PPE and Respiratory Protection
14.0 Radioactive Waste
15.0 Transportation of Radioactive Material
16.0 Exam
Exhibit 4 – Example Course Outline of Training Requirements for Radiation Protection Technicians (RPT) and Radiation Safety Officers (RSO) Health Physics Training.

The expectation for RSOs and RPTs is to complete additional training incorporating site specific details of the proposed work. The classroom training will require advance planning for proper staff preparation due to the extent of material to be covered as determined in part by the class attendee’s current level of understanding of the topic, prior training completed, and the nature of the work proposed. Coordination with the TKI Radiological Services Group and the ARCADIS Training Center is required for participating in these classes.

Example of Training Topics Covered

1.0 BASIC RADIATION PHYSICS
   1.1 Atomic Structure and Radioactive Decay
   1.2 Interaction of Radiation with Matter

2.0 RADIATION DOSE AND HEALTH RISKS
   2.1 Dosimetry
   2.2 Biological Effects

3.0 REGULATIONS
   3.1 Occupational Dose Limits
   3.2 Dose Limits for Members of the Public
   3.3 Transportation of Radioactive Material

4.0 POTENTIAL RADIATION HAZARDS
   4.1 Direct External Dose
   4.2 Internal Dose from Inhalation
   4.3 Internal Dose from Ingestion
   4.4 Internal Dose from Dermal Absorption
   4.5 Hazards in Perspective

5.0 BASIC RADIATION PROTECTION
   5.1 ALARA Policy
   5.2 Radiation Protection Program Management
   5.3 Protection from External Exposures
   5.4 Protection from Internal Exposures
       5.4.1 General Personal Protection Equipment (PPE)
       5.4.2 Respiratory Protection
   5.5 Female Personnel and Fetal Exposures
5.6 Working Area Designations
5.7 Dose Monitoring
   5.7.1 Worker Monitoring
   5.7.2 Environmental Monitoring
   5.7.3 Calculation of Dose
   5.7.4 Records
5.8 Control of Radioactive Materials
   5.8.1 Accidental Loss of Control
   5.8.2 Emergency Response
   5.8.3 Equipment Release Surveys
   5.8.4 Personnel Release Surveys
   5.8.5 Decontamination

6.0 INSTRUMENTATION
   6.1 Alpha Radiation Surveys
   6.2 Beta Radiation Surveys
   6.3 Gamma Radiation Surveys
   6.4 Air Sampling and Surveys
   6.5 Data Quality Control

7.0 COUNTING STATISTICS AND UNIT CONVERSIONS
   7.1 Determining instrument backgrounds
   7.2 Determining Absolute Activity
   7.3 Instrument Performance Verification in the Field
   7.4 Exposure vs. True Dose Rates

8.0 Practicum and Exam
   8.1 Hands on Use of Instruments and Measurement Protocols
   8.2 Measurement of a Variety of Radionuclides
   8.3 Determining External Exposure and Dose Rates
   8.4 Alpha vs. Beta vs. Gamma Measurements of Surfaces and Personnel
   8.5 Collection and Analysis of Air Samples
   8.6 Exam
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.

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<thead>
<tr>
<th>Project Name:</th>
<th>Project Location:</th>
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<th>Time:</th>
<th>Conducted by:</th>
<th>Signature/Title:</th>
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<tr>
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<th>Client Contact:</th>
<th>Subcontractor companies:</th>
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**TRACKing the Tailgate Meeting**

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

1. 
2. 
3. 
4. 
5. 
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?

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

<table>
<thead>
<tr>
<th>Doc #</th>
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<th>Overhead &amp; Buried Utilities</th>
<th>Other permit</th>
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</table>

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

- Incidents from day before to review? (Check if yes)
- Lessons learned from the day before? (Check if yes)
- Any corrective actions from yesterday? (Check if yes)
- Will any work deviate from plan? (Check if yes)
- JLAs or procedures are available? (Check if yes)
- Field teams to "dirty" JLAs, as needed? (Check if yes)
- Staff has appropriate PPE? (Check if yes)
- Staff knows Emergency Plan (EAP)? (Check if yes)
- Topics from Corp H&S to cover? (Check if yes)
- Any Stop Work Interventions yesterday? (Check if yes)
- If deviations, notify PM & client (Check if yes)
- All equipment checked & OK? (Check if yes)
- Staff knows gathering points? (Check if yes)

**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.

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

**Continue TRACK Process on Page 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)*)

<table>
<thead>
<tr>
<th>Elimination</th>
<th>Substitution</th>
<th>Isolation</th>
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<tbody>
<tr>
<td>Engineering controls</td>
<td>Administrative controls</td>
<td>Monitoring</td>
</tr>
<tr>
<td>General PPE Usage</td>
<td>Hearing Conservation</td>
<td>Respiratory Protection</td>
</tr>
<tr>
<td>Personal Hygiene</td>
<td>Exposure Guidelines</td>
<td>Decon Procedures</td>
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<tr>
<td>Emergency Action Plan (EAP)</td>
<td>Fall Protection</td>
<td>Work Zones/Site Control</td>
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<tr>
<td>JLA to be developed/used <em>(specify)</em></td>
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### Signature and Certification Section - Site Staff and Visitors

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<thead>
<tr>
<th>Name/Company/Signature</th>
<th>Initial &amp; Sign in Time</th>
<th>Initial &amp; Sign out Time</th>
<th>I have read and understand the</th>
</tr>
</thead>
</table>

### 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. Employees will, in turn, notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a motor vehicle accident, employees will notify the field supervisor. The field supervisor will then notify the Corp H&S at 1.720.344.3844 and then Corp Legal at 1.678.373.9556 and Corp H&S at 1.720.344.3844.

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 1.720.344.3844.

### Visitor Name/Co - not involved in work

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<th>Out</th>
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### 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

---

Rev.03 22 February 2010
ARC HSGE001
Tailgate pg.2

A Real Commitment, A Daily Issue: Safety
Pads available at Alphagraphics
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:

<table>
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<th>Reading</th>
<th>Action Required? Y/N</th>
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Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

________________________________________________________________________

________________________________________________________________________
Employee Signature Form

I certify that I have read, understand, and will abide by the safety requirements outlined in this HASP.

<table>
<thead>
<tr>
<th>Printed Name</th>
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Subcontractor Acknowledgement: Receipt of HASP Signature Form

ARCADIS claims no responsibility for the use of this HASP by others although subcontractors working at the site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this site. To this end, health and safety becomes the inherent responsibility of personnel working at the site.

