



**Health and Safety Plan for
Remedial Investigation and
General Site Activities**

Revision 0

Nevada Environmental Response
Trust Site; Henderson, Nevada

Prepared for:
Nevada Environmental Response Trust

Prepared by:
**ENVIRON International Corporation
Emeryville, California**

Date:
January 24, 2014

Project Number:
21-321001

**Health and Safety Plan for Remedial Investigation and
General Site Activities, Revision 0**

**Nevada Environmental Response Trust
(Former Tronox LLC Site)
Henderson, Nevada**

Nevada Environmental Response Trust (Trust) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of the Trust. Based on my own involvement and/or my inquiry of the person or persons who manage the system(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Signature: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

not individually, but solely as President

Name: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 1/29/14

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**Nevada Environmental Response Trust
(Former Tronox LLC Site)
Henderson, Nevada**

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



January 24, 2014

**John M. Pekala, PG
Senior Manager**

Date

Certified Environmental Manager
ENVIRON International Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2014

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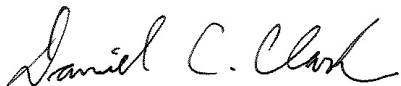

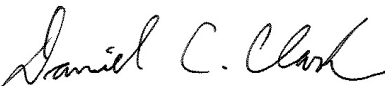

Acronyms and Abbreviations

AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
BMI	Black Mountain Industrial
C	Ceiling Limit
CPR	cardiopulmonary resuscitation
dBA	Decibels on the "A" weighted scale
EMR	Experience Modification Rate
ENVIRON	ENVIRON International Corporation
ERP	Emergency Response Plan
FS	Feasibility Study
GFCI	Ground fault circuit interrupter
GWETS	Groundwater Extraction and Treatment System
H	High
HA	Hazard Assessment
HASP	Health and Safety Plan
HSIR	Health and Safety Incident Report
HSC	Health and Safety Coordinator
IDLH	Immediately Dangerous to Life and Health
KMCC	Kerr-McGee Chemical Corporation
LOTO	Lockout/Tagout
L	Low
M	Moderate
MSDS	Material Safety Data Sheet
mg/m ³	milligrams per cubic meter
NA	Not Anticipated
NE	Not Established
NIOSH	National Institute for Occupational Safety and Health
OSSM	Olin Chlor-Alkali/Stauffer/Syngenta/Montrose (formerly POSSM)
PELs	Permissible Exposure Limits
PPE	Personnel Protective Equipment
ppm	Parts Per Million

RI	Remedial Investigation
SC	Site Coordinator
SPI	Standard Practice Instruction
SSC	Subsurface Clearance
STEL	Short Term Exposure Limits
T & C	Terms and Conditions
TWA	Time Weighted Average
WECCO	Western Electrochemical Company

Health & Safety Plan Review and Approval

By signing below, it is acknowledge that this HASP identifies the activities that are anticipated to be performed in the field. In addition, this HASP identifies the personal protective and monitoring equipment that may be necessary to be on site and be available for use. It is also understood that the provisions of this HASP will be updated if there is a change of a task and/or the addition of tasks and will be approved by the individuals listed below or their designee.

Allan DeLorme Project Manager	 Signature	January 24, 2014 Date
John Pekala Task Leader	 Signature	January 24, 2014 Date
Dan Clark Health & Safety Coordinator	 Signature	January 24, 2014 Date
Nita Shinn Designated Site Coordinator	 Signature	January 24, 2014 Date
Dan Clark Designated HASP Preparer	 Signature	January 24, 2014 Date
Christopher Ritchie Designated HASP Reviewer	 Signature	January 24, 2014 Date

This form **MUST** be signed prior to starting the on-site work. In addition, a copy of this form should be returned to the office Health and Safety Coordinator prior to leaving for the field. After completion of the project, the original signed HASP must be retained in the project file

Author's Initials: DCC

Typist's Initials: DCC

File Name: ENVIRON NERT HASP_Revision 0_RIFS and General Site Activities.doc

1 Introduction

On behalf of the Nevada Environmental Response Trust (“the Trust”), ENVIRON International Corporation (ENVIRON) prepared this Health and Safety Plan (HASP) to inform all ENVIRON personnel of known or reasonably anticipated potential hazards and safety concerns at the Nevada Environmental Response Trust Site (the “Site”). All personnel participating in field activities must be trained in the general and specific hazards unique to the job they are performing and, if applicable, meet recommended medical examination and/or training requirements. All ENVIRON employees shall follow the guidelines, rules, and procedures contained in this Site-specific HASP as well as ENVIRON’s Standard Practice Instructions (SPIs). ENVIRON personnel shall contact the Task Leader if unexpected conditions are encountered at the Site, including but not limited to new processes; changes in operation, products, services; additional or changes in the chemicals of concern; and/or unsafe conditions are encountered which were not previously addressed in this HASP.

For purposes of this HASP, subcontractors refer to those retained directly or indirectly by ENVIRON, and contractors refer to all other entities working on the Site. Each contractor, subcontractor, and visitor shall be expected to review and understand the hazards, risks, and control methods (including emergency procedures) as outlined in this HASP, and sign off on the HASP. This can be accomplished either during the project planning stage or during the first safety briefing on the Site. However, contractors and subcontractors will be required to prepare their own HASP to address Site safety and work hazards associated with their proposed Site activities prior to mobilization to the Site. In addition, each subcontractor will be required to provide ENVIRON with their Site-specific HASP, and communicate the types of hazards and control methods associated with their activities to ENVIRON during the first safety briefing on Site and as conditions change. Relevant contractor information regarding the identification of hazards and appropriate control strategies for the hazards for their particular job tasks should also be presented and a Site-specific HASP should be available for review by all parties. Each contractor or subcontractor must assume direct responsibility for its own employees’ health and safety.

Copies of the HASPs will be kept on the Site for review and reference during all Site activities. Upon completion of the project, the finalized and signed copy of the HASP will be placed in the project file.

When retaining and working with subcontractors, the following minimum requirements shall be met:

- A properly executed Contractor/Subcontractor Terms and Conditions (T&C) agreement with ENVIRON is in place prior to commencing work on the Site;
- Insurance policies and limits are acceptable to ENVIRON and all applicable Insurance Certificates are properly executed (i.e., ENVIRON being named as additionally insured under such policies, including Professional and Pollution Liability, if applicable. This will also include adding the Trust as being named as an insured party under the same policies);

- The roles and responsibilities of the subcontractor have been established, including the naming of the Health and Safety point of contact (these should be clearly indicated in the applicable subcontractor HASP);
- Submission of illness and injury logs indicating a favorable total incident rate (i.e., for the previous calendar year: the total incident rate is calculated by the total number of cases X 200,000 divided by the total hours worked by all employees of the subcontractor). This should be equal to or less than the industry average (i.e., for remediation services listed under the North American Industry Classification System (NAICS) 5629 the total incident rate must be equal or below 3.8); and
- A favorable Experience Modification Rate (EMR) (i.e., a rate equal to or less than 1.0) or an explanation of why your company does not qualify for an EMR from the Contractors insurance company.

1.1 Site Description

The Site is located approximately 13 miles southeast of the city of Las Vegas and is located in an area of unincorporated Clark County, Nevada, that is surrounded by the City of Henderson (Figure 1-1). It covers approximately 346 acres¹, and lies in Sections 12 and 13 of Township 22 S, Range 62 E (Figure 2-2).

The Site is located in an industrial land use area. The nearest residential areas are located just north (across North Boulder Highway) and south (across Lake Mead Parkway) of the Site. The Site is generally rectangular, but certain interior portions of the rectangle are owned and operated by other companies, specifically, Lhoist, Western Area Power Administration (WAPA), BMI, and Titanium Metals Corporation (TIMET). Facilities on the exterior borders of the Site are TIMET to the east, and Olin Chlor-Alkali to the west (formerly known as [1] Pioneer Americas LLC, which includes former Stauffer and Montrose Sites; [2] Olin Chlor-Alkali/Stauffer/Syngenta/Montrose [OSSM]; and [3] Pioneer/Olin Chlor-Alkali/Stauffer/Syngenta/Montrose [POSSM]). Olin Chlor-Alkali is hereafter referred to as the Olin property. Certain remediation system components jointly operated by Olin Chlor-Alkali, Stauffer, Syngenta, and Montrose are referred to as being operated by OSSM. BMI is located mainly to the east of the Site, although a BMI-owned Corrective Action Management Unit (CAMU) is located immediately to the west. Areas referred to as Parcels A, B, I, and J, which were formerly part of the Site, were sold in 2008 and 2013, and now represent neighboring properties to the north.

An area within the northwestern portion of the Site consists of groundwater treatment facilities, which are operated on behalf of the Trust by an outside contractor, Envirogen Technologies, Inc. (Envirogen). Three lined ponds on the Site (known as WC-West, WC-East, and Mn-2 receive process-related wastewater discharges from ongoing Tronox facility operations, and an additional lined pond (known as GW-11) receives extracted groundwater from remediation activities. The Site is traversed (from west to east) by a drainage ditch known as the Beta Ditch that historically conveyed liquid wastes from the Site and from neighboring facilities located to the west. The Beta Ditch, which no longer discharges off-site to the east, has been re-graded,

¹ Previous documents have identified an area of approximately 450 acres. Following the sale of Parcels I and J and a part of Parcel B in 2008, the Site comprised approximately 410 acres. Following the sale of Parcel A and the remaining portion of Parcel B in December 2013, the Site currently comprises approximately 346 acres.

channelized, and now includes a retention basin. The west end of the Beta Ditch at the Site continues to receive storm water drainage from the neighboring property to the west.

In addition to the three ponds described above, another process-related surface impoundment, known as the AP-5 pond, was constructed as a double-lined impoundment basin in 1983 and was removed from service in 2001. It was historically used to contain ammonium perchlorate process waters. After the pond was taken out of service, Veolia Water North America (Veolia) (which formerly operated water treatment systems at the Site) periodically used Lake Mead water to flush residual solids in the pond in an attempt to solubilize remaining ammonium perchlorate into the Site wastewater treatment system. As of the date of this HASP, the AP-5 pond still contains residual solids, which appear to be a mixture of residual process chemicals and fine sediments that accumulated in the pond during flushing with Lake Mead water. AP-5 Pond sampling activities are covered by a separate HASP: the NERT HASP for AP-5 Sampling and General Site Activities (Revision 6), and future pond decommissioning activities will be included in a future HASP revision.

The major buildings on the Site include Units 1 through 6, which are aligned in a row extending in a west-east direction across the southern portion of the Site. These buildings were constructed during World War II for magnesium production. Unit buildings 3 through 6 and the southern portions of Unit buildings 1 and 2 are within the boundaries of the Tronox-leased area. Tronox uses Units 5 and 6 for production of manganese dioxide; Unit 5 is also used for storage. Units 1, 2, and most of Unit 4 are no longer used and have been partially demolished. The remaining portion of Unit 4 has been retrofitted to house an advanced battery manufacturing process that started up in 2012. Tronox currently uses Unit 3 for office and storage activities. In addition, Tronox produces boron products within a Boron Plant to the north of Unit 4, and manganese sulfate solution (for use in the manganese dioxide production process) is produced within a Leach Plant north of Units 5 and 6. Other buildings present at the Site include an administration building, a change house, a laboratory building, a maintenance shop, a steam plant, and various storage buildings. The Site is crossed by asphalt and concrete roads, dirt roads, active utility lines, a gaseous chlorine line, and railroad spurs. An extensive network of active and inactive underground utility lines is present under the roads and open areas at the Site.

In addition to the Tronox and Envirogen operations at the Site, Tronox has three subtenants within the Tronox-leased area, which provide various services to Tronox and other local businesses. The Tronox subtenant operations are briefly described below:

- Industrial Supply: provides tools and supplies for manufacturing, construction, and utilities.
- Angelo & Newton: provides technical and managerial consulting services, specializing in chemical process plant safety compliance, regulatory compliance, and battery and energy systems.
- Pronto Constructors: provides construction services.

Within the boundaries of the Site are Parcels C, D, E, F, G, and H. The Parcels are at the edges of the Site, to the north, west, and south. Parcel E contains a portion of the OSSM

groundwater treatment system. As noted above, Parcels I and J (and the eastern portion of Parcel B) were sold to Rolly Properties LLC (Parcels B and I) and Robert and Sandra Ellis (Parcels B and J) in 2008, and Parcel A and the remaining portion of Parcel B were sold to TRECO, LLC in December 2013; these areas are no longer a part of the Site. Environmental investigations for all remaining Parcels except Parcel E (i.e., Parcels C, D, F, G, and H) have generally been conducted separate from investigations at other portions of the Site.² The field investigation work for these Parcels has been completed, and the health risk assessments and decision documents are in progress or completed, depending on the parcel.

1.2 Site History

The Site is located within the BMI³ Complex, which consists of several facilities owned and operated by a number of chemical companies (Figure 2-1). The BMI Complex was first developed in 1942 by the U.S. government as a magnesium plant for World War II operations. Later, a part of the BMI Complex that would ultimately become the Site was leased by Western Electrochemical Company (WECCO). WECCO produced manganese dioxide, sodium chlorate, sodium perchlorate, and other perchlorates. WECCO also produced ammonium perchlorate (a powerful oxidizer) for the Navy during the early 1950s using a plant that was constructed on the Site by the Navy. WECCO merged with American Potash and Chemical Company (AP&CC) in 1956, and continued production of ammonium perchlorate for the Navy. In 1967, Kerr-McGee Chemical Corporation (KMCC) purchased AP&CC. KMCC began production of boron chemicals in the early 1970s. The production processes included elemental boron, boron trichloride (a colorless gas used as a reagent in organic synthesis), and boron tribromide (a colorless fuming liquid used in a variety of applications). The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate was discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the Site using existing equipment until early 2002.

In 2006, Tronox took ownership of the facility formerly operated by KMCC on the Site and operated it to produce electrolytic manganese dioxide for use in the manufacture of alkaline batteries; elemental boron for use as a component of automotive airbag igniters; and boron trichloride for use in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers for products that include sporting equipment and aircraft parts. In 2009, Tronox filed for Chapter 11 bankruptcy. The Trust took title to the Site on February 14, 2011, as a result of the settlement of Tronox's bankruptcy proceeding. Tronox currently has a long-term lease for approximately 114 acres of the Site (ENVIRON 2013d), where it continues its manufacturing operations (identified on Figure 2-2 as "Tronox-Leased Area").

1.3 Scope and Applicability

ENVIRON has been retained to conduct and manage the Remedial Investigation/Feasibility Study ("RI/FS") and certain other Site management and environmental activities at the Site. This HASP addresses activities currently being conducted at the Site and activities that are

² The remaining portion of the Site excluding Parcels C, D, F, G, and H is herein after referred to as the "Facility Area."

³ The acronym "BMI" has been applied to several entities over the years. From 1941 until 1951 it referred to Basic Magnesium Incorporated; in 1951, a syndicate of tenants formed under the name of Basic Management, Inc. to provide utilities and other services at the complex; the group has also been known as Basic Metals, Inc., and at the present is called the Black Mountain Industrial complex.

planned as part of the RI/FS. Addendums will be added to this HASP to address activities at the Site as they develop in the future.

ENVIRON views the implementation of a Site-specific HASP as a critical management tool necessary to the safety, health, and well-being of Site personnel and the community. Site operations will be performed in such a manner as to minimize the possibility of serious injury or accidents to Site personnel, fire, explosion, or any unplanned or sudden release of contaminants into the environment that could adversely affect local receptors. This HASP is intended to be in compliance with all applicable state, federal and local regulations and is consistent with ENVIRON's commitment to the health and safety of its personnel, contractors on the Site, and the surrounding community.

The HASP identifies potential hazards associated with the activities being conducted during field activities at the Site, establishes the minimum procedural and equipment requirements to protect on-site personnel from potential hazards, and requires that on-site activities are conducted in a manner consistent with both accepted professional practice and applicable regulations. It also describes measures to minimize accidents and injuries that may occur during normal daily activities or during adverse conditions.

The HASP is based upon the currently available information regarding the Site. Operating conditions could potentially change as the work progresses, requiring some modification of the HASP. Any permanent modifications to the HASP, including changes necessary to correct any potential health and safety issues at the Site will be made only with permission by those individuals listed in Section 1 of this HASP. Approved changes will be added to the HASP as Addendums.

Applicability of this HASP extends to all personnel and visitors to the Site. However, ENVIRON's subcontractors are ultimately responsible for the health and safety of their personnel and representatives, and are required to furnish their own HASP. All personnel and visitors entering on-site active fieldwork areas are responsible for reading and complying with the HASP, and must sign an agreement to comply with the requirements of the HASP.

1.4 Specific Work Activities

The principal features of the field activities covered by this HASP include the following work activities or tasks to be conducted or overseen by ENVIRON field personnel:

- Task 1 - Observation of underground utility locating and clearance activities prior to intrusive sampling or construction activities
- Task 2 - Observation of drilling activities to advance soil borings, groundwater monitoring well borings, and soil gas sampling borings
- Task 3 - Exploratory trenching in Debris Pile area
- Task 4 - Soil sampling (surface soil sampling, trench soil sampling, and sampling from soil or groundwater monitoring well borings)

- Task 5 - Observation of groundwater monitoring well installation and well development activities
- Task 6 - Groundwater sampling (grab groundwater sampling from soil borings and groundwater monitoring well sampling)
- Task 7 - Soil gas sampling, including observation of installation of soil gas sampling points
- Task 8 - Aquifer testing at groundwater monitoring wells (slug testing, step drawdown testing, pumping tests)
- Task 9 - Site management activities (e.g., surveying, fencing repair, scrap removal, waste characterization, etc.)
- Task 10 - Observation and documentation of groundwater extraction and monitoring wells maintenance, abandonment, pump shakedown testing, and/or well head modifications
- Task 11 - Observation of trenching and utility construction activities as part of the GWETS optimization process

Each of these tasks is further described as follows:

Task 1 - Utility Locating

As part of the Remedial Investigation (RI) activities, ENVIRON will oversee underground utility locating and clearance activities at locations designated for soil borings or other intrusive sampling or construction activities.

Task 2 - Drilling

As part of the Remedial Investigation (RI) activities, ENVIRON will oversee drilling activities, performed by a drilling contractor, for the advancement of soil borings. Soil borings are purposed for soil sampling, for soil sampling followed by groundwater monitoring well construction, or solely for the construction of temporary soil gas monitoring wells, which are referred to as soil gas sampling points.

Task 3 - Exploratory trenching and/or test pits

As part of the RI activities, ENVIRON will oversee exploratory trenching and/or test pit activities performed by a remediation contractor in the Debris Pile area. Trenches or test pits will be dug through the debris layer and into underlying soil. Samples of soil and/or debris material will be collected from trench sidewalls (if shallower than 4 feet and evaluated as safe for entry by the Site Health and Safety Officer), or from the backhoe or excavator shovel (if deeper than 4 feet or evaluated as unsafe for entry by the Site Health and Safety Officer).

Task 4 - Soil sampling

As part of the RI activities, ENVIRON will collect soil samples for chemical and physical testing. Soil samples will be collected from soil borings and groundwater monitoring well borings. Surface soil sampling will also be conducted.

Task 5 - Groundwater monitoring well installation and well development activities

As part of the RI activities, ENVIRON will observe groundwater monitoring well installation and well development activities performed by a drilling contractor.

Task 6 - Groundwater sampling

As part of the RI activities, ENVIRON or its subcontractors (drilling contractor or groundwater sampling contractor) will perform groundwater sampling. Groundwater samples will be collected from temporary well casings inserted into soil borings that intersect with groundwater, and will also be collected from permanent groundwater monitoring wells.

Task 7 - Soil gas sampling

As part of the RI activities, ENVIRON will observe the installation of soil gas sampling points by a drilling contractor. ENVIRON will also perform soil gas sampling using Summa canisters and other related equipment (e.g., sampling shrouds, helium gas, and helium leak checking equipment) at the soil gas sampling points.

Task 8 - Aquifer testing

As part of the RI activities, ENVIRON will perform or oversee aquifer testing at groundwater monitoring wells, specifically including slug testing. Some aquifer testing activities may be performed by an aquifer testing or drilling subcontractor, if necessary. In addition, as part of the 2013 GWETS Optimization Project activities, ENVIRON will perform or oversee aquifer testing at groundwater monitoring wells, specifically including slug testing, step-drawdown testing, and aquifer pumping tests. As with aquifer testing performed as part of the RI, some aquifer testing activities as part of the GWETS optimization process may be performed by an aquifer testing or drilling subcontractor, if necessary.

Task 9 - Site management activities

As part of the RI activities, 2013 GWETS Optimization Project activities, and other general site activities, ENVIRON will perform or oversee miscellaneous site management activities including surveying; fence repair; scrap or debris removal; investigation-derived waste (IDW) characterization and removal; GWETS-related waste characterization and removal; and surveying of soil boring, groundwater monitoring well, and soil gas sampling point locations. These activities will generally be performed by qualified subcontractors.

Task 10 - Groundwater well maintenance, abandonment, testing, and modifications

As part of the 2013 GWETS Optimization Project activities, and as part of the RI activities as necessary, ENVIRON will oversee groundwater monitoring and/or extraction well maintenance, well abandonment, shakedown testing of extraction well pumps, and well head modifications. These activities are expected to be performed by a remediation contractor or drilling contractor.

Task 11 - Observation of trenching and utility construction activities

As part of the 2013 GWETS Optimization Project activities, ENVIRON will oversee trenching and construction of groundwater conveyance utilities performed by a qualified remediation contractor. These activities will also include utility locating and clearance activities to be performed by a qualified subcontractor. The construction activities are designed to create new connections between extraction wells and existing groundwater conveyance pipelines.

1.5 Applicable Standards

The methods and procedures prescribed in this HASP are intended to conform to established professional practices and applicable federal, state, and local occupational safety and health protection standards based on information that is currently available. Regulations serving as the technical compliance basis for this document may include but are not limited to the following:

- Nevada Administrative Code (NAC) 618
- USEPA Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992)
- U.S. Department of Labor, Occupational Safety and Health Standards for Construction (29 CFR 1926).
 - *Hazardous Waste Operations and Emergency Response* (29 CFR 1926.65)
 - *Hearing Protection* (29 CFR 1926.101 and 29 CFR 1926.52)
 - *Eye and Face Protection* (29 CFR 1926.102)
 - *Respiratory Protection* (29 CFR 1926.103)
 - *Working Over or Near Water* (29 CFR 1926.106)
 - *Material Handling Equipment* (29 CFR 1926.602)
- U.S. Department of Labor, OSHA Standards for General Industry (29 CFR 1910).
 - *Hazardous Waste Operations and Emergency Response* (29 CFR 1910.120)
 - *PPE General Requirements* (29 CFR 1910.132)
 - *Eye and Face Protection* (29 CFR 1910.133)
 - *Respiratory Protection* (29 CFR 1910.134)
 - *Head Protection* (29 CFR 1910.135)
 - *Foot Protection* (29 CFR 1910.136)
 - *Hand Protection* (29 CFR 1910.138)

- *Medical Services and First Aid (29 CFR 1910.151)*
- *Portable Fire Extinguishers (29 CFR 1910.157)*
- *Hazard Communication Standard (29 CFR 1910.1200)*
- *Control of Hazardous Energy (LOTO) (29 CFR 1910.147)*
- U.S. Department of Labor, Recording and Reporting Occupational Injuries and Illnesses, (29 CFR 1904).

The following technical documents may have been utilized as references in the preparation of this HASP. However, the citation of these technical documents does not imply compliance with all aspects of these documents. The purpose of these citations is to aid in the interpretation of conflicting issues that may arise during the performance of Site activities. Technical documents utilized as references in the preparation of this HASP may include but are not limited to:

- National Institute for Occupational Safety & Health (NIOSH)/OSHA/United States Coast Guard (USCG)/ United States Environmental Protection Agency (USEPA), Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, (October, 1985).
- U.S. Department of Health and Human Services (DHHS), NIOSH Sampling and Analytical Methods, DHHS (NIOSH) Publication 84-100.
- American National Standards Institute (ANSI), Emergency Eyewash and Shower Equipment, Z358.1 (1981).
- ANSI, Practices for Respiratory Protection, Z88.2 (1980).
- ANSI, Protective Footwear, Z41.1 (1983).
- ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1 (1979).
- ANSI, Protective Headgear for Industrial Workers - Requirements, Z89.1 (1986).
- ANSI, Physical Qualifications for Respirator Use, Z88.6 (1984).

Future revisions of this HASP may be updated as necessary to demonstrate compliance with additional applicable regulations.

1.6 Site-Specific Standards

The following section describes Site-specific standards that must be adhered to during all operations at the Site.

1.6.1 Site Management Plan

The Site Management Plan (SMP) for the NERT Site, prepared by ENVIRON and dated October 2013, is a document that provides a decision framework for the management of residual chemicals in soil and groundwater at the Site. The SMP describes procedures to address known remaining environmental conditions at the site, as well as contingency actions to be taken if previously unknown environmental conditions are encountered. The SMP addresses the following:

- Procedures for long-term compliance with the SMP; and
- Risk management measures to be implemented during construction activities.