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<th>Printed Name</th>
<th>Company</th>
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</table>
Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and ARCADIS and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Reason for Visit</th>
<th>Date/Time On Site</th>
<th>Date/Time Off Site</th>
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Site Control (check all that apply)

- Not applicable for this project.
- Site control protocols are addressed in JSA or other supporting document (attach)
- Maintain an exclusion zone of ________ ft. around the active work area
- Site control is integrated into the STAR Plan or TCP for the project
- Level C site control - refer to Level C Supplement attached
- Other (specify):

Decontamination (check all that apply)

- Not applicable for this project.
- Decontamination protocols are addressed in JSA or other governing document (attach)
- Wash hands and face prior to consuming food, drink or tobacco.
- Remove gloves and coveralls and contain, wash hands and face prior to consuming food, drink or tobacco. Ensure footwear is clean of site contaminants
- Respiratory protection- refer to the Level C supplement attached.
- Other (specify):

Sanitation (check all that apply)

- Mobile operation with access to off-site restrooms and potable water
- Restroom facilities on site provided by client or other contractor
- Project to provide portable toilets (1 per 20 workers)
- Potable water available on site
- Project to provide potable water (assume 1 gal./person/day)
- Project requires running water (hot and cold, or tepid) with soap and paper towels

Safety Briefings (check all that apply)

- Safety briefing required daily
- Safety briefing required twice a day
- Safety briefings required at the following frequency: ____________________________
- Subcontractors to participate in Arcadis safety briefings
- Arcadis to participate in client/contractor safety briefings
- Other (specify):

Safety Equipment and Supplies

Safety equipment/supply requirements are addressed in the JSA or Permit for the task being performed. If work is not performed under a JSA or Permit, the following safety equipment is required to be present on site in good condition (Check all that apply):

- First aid kit
- Bloodborne pathogens kit
- Fire extinguisher
- Eyewash (ANSI compliant)
- Eyewash (bottle)
- Drinking water
- Other: Spill kit for Decon Station
- Insect repellent
- Sunscreen
- Air horn
- Traffic cones
- 2-way radios
- Heat stress monitor

Other:
International Travel

☐ This project does not involve international travel
☐ This project involves international travel

Behavior Based Safety Program (check all that apply)

☐ TIP required at the following frequency on this project:
  Select One: ________ hrs ________ time(s) ________ Define: __________

☐ H&S Field Assessment required at the following frequency on this project:
  Select One: ________ hrs ________ time(s) ________ Define: __________

☐ Other (specify):

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

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Add additional sheets if necessary

You have an absolute right to STOP WORK if unsafe conditions exist!
Site Security Evaluation Plan

Arcadis has developed the following site security evaluation plan as a best practice for field staff to use when conducting field work in settings where hazards exist to personal security.

Before any Arcadis personnel visit a site for the first time, an Arcadis staff member shall call the site property owner to confirm the schedule for property sampling. In addition the Arcadis staff member will call the local Police precinct and ask about the general condition of the area of the site, the neighborhood, and whether criminal or other suspicious or threatening activity, of any nature, occurs in the vicinity of the site. If indications are that the site is in a relatively safe area, this should be documented and reported to the Task or Project Manager. If it is indicated that the site is not in a relatively crime-free, or safe area, then this should be documented, reported to the Task or Project Manager and crime statistics for the area researched and documented. In all cases, site reconnaissance and site sampling will be conducted using the buddy system, with teams of not less than two personnel. All sampling work will be conducted during daylight hours.

If the site manager or property owner cannot be reached after at least three attempts, Arcadis personnel personnel will notify the DTSC manager for assistance and the property will not be sampled until proper notification can be made.

Based on initial site reconnaissance, the following security rating system shall be used to classify each site. Security ratings should be periodically reviewed and updated as more first-hand knowledge of the site becomes available. At a minimum, the security rating of a site should be reviewed annually when the HASP is reviewed and updated.

**Level 1** – These sites are assessed to be “low-threat” based on: pedestrian traffic in and around the site, whether members of the public are loitering in and around the site or approaching Arcadis field staff, the types of businesses located in the vicinity of the site, the condition of buildings proximal to the site and vehicles parked in the vicinity of the site, and the amount of vehicular traffic in the vicinity of the site noted by Arcadis staff during initial site visits. No additional measures over and above the normal H&S measures outlined in the Site-specific HASP need to be specified. Ongoing, open dialogue regarding site conditions is necessary between field and office staff throughout the period of the project and HASPs should be updated if conditions change or new information becomes available. Employees are encouraged to use Stop Work Authority whenever they feel their safety or well-being is threatened or compromised. For the DTSC Exide project, all work will be conducted under a minimum of Level 2 conditions.

**Level 2** – These sites are assessed to be “less safe” based Arcadis staff observations during initial site visits. For example, if Arcadis staff are repeatedly approached by pedestrians while they are on site or pedestrians routinely ignore Work Zone delineation or other physical health and safety controls (cones, tape etc.) sites should be categorized as Level 2. At Level 2 sites: at least 2 field staff should be on site during any field activities, field staff should plan out the field event so that they work in close proximity to each other as much as possible, and, at a minimum, one person from the field crew shall contact the office at mid-day and at the end of the day to confirm field staff have left the site. These measures shall be reviewed with the Project Manager or Task Manager during the pre-field kick-off meeting.

During each field event, every team member must pay attention to their surroundings and be on the lookout for suspicious behavior or activity. Employees are encouraged to use Stop Work Authority whenever they feel their safety or well-being is threatened or compromised. They should contact the other field person on-site, leave the site, relocate to a place of safety (e.g. inside a locked vehicle) and then call the PM/TM.
At Level 2 sites, field staff should leave personal valuables at home and take only necessary electronic equipment and tools to the Site. Keep valuable items (GPS unit, laptop, power tools, etc.) out of sight and locked in a vehicle when not in use.

Ongoing, open dialogue regarding site conditions is necessary between field and office staff throughout the period of the project and HASPs should be updated if conditions change or new information becomes available.

When work outside of normal business hours are required, additional safety measures should be considered and implemented as required. Additional measures might include hiring special security services or requesting support from local police.

**Level 3** — Sites in this category are located in high-crime areas and/or have had serious crimes (murders, robberies, etc.) reported at or near the Site. In addition to the measures taken for Level 2 sites, work hours at Level 3 sites are restricted. Work will start at approximately 7am and will be completed with all field personnel off-site by approximately 2pm in order to avoid very early morning, afternoon and evening hours when many crimes seem to occur. Employees are encouraged to obtain feedback from businesses located on/and adjacent to the site to determine when they are the busiest. Work should be scheduled during non-peak hours/days when possible.

At Level 3 sites, the hiring of special security services should be considered and implemented as required. These security personnel may be armed or unarmed. Armed security personnel might be hired if there is a report of recent shootings in the vicinity of the site or encounters between Arcadis staff and members of the public behaving in an aggressive or irrational manner have occurred. Armed security personnel can maintain a secure perimeter around the work allowing field personnel to complete their tasks safely and as efficiently as possible.

Regardless of whether special security services are on site, employees are encouraged to use Stop Work Authority whenever they feel their safety or well-being is threatened or compromised. They should contact the other field person on-site, leave the site, relocate to a place of safety (e.g. inside a locked vehicle) and then call the PM/TM.

Ongoing, open dialogue regarding site conditions is necessary between field and office staff throughout the period of the project and HASPs should be updated if conditions change or new information becomes available.
IIPP HASP Supplement for Project Sites and Offices

The purpose of the Arcadis Illness and Injury Prevention Program (IIPP) is to establish location specific written guidelines to ensure the safety of employees working at Arcadis offices or project sites located in the state of California (best management practice for other locations). It is the intention of Arcadis to provide a safe and healthy working environment for all of its employees. All Arcadis employees and subcontractors will be offered a copy and are required to implement and following the principles set forth in this IIPP.

The purpose of this HASP Supplement is to communicate the specific details of the IIPP associated with the specific California office or project site for which this supplement has been prepared.

A copy of the Arcadis H&S Standard ARC HSGE008 (Injury and Illness Prevention Program) must be included as an attachment to all California project site HASPs or office Emergency Response Hazard Communication Plans to meet the requirements of CCR Title 8 3203. The programmatic details of the Arcadis H&S Standard ARC HSGE008 are incorporated by reference.

This IIPP HASP supplement has been prepared to be used as a location specific IIPP template to address the required components of the IIPP as mandated by CCR Title 8, Section 3203.

Scope and Application:
This document serves as the written Injury Illness Prevention Plan for Arcadis activities for the following Arcadis office and/or project site:

Arcadis Project Site: Exide Facility Sites Vernon CA

This HASP supplement is supported by the following documents, which are presented as references supporting this supplement:

Arcadis Office or Project Site Documen
(e.g., HASP or Office Emergency Response & HazCom Plan, Field Sampling Plan, SOPs, etc.)

Responsibility §3203(a)(1):
Roles and responsibilities are detailed in the office/site HASP. See the "Emergency Information" and "Tasks, Roles & Training Sections".

Arcadis California IIPP Program Administrator: David Kudlinski, Irvine CA
Arcadis Office H&S Coordinator / Site Health and Safety Officer: Watson Metsutnan - SHSO. Lawrence Browne - Field Team Leader
**Compliance §3203(a)(2):**
All employees are responsible for applying the Arcadis TRACK process in evaluating hazards and assessing risk for all work tasks, using safe work practices, following all directives, policies and procedures, and for assisting in maintaining a safe work environment. See the Arcadis H&S Standard ARC HSGE008 for the steps detailing compliance with the Arcadis H&S program.

**Communication §3203(a)(3):**
Arcadis recognizes the importance of two-way communication between management and staff to address health and safety issues with the objective of planning for and maintaining an injury-free, productive workplace. A description of the policy and procedures developed to facilitate a continuous flow of health and safety focused communications between management and staff is provided in the Arcadis H&S Standard ARC HSGE008.

Office/site specific workplace hazard methods of communication include the following:

- ✔ Site Health & Safety Plan
- ✔ Tailgate Safety Meetings
- ✔ Job Safety Analysis (JSA)
- ✔ Safety Data Sheets (SDS)
- ✔ Other: **Appendix H Site Security Evaluation Plan**

**Workplace Hazard Assessment §3203(a)(4):**
Initial workplace hazard analysis is completed during the preparation of the project site HASP or office HazCom plan. Periodic inspections will be performed to identify and evaluate workplace hazards in all areas of the office or project site. Inspections and the associated observations will be conducted in accordance with the Arcadis H&S Standard ARC HSGE008. Periodic inspections will consist of identification and evaluation of workplace hazards using the H&S management assessments, H&S compliance assessments, TIPs, site/office inspections or Arcadis global/Third Party/Client-Led H&S assessments to identify and evaluate workplace hazards.

*Note: The primary criteria for conducting inspections are the number of hours worked at the site or office and the risk ranking of the hazards present.* See the project specific HASP "Signatures" tab or office Emergency Response and Hazard Communication plan for a detail of proposed TIPs, assessments and inspections.
Accident Investigations §3203(a)(5):
All near misses, calls to WorkCare, and injuries must be reported to Arcadis Corporate H&S as soon as possible. Procedures for investigating workplace accidents, incidents and injuries are described in the Arcadis H&S Standard ARC HSGE008 and documents referenced therein. For incidents involving third parties the Arcadis Legal Counsel must be contacted. Approval from legal counsel is required before a 4-Sight incident investigation entry is prepared.

Hazard Correction and Communication §3203(a)(6):
Unsafe or unhealthy work conditions, practices or procedures shall be corrected in a timely manner based on the severity of the hazard(s). Hazards shall be corrected according to the procedures outlined in the Arcadis H&S Standard ARC HSGE008.

Note: When an imminent hazard exists which cannot be immediately abated without endangering employee(s) and/or property, All Arcadis employees and subcontractors will Stop Work and leave the area. Employees identified to correct the hazardous condition will do so only when provided with the necessary training and protection to address the

Training and Instruction §3203(a)(7):
All employees, including managers and supervisors, shall have training and instruction on general and job-specific health and safety practices. Project site specific training requirements are communicated in the site specific HASP under the “Tasks, Roles and Training” tab. A detailed discussion of the competency, training requirements and training process for the IIPP are covered in the Arcadis H&S Standard ARC HSGE008.

Record Keeping §3203(b)(1) & (2):
Records of workplace hazard assessments and inspections will be maintained in accordance with the Arcadis Human Resources policy HR 2.12 for record retention. Project teams or office staff who are responsible for recording of the assessment or inspection will include at a minimum; the person(s) conducting the inspection, any unsafe conditions and work practices that have been identified and the action taken to correct the identified unsafe conditions and work practices. Also, Documentation of health and safety training for each employee including the employees name, training dates, training program, and training providers are recorded and maintained by the Arcadis Training Center. All employees receiving training conducted via third party training vendors are required to send a certificate of completion or similar record to the Training Center.
Labor - Management Safety Committee §3203(a)(3):
Establishment of a "Labor - Management Safety Committee" is a recommendation of §3203(c) when working in facilities with unionized employees and as such is not required for an IIPP to be complete. If establishment of a Labor - Management Safety Committee is not applicable the process and procedures to formalize, document and communicate the health and safety related reporting is described in this IIPP. The components of the Arcadis H&S Communications program is provided in the Arcadis H&S Standard ARC HSGE008.

Notes:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
The purpose of this document is to serve as a planning tool and implementation guide to help the Project Team Site, Site Health & Safety Officer (SHSO) or other designated responsible party to comply with the requirements set forth by Cal/OSHA Title 8 CCR 3395 Heat Illness Prevention Standard and the Washington State Outdoor Heat Exposure Regulations 296-62-09510 thru 09560.

This HASP Supplement is required to be used in California and Washington states. Projects sites in other states and provinces can use this HASP Supplement as a Best Management Practice to prevent heat illness related injury.

The objective of this planning guide is to prevent or reduce the risk of work-related heat illness. This HASP Supplement provides site specific guidance for actions to be completed the project site. The Arcadis Health and Safety Standards ARC HSIH013 Heat Stress Prevention, and ARC HSGE008 Injury and Illness Prevention Program (IIPP) must accompany this HASP Supplement. To completely address the regulatory requirements for work in CA and WA states these standards are required to be used in association with the project specific HASP and this supplement.

Project Name: DTSC Exide
Project Manager: Nichole Pagano

Authority and Implementation

The following designated individuals have authority and responsibility for implementing the provisions of this program at the work site indicated above.

<table>
<thead>
<tr>
<th>Site Health &amp; Safety Officer</th>
<th>Designated Alternate</th>
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<tr>
<td>Peter Kelly Watson Metsutnan (Coleman)</td>
<td>Watson Metsutnan (Coleman)</td>
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</table>

Procedures for Provision of Water

The Site Health & Safety Officer (SHSO) or designee will be responsible for implementing the following when conditions at the site are anticipated to exceed 80 degrees Fahrenheit:

1. Maintaining an adequate supply of suitably cool, fresh and pure potable water (fresh and pure is defined as “odor free” and “suitably cool” is defined as water being cooler than the ambient temperature but not so cold as to cause discomfort or prevent drinking.) on site at all times to allow each employee to consume one quart of water per hour, ideally at a rate of four 8-oz cups per hour. Entering the requested information into the formula provided below calculates the number of quarts of water required per employee, per hours worked per day. Electrolyte replacement drinks or “Sports Drinks” can be used to replace essential minerals lost during sweating. Generally, such drinks should supplement water intake such as one “sport drink” to every three bottles of water (3 water : 1 sport drink intake ratio). Also, a teaspoon of salt added to every gallon of water could also be used.

2. Designate and communicate a water source such as an onsite potable plumbed system, chilled coolers containing bottled water, or drinking water coolers (of a sufficient capacity to support all field staff present) and disposable cups for potable water consumption. The water source must provide suitably cool, fresh and pure water in sufficient quantity for all employees at the site. Water shall be provided free of charge or expenses will be reimbursed for employees.