The SMP applies to the following areas of the Site:

- Areas of the site that have been designated as Excavation Control Areas (ECAs), where known impacted soil has been left in-place. ECAs are identified and discussed in Appendix A of the SMP;
- Areas of the Site where unexpected environmental contamination is encountered during construction/demolition/excavation/investigation activities; and
- Areas of the Site where concentrations of contaminants in groundwater exceed current regulatory standards.

All owners, operators, tenants, lessees, project managers and other entities with responsibility for Site activities (collectively "Site Occupants") shall have the independent obligation to:

1. Review available information concerning Site environmental conditions
2. Determine the applicability of the SMP with respect to the expected and actual Site conditions and the intended land use;
3. Establish management procedures to ensure that the risk management measures outlined in the SMP are properly implemented and maintained; and
4. Comply with applicable policies, environmental covenants, laws, and regulations.

The procedures and protocols described in this HASP are intended to fully comply with the SMP. As detailed in the SMP, a summary of spill response procedures and related measures for activities that could result in damage to the GWETS components (potentially resulting in the release of untreated groundwater) are provided in Section 10 of this HASP.

Any questions regarding compliance with the SMP should be directed to the ENVIRON Site Coordinator or Task Leader.

2 Identification of Key Personnel

An efficient on-site operation requires that all key personnel be identified and that their roles and responsibilities be clearly defined. Below is a discussion of the management structure for this project.

2.1 Project Organization

ENVIRON is responsible for overseeing activities conducted by ENVIRON personnel and ENVIRON's subcontractors at the Site. ENVIRON also is responsible for oversight of compliance with this HASP in the field by ENVIRON personnel. ENVIRON subcontractors may plan, manage, and carry out activities at the Site, including environmental investigation and remediation tasks, and will provide their own health and safety officers and HASP. As part of ENVIRON's role, ENVIRON will ensure that all subcontractors and Site workers are aware of the ENVIRON HASP and its requirements.

2.2 ENVIRON Personnel

Assigned functions of key ENVIRON project team members and subcontractors are described in Tables 1 and 2, respectively, located at the end of this section. The applicable responsibilities for these individuals are as follows:

2.2.1 Project Manager/Task Leader

Responsibilities include overall coordination of Site activities. The Project Manager and the Task Leader have overall accountability and responsibility for the safety of operations and the health and safety of all personnel and for monitoring the work effort, schedule, costs, communication, and will ensure that the activities of all Site personnel comply with the approved work plans and will recommend or provide disciplinary action, as appropriate, if non-compliances occur.

These individuals will also provide the focal point for communications between the regulatory authorities; state and local community, on-site contractors, and project staff. This liaison activity will provide a clear line of communication between all parties to minimize the chance for misconceptions concerning any aspect of the project.

Any and all recommended revisions or changes in the HASP will be reviewed by the Project Manager, Task Leader and Project Health and Safety Coordinator.

Project Manager

The Project Manager, assisted by a supervisory staff, will oversee project activities. The Project Manager is responsible for monitoring the work effort, schedule, costs and communication. The Project Manager will report to the client and will coordinate any support required from ENVIRON and/or its subcontractors. The Project Manager will ensure that the activities of all Site personnel comply with the approved work plans and will recommend or provide disciplinary action, as appropriate, if non-compliances occur.

The ENVIRON Project Manager is Allan DeLorme, PE.

Task Leader

The Task Leader will be responsible for tracking project progress, project accounting, and will act as an assistant to the Project Manager. The Task Leader will stay in contact with on-site personnel and facilitate on-site operations as necessary.

The ENVIRON Task Leader is John M. Pekala, PG, CEM.

2.2.2 Corporate Health and Safety Director

The ENVIRON Corporate Health and Safety Director will oversee all issues related to health and safety and will have final approval authority for any revisions or changes to standard procedures.

The ENVIRON Corporate Health and Safety Director is Mark Watka, CIH.

2.2.3 Project Health and Safety Coordinator

The Project Health and Safety Coordinator, along with the Corporate Health and Safety Director are resources for the development of the Site-specific hazard assessments and control mechanisms. For any changes/modifications/additions to the HASP that may be needed, the Project Health and Safety Coordinator and/or the Corporate Health and Safety Director will be consulted. The Corporate Health and Safety Director will make all final decisions regarding questions on the hazard assessment and/or the control mechanisms.

Any and all recommended revisions or changes in the HASP will be reviewed by the Project Manager, Task Leader and Project Health and Safety Coordinator.

The ENVIRON Project Health and Safety Coordinators are Christopher Ritchie, PE and Dan Clark.

2.2.4 Designated Site Coordinator

The designated Site Coordinator is responsible for overseeing day-to-day Site activities performed by ENVIRON and its subcontractors. The principal responsibility of the designated Site Coordinator will be to coordinate and document all on-site work necessary to fulfill approved work plans. The Site Coordinator and Site Health and Safety Officer may be the same individual.

The Site Coordinator reports to the Project Manager, Task Leader, and Corporate Health and Safety Director. The Site Coordinator is responsible for ensuring compliance with all aspects of the HASP which include, but are not limited to, safe work practices, Site access controls, work safety zones, proper personal protective equipment (PPE), review of planned Site activities, implementation of safety procedures necessary to complete work safely, performance of daily safety briefings, assisting in on-site emergencies, and acting as technical liaison to regulatory agency personnel. The Site Coordinator will report all Site-related injuries to the Project Manager/Task Leader and the Project Health and Safety Coordinator and/or Corporate Health and Safety Director and to any other necessary authorities. The Site Coordinator will ensure that all Site personnel understand their respective emergency response duties. In the instance of any emergency or non-emergency incidents concerning Site personnel, the Site Coordinator will be contacted and will be responsible for communicating any information regarding Site

safety conditions to rescue or emergency personnel. The Site Coordinator will ensure that all activities at the Site comply with the approved HASP.

Any person working on-site has the authority to **stop work** if any operation threatens the health and safety of on-site workers or the surrounding community. In the event that such a situation occurs, the Site Coordinator shall be notified immediately. ENVIRON's Site Coordinator will update the ENVIRON Project Manager/Task Leader and on all project-related health and safety issues as they arise.

The Site Coordinator will be certified in first aid and cardiopulmonary resuscitation (CPR) by the American Red Cross, or equivalent. The Site Coordinator will also be HAZWOPER trained for Site work in accordance with applicable regulations and participate in a medical surveillance program.

In the event of an emergency, the ENVIRON Site Coordinator will also function as the Site Emergency Response Coordinator and will implement and coordinate emergency response procedures described in this HASP.

The ENVIRON Site Coordinator is Nita Shinn.

2.2.5 Site Health and Safety Officer

The ENVIRON Site Health and Safety Officer reports to the Task Leader, Site Coordinator and Project Health and Safety Coordinator. The Site Health and Safety Officer is responsible for ensuring compliance with all aspects of the HASP which include, but are not limited to, safe work practices, site access controls, work safety zones, proper personal protective equipment (PPE), and daily safety briefings. This individual may also act as the Site Coordinator. The Site Health and Safety Officer will report all Site-related injuries to the Project Manager, Task Leader, and/or the Project Health and Safety Coordinator, and to any other necessary authorities, review planned Site activities and implement safety procedures necessary to complete work safely, assist in on-site emergencies, and act as technical liaison to regulatory agency personnel. The Site Health and Safety Officer will ensure that all Site personnel understand their respective emergency response duties. In the instance of any emergency or non-emergency incidents concerning Site personnel, the Site Health and Safety Officer will be contacted and will be responsible for communicating any information regarding Site safety conditions to rescue or emergency personnel. The Site Health and Safety Officer will ensure that all activities at the Site comply with the approved HASP.

Any person working on-site has the authority to stop work if any operation threatens the health and safety of on-site workers or the surrounding community. In the event that such a situation occurs, the Site Health and Safety Officer shall be notified immediately. ENVIRON's Site Health and Safety Officer will update the ENVIRON Site Coordinator, Task Leader, and Project Health and Safety Coordinator on all project-related health and safety issues as they arise.

The Site Health and Safety Officer will be certified in first aid and CPR by the American Red Cross, or equivalent. The Site Health and Safety Officer will also be HAZWOPER trained for Site work in accordance with applicable regulations and participate in a medical surveillance program.

The ENVIRON Site Health and Safety Officer is Nita Shinn, or other personnel as designated by the Task Leader.

2.2.6 Other Personnel

All other ENVIRON personnel will be certified in first aid and cardiopulmonary resuscitation (CPR) by the American Red Cross, or equivalent and will also be HAZWOPER trained for site work in accordance with applicable regulations and participate in a medical surveillance program.

ENVIRON's subcontractors, if needed, shall prepare their own company HASP which shall specifically govern the work performed by its employees. The contractor's HASP shall be in conformance with ENVIRON's HASP.

All Subcontractors will also provide a Health and Safety Site Coordinator who will assist ENVIRON's Site Coordinator. The subcontractor Health and Safety Site Coordinator will ensure that their personnel have received appropriate health and safety training and are participating in a medical surveillance program.

Table 1: ENVIRON Personnel Contact Information

Personnel Telephone Roster			
Company/Title	Personnel	Office	Cell
ENVIRON Project Manager	Allan DeLorme	(510) 420-2565	(925) 487-7594
ENVIRON Task Leader	John Pekala	(602) 734-7710	(707) 815-7474
ENVIRON Corporate Health and Safety Director	Mark Watka	(312) 288-3875	(312) 927-1140
ENVIRON Project Health and Safety Coordinators	Chris Ritchie Dan Clark	(510) 420-2542 (510) 420-2563	(510) 418-0535 (510) 299-7036
ENVIRON Designated Site Coordinator	Nita Shinn	N/A	(312) 927-1146
ENVIRON Designated Site Health and Safety Officer	Nita Shinn	N/A	(312) 927-1146
Client Contact	Andy Steinberg	(312) 498-2800	(312) 498-2800
Tronox Contact	John Holmstrom	(702) 651-2305	(702) 465-6703

Table 2: Contractor/Subcontractor Contact Information

Contractor/Subcontractor Telephone Roster			
Company/Title	Personnel	Office	Cell
Envirogen Technologies	Wendy Prescott	Not Available	(702) 371-9307

3 Hazard Evaluation

The Project Hazard Analysis below identifies the hazards anticipated to be encountered by the project team based on the tasks presented in Section 2.5.

Table 3: Project Hazard Analysis

Chemical Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Flammable/combustible <input checked="" type="checkbox"/> Compressed gas <input type="checkbox"/> Explosive <input type="checkbox"/> Organic peroxide <input checked="" type="checkbox"/> Oxidizer <input type="checkbox"/> Water reactive <input type="checkbox"/> Unstable reactive <input checked="" type="checkbox"/> Dust/Fumes/Particulates	<input checked="" type="checkbox"/> Corrosive <input checked="" type="checkbox"/> Toxic <input checked="" type="checkbox"/> Highly Toxic <input checked="" type="checkbox"/> Irritant <input type="checkbox"/> Sensitizer <input checked="" type="checkbox"/> Carcinogen <input type="checkbox"/> Mutagen <input type="checkbox"/> Other:
Physical Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Heat <input checked="" type="checkbox"/> Cold <input checked="" type="checkbox"/> Walking/working surfaces <input checked="" type="checkbox"/> Visible Dust <input type="checkbox"/> Other:	<input type="checkbox"/> Ionizing radiation <input type="checkbox"/> Non-ionizing radiation <input checked="" type="checkbox"/> Electricity <input checked="" type="checkbox"/> Severe Weather <input type="checkbox"/> Poor lighting <input checked="" type="checkbox"/> Overhead Hazards <input type="checkbox"/> Other:
Environmental/Equipment Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Heavy machinery/ Drill Rigs <input checked="" type="checkbox"/> Trenching/excavation <input type="checkbox"/> Docks-marine operations <input type="checkbox"/> Docks-loading <input checked="" type="checkbox"/> Drilling <input checked="" type="checkbox"/> Forklifts <input checked="" type="checkbox"/> Operations on Water <input type="checkbox"/> Elevated heights (includes fall protection) <input checked="" type="checkbox"/> Overhead/Underground utilities <input type="checkbox"/> Confined spaces <input checked="" type="checkbox"/> Power tools	<input type="checkbox"/> Cranes/Hoists/Rigging <input type="checkbox"/> Ladders <input type="checkbox"/> Scaffolding <input type="checkbox"/> Manlifts <input checked="" type="checkbox"/> Gas cylinders <input checked="" type="checkbox"/> Roadway work <input type="checkbox"/> Railroad work <input type="checkbox"/> Energized equipment (LO/TO) <input type="checkbox"/> Pressurized equipment (LO/TO) <input checked="" type="checkbox"/> Drums and containers <input type="checkbox"/> Others:
Biological Hazards Present: <input type="checkbox"/> None	<input type="checkbox"/> Animal/human fluids or blood <input type="checkbox"/> Animal/human tissue(s) <input checked="" type="checkbox"/> Poisonous/irritating plants <input type="checkbox"/> Other:	<input type="checkbox"/> Contaminated needles <input checked="" type="checkbox"/> Live bacterial cultures <input checked="" type="checkbox"/> Insects/rodents/snakes <input checked="" type="checkbox"/> Other: Coyotes
Ergonomics Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Repetitive motion <input checked="" type="checkbox"/> Awkward position <input checked="" type="checkbox"/> Heavy Lifting <input checked="" type="checkbox"/> Frequent Lifting <input type="checkbox"/> Other:	<input type="checkbox"/> Limited movement <input type="checkbox"/> Forceful exertions <input checked="" type="checkbox"/> Vibration <input type="checkbox"/> Other:
Personal Safety/Security: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Personal safety <input type="checkbox"/> Security issue <input checked="" type="checkbox"/> Project site in isolated area <input checked="" type="checkbox"/> Employees working alone <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Employees working early/late <input checked="" type="checkbox"/> Potentially dangerous wildlife <input checked="" type="checkbox"/> Guard or stray dogs in area <input type="checkbox"/> No/limited cell phone service <input type="checkbox"/> Other:

3.1 Specific Chemicals of Concern

The chemicals listed in the table below includes the identification of chemical contaminants known and/or suspected of being present on-site, the affected media, known concentrations (if applicable), the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV), and the Action Level (i.e., 50% of the PEL/TLV). This information will be inserted into Table 4 below. In

addition, Appendix A contains specific hazardous property information for commonly encountered chemicals although a Material Safety Data Sheet (MSDS) (or equivalent) will also be included in Appendix A.

Table 4: Chemicals of Concern

Chemical	Environmental Media ¹	Highest Measured Concentration (Before 2010-2011 Soil Remediation)	Highest Measured Concentration (After 2010-2011 Soil Remediation)	PEL/TLV ²
Manganese	SO	560,000 mg/kg	300,000 mg/kg	0.2 mg/m ³
Hexachlorobenzene	SO	790 mg/kg	300 mg/kg	0.002 mg/m ³
Arsenic	SO	2,000 mg/kg	2,000 mg/kg	0.010 mg/m ³
Perchlorate	SO, GW	56,000 mg/kg (SO) 18,000 mg/l (GW)	56,000 mg/kg (SO) 18,000 mg/l (GW)	NL
Dioxin/Furans	SO	1,900,000 pg/g	73,000 pg/g	NL
Asbestos	SO	94 s/samp	58 s/samp	0.1 f/cc
Hexavalent chromium	SO, GW	140 mg/kg (SO) 47 mg/l (GW)	106 mg/kg 47 mg/l (GW)	NL
Total Volatile Organic Compounds	SO, GW	138 mg/kg (SO) 196.1 mg/l (GW)	138 mg/kg (SO) 196.1 mg/l (GW)	Various The most strict for some common compounds are 1 ppm

Notes:

- Highest concentrations measured as reported above apply to the NERT Site as a whole. Individual work areas may have lower concentrations of the chemicals of concern, or there may not be prior data available.
- Other Chemicals of Potential Concern (COPCs) that may be present at the site include chlorate, other metals including rare earth metals, SVOCs, PAHs, PCBs, petroleum hydrocarbons, organochlorine pesticides, organophosphorus pesticides, radionuclides, and organic acids. These COPCs are not expected to be a significant factor in potential exposures to field personnel.

¹ Codes for environmental media: **SL**=Sludge; **GW**=Ground Water; **SW**=Surface Water; **LW**=Liquid Waste; **SO**=Soil; **A**=Air; **OTH**= Other (Specify)

² PEL: Permissible Exposure Limit / TLV: Threshold Limit Value, use appropriate PEL which would be country or state specific or if one is not available may be from a recognized source.

mg/m³: milligrams per cubic meter

mg/l: milligrams per liter

ppm: Parts per million

s/samp: structures per sample

%: Minimum percent allowed for personal entry into a space

NL: No limit found in reference materials

3.1.1 Chemical Hazards

Chemical hazards at the Site consist of potential exposure to contaminants that will be encountered in soil or pond sediments during excavation and soil sampling activities; potential exposure to contaminants encountered in groundwater during groundwater sampling; potential

exposure to chemical preservatives found in laboratory-supplied sample containers; and potential exposures to chemicals stored, used, and manufactured on-site by Tronox.

3.1.2 Hazardous Chemicals in Soil and Groundwater

Based on extensive soil and groundwater investigations conducted at the Site, the primary contaminants of concern and their general locations of impacted environmental media are:

- Manganese compounds – manganese tailing area and groundwater
- Dioxin/Furans – impacted soil in former effluent pond areas
- Hexachlorobenzene – impacted soil in former trade effluent pond areas
- Asbestos – impacted soil in areas of building demolition
- Perchlorate compounds – soil around production facilities, AP-5 pond solids, groundwater, and associated treatment system
- Hexavalent chromium – soil around production facilities, groundwater, and associated treatment system
- Arsenic – in shallow soils throughout the Site and groundwater downgradient of Unit 4 Oxidizing compounds (sodium chlorate filter cakes and potassium perchlorate process waste solids) – the hazardous waste landfill area in northwest corner of RZ-D
- Volatile Organic Carbons (VOCs) – groundwater and west side of RZ-D/E Semi-Volatile Organic Compounds (SVOCs) / Polycyclic aromatic hydrocarbons (PAHs) – soils throughout the Site, particularly around Site buildings and production areas
- Materials related to production (e.g., boron) – soils around production facilities and groundwater
- Metals (i.e., magnesium, uranium) – soils around production facilities and groundwater
- Other ions (ammonia, chloride, nitrate, phosphate, sulfate) – in soils and groundwater at various locations throughout the Site

Other contaminants detected in soil at the Site less frequently include the pesticides dieldrin, DDD, DDE, and DDT. The primary exposure pathway for contaminants of concern is dermal contact. The appropriate safeguards provided in this HASP are designed to prevent all contact (dermal and otherwise) with contaminants of concern at the Site.

Based on the age of buildings and electrical equipment (e.g., transformers and capacitors) at the Site, lead-based paint, polychlorinated biphenyls (PCBs), and mercury may be present. Future demolition, repair, and/or redevelopment activities at the Site need to incorporate measures to assess the presence of these hazardous materials and specify how they will be addressed within the planned action.

3.1.3 Primary Contaminants of Concern in Soil and Groundwater

The sections below briefly discuss the primary contaminants of concern in soil and groundwater. Additional chemical information is included in Appendix D.

Manganese Compounds

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods and may be added to some foods. The most common health problems in workers exposed to high levels of manganese involve the nervous system. These health effects include behavioral changes and other nervous system effects, which include movements that may become slow and clumsy. This combination of symptoms when sufficiently severe is referred to as "manganism". Other chronic effects reported in humans from inhalation exposure to manganese are respiratory effects such as an increased incidence of cough, bronchitis, dyspnea during exercise, and an increased susceptibility to infectious lung disease.

Dioxins/Furans

Dioxins and furans are a class of similar chlorinated aromatic organic compounds. Dioxins have two phenyl rings connected by two oxygen atoms. Furans have one or two phenyl rings connected to a furan ring. One or more chlorine atoms can attach to any available carbon atom, allowing for 100 - 200 forms of each. Dioxins and dioxin-like furans have no known commercial or natural use. They are produced primarily during the incineration or burning of waste; the bleaching processes used in pulp and paper mills; and various chemical syntheses. Most of the population has low-level exposure to dioxins. Although dioxins are environmental contaminants, most dioxin exposure occurs through the diet. Small amounts of exposure occur from breathing air containing trace amounts of dioxins on particles, from inadvertent ingestion of soil containing dioxins, and, to a lesser degree, from absorption through the skin.

One chemical in this group, 2,3,7,8-tetrachlorodibenzo-p-dioxin or 2,3,7,8-TCDD, has been shown to be very toxic in animal studies. It causes acne-like lesions on the skin called "chloracne" and may cause cancer in people. In people, exposure to furans is most likely to cause skin and eye irritation, and increased vulnerability to respiratory infection and nervous system effects.

Hexachlorobenzene

Hexachlorobenzene was widely used as a pesticide until 1965. It was also used to make fireworks, ammunition, and synthetic rubber. Hexachlorobenzene is a white crystalline solid that does not occur naturally in the environment. Studies in animals show that ingesting hexachlorobenzene for a long time can damage the liver, thyroid gland, nervous system, bones, kidneys, blood, and immune and endocrine systems. A study in rats indicated that inhalation hexachlorobenzene harmed immune systems.

Asbestos

Asbestos is the name given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment. Asbestos has been used for a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings. Asbestos fibers may be released into the air by the disturbance of asbestos-containing material where they can be inhaled into the lungs. Breathing high levels of asbestos fibers for a long time may result in scar-like tissue in

the lungs and in the pleural membrane (lining) that surrounds the lung. These diseases, asbestosis, lung cancer, and mesothelioma, are usually found in workers exposed to asbestos. People with these diseases can have difficulty breathing, often a cough, and in severe cases heart enlargement. These diseases can eventually lead to disability and death. It is also known that breathing asbestos can increase the risk of cancer in people. Respiratory protection is required when working around asbestos that can, or has become airborne.

Perchlorate

Perchlorates are colorless salts that have no odor. There are five perchlorate salts that are manufactured in large amounts: magnesium perchlorate, potassium perchlorate, ammonium perchlorate, sodium perchlorate, and lithium perchlorate. Perchlorates can be very reactive chemicals that are used mainly in fireworks, explosives, and rocket motors.

Perchlorate salts dissolve easily in water. Ingestion of food and water containing perchlorates are the most relevant routes of exposure. Efforts are being made to determine the relative contribution of perchlorate from food and water. High levels of perchlorates can affect the thyroid gland, which in turn can alter the function of many organs in the body. The fetus and young children can be especially susceptible.

Arsenic

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling. Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. Very little is known regarding health effects of organic arsenic compounds in humans.

Hexavalent Chromium

Hexavalent chromium refers to chemical compounds that contain the element chromium in the +6 oxidation state. Hexavalent chromium is present in a variety of compounds including the salt sodium dichromate (as well as other chromate and dichromate salts), chromium trioxide, and chromic acid. Hexavalent chromium is used in making stainless steel, textile dyes, wood preservatives, leather tanning products, anti-corrosion coatings, and a variety of niche uses. Hexavalent chromium can be formed when performing "hot work" such as welding on stainless steel or melting chromium metal.

Inhaled hexavalent chromium is recognized as a human carcinogen. Hexavalent chromium compounds are genotoxic carcinogens. Chronic inhalation increases the risk of lung cancer, as

well as gastrointestinal cancers. Ingestion of hexavalent chromium can also cause irritation or ulcers in the stomach and intestines.

Oxidizing Compounds

Wastes disposed of in the hazardous waste landfill area of the Site contained sodium chlorate filter cakes and potassium perchlorate process waste solid mixed with soil. Both sodium chlorate and potassium perchlorate are strong oxidizers. Oxidizers have the capacity to provide excess oxygen at elevated temperatures and these chemicals may pose a fire and explosion hazard when they come in contact with all forms of combustibles (wood, paper, textiles, plastics, liquid fuels, etc.). In addition, mixtures of oxidizers and combustibles can be ignited by a heat energy originating from a weak ignition source such as friction, physical impact or static electricity. See the precautions listed in Section 4.1.4 when working in this area.

Sodium chlorate and potassium perchlorate are skin and eye irritants. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation.

Volatile Organic Compounds

Volatile Organic Compounds (VOCs) include a large variety of disparate chemicals, some of which may have short- and long-term adverse health effects. The common characteristic between all VOCs is that they produce vapors that can be inhalation hazards. The most common symptoms associated with exposure to VOCs are eye, nose, and throat irritation; headaches; loss of coordination; and nausea. Long-term exposure to VOCs may cause damage to the liver, kidneys, and central nervous system. Some VOCs are suspected or known to cause cancer in humans.

3.1.4 Hazardous Process Chemicals

Tronox currently operates processes to produce manganese dioxide, boron trichloride, and elemental boron on a portion of the NERT Site that is leased to Tronox. The section below briefly discusses the primary chemicals of concern. While field personnel are not expected to be exposed to these chemicals, they are included based on the potential for exposure during an emergency such as a fire or chemical leak from Tronox-leased areas of the Site.