3. Document and communicate the decision to either provide all water for the day at the start of the shift (e.g., 2 gallons per employee for an 8-hour shift), or a replenishment plan. Note: a sufficient quantity of water must always be present and readily accessible to allow every employee to consume at least one quart of water per hour. It is suggested to have a minimum of three hours supply of water per employee on hand.

4. Water supplies must be positioned as close as possible to the work site. If site conditions prohibit such positioning then an alternative plan must be prepared to address making water readily available to site workers.

5. Inspect the coolers / water dispensers for cleanliness and replenishment of water and cooling ice on a documented routine interval based on temperatures and staff size. Cooling ice will be stored in clean coolers if added directly to water dispensers. If the site temperature exceeds 90 degrees F the frequency of the cooler inspection will increase to maintain cool water and water supply levels.

6. Oversee the daily inspection and maintenance of coolers to ensure they are kept clean and in good condition.

<table>
<thead>
<tr>
<th>No. of Employees</th>
<th>No. of Work Hours Per Day</th>
<th>Quarts of Water Required</th>
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<tr>
<td>23</td>
<td>10</td>
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</table>

One cooler will be provided for every four workers and will contain 24 16-ounce bottles every 2 hours.

<table>
<thead>
<tr>
<th>No. of Employees</th>
<th>Number of Coolers</th>
<th>Bottles Required</th>
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<tr>
<td>23</td>
<td>6</td>
<td>144</td>
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Form Color Key

- Enter requested Information
- Calculation Completed

Check which situation applies. Must check at least one box, or provide additional detail.

- Ice will be purchased at the start of each day by the site Health & Safety Officer or designee.
- Ice will be distributed from on-site machine or service meeting applicable potable water standards.

Checklist of materials to order and keep on hand.

- Anti-microbial hand cleaner
- Food Safe cleaning product for water cooler.
- Paper towels.
- Sufficient amount of drinking cups for each employee and water dispenser.
- Potable water to clean coolers.
- Other items.

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Anti-microbial hand cleaner</td>
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<tr>
<td>Food Safe cleaning product</td>
</tr>
<tr>
<td>Paper towels</td>
</tr>
<tr>
<td>Sufficient amount of drinking</td>
</tr>
<tr>
<td>Potable water to clean</td>
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<tr>
<td>Other items</td>
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</tbody>
</table>
**Access to Shade**

1. The Site Health & Safety Officer or designee is responsible for directing how shade will be coordinated and placed when temperatures exceed **80 degrees Fahrenheit**.

2. Before the start of work, the location of the shade areas, the importance of taking shade breaks, recognizing the signs and symptoms of heat illness, and the schedule of shade breaks (> 10 minutes every two hours), and the location will be addressed during each Tailgate Safety Meeting. Access to shade must be allowed at all times (As temperature increases cool down breaks should increase in frequency.)

3. The amount of shaded areas must be able to accommodate all employees taking a recovery or rest break including those employees who are on meal breaks. This doesn’t mean that the shaded area(s) must provide shade to accommodate all employees on a site or working a shift at the same time. An example includes rotating routine breaks among employees. Also, additional portable shade structures can be erected on an “as-needed” basis. Employees must have enough shaded space so they can sit in a normal posture fully in the shade with enough space to allow for sitting without being in physical contact with each other. **Employees who desire access to shade must not be deprived of it due to lack of space.**

4. Employees who take a preventative cool-down rest; (1) shall be monitored and asked if they are experiencing symptoms of heat stress; (2) shall be encouraged to remain in the shade; (3) shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than 5 minutes in addition to the time needed to access the shade. If an employee exhibits signs or symptoms of heat illness while taking a preventative cool-down rest the SHSO will provide appropriate first aid or emergency response support.

5. Shade structures will be relocated to follow along with the crew for moving tasks. Shade structures will be placed within 50 feet of the work area, if practical. Shade structures must be no further than a short walk away (e.g. 2-3 minutes) from the work area. This consideration becomes critical as the temperature rises above 80 degrees F.

6. In situations where it is not safe or feasible to provide shade, the SHSO will document in the HASP Supplement the unsafe or unfeasible conditions, and include the steps taken to provide alternative cooling measures equivalent to shade.

**Check Available Option**

- Provide vehicle(s) with working air conditioner to all employees on recovery or rest breaks as well as employees taking onsite meal breaks on the shift at any time.

- Provide temporary or mobile shade structure(s) that are either ventilated or open to air movement (Secure against wind.)

- Building or permanent structure(s) in close proximity to the work area that provide a cooling environment either through mechanical ventilation or are open to air movement will be used for shade. (Job trailer, pavilion, manufacturing building, etc.)

**Monitoring of Weather**

1. The SHSO or designee must check the extended weather forecast in advance of the upcoming work on a weekly basis. Work schedules will be adjusted in advance, taking into consideration whether high temperatures or a heat wave is expected. Accepted weather forecasting resources include webpages such as: [http://www.noaa.gov](http://www.noaa.gov) or [http://www.weather.com](http://www.weather.com)

2. Before work starts for the day or for the shift, the SHSO will review the forecasted temperature and humidity for the work site and compare conditions against the National Weather Service Heat Index (below) to evaluate the risk level for heat illness. Determination will be made of whether or not workers will be exposed to a combination of temperature and humidity characterized as “Extreme Caution”, “Danger” or “Extreme Danger” for heat illnesses. It is important to note that the temperature at which these warnings occur must be lowered as much as 15 degrees if the workers under consideration are in direct sunlight.

3. A thermometer will be used at the job site to monitor for sudden increases in temperature. The SHSO will be responsible for obtaining a thermometer prior to the start of the project and making it readily accessible or mounting it in an area where it can easily be monitored throughout the course of the day.

3a. If the temperature exceeds **80 degrees Fahrenheit**, shade structures will be opened and made available to workers.

3b. If the temperature equals or exceeds **95 degrees Fahrenheit**, additional preventive measures (such as those outlined in the High Heat Procedures below) will be implemented.
Procedures for High Heat and Heat Waves

High Heat
These procedures are additional preventative measures to be implemented when the temperature equals or exceeds 95 degrees Fahrenheit.

The SHSO or designee is responsible for ensuring effective observation and monitoring of employees during periods of high heat by implementing one or more of the following procedures to be determined by the project team as conditions warrant:

1. SHSO or designee will supervise 20 or fewer employees.
2. The “Buddy System” is mandatory. Have routine checks for early signs of Heat Illness and routine consumption of water & sports drinks.
3. Regular communication with SHSO or designee and field crew for working continuing assessment of high heat conditions (direct conversation, mobile phone, radio or other effective means of observation).
4. Designating one or more employees as authorized to contact emergency medical services and communicating that if no designee is identified and the SHSO is unavailable that any employee can call for emergency medical assistance.
5. During high heat conditions, employees will be provided with a minimum 10-minute cool-down period every two hours.
6. Modify work schedule to avoid hottest parts of the day (DEFINE THIS TIME PERIOD AND IF ABLE TO START EARLIER OR WORK LATER).
7. Heat Index Action Levels (Contact Project Manager & Notify that Actions Levels have been triggered:
   - If Heat Index indicates “CAUTION” then 15 minute breaks in cool shaded area every hour will be required.
   - If Heat Index indicates “EXTREME CAUTION” then 15-30 minute breaks in cool shaded area every hour will be required.
   - If Heat Index indicates “DANGER” then take 30 minute breaks in a cool shaded area every hour will be required.
   - If Heat Index indicates “EXTREME DANGER” Stop Work.

Heat Waves

A “heat wave” as defined by the National Oceanic and Atmospheric Administration (NOAA), is a period of abnormally and uncomfortably hot and unusually humid weather. Typically, a heat wave lasts 2 or more days. A “Heat Wave” as defined for the purposes of this Standard is when temperatures are sustained above 80 degrees F.