Boron Trichloride

Boron trichloride (BCl₃) is manufactured by Tronox and reacts violently with water. Fumes are highly irritating and corrosive. Personnel exposed to gaseous boron trichloride should change into fresh clothing since clothing absorbs fumes rapidly. If liquid boron trichloride comes into contact with skin, it should be immediately wiped dry before attempting to rinse skin. If even a small amount of boron trichloride comes into contact with eyes, irrigation with large quantities of water should be initiated immediately and continued for at least fifteen minutes.

Carbon Monoxide

Carbon monoxide is a poisonous gas that is odorless and tasteless. It can be flammable and possibly explosive if mixed with air. Ordinary cartridge respirators are not sufficient to protect from carbon monoxide poisoning; self-contained breathing apparatus (SCBAs) will provide protection. Symptoms of carbon monoxide poisoning include headache, unconsciousness, convulsions, accelerated breathing and discoloration of the skin, usually a bright red.

Caustic soda (sodium hydroxide), Lime, and Soda Ash

As powders, caustic soda, lime, and soda ash are skin irritants that may affect eyes, mucous membranes, and the respiratory tract. As liquids and vapors, they are caustic substances that can burn skin and eyes. If any form of the chemical comes into contact with the body, wash immediately with large amounts of water.

Chlorine gas

Chlorine gas is an irritant to eyes, mucous membranes, and the respiratory system. If inhalation occurs, artificial respiration or administration of oxygen may be necessary. Liquid chlorine will cause skin burns. Skin that has come into contact should be flushed with large amounts of water.

Hydrogen Sulfide and Sodium Hydrosulfide

Hydrogen sulfide is a potentially deadly gas that may be fatal in low concentrations. Victims of inhalation should be removed to an area with fresh air and areas contaminated with hydrogen sulfide gas may only be entered with a SCBA. Hydrogen sulfide is also explosive in air when it is present between 4.3 and 46% by volume. Sodium hydrosulfide is a corrosive liquid that contains hydrogen sulfide. If any form of the liquid comes into contact with the body, wash immediately with large amounts of water.

Filter Aid (perlite or diatomaceous earth), silica sand

When inhaled over long periods of time, filter aid and silica sand may be harmful. Working with them requires the use of a respirator.

Magnesium and Titanium Metals

Magnesium metal is highly flammable when exposed to a flame and is dangerous when it comes into contact with water and moisture. If ignited, titanium metal cannot be extinguished by water. Both magnesium and titanium metals require Class D fire extinguishers.

Manganese Dioxide

Manganese dioxide dust is not harmful in small amounts, but is a health hazard if breathed or swallowed in large amounts. A respirator must be worn when it is present in large amounts. Personal cleanliness is important when skin is exposed to manganese dioxide; to prevent ingestion, hands must be washed before eating or smoking.

Sulfuric Acid

Sulfuric acid is a caustic liquid that may cause burns. Wash skin and eyes with large amounts of water in the event of contact. Sulfuric acid may also react with metal to create hydrogen gas, which is highly flammable and potentially explosive.

Nitrogen gas

Nitrogen gas is only dangerous as a breathing hazard if it dilutes the concentration of oxygen in air.

Other process chemicals—natural gas, propane or liquefied petroleum gases, solvents

Other flammable process chemicals are used at the Site. It is unlikely that personnel will encounter these chemicals, but should be aware of the potential for explosion.

3.1.5 Skin and Eye Contact

Skin and eye contact with contaminants may cause skin or mucous membrane irritation. Gloves and other PPE to protect exposed skin must be worn. Eye protection will be required during all field and sample processing activities.

3.1.6 Inhalation of Contaminated Dust

Construction-type methods of dust suppression will be employed for activities that significantly disturb the soil and that are expected to generate visible dust. For activities expected to generate visible dust, air monitoring will also be performed in accordance with Section 8 of this HASP. Soil excavation, trenching, and test pits are activities that are expected to require dust suppression. Drilling for soil and soil vapor sampling and/or well construction is generally not expected to generate visible dust.

The main mechanism for the control of fugitive dust emissions from construction activities and wind erosion is by watering, which leads to the formation of a surface crust to reduce the available reservoir of dust. The effectiveness of wet suppression is dependent on the type of activities occurring, the frequency of watering, and the meteorological conditions. The watering schedule will be determined by an evaluation of the air monitoring and meteorological data, Site conditions, and Site activities.

To avoid creating airborne dust, soil residues on equipment and vehicles will be removed daily in accordance with the decontamination procedures included in Section 10 of this HASP. In addition, Site workers will follow the personal hygiene and prevention of contamination procedures outlined in Section 5.5.1 of this HASP to prevent individual exposures to soil residues on their person.

A Dust Control Permit may be required for certain activities involving soil disturbance of the following dimensions:

- Soil-disturbing or construction projects greater than or equal to 0.25 acres;
- Trenching projects greater than or equal to 100 feet in length; or
- Mechanical demolition of any structure larger than or equal to 1,000 square feet.

Minimum requirements for activities requiring a Dust Control Permit include completing a permit application and preparing a Dust Mitigation Plan. Additional requirements may be necessary for larger projects as described in the Construction Activities Dust Control Handbook (Clark County Department of Air Quality).

3.1.7 Inhalation of Volatile Chemicals

Site personnel will monitor any indications of potential VOCs (as evidenced by odors, indications of free product, or unusual discoloration) during their work activities. If any of these are observed, a PID will be utilized to monitor worker breathing zones as described further in Section 8.2.1 of this HASP.

3.1.8 Incidental Ingestion

Field personnel may be exposed to accidental ingestion of contaminants by hand to mouth contact after handling contaminated equipment or by collecting and processing samples. In addition to the use of PPE, hand and face washing (personal hygiene) are essential after handling soil, ground water, or equipment and prior to handling food, drinks, or tobacco products.

4 Hazard Controls

In order to conduct a Task in the safest possible manner, the hazard(s) associated with a Task need to be identified so that appropriate hazard control(s) can be implemented and used by personnel conducting these Task(s). This process is called a “Job Hazard Analysis (JHA) or “Job Safety Analysis” (JSA). To aid in the JHA/JSA process, the associated Task(s) (as outlined in Section 2.5) are correlated against the anticipated hazards. A “Relative Hazard/Risk Rating” is also provided in order to identify which hazards pose the greatest risk to personnel but more importantly, what hazard controls should be implemented.

Table 5: Control of Hazards Summary

Task Number(s)	Hazards	Relative Hazard /Risk Rating*				Hazard Controls Appendix and/or HASP Section
2-9	Chemical	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B1
1-11	Physical	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B2
2-5,7-11	Mechanical	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B3
1-3,5-11	Traffic/Equipment	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B4
1,2,8,10,11	Electrical Hazards/Safety	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B5/B20
2,3,11	Fire/Explosion	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B6
2,3,4,7,10,11	Noise (acoustical)	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B7
NA	Ventilation / Oxygen Deficiency	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B8
1-11	Heat Stress	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B9
1-11	Cold Stress	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B10
1-11	Insects, Spiders, Snakes	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B11
1-11	Poisonous Plants	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B12
6,7,8,10,11	Personal Safety	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B13
4,7,9	Working Alone	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B14
1-11	Severe Weather	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B15
1,2,3,7,9,10,11	Above and Under-ground Utilities	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B16 & Sections 4.2 - 4.3
3,9,10,11	Trenching/Excavation	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B17
NA	Water Safety	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B18
2,4,6,8,9	Material Handling / Ergonomics	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B19
NA	Power Tools	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B20
1-11	Vehicle Use	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B21
NA	Seasonal Hunting	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B22
9,10,11	Demolition	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>	B23
NA	Unexploded Ordinances	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B24
NA	Closed/Abandoned Mine	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B25
NA	Confined Space	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	Section 9
2,4-6,8-11	Spills	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>	B26 & Section 10

***Relative Hazard/Risk Rating**

When evaluating a Task against a specific hazard, the evaluator should:

1. **Determine how frequently you will be conducting the Task and generally be exposed to the Hazard while on-site;**
2. **Determine the duration (i.e., the amount of time) you will spent conducting the Task; and**
3. **Determine the Severity that the Task/Hazard may cause using Table 6. When assessing the severity, assume the hypothetical injury was a result of the task being conducted improperly and that PPE was not being worn:**
 - **Minimal Severity** would require first aid and/or the property/equipment damage is limited to minor wear and tear, scratches, dents (still functional);
 - **Moderate Severity** requires professional medical attention and/or the property/equipment damage necessitates repair but not replacement; and
 - **High Severity** requires immediate medical attention/life threatening and/or the property/equipment damage is significant and requires replacement.

NOTE: A single hazard maybe listed under several Tasks. In this case, use the highest Severity ranking of the tasks evaluated as the overall ranking.

Table 6: *Relative Risk Rating Decision Table

The Hazard...	Has No Severity	Has Minimal Severity	Has Moderate Severity	Has High Severity
Is Not Present (i.e., 0% of your on-site time does not expose you to this Hazard)	NA	NA	NA	NA
Is Rarely Present (i.e., <25% of your on-site time exposes you to this Hazard)	NA	LOW	LOW	MED
Is Sometimes Present (i.e., 25% - <50% of your time exposes you to this Hazard)	NA	LOW	MED	HIGH
Is Frequently to Constantly Present (i.e., 50% to 100% of your time exposes you to this Hazard)	NA	MED	HIGH	HIGH

4.1 Work Zones

At areas where intrusive investigation activities or sampling will occur, or anywhere there is expected to be significant potential for exposure to contaminants of concern and/or hazardous conditions, work zones for site control will be established. Work zones include, and are defined as:

- Exclusion Zone: the contaminated area.
- Contamination Reduction Zone (CRZ): the area where decontamination takes place.
- Support Zone: the uncontaminated area where workers are not expected to be exposed to hazardous conditions.

Delineation of these three zones should be based on sampling and monitoring results and on an evaluation of potential routes and amount of contaminant dispersion in the event of a release. Movement of personnel and equipment among these zones should be minimized and restricted to specific access control points to prevent cross-contamination from contaminated areas to clean areas.

4.2 General Site Safety

All activities will be conducted in a manner that minimizes hazards and employee exposures to such hazards. The following are some general safety rules that must be followed while on-site:

- All personnel who perform on-site operations with the potential for exposure to hazardous substances are required to meet personnel training requirements and medical surveillance criteria, which are described in this HASP.
- All hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with accepted material handling procedures.
- Personnel will wear personal protective equipment as required.
- All work on-site, will be planned and supervised by the appropriate personnel to prevent injuries.
- All injuries and accidents will be reported.
- Supervisors will ensure that their employees observe and obey all safety rules and regulations required for the safe conduct of work.
- Alcoholic beverages and illegal drugs will not be allowed on-site. Possession of either will be grounds for disciplinary actions.
- No employee will be assigned to a task without first having been instructed on proper methods of carrying out the task.
- All posted safety signs will be obeyed.
- Space around on-site emergency and fire-fighting equipment will be kept clear.
- All trash and discarded materials will be staged in an orderly fashion and regularly removed from the Site.

- Approval to perform work operations alone must be preapproved by the Site Project Manager, Task Leader or Project Health and Safety Coordinator and a communication plan must be established.
- Smoking, eating, drinking, and chewing gum or tobacco will not be permitted within the work zones and will follow applicable decontamination procedures prior to eating, drinking, and/or smoking.
- Personnel should keep track of weather conditions and wind direction to the extent they could affect potential exposure.
- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.
- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. These should be immediately reported to their supervisor or the Site Health and Safety Officer.
- Visible indicators of potentially immediate danger to life and health (IDLH) conditions include:
 1. Large containers and tanks that must be entered.
 2. Enclosed spaces such as buildings or trenches that must be entered.
 3. Potentially explosive or flammable situations (indicated by bulging drums, effervescence, gas generation, or instrument readings).
 4. Extremely hazardous materials (such as cyanide, phosgene, or radiation sources).
 5. Visible vapor clouds.
 6. Areas where biological indicators such as dead animals or vegetation are located.

4.3 Specific SSC Requirements

The hazards posed by the presence of underground and overhead services are significant. Where there is a requirement for ground penetrating activity, the work shall be thoroughly vetted prior to commencing subsurface work. No intrusive work is to be conducted until the hazards associated with the possible presence of underground and overhead services have been properly identified, and safe locations for intrusion marked and agreed upon. This applies to any intrusive Site work (i.e., any work which will involve the disturbance or penetration of the ground or manmade surface by mechanical or manual means, INCLUDING: trial pit excavations, borehole excavations (shell and auger, rotary, hydraulic, percussive), gas spiking, manual excavations, hand digging, intrusion into vertical, indoor, or below ground surfaces, and/or any other on-site activity where disturbance of the ground surface is required). If conducting intrusive activities, the following tasks must be completed **and documented** prior to initiating ground disturbance activities (each is summarized below):

4.3.1 Historical Site Information Review

Obtain the most recent as-built drawings and/or Site plans (including underground storage tank (UST), product and vent lines), as available. Consider requesting any other Site plot plans,

surveys, photographs, and information that might be instructive from the client or other sources. Site information reviewed shall be specified in Table 7 SSC Actions (below).

4.3.2 Plot Plan

Develop a plot plan that accurately reflects all available information and Site conditions as accurately as possible, including the number of facilities/pipelines or utilities, locations and alignments. The plot plan shall be updated as SSC activities commence to properly capture Site conditions or visual indicators. Intrusive activities shall not proceed without an updated plot plan or drawing.

4.3.3 Pre-Marking Ground Disturbance Locations

Whenever feasible, ground disturbance locations and/or areas shall be pre-marked using white stakes, white paint or white flags (or black in cases where snow is on the ground) prior to the public and/or private utility mark-outs. Pre-marking provides the line locators with visual boundaries as guidance in clearing locations and placing marks.

4.3.4 Line Location Services

In areas where public and private resources are available, **ENVIRON will contact both public and private utility locate services for any project that involves intrusive activities.** In order to give line operators sufficient time to respond to a request to locate, a minimum of 72 business hours is required prior to the planned start of work. In the event that the driller/excavator retains these services, ENVIRON will conduct a follow-up to confirm utility locate information.

Meet directly with the private locator and provide them with location plans, if possible. If an on-site meeting with the private locator is not possible, you **MUST** contact the private locator so that they understand the scope of the proposed subsurface work and the extent of their activities.

4.3.5 Site Walkover-Visual Indicators

The Designated Person (ENVIRON Site Coordinator, Site Health and Safety Officer, Task Leader, Project Health and Safety Coordinator, or experienced ENVIRON field engineer/geologist) **MUST** conduct site walk-over and complete the SSC Field Checklist (Appendix C) for all projects that involve ground disturbance. The site walk-over and visual inspection is most effective when completed during locating activities, but, at a minimum, must be completed **PRIOR** to ground disturbance. The main intent of the SSC Field Checklist is to identify above ground indicators which may identify the potential existence of subsurface issue. It will also be used to confirm that common utilities have been accounted for, located and verified. Any potential underground utilities should be marked on a Site plot plan and the site walkover should be documented utilizing ENVIRON's Subsurface Clearance Field Checklist.







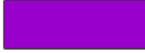

4.3.6 Utility Mark-out

All known pipelines and utilities, as noted on the plot plan, pipeline map or drawing, that pass within the search zone must be located, identified and marked to indicate location and alignment.

A qualified and competent line locator shall conduct line-locating practices utilizing available pipeline maps or plot plans for all areas within the search zone. Direct connection (clamping on) to all possible nearby underground services should be undertaken whenever possible to increase the success rate/reliability in locating. **The specific ground penetration location must be cleared to the edge of the critical zone** (5 feet or 1.5m area surrounding intrusive locations/areas in every direction) using a search and sweep method to verify maximum detection capabilities.

If anticipated services are not identified or located, drilling or ground disturbance will not occur until the service is visually identified.

Commonly used utility mark out colors and identifiers are listed below:

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

Upon completion of their work (whether you are on-site or not), the private locator **MUST** contact you to present their results. In addition to providing you with an overall summary of their work, **they must also inform you of any unique circumstance(s) which limited their ability in locating the potential presence of underground utilities (e.g., the existence of overhead electrical lines); if they encountered any abnormalities (e.g., concrete surfaces with reinforced rebar); and/or any other condition which may have diminished the validity of their results and efforts.**

Where doubt exists over the location of a service, request a site visit from the appropriate utility provider or abandon locations in the immediate area and contact the Project Manager and/or Project Health and Safety Coordinator.

4.3.7 Clearance of Ground Disturbance Locations & Critical Zones

After anticipated utilities have been located and marked, use the available information along with regulatory requirements and project objectives to select final ground disturbance locations.

Each specific ground penetration location must be cleared to the edge of the critical zone (5 feet or 1.5m area surrounding intrusive locations/areas in every direction) using a search and sweep method to verify maximum detection capabilities. Ensure that all detected services and

those featured on location plans are outside of the critical zone of EACH location where intrusive work will occur, using a sweep and search method.

The critical zone takes into account minimum tolerance distances from facility lines (which vary by location) and uncertainties introduced by on-site conditions, human factors, and equipment. **No intrusive activities shall take place within a critical zone with which utilities or visual indicators intersect.** When known utilities intersect ground disturbance critical zones, boring and/or excavation location criteria should be reevaluated by the Designated Person, Project Health and Safety Coordinator, and Task Leader, and if possible, moved to a pre-cleared alternate location.

In the event that work is required to be conducted in a critical zone containing a marked utility or visual indicator, approval MUST be obtained from the Project Manager, Task Leader and Corporate Health and Safety Director prior to ground penetrating activities.

4.3.8 Overhead Lines

Ensure that any ground penetrating activities are located a minimum of 28 feet (9m) horizontally from any overhead electric cable supported wooden poles, or 50 feet (15m) horizontally in the case of those supported on metal poles/towers. Where this cannot be achieved, contact relevant electricity provider for guidance as well as the Project Manager, Task Leader and Corporate Health and Safety Director.

4.4 SSC Summary

If the tasks presented in this HASP involve ground penetrating work, Table 7 and the specific procedures outlined in section 4 are applicable and must be followed. Table 7 summarizes the steps required to be completed, including justification of any exceptions. This table must be completed in its entirety prior to conducting subsurface work. If certain requirements are not applicable, describe reason for exemption.

The SSC Project Checklist (Table 7) is to be completed by the HASP preparer and used as a guideline for the activities that must be planned for SSC project work. Planned and proposed dates and activities should be included by the HASP preparer, and information updated as it become available. If field practices differentiate from plans proposed and documented on the SSC Project Planning Checklist (like walkover dates or historical documents reviewed), it is the Designated Person's responsibility to update the project-specific HASP and SSC Project Planning Checklist to reflect these changes. Any deviations from these requirements must be documented and approved prior to the commencement of ground disturbance activities.

Table 7: SSC Project Planning Checklist

Subsurface Clearance (SSC) Pre-Project Planning Checklist Document the steps that must be followed and justify any exceptions. This checklist MUST be completed in its entirety.				
SSC Requirements	Yes	No	NA	Comments
1 Prequalification of Contractor for capability of ground disturbance work performed (See Section 4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2 "Designated Person" for SSC work assigned (must be on-site)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3 Historical Site Information Review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4 Development of Site-specific plot plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5 Ground penetrating location marked prior to locate(s) and alternate locations chosen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6 Service notifications provided to clear/locate public utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7 Private locate contracted for on-site utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8 Designated Person present during private locating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9 Underground utilities identified prior to commencement of intrusive activities as reasonably feasible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10 Site walkover conducted to assess utility locations, visual indicators and complete SSC Field Checklist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11 Ground penetration locations(s)/area(s) and Critical Zones (i.e., the 5ft or 1.5m distance surrounding intrusive activities in every direction) cleared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note: This checklist will be completed for tasks involving intrusive sampling or excavation activities, on a task-by-task basis.

5 Personnel Training Requirements

All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards will meet the personnel training requirements in accordance with applicable regulations. The training policies and procedures will ensure that personnel can recognize hazards, understand emergency response procedures, and have the knowledge necessary to enable them to perform their assigned jobs in a manner that ensures employee and public safety. Completion of appropriate health and safety training, as described below, and participation of medical surveillance will be required to gain access to on-site areas other than the Support Zone. Documentation of training includes initial 40-hour health and safety training, 8 hours of annual refresher training, 8 hours of supervisor training, supervised field experience, first aid training, and CPR certification.

Note that if personnel will be working on the Tronox property, they must have a current Tronox safety orientation certification (“yellow card”) and must sign in and out at the security office next to the main Site entrance gate. The safety orientation certification is obtained by attending a safety orientation class prior to working on the Tronox property. This course is held every Tuesday at 8:00 AM, at the Tronox facility training center, located on Van Wagenen Road (the Tronox main entrance road). The training course lasts approximately 3 hours. Upon completion of the training, personnel are authorized to work inside the Tronox facility for a period of 1 year.

5.1 Initial Training

A. Basic Health and Safety Training

A minimum of 24 hours of initial health and safety training off-site is required to obtain on-site access to areas other than the Support Zone. All personnel engaged in or supervising activities in the EZ or CRZ (see Section 4.1) will have a minimum of 40 hours of initial health and safety training off-site, in accordance with applicable regulations.

B. Supervised Field Experience

All personnel with 24 hours of initial health and safety training are also required to have a minimum of 1 day of field experience under the direct supervision of an experienced supervisor. Personnel with 40 hours of initial health and safety training are required to have a minimum of 3 days of field experience under the direct supervision of an experienced supervisor.

C. Supervisor Training

All on-site managers and supervisors directly responsible for, or who supervise personnel engaged in invasive Site activities will have received the initial 40-hour health and safety training and at least 8 additional hours of specialized off-site training in accordance with applicable regulations. This specialized training will include topics such as, but not limited to, regulatory compliance, management of on-site health and safety hazards and recognition of special personnel training needs.

D. Health and Safety Officer Training

Health and safety officers will be trained to a level required by their job function and responsibility. This will include training in implementation of HASPs and compliance with applicable health and safety requirements.

E. First Aid and CPR Training

ENVIRON personnel will maintain first aid and CPR training as certified by the American Heart Association (or equivalent) to render first aid and CPR.

5.2 Refresher Training

All personnel who have received 40 hours of initial health and safety training will receive 8 hours of refresher training annually, as specified in accordance with applicable regulations. Topics to be covered in this training program will include those specified in the initial 40-hour health and safety training and/or those specified in the supervisory training course, as well as a critique of incidents that could serve as training examples.

Project-specific refresher training will be provided when the project scope is changed and/or when the hazards change.

A. Site Safety Briefings

Site safety briefings will be conducted prior to the start of each work day or work shift to discuss health and safety issues, changes in work procedures, exposure incidents and other relevant information. Prior to each change in operations, the meetings will address PPE use and maintenance, physical safety hazards from machinery, protection from chemical hazards, decontamination procedures, protection from heat/cold stress and specific safety requirements associated with the new operations. During safety meetings, on-site personnel qualified to perform first aid and CPR will be identified. All changes in the HASP will be reviewed during the morning safety briefing. A record of the meeting will be written daily and signed by all participants and included in section 13.0 of this HASP.

B. Visitor's Briefing

Visitors will not be permitted to enter areas other than the Support Zone unless documentation of training, as described above, is presented to the ENVIRON Site Coordinator. All visitors will be provided with applicable Site-specific information including but not limited to hazard recognition, personnel hygiene and Site safety rules, use of PPE, and emergency response procedures. Visitors requesting on-site access to areas other than the Support Zone will be required to review and sign off on the HASP to ensure understanding and compliance with the provisions in the HASP. All personnel, contractors, and Site visitors will receive information contained in this HASP and any Site-specific hazard awareness prior to entry into the Site, as applicable. The training will ensure that personnel can recognize hazards, understand emergency response procedures, and have the knowledge necessary to enable them to perform their assigned jobs in a manner that ensures employee and public safety. All personnel will be required to sign an attendance sheet (see section 13.0 in this HASP) verifying that they received and participated in a

training briefing. Individuals refusing to sign the sheet will not be allowed to work on the Site.

Compliance with Hazard Communication Standard is required for work at this Site. Material Safety Data Sheets (MSDSs) are part of Appendix A. Personnel shall receive training for the identification of hazards associated with the materials in use and the safe use of these materials, as applicable. Any hazardous chemical products brought to the Site (other than standard fuels) for use during field activities must be reviewed by the Site Coordinator. Contractors are responsible for having their own hazard communication program. Contractors will supply MSDS to the Site Coordinator for all products to be used on-site.

In addition, any employee who is or is expected to be directly involved with intrusive sampling of contaminated environmental media or other sampling activities that could reasonably lead to chemical exposure is subject to appropriate training and standards, including but not limited to 40-hour HAZWOPER (and 8-hour refresher training), respiratory protection, first aid, and CPR training. This would include any employee that visits exclusion zones of hazardous waste sites or remediation sites.

5.3 Hazard Communication

The following procedures related to hazard communication are applicable to this Site. All employees will be briefed on this program.

5.3.1 Container Labeling

All containers received on-site will be inspected to ensure the following: (1) All containers will be clearly labeled as to the contents; (2) the appropriate hazard warnings will be noted; and (3) the name and address of the manufacturer will be listed.