During a heat wave or if site conditions indicate the potential for “Extreme Caution”, “Danger” or “Extreme Danger” per the NOAA Heat Index Table the following steps will be taken:

Work schedules will be modified to protect workers from heat illnesses. The SHSO or designee in coordination with the project team, will use their Stop Work Authority and evaluate the following actions and document the action in the daily field log:

1. Modify work hours.
2. Reschedule or suspend work or specific tasks that are strenuous.
3. Cease work for the day.
4. During work activities and rest breaks, employees will be observed for signs and symptoms of heat illness.

Tailgate Safety Meetings will include a review the high heat procedures, encourage employees to drink plenty of water, and remind employees of the importance to take a preventative or recovery cool-down rest when necessary.

The “Buddy System” must be implemented, especially for new employees and employees who have yet to acclimate to high heat conditions. Additionally, frequent communication will be maintained with employees working by themselves (via cell phone or two-way radio), to be on the lookout for possible symptoms of heat illness.

Employees will be observed for alertness and signs and symptoms of heat illness at regular intervals to be documented in the field book or field log.

When the SHSO is not available, an alternate responsible person must be assigned to look for signs and symptoms of heat illness. Such a designated observer will be trained and know what steps to take if heat illness occurs.

Employees will be provided with additional water and rest breaks and will be observed more frequently. During work activities and rest breaks, employees will be observed for signs and symptoms of heat illness.

All employees will maintain frequent communication with the SHSO or designee, who will be monitoring workers for possible symptoms of heat illness. In the event of large project sites where the SHSO may be unable to be near the workers (to directly observe or communicate with them), then communication via a cell phone or radio may be used for this purpose provided reception in the area is reliable.

Note: Work conducted in direct sunlight can add up to 15 degrees F to the Heat Index evaluation.
**Procedure for Emergency Response**

Emergency procedures include recognizing the symptoms of heat-related illness. A critical step also involves ensuring that effective communication is established either through voice, direct observation, or electronic means such as via mobile phones or two-way radios. In an emergency situation it is critical that employees understand the process and contact information for requesting emergency medical support. The reception coverage for the site must be evaluated and understood to ensure adequate communication is in place across the project site.

1. The Site Health & Safety Officer or designee is responsible for implementing the following procedures for emergency response. These procedures include, but are not limited to, the following:

2. Prior to assigning staff to a particular work site, during the Tailgate H&S Tailgate Safety Meeting all site workers will review a map of the Site along with clear and precise directions (such as streets or road names, distinguishing features, and distances to major roads), to avoid a delay of emergency medical services.

3. Prior to assigning staff to a particular work site, efforts will be made to ensure that a qualified and appropriately trained and equipped person is available at the site to render first aid, if necessary.

4. Prior to the start of the morning Tailgate Safety Meeting, a determination will be made of whether or not a language barrier is present at the site, and steps will be taken (such as assigning the responsibility to call emergency medical services to the Health & Safety Officer or an English speaking worker) to ensure that emergency medical services can be immediately called in the event of an emergency in accordance with the HASP.

5. All Health & Safety Officers and supervisors will carry cell phones or other means of communication to ensure that emergency medical services can be called. Checks will be made to ensure that these electronic devices are allowed on site, have adequate reception across the site, and are functional prior to each shift.

6. When an employee reports symptoms, or is observed displaying symptoms of possible heat illness, steps will be taken immediately to keep the affected employee cool and comfortable until emergency service responders have been called and treatment guidance is provided, or until they arrive at the Site (to reduce the progression to more serious illness).

7. During a heat wave or hot temperatures, workers will be reminded and encouraged to immediately report to the Site Health & Safety Officer any signs or symptoms they are experiencing.

**Procedure for Handling a Sick Employee**

1. The Site Health & Safety Officer or designee is responsible for implementing the following procedures for handling a sick employee. These procedures include the following:

2. When an employee displays possible signs or symptoms of heat illness, the Site Health & Safety Officer or designee will check the sick employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. In the event of a non-emergency incident the SHSO will contact the employee’s supervisor or the project manager as well as calling WorkCare 1-800-455-6155 (US) and 1-888-449-7787 (Canada) for non-emergency medical assistance.

3. Signs of the onset of Heat Illness are: excessive fatigue, heavy sweating, headaches, cramps, dizziness, elevated pulse. Signs of Heat Exhaustion are: cool, moist, pale or flushed skin, nausea or vomiting, disorientation or confusion. Signs of Heat Stroke are: hot, red skin which can feel dry to the touch, or moist from overexertion, changes in consciousness, rapid or weak pulse, shallow rapid breathing.

4. When an employee displays possible signs or symptoms of heat illness and no trained first aid worker or supervisor is available at the site, emergency service providers will be called.

5. Emergency service providers will be called immediately if an employee displays signs or symptoms of heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face) or does not get better after drinking cool water in intervals of 8 ounces every 15 minutes and resting in the shade. While the ambulance is in route, first aid will be administered cool the worker: place the worker in the shade, remove excess layers of clothing, place ice pack in the armpits and groin area and fan the victim.

6. If an employee displays signs or symptoms of severe heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face), and the work site is located more than 20 minutes away from a hospital, call emergency service providers, communicate the signs and symptoms of the victim, and request an Air Ambulance if necessary.

**Revisions, notes, amendments, and clarifications specific to this plan will be detailed in the space below:**

---

Procedures for High Heat:

**Access to shade tents will be made available to project teams when temperatures exceed 80 degrees Fahrenheit.**
APPENDIX F

Air Monitoring
### Monitoring

Chemical air monitoring is not required for this project or is the responsibility of contractor.

For projects requiring air monitoring, list the relevant constituents representing a hazard to site workers.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Max. Conc.</th>
<th>TWA</th>
<th>STEL</th>
<th>IDLH</th>
<th>LEL/UEL</th>
<th>VD</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>4858 mg/kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 0.05 m NA 100 m NA/NA NA NA
- 9999 - 0 - 0 - 0 0 0
- 9999 - 0 - 0 - 0 0 0
- 9999 - 0 - 0 - 0 0 0
- 9999 - 0 - 0 - 0 0 0

Notes: TWAs are ACGIH 8 hr.- TLVs unless noted.

### Monitoring Equipment and General Protocols

Air monitoring is required for any task or activity where employees have potential exposure to vapors or particulates above the TWA. Action levels below are appropriate for most situations. Contact the project H&S contact for all stop work situations. Select monitoring frequency and instruments to be used.