All drums or bins to be shipped off the Site will have a label affixed with the following information: (1) the identity of the waste generator, (2) the boring, well, or excavation identification and sample depth, (3) the waste matrix (e.g. soil, water, product), and (4) the date of waste generation.

5.3.2 Employee Training & Information

Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:

1. An overview of the requirements contained in the Hazard Communication Standard;
2. Hazardous chemicals present in their workplace operations;
3. Location and availability of a written hazard communication program;
4. How to read labels and review MSDSs to obtain appropriate hazard information;
5. Locations of MSDS files and the hazardous chemical inventory;
6. Physical and health effects of the hazardous chemicals;
7. Methods and observation techniques used to determine the presence or release of hazardous chemicals;

8. How to lessen or prevent exposure to these hazardous chemicals through usage of control/work practices and personal protective equipment; and
9. Emergency procedures to follow if they are exposed to these chemicals.

ENVIRON employee(s) will inform its subcontractor(s) the hazardous chemicals brought on-site by ENVIRON; and likewise, subcontractors shall inform ENVIRON employees the same.

5.4 Disciplinary Actions

In the event that personnel do not follow the health and safety rules and/or are conducting operations that are hazardous to themselves or their fellow workers, disciplinary actions will be implemented in accordance with ENVIRON's policies.

5.5 Incident Reporting

Each contractor is responsible for maintaining injury and illness records in accordance with applicable regulations and supplying ENVIRON with applicable records in a timely fashion upon request. With respect to incidents, the following types of health and safety incidents are to be reported:

- All employee injuries and illnesses that include first aid, doctor/hospital visits which may or may not involve restricted work and/or lost time;
- Environmental incidents and exposures, such as spills or other unplanned releases to the environment or nonconformance to operating procedures (see also Section 10);
- All evacuations (false or real);
- Any property damage;
- Near miss incidents which could have resulted in an injury, an accident, environmental impact or significant loss of facilities;
- Public/third party liability - Incidents that involve injury, illness or property damage due to the actions of any non-ENVIRON employee arising out of, or in connection with ENVIRON's contracted scope of work, operations, or premises.

As a rule of thumb, all of the incidents types outlined above MUST be communicated by the ENVIRON Site Coordinator to the Project Manager, Task Leader, Project Health and Safety Coordinator, and the Corporate Health and Safety Director immediately following the incident, either in person or via phone, e-mail, or text messaging. The contacted person will then ensure that the other core project members are informed either in person or via phone, e-mail, or text messaging, regardless of time of day. As soon as possible after the incident but no later than 72 hours after the event, the first page of the Incident Investigation Report form will be completed by the Site Coordinator or his/her designee and sent the core project members (i.e., the Project Manager, Task Leader, Project Health and Safety Coordinator, and Corporate Health and Safety Director), for preliminary root cause analysis. The root cause analysis will not be deemed complete until input from all individuals involved in the incident, applicable witnesses, and input from the core team has been obtained. Similarly, the implementation of any corrective/preventive actions will NOT be implemented until input from the Corporate Health and Safety Director (and others as necessary) has been obtained.

6 Medical Surveillance and Recordkeeping

The goals of the medical surveillance program are to monitor the health of potentially exposed personnel through the use of medical examinations and diagnostic laboratory testing, to provide medical care for occupational injury or illness, to keep accurate records for future reference and to ensure the selection of personnel physically able to safely perform the work assigned. The medical surveillance program supports and monitors the effectiveness of the primary health and safety goal of controlling worker exposure to hazardous substances. Medical examinations will be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine.

In general, all employees who may be exposed to hazardous substances above the permissible limits; who wear a respirator; or who are injured, become ill, or develop signs or symptoms due to possible overexposure to hazardous substances from hazardous waste operations must be medically monitored. ENVIRON's requirement is for all employees to be subject to Medical Surveillance Program as well as any employee who may wear a respirator, regardless of the duration of use.

Each employee enrolled in the Medical Surveillance Program will be subject to periodic medical exams, the frequency of which will vary depending on the extent and duration of exposure, the type of chemicals involved, and the individual employee's medical profile. These personnel will receive a medical examination at least once per calendar year.

Documentation of current participation in a medical surveillance program and fitness for duty, including ability to wear respiratory protective equipment, will be necessary for all personnel who work on-site in areas other than the Support Zone. However, all specific medical information and examination results obtained in the course of administration of the medical surveillance program will be maintained by the examining physician as confidential.

6.1 Baseline Medical Examinations

The baseline medical examination serves two major purposes: (1) it determines the individual's fitness for duty, including the ability to work while wearing a respirator; and (2) it provides baseline data for comparison with future medical data. The baseline medical examination will include, at a minimum, the following:

1. Complete occupational and medical history;
2. Physical examination;
3. Blood count and chemistry profile;
4. Urinalysis with microscopic review;
5. Chest x-ray;
6. Pulmonary function tests;
7. Resting electrocardiogram (EKG); and
8. Cardiac stress test (at physician's discretion).

Certification of fitness for duty and ability to wear personal protective equipment must be provided to gain access to on-site areas other than the Support Zone. However, all specific medical information obtained in the course of administration of the medical surveillance program will be maintained as confidential.

6.2 Periodic Medical Examinations

Each individual enrolled in the medical surveillance program will be subject to periodic medical surveillance examinations. In general, personnel involved in field activities with a frequency of greater than 30 days per year will receive medical examinations at least annually. Periodic medical examinations should include the parameters included in the baseline examination, with the exception of the chest x-ray and EKG, which are repeated after the baseline examination at the physician's discretion and with agreement of the individual.

6.3 Special Medical Examinations

Special medical examinations or consultations will be arranged for personnel exposed in an emergency situation to hazardous substances at concentrations above the PELs without adequate protection. This will be done as soon as possible after the overexposure has been determined by the Site Coordinator, Site Health and Safety Officer and/or Project Health and Safety Coordinator, in consultation with the Corporate Health and Safety Director.

Special medical examinations shall also be arranged upon notification by the individual that he/she has developed signs or symptoms indicating a possible overexposure to hazardous substances, or if the examining physician determines that a more frequent medical examination is necessary.

6.4 Special Circumstances

Any individual who is on a medication that may interfere with the ability to perform his/her job function, or who may require special medical attention, must notify the Site Coordinator of these circumstances prior to commencing work at the Site.

6.5 Health and Safety Records

Health and safety records for on-site ENVIRON personnel including but not limited to training, medical clearances, fit testing, and any monitoring will be kept on file by the Corporate Health and Safety Director and on-site by the Site Coordinator, as applicable. Sub-contractor and contractor health and safety records shall be maintained by the applicable sub-contractor and/or contractor and provided to the Site Coordinator. ENVIRON Personnel Training and Medical Records are maintained at ENVIRON, 333 West Wacker Drive, Chicago, Illinois. RECORDS WILL BE MAINTAINED ON-SITE AS NECESSARY.

Health and safety records for all on-site personnel will be maintained by their respective employers. Site-specific records and documentation of proof-of-training and medical fitness for all on-site personnel will be maintained at the Site office.

6.5.1 Personnel Training Records

Health and safety training of on-site personnel, as described in Section 6 of the HASP, will include documentation of initial 40-hour or 24-hour health and safety training, 8 hours of annual

refresher training, supervised field experience, 8 hours of supervisor training, CPR/first aid certification, and Site orientation and daily safety briefing logs is required. Respirator fit tests will also be required.

6.5.2 Site Logs

Logs of visitor and Site personnel, vehicles and equipment, and daily safety meetings will be maintained, or may be recorded in the field book. Errors will be crossed out with a single line in ink so that the error can be read, and will be initialed and dated by the person performing the entry. For work that is to be performed on Tronox leased property, personnel should enter through the Tronox facility main entrance after first signing in at the Tronox security desk.

7 Personal Protective Equipment

This section of the Site HASP is a reference of selection for different levels of PPE. The protective equipment will be selected based on the contaminant type(s), concentration(s) in air (if any), standing liquid (if any), or other applicable matrix, and the known route(s) of entry into the human body. In situations where the type of materials, their concentrations, or exposure potentials are unknown, a decision based on professional judgment regarding the assignment of personal protective equipment will be made by the Project Health and Safety Coordinator.

7.1 Site-Specific PPE

It should be noted that due to the potential for a chemical release or vapor cloud from the Tronox-leased area or a neighboring facility, all personnel working at the site are required to carry an emergency escape respirator. Emergency response procedures and facility alarm codes are described in Section 12.

7.2 Selection of PPE

The selected PPE should be able to resist degradation, penetration, and permeation by the contaminants present at the Site. In selecting the appropriate protective material, the following should be considered: chemical resistance; tear and puncture resistance; flexibility; thermal stress; cleanability; and durability.

PPE will be selected, used and maintained in accordance with applicable regulations.

Levels of PPE

The four levels of PPE are Levels A, B, C, and D, with Level A providing the highest available level of respiratory, skin, and eye protection. A summary of the basic PPE ensemble for Levels A, B, C, and D is provided below. PPE selection for operations at the Site will be tailored to address specific task conditions.

Level A

Level A PPE provides the maximum degree of respiratory, skin, and eye protection. A Level A PPE ensemble should include:

1. Full-face piece self-contained breathing apparatus (SCBA) or full-face piece supplied air respirator with escape SCBA;
2. Fully encapsulating, chemical-resistant suit, safety boots and inner gloves; and
3. Hard hat (if overhead or bump hazards exist).

Level B

Level B PPE provides the maximum level of respiratory protection. Since chemical-resistant clothing is not considered gas, vapor, or particulate tight, Level B PPE does not provide the maximum skin protection. However, a good quality, hooded, chemical-resistant one-piece garment with taped wrists and ankles provides a reasonable degree of protection against splashes of liquids and lower concentrations of chemicals in ambient air. It is the minimum level

recommended for confined space entries and initial Site entries until the hazards have been further identified. Level B PPE should be used when **any** one of the following criteria is met:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection -- this includes atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard or atmospheres that do not meet the criteria for use of air-purifying respirators;
2. Atmosphere contains less than 19.5% oxygen; or
3. Presence of incompletely identified vapors or gases is indicated by air monitoring instruments but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Level C

Level C PPE provides the same level of skin protection as Level B PPE, but a lower level of respiratory protection. Air-purifying respirators can be used only if the substance has adequate warning properties; the individual passes a qualitative fit-test for the mask; an appropriate cartridge/canister is used and its service limit concentration is not exceeded; and Site operations are not likely to generate unknown compounds or excessive concentrations of already identified substances. Level C PPE can be used when **all** of the following conditions are met:

1. Oxygen concentrations are not less than 19.5%;
2. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin;
3. Types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant;
4. Atmospheric contaminant concentrations do not exceed IDLH levels; and
5. Job functions do not require self-contained breathing apparatus (SCBAs).

Modified Level D

Modified Level D PPE provides minimal skin protection (i.e., hand/glove protection along with standard work clothes with optional coveralls) and no respiratory protection. Modified Level D PPE can be used when the following conditions are met:

1. Atmosphere contains no known hazard;
2. Oxygen concentrations are not less than 19.5%;
3. Work functions include minimal contact with contaminated soil, water, groundwater and precludes splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D

Level D PPE provides no skin protection other than standard work clothes and no respiratory protection. Work functions are limited non-hazardous environments and preclude contact with media that may be potentially contaminated at hazardous levels for any type of chemical.

7.3 Respirator Fit Test

A respirator fit test will be conducted on all Site personnel who will perform work operations in areas other than the Support Zone. Prior to the initiation of any fit testing, personnel must be certified as medically able to wear a respirator. The respirator fit test is conducted to ensure proper face piece-to-face seal. A secure fit is important with positive-pressure equipment, and is essential to the safe functioning of negative-pressure equipment, such as most air-purifying respirators. Personnel will receive instruction on proper wear and maintenance of the respirator.

Qualitative fit tests will be conducted annually in accordance with the ANSI Practices for Respiratory Protection, Z88.2-1989. In addition, a negative and positive fit check will be performed each time an employee dons the air-purifying respirator (APR). Documentation of annual respirator fit tests will be kept in the Support Zone.

7.3.1 Negative and Positive Fit Check

The negative and positive pressure fit check will be performed each time an employee dons the APR. The negative pressure fit check involves closing off the inlet openings to the APR cartridges by covering with the palms of the hands. If an inward leakage of air is detected, the APR should be checked for material defects and refitted or replaced with another APR.

The positive pressure fit check is performed by placing the palm of hand over the exhalation valve and gently exhaling for 10 seconds to create positive pressure inside the facepiece. If an outward air leak is detected, the APR should be readjusted. If after readjustment leakage still occurs, another APR should be used.