**Monitoring Frequency:**
- Indicator Tube/Chip Frequency: **Indicator tube/chip monitoring not required**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Action Levels</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photoionization Detector Lamp (eV):</td>
<td>&lt; 0.000</td>
<td>Continue work</td>
</tr>
<tr>
<td></td>
<td>0.000 - 0.0</td>
<td>Sustained &gt;5 min. continuous monitor, review eng. controls and PPE, proceed with caution</td>
</tr>
<tr>
<td></td>
<td>&gt; 0.0</td>
<td>Sustained &gt;5 min. stop work, contact SSO</td>
</tr>
<tr>
<td>Flame Ionization Detector (FID)</td>
<td>&lt; 0.0</td>
<td>Continue work</td>
</tr>
<tr>
<td></td>
<td>0.0 - 0.0</td>
<td>Sustained &gt;5 min. continuous monitor, review eng. controls and PPE, use caution</td>
</tr>
<tr>
<td></td>
<td>&gt; 0.0</td>
<td>Sustained &gt;5 min. stop work, contact SSO</td>
</tr>
<tr>
<td>LEL/O2 Meter</td>
<td>0-5% LEL</td>
<td>Continue work</td>
</tr>
<tr>
<td></td>
<td>&gt;5-10% LEL</td>
<td>Continuous monitor, review eng. controls, proceed with caution</td>
</tr>
<tr>
<td></td>
<td>&gt;10% LEL</td>
<td>Stop work, evacuate, contact SSO</td>
</tr>
<tr>
<td></td>
<td>19.5%-23.5% O2</td>
<td>Normal, continue work</td>
</tr>
<tr>
<td></td>
<td>&lt;19.5% O2</td>
<td>O2 deficient, stop work, evacuate, cont.</td>
</tr>
<tr>
<td></td>
<td>&gt;23.5% O2</td>
<td>O2 enriched, stop work, evacuate, contact</td>
</tr>
</tbody>
</table>

| Compound(s): |
| Indicator: | ≤PEL/TLV | Continue work |
| >PEL/TLV | Stop work, review eng. controls and PPE, contact SSO |
| Particulate Monitor (For soil dusts as measured in mg/m³) | < 0.05 | Continue work |
| | 0.05 - 0.05 | Use engineering controls, monitor continuous |
| | > 0.05 | Stop work, review controls, contact SSO |
| Other: | Specify: | Specify: |

* Arcadis administrative TWAs ensure mixture component TWAs are not exceeded that would require additional monitoring or medical surveillance.
Dangerous Animals Standard Operating Procedures: DRAFT

Rev. #: 0

Rev Date: August 2014
SOP: Dangerous Animals
Rev. #: 0 | Rev Date: August 2014

Approval Signatures

Prepared by: ____________________________ Date: 8/15/14
Health and Safety Manager

Reviewed by: ____________________________ Date: ______

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I. Scope and Application

This standard operating procedure (SOP) describes procedures for recognizing and avoiding hazardous animals, and outlines appropriate actions to take in any potentially hazardous animal encounters. For the purposes of this SOP, hazardous wildlife will be categorized into the following: 1) ticks, 2) snakes, 3) bears, 4) dogs, and 5) moose. This SOP is designed as a summary of the policies and procedures outlined in the ARCADIS Employee Field Health and Safety Handbook and the site-specific Health and Safety Plan.

II. Personnel Qualifications

No special training is required to implement this SOP, it is however recommended that all employees are current in their First Aid, CPR and Blood Borne Pathogens training and are also familiarized with the use and hazards of bear repellant spray. A variety of tools are available that, when properly applied and combined with common sense, can prevent loss/injury and save lives. This SOP assumes that ARCADIS field sampling personnel will be versed in the relevant SOPs and be familiar with the applicable site Health and Safety Plan.

III. Equipment List

The following list of materials and devices are appropriate for mitigating the risks associated with hazardous wildlife:

- Cellular telephone and/or 2-way communication
- GPS Location and Emergency Beacon
- First Aid Kit
- Insect repellant
- Snake Gaiters/Chaps
- Bear repellant spray (atleast one canister per team)

IV. Cautions

Avoidance is the best approach to dealing with all hazardous wildlife, but this can best be accomplished by A) recognizing and avoiding situations that can bring employees into contact with dangerous wildlife and , B) appropriately dealing with an animal if avoidance is not possible . As such, field crews should be constantly aware of their surroundings, and in constant communication with their immediate team as well as the field leader.
V. Health and Safety Considerations

- Refer to the project Health and Safety Plan for any site-specific procedures or instructions for responding to hazardous wildlife that are known to be in the area. Generalized procedures can be found in the ARCADIS Employee Field Health and Safety Handbook.

VI. Procedure

1. TICKS

**Environment:**
This information is limited to the American Dog Tick and the Deer Tick. Both ticks favor tall grass and brushy environments. Both ticks are primarily active during summer months, but may also be active in the spring and fall. The following should help reduce exposure to tick bites.

Also, larval stage ticks (also known as “seed ticks”) are prevalent during August and September. During this period, the larvae accumulate in masses on vegetation and infest a host upon contact (brushing up against the infested vegetation), resulting in numerous tick bites.

**Preventative Measures:**

- Avoid unnecessary entry into tall grass and brushy areas.
- Wear insect repellents containing N,N-diethyl-meta-toluamide (DEET) or permethrin (treated clothing).
- Wear light-colored clothing so crawling ticks can be easily identified.
- Inspect yourself frequently during the day.
- Minimize exposed skin and tuck pants into socks or boots.

**First Aid:**

If a tick is found on the body, carefully remove using the following process:

- Gently, but firmly and steadily, pull on the tick’s body using a small pair of tweezers.
- During removal, be careful not to squeeze the tick’s body and grasp the tick where its mouth enters the skin.
- After removal, inspect the tick to see if its head was removed.
- Once the tick has been removed, wash the area with soap and water and apply antiseptic or antibiotic ointment to prevent infection.
• Keep a close watch over the bite area and keep the tick in a small jar or bag for reference by a physician, if needed.

• If parts of the tick stay in the skin, or if unexplained symptoms develop (severe headaches, fever or rash within 10 days of the bite), call WorkCare.

If infested with "seed ticks," use the following methodology to remove them:

• Use tweezers designed for splinter removal or a specially designed tick removal tool to grasp and remove the tick as described above.

• If infested with a large number of seed ticks, tape may be placed across the ticks where they can be pulled off the skin; however, this should only be used as a last resort.

Lyme Disease and Erlichiosis
Lyme disease results from a tick-borne infection. Ticks that are removed within 24 hours of insertion typically do not result in Lyme disease exposure. A red papule appears at the site of the tick bite. This infection tends to expand over a period of 3 to 4 days and may reach 15 centimeters in diameter. Symptoms of the disease include influenza-like symptoms, such as chills, headache and aching muscles. "Hot spots" in the U.S. include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin.

Erlichiosis also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the U.S. include New York, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin. Symptoms include muscle and joint aches and flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever
Rocky Mountain Spotted Fever can be very difficult to diagnose in its early stages, even by experienced physicians who are familiar with the disease.

Patients infected with R. rickettsii (the bacteria that causes Rocky Mountain Spotted Fever) generally visit a physician in the first week of their illness, following an incubation period of 5 to 10 days after a tick bite. The early clinical presentation of Rocky Mountain Spotted Fever is nonspecific and may resemble a variety of other infectious and noninfectious diseases.

The classic triad of findings for this disease are fever, rash and history of tick bite. However, this combination is not always detected when the patient initially presents for care.

Initial Signs and Symptoms
Initial symptoms may include fever, nausea, vomiting, severe headache, muscle pain and lack of appetite.
The rash first appears 2 to 5 days after the onset of fever and is often not present or may be very subtle when the patient is initially seen by a physician. Younger patients usually develop the rash earlier than older patients. Most often it begins as small, flat, pink, nonitchy spots (macules) on the wrists, forearms and ankles. These spots turn pale when pressure is applied and eventually become raised on the skin.

Later Signs and Symptoms
Later signs and symptoms include rash, abdominal pain, joint pain and diarrhea. The characteristic red, spotted (petechial) rash of Rocky Mountain Spotted Fever is usually not seen until the sixth day or later after onset of symptoms, and this type of rash occurs in only 35 to 60 percent of patients. The rash involves the palms or soles in as many as 50 to 80 percent of patients; however, this distribution may not occur until later in the course of the disease. As many as 10 to 15 percent of patients may never develop a rash.

SNAKES

Environment:

The possibility of encountering snakes exists, specifically for personnel working in wooded or vegetated areas. All personnel walking through areas that are suspected or prone to have snake activity must be aware of the potential for encountering snakes and the need to avoid actions that will increase the risk of such an encounter (e.g., turning over logs and rocks).

Preventative Measures:

- Wear long pants and leather boots, preferably covering the ankles
- Wear snake gaiters
- Avoid disturbing logs or rocks as best as possible
- Do not place hands into a crack or crevice where you cannot see where you are placing your hand

First Aid:

If a snake bite occurs, attempt to obtain markings, size and color of the snake for identification. The victim must be transported to the nearest hospital as soon as possible. First aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom. If an attack occurs, take the following actions:

- Keep the bite victim calm and reassure them that bites can be effectively treated in an emergency room. Restrict movement and keep the affected area just below heart level to reduce the flow of venom.
• Remove any rings or constricting items because the affected area may swell.

• Create a loose splint to help restrict movement of the area.

• If the bite location begins to swell and change color, the snake was probably poisonous.

• Monitor the person’s vital signs (temperature, pulse, rate of breathing and blood pressure). If there are signs of shock (such as paleness), lay the victim flat, raise the feet about 1 foot and cover the victim with a blanket.

• Get medical help immediately.

The effects produced by venoms include:

• Neurotoxin effects with sensory, motor, cardiac and respiratory difficulties

• Cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys and lungs

• Defects in coagulation of blood

• Effects from local release of substances by enzymatic actions

• Other noticeable effects of venomous snakebites include swelling, edema and pain around the bite, and the development of ecchymosis (the escape of blood onto tissues from ruptured blood vessels).

BEARS

Environment

Bears are curious, intelligent and potentially dangerous animals, but undue fear of bears can endanger both bears and people. Respecting bears and learning proper behavior in their territory will help so that if you encounter a bear, neither of you will suffer needlessly from the experience. Most bears tend to avoid people. In most cases, if you give a bear the opportunity to do the right thing, it will. Bears feed on green grasses and on vegetation that grows in wet areas. They often rest in cool, dark, thick forests. Grizzly bears are typically, but not exclusively, active during the dawn, dusk and nighttime.

Preventative Measures:
• Be alert where recent bear activity has been documented by park officials, Fish and Game, Forest Service and other public service people. Some common areas where bears like to frequent are avalanche chutes, stream beds, dense edge cover and, in late summer, berry patches.

• Use extreme caution when traveling on trails in the early morning, at dusk or at night.

• Always stay near and within communication distance of an armed guide.

• Always stay near your vehicle or other mode of transportation or permanent shelter.

• Be careful with food smells—never cook close to camp. Store all foods in plastic away from camp at night. When camp is unattended, store food at least 100 yards away and at least 14 feet up a tree hung 4 feet away from the trunk.

• Watch for fresh bear signs (scat or bear tracks) on the trail or near possible camp sites.

• If possible, make plenty of noise on the trail, especially on blind curves, in dense vegetation or areas with limited vision.

• Be conscious of the wind—bears have an excellent sense of smell. If the wind is at your back, chances are that a bear will smell you and leave the area well before you reach it. If the wind is blowing in your face, your chances of an encounter greatly increase. In high wind situations or along creeks and streams, a bear might not hear you coming or you might not hear it.

• If you come upon a dead animal carcass, immediately leave the area. Bears will often feed on a carcass for days and will stay in the area to protect their food.

• If you see a bear cub, the sow is likely nearby. Female bears will fiercely defend their young, so it is best to leave the area and find an alternative route.

• Keep dogs under control. Dogs can lead an angry bear back to you.

• Do not travel alone; use the buddy system or small groups.
Body Language of Bears

If a bear looks you in the eyes and has its ears back, it is warning that you are too close and that it feels threatened. A bear may also make barking, woofing or moaning sounds to indicate this. If a bear “pops” its jaws, it is very agitated and most often will charge. A bear can reach speeds of 30 to 35 mph in a matter of a split second. Never try to outrun a bear, if the situation occurs, going downhill is the best option and finding shelter.

Bear Repellent Pepper Spray

Project personnel should always carry bear repellent pepper spray when working in bear country. Bear repellent spray is a proven defense against possible attack by grizzly and black bears. Bear safety has greatly increased because of bear pepper spray, which is made of oleoresin capsicum, an effective bear repellent for black bears, grizzlies, brown bears and even polar bears.

Bear pepper spray is not intended to be used like insect repellent. You should never apply bear spray to your clothes, tent or gear. Bear spray is used by pointing and spraying the bear pepper spray directly at the oncoming bear. It should always be carried in a holster (not buried in a back pack). However, bear safety is more involved than just having a bear repellent handy. You can reduce your risk of conflict with bears by understanding them, their habitat and by following some safety tips, as presented below.

Bear Encounters on the Trail

- Stop, stay calm and quiet, and make no sudden moves. Do not yell or scream.
- Break eye contact—do not stare in the bear’s eyes because this is a sign of aggression.
- Stand your ground. Do not turn your back on the bear. Sometimes a bear will bluff charge several times.
- Calmly alert the armed guide and other field crew if they are not already aware of the bear’s presence.
- Determine the distance to your vehicle, other mode of transportation or secure permanent building. Back away slowly, speaking in a calming, monotone voice.
You want to show the bear that you are being submissive and want to get out of its territory. Don’t turn and run.

- Look for signs of agitation and aggression. When a bear is standing on its hind legs, it is usually just trying to get a better look at and smell of you. When a bear is upset it may have its ears back, lower its head and swing it from side to side, paw at the ground, make huffing or woofing noises, snap its teeth, or not show any signs at all, and just drop and charge with no warning.

- Being close to a sow with cubs is always a dangerous situation.

- A grizzly can reach 10 feet up a tree while standing on the ground.

If Attacked

If a bear actually makes contact, you have two choices: play dead or fight back. The best choice depends on whether the bear is reacting defensively or is seeking food. Play dead if you are attacked by a grizzly bear you have surprised, encountered on a carcass, or any female bear that seems to be protecting cubs. Lie flat on your stomach, or curl up in a ball with your hands behind your neck. Typically, a bear will break off its attack once it feels the threat has been eliminated. Remain motionless for as long as possible. If you move, and the bear sees or hears you, it may return and renew its attack. Rarely, lone black bears or grizzlies may perceive a person as potential food. Fight any bear that follows you or breaks into a tent or building. Fight any black bear regardless of circumstances.

MOUNTAIN LIONS

Environment

Avoid contact with mountain lions. Carry bear spray and be aware of surroundings at all times, avoiding all kill sites and young. If a mountain lion is encountered, deter it from attacking. Stop where you are, stand your ground, and try to look as big and scary as possible. Stand on something like a rock or log so you look taller, wave your arms and with sticks in your hands if available, yell at the lion, and stand your ground, but back away slowly. Do NOT run. Throw rocks if possible, but be wary of bending down to pick them up. Use your bear spray as a last resort. Do NOT play dead with a mountain lion.

Preventative Measures:

- Be alert where recent mountain lion activity has been documented by park officials, Fish and Game, Forest Service and other public service people.
• Mountain lions tend to attack from above, be careful when working with rock outcrops abovehead and trees.

• Mountain lions tend to prey on the smallest individual when stalking a group, keep this in mind while using the buddy system.

• Use extreme caution when traveling on trails in the early morning, at dusk or at night.

• Always stay near your vehicle or other mode of transportation or permanent shelter.

• If possible, make plenty of noise on the trail, especially on blind curves, in dense vegetation or areas with limited vision.

• Do not leave food or garbage outside

• Do not travel alone; use the buddy system or small groups.