7.4 PPE Inspection Checklist and Maintenance

PPE inspections will be conducted upon receipt of PPE from the factory or distributor; when it is issued to workers; after use or training; and prior to maintenance. Periodic inspections of stored equipment will be conducted routinely, whenever a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise. At a minimum, PPE inspection should include the following:

A. Clothing

Before use:

1. Determine that the clothing material is correct for the specified task.
2. Visually inspect for:
 - Imperfect seams
 - On-uniform coatings
 - Tears

- Malfunctioning Closures
3. Hold up to light and check for pinholes
 4. Flex product:
 - Observe for cracks
 - Observe for other signs of shelf deterioration
 5. If the product has been used previously, inspect inside and out for signs of chemical breakthrough or deterioration, such as:
 - Discoloration
 - Swelling
 - Stiffness
 6. During the work task, periodically inspect for:
 - Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind that chemical permeation can occur without any visible effects.
 - Closure failure
 - Tears
 - Punctures
 - Seam discontinuities

B. Gloves

Before use, pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet towards fingers or inflate glove and hold under water. In either case, no air should escape.

C. Respirators

SCBA/supplied air/air-purifying/emergency escape respirators should be subject to the following:

1. Inspect SCBA/supplied air/air-purifying respirators before and after each use, at least monthly when in storage and during cleaning. Air-purifying respirators should be inspected before each use to be sure they have been adequately cleaned.
2. Check all connections for tightness, inspect air lines prior to each use for cracks, kinks, cuts, frays, and weak areas.
3. Check for proper setting and operation of regulators and valves (according to manufacturer's recommendations) and check operation of alarms.
4. Check material conditions for:
 - Signs of pliability
 - Signs of deterioration
 - Signs of distortion

5. Check face shields and lenses for:
 - Cracks
 - Crazing
 - Fogginess
6. Examine cartridges or canisters to ensure that:
 - They are the proper type for the intended use,
 - The expiration date has not passed, and
 - They have not been opened or used previously.

7.5 Task Specific PPE

This section of the Project HASP is used for the selection of the appropriate PPE. The protective equipment will be selected based on the contaminant type(s), concentration(s) in air (if any), standing liquid (if any), or other applicable matrix (e.g., soil, sludge, sediment, etc.) and the known route(s) of entry into the human body. Table 8 presents the general level of protection to be used for each task that is anticipated to be conducted on this Project.

Table 9 identifies the specific PPE items that are required or recommended to be used on this project. This includes identifying the specific type of hand and body protection (as applicable) for the chemicals that may be encounter while conducting the tasks outlined in this HASP.

Table 8: Task Specific PPE

Task Description as depicted in Section 2.5	Level of Protection				
	A	B	C	Mod D	D
1. Utility Clearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Exploratory trenching/test pits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Soil sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Groundwater monitoring well installation and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Groundwater sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Soil gas sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Aquifer testing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. Site management activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Monitoring well maintenance activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Trenching and utility connections for GWETS optimization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Key:

Level D: Long sleeve shirt*; long pants*; hard hat; eye protection; hearing protection; and safety shoes.

Level D Modified: Level D protection plus protective coveralls, as required; and appropriate hand protection.

Level C: Level D (Modified) protection plus negative pressure respiratory protection with appropriate cartridges; chemical protective coveralls in lieu of general coveralls; use of inner and outer sets of hand protection.

Level B: Level C protection plus Pressure-demand supplied air respirator with escape bottle in lieu of negative pressure respirator; chemical resistant coveralls with hood; chemical resistant boots.

Level A: Level B protection plus fully encapsulating (gas tight) chemically resistant suit.

*Clothing made of natural fibers shall be worn when a shock or arc flash hazard exists.

Key: Req = Required; Rec = Recommended; NA = Not Applicable

Table 9: Personal Protective Equipment and Supplies

Equipment	Req	Rec	NA	Equipment	Req	Rec	NA
Steel-toe Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SCBA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Outer Disposable Boots	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Full-face Airline Resp.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Long Sleeve Shirt and Pants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Full Face Negative Pressure Resp.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Flame Retardant Coveralls	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Half Face Negative Pressure Resp	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tyvek Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Powered Air Purifying Resp	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Poly-coated Tyvek / Saranex Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other: 15-minute Escape Respirator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fully Encapsulated Chemical Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	First Aid Kit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hearing Protection (<i>for noisy activities such as drilling</i>)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire Extinguisher	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leather Gloves	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mobile Phones	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outer Chemical Gloves (Type):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Walkie Talkies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inner Chemical Gloves (Type): Nitrile (<i>while handling soil, groundwater, or chemicals</i>)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water or Other Fluid Replenishment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hard Hat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Eye Wash	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety Glasses with Side Shields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sunscreen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vented (Splash proof) Goggles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Insect Repellent/Gators	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Notes: Respiratory protection is required if monitoring shows that a respiratory hazard exists. However, all personnel are required to carry a 15-minute Escape Respirator in case emergency escape procedures are necessary.</p>							

8 Air Monitoring/Sampling Procedures

Air samples may be collected during the project to identify and quantify airborne contaminants in order to delineate areas where PPE may be needed; determine the level of PPE necessary; document on-site employees' exposures; assess the potential health effects of exposure; determine the need to implement engineering controls or evacuate the work zone or Site; and determine the need for specific medical monitoring. Some commonly used devices include the following:

Combustible Gas Indicator (CGI) – Examples include O₂ / LEL meter. A CGI measures the concentration of a combustible gas or vapor. Its accuracy is, in part, dependent upon on the difference between the calibration and sampling temperatures; oxygen-deficient atmospheres also affect accuracy; filament can be damaged by silicones, halides, and tetraethyl lead; and the sensitivity is a function of the difference in the chemical and physical properties between the calibration gas and the unknown.

Flame Ionization Detector (FID) – Examples include Organic Vapor Analyzers (OVA). Depending on mode, it may detect many organic gases and vapors. A FID will not detect inorganic gases and vapors; has reduced reliability in high humidity conditions; and should not be used when temperatures are below 40F (4.4C).

Ultraviolet (UV) Photo Ionization Detector (PID) – Examples include HNU. Detects a number of organic and some inorganic gases and vapors. A PID does not detect methane; does not detect a compound if the probe used has a lower energy than the compound's ionization potential; does not readily ionize fully chlorinated materials; high humidity affect readings; low humidity affects operation; response is sensitive to dust or moisture on the lamp; and responses will fluctuate when gases are mixed.

Infrared Spectrophotometer (IR) – Examples include Miran. Measures concentrations of many gases and vapors in the air but designed to quantify one- or two- component mixtures. Not approved for use in hazardous conditions; must make repeated passes to achieve reliable results; and somewhat bulky/heavy.

Direct-Read Colorimetric Tubes – Examples include Drager. The compound reacts with the indicator chemical in the tube, producing a stain whose length is proportional to the compounds' concentration. Results are affected by temperature, pressure, and humidity; many similar compounds interfere with results.

Personal Air Monitoring – Quantitative air sampling for nuisance dust, metals, organic and inorganic compounds. Samples are collected using personal air sampling pumps and the appropriate sampling media. All personnel samples will be collected in the employees breathing zone over the duration of the work shift. The specific methods to be utilized for the collection of personal air samples will require the involvement of a Certified Industrial Hygienist (CIH) if this type of sampling will be conducted.

8.1 Using Monitoring Devices

Conducting an applicable task may necessitate using one or more monitoring devices as listed in Table 10, particularly if gases, vapors, explosion hazards and/or oxygen deficient atmosphere can occur or are expected. If a monitoring device will be utilized, the corresponding device letter should be placed in the column labeled “Monitoring Instrument Required” in Table 11. In addition, you MUST record the following information in the field log book if you are going to use a monitoring device:

1. Instrument name and serial number
2. Date of calibration
3. Frequency/duration of monitoring
4. The monitoring results
5. And the actions taken based on the results, even if “no actions are required to be taken”

Letter	Device Name	Letter	Device Name
A	PID (10.6 eV)	H	Summa Canister
B	PID (11.7 eV)	I	Heat Stress Monitor
C	FID	J	Air Sampling:
D	OVA	K	Low Volume Pump
E	CGI/LEL	L	Radiation Detector
F	Colorimetric Indicator Tubes	M	Gas Multimeter
G	Dust Monitoring – <i>Personal DataRAM 1000 or equiv.</i>	N	Other Device:

Table 11: Required Monitoring

Required Monitoring	Constituent	Task(s)	Trigger (action level)	Monitoring instrument required
If monitoring is necessary to identify that a risk is at or above tolerable limits and/or is used in controlling a risk on-site, document the task and the maximum allowable exposure or trigger, and the monitoring instrument required to be used.	Oxygen		19.5% to 23.5%	
	Carbon Monoxide		25 ppm	
	H ₂ S		5 ppm	
	C ₂ S			
	CH ₄		0.5% or 5000 ppm	M
	VOCs: Total	2,3	0.5 ppm	A,B
	Semi-VOCs:			
	Metals			
	Respirable Dusts	2	0.1 mg/m ³	G
	Asbestos		0.05 f/cc	
	Others:			

8.2 Action Level Guidance

In general, this HASP must address Site-specific chemicals as noted in Tables 10 and 11. However, there are chemicals commonly encountered in the workplace that may not be a chemical targeted for sampling but nonetheless will have adverse health effects. These chemicals are listed in Table 12 below.

Table 12. Action Levels for Commonly Encountered Compounds

Compound	Action Level
VOC (as Benzene)	0.5 ppm MAXIMUM
CH ₄	0.5% MAXIMUM or 5000 ppm
CO ₂	0.25% OR 2500 ppm MAXIMUM
CO	25 ppm MAXIMUM
H ₂ S	5 ppm MAXIMUM
O ₂	19% MINIMUM – 23.5% MAXIMUM
Respirable Dust	0.1 mg/m ³
Manganese	0.1 mg/m ³
Hexachlorobenzene	0.001 mg/m ³
Asbestos	0.05 f/cc

8.2.1 Volatile Organic Compound

An action level for each chemical or group of chemicals should be based on 50% of the most restrictive (lowest) PEL or TLV. If a sustained (i.e., 1-minute sampling period) total volatile organic compound (VOC) reading within the breathing zone as determined by a photo ionization detector (PID) is above the action level, Site personnel shall attempt to mitigate the situation through the use of engineering controls (i.e., move upwind, increase air circulation) as indicated in Table 13. If the action level still cannot be met, personnel shall leave the area and contact the Task Leader and the Project Health and Safety Coordinator for further instructions.

Table 13: Volatile Organic Compound

Instrument	Calibration Gas Standard	Frequency/ Duration of Air Monitoring	Action Level ⁽¹⁾ Above Background (Breathing Zone)	Action
Photo ionization detector (PID) calibrated daily	100 ppm isobutylene	Every 5-10 minutes, take a 1-minute reading.	> 5 ppm above background level	Introduce engineering controls (i.e., blower fans) (Level D) Evaluate controls (see below)
After Introduction of Engineering Controls				
PID calibrated daily	100 ppm isobutylene	Every 5-10 minutes, take a 1-minute reading.	< 5 ppm	Continue work (Level D)
			5-50 ppm above background level	Don respirator (Level C); Contact HSC to evaluate
			> 50 ppm above background level	Discontinue work (Level C)
Note:				
1 Action Levels for “Known contaminants” should be based upon each contaminant’s Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV).				

8.2.2 Combustible Gas Indicator (CGI)/Oxygen Meter

Table 14: Combustible Gas Indicator (CGI)/Oxygen Meter

Meter Response	Action/Respiratory Protection
CGI response <10% LEL	Continue normal operations with regular, periodic monitoring
CGI response > 10% LEL	Discontinue operations; evacuate personnel and prohibit entry; allow to vent until readings are <10%.
Oxygen level <19.5% or >23.5%	Retreat from work area; consult with Project Manager and Project Health and Safety Coordinator about upgrading to Level B respiratory protection, adding mechanical ventilation, or possible changes in work practices.

8.2.3 Odors

If strong odors are encountered or if personnel develop headaches, dizziness or other potential exposure symptoms, the personnel shall leave the work area to a well-ventilated area and contact the Task Leader and Project Health and Safety Coordinator for further instructions.

8.2.4 Dusts

The permissible exposure levels for total and respirable dusts are 15 and 5 mg/m³, respectively. In general, at these concentrations you will not be able to read the face of a wristwatch (with your arm extended) when the total dust concentration reaches 15 mg/m³. Particles of dust in the respirable size range cannot be seen without the aid of a microscope but in aggregate, may be perceived as a haze. More importantly and with few exceptions, when dust is noticeable in the air, more respirable particles will exist than larger particles.

Typically, controlling dusty investigative activities through the use of a water sprayer will control potential exposures