If Attacked
If a mountain lion actually makes contact, you have one choice: fight back. Aim for weak points on the head and upper body. Use any rocks, branches, knives, or tools at your disposal. Make the mountain lion believe you are not worth the trouble. DO NOT play dead.

WOLVES

Environment

Wolves are highly social animals, and the family structure is focused around the pack. Packs typically consist of a breeding pair—the “alpha male and alpha female”—and their young from previous years. Pack size doesn’t vary much between years because the wolves that either leave or die each year are replaced by newborn pups. An adult male wolf stands about 30 inches at the shoulder and can be over six feet long from the tip of nose to point of tail. It will weigh 70 to 110 pounds. Females are slightly smaller, usually 60 to 80 pounds.

Preventative Measures:

• Be alert where recent wolf activity has been documented by park officials, Fish and Game, Forest Service and other public service people.
• Use extreme caution when traveling on trails in the early morning, at dusk or at night.

• Always stay near your vehicle or other mode of transportation or permanent shelter.

• If possible, make plenty of noise on the trail, especially on blind curves, in dense vegetation or areas with limited vision.

• Do not travel alone; use the buddy system or small groups.

**DOGS**

*Environment:*

Dogs may be a serious concern when working on residential or farm properties.

*Precautions:*

• Do not approach strange dogs, especially dogs that are tied up or confined behind fences.

• Do not pet a dog unfamiliar with you or attempt to pet a dog familiar with you without the dog seeing and sniffing you first.

• Never turn and run away from dogs.

• Do not disturb dogs that are sleeping, eating, chewing on toys or caring for puppies.

If approached by an aggressive or unknown dog, implement the following actions to avoid or reduce severity of attack:

• Never yell, scream or run.

• Remain motionless, hands at your sides and avoid eye contact with the dog.

• Once the dog loses interest in you, slowly back away until the dog is out of sight.

• If attacked, “feed” the dog outer clothing like jackets, field equipment, field books or anything else that may be used to place between you and the dog.
• If you fall or are knocked down to the ground, curl into a ball with your hands over your ears and remain motionless to the extent possible. Do not scream.

**First Aid:**

If bitten by an animal, thoroughly clean the bite area with soap and water and seek to control bleeding. Do not scrub the wound. Lightly cover the wound, but do not tighten with tape or butterfly bandages, and seek medical attention. Call WorkCare. Avoidance and alertness to surroundings are the best defense to biting animal hazards.

**MOOSE**

**Environment:**

Moose are not normally aggressive but they can be very aggressive when they are hungry, tired of walking in deep snow or harassed by people, dogs and traffic, and also during the fall mating season- in late September and October- bull moose may be aggressive toward humans. In late spring and summer, cow moose with young calves are very protective and will attack humans who come too close. If you see a calf and not a cow, be very careful, because you may have walked between them.

**Precautions:**

• When a moose attacks, the long hairs on its hump are raised, ears are laid back (much like a dog or cat) and it may lick its lips (if you can see this, you are way too close).
• A moose that sees you and walks slowly toward you is not trying to be your friend; it may be looking for a handout or warning you to keep away. All of these are dangerous situations. Back off. Look for the nearest tree, fence, building, car or other obstruction to duck behind.

What if a moose is standing in your path?

• Is there another way around the moose? If not, be patient. The moose will often move away on its own. It may take half an hour or more, but it’s usually worth waiting.

• Sometimes a loud noise or movement will startle them into moving, but moose that are used to people are usually not easily chased away.

• If you have to get by, try to keep a large tree, snow berm, vehicle, building or fence between you and the moose. Don’t get near a moose if its only escape route is in your direction, and always leave yourself one or more escape routes.

What if a moose charges?

Many charges are “bluff” charges, warning you to get back. However, you must take them all seriously. A calf, which weighs 300 or 400 pounds by its first winter, can injure you. When a moose charges it often kicks forward with its front hooves. It’s usually a good idea to run from a moose because they won’t chase you very far. Get behind something solid; you can run around a tree faster than a moose can. If it knocks you down, a moose may continue running or start stomping and kicking with all four feet. Curl up in a ball, protect your head with your hands, and hold still. Don’t move or try to get up until the moose moves a safe distance away or it may renew its attack.

VIII. Data Recording and Management

Contact with dangerous wildlife that results in a suspension of work, personal injury or other loss should be documented to the best of your ability AFTER all other health and safety considerations have been dealt with. Do not linger in a hazardous situation simply to take notes. Record your observations after the situation becomes safe. If contact contributes to a loss or incident, a more detailed investigation of conditions at
the time of the incident/loss is required, contact project management to discuss the proper course of action.

IX. References


Washington Department of Fish And Wildlife (Region 1 – East)

2315 North Discovery Place, Spokane Valley WA 99216-1566

(509)-892-1001, teamspokane@dfw.wa.gov
APPENDIX G

Enhanced Personal Protective Equipment Requirements
Personal Protective Equipment (PPE)

See JSA or Permit for the task being performed for required PPE. If work is not conducted under a JSA or Permit, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for all tasks during field work (outside of field office trailers and vehicles) not covered by a JSA or Permit on this project:

Minimum PPE required to be worn by all staff on project:

<table>
<thead>
<tr>
<th>Checked</th>
<th>PPE</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hard hat</td>
<td></td>
</tr>
<tr>
<td>✔</td>
<td>Safety glasses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snake chaps/guards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Face shield</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chainsaw chaps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hearing protection</td>
<td></td>
</tr>
<tr>
<td>✔</td>
<td>Steel or comp. toe boot</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rain suit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metatarsal boot</td>
<td></td>
</tr>
<tr>
<td>✔</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coveralls</td>
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</tr>
<tr>
<td></td>
<td>Apron</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chem. resistant gloves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gloves other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chemical boot</td>
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<tr>
<td></td>
<td>Boot other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Traffic vest, shirt or coat</td>
<td>Class II</td>
</tr>
<tr>
<td></td>
<td>Life vest</td>
<td></td>
</tr>
</tbody>
</table>

Task specific PPE:

Comments:

Hearing protection is not needed. Workers will not be exposed to occupational noise levels greater than 85db. All work will be completed with hand tools and noise hazards are not anticipated.

Medical Surveillance (check all that apply)

- Medical Surveillance is not required for this project.
- HAZWOPER medical surveillance applies to all Arcadis site workers on the project.
- HAZWOPER medical surveillance applies to all subcontractors on the project.
- HAZWOPER medical surveillance applies to all site workers on the project except:

Other medical surveillance required (describe type and who is required to participate):

Arcadis AFS LLC soil sampling field staff

Client drug and/or alcohol testing required.

Hazardous Materials Shipping and Transportation (check all that apply)

- Not applicable, no materials requiring a Shipping Determination (SD) will be transported or shipped
- A SD has been reviewed and provided to field staff
- A SD is attached
- All HazMat will be transported under Materials of Trade by Arcadis (see generic MOT SD Form)
- Other (specify):

Roadway Work Zone Safety (check all that apply)

- Not applicable for this project
- All or portions of the work conducted under a TCP
- All or portions of the work conducted under a STAR Plan
- TCP or STAR Plan provided to field staff
- TCP or STAR Plan attached
- Other (specify):

Arcadis Commercial Motor Vehicles (CMVs)

This section is applicable to Arcadis operated vehicles only

✔ This project will not utilize CMV drivers

This project will utilize CMV drivers

This project will NOT utilize vehicles (alone or in combination with a trailer) with a gross vehicle weight rating (GVWR) of 10,001 pounds or more. GVWR Truck + GVWR Trailer = <10,001 pounds

Page 1 of 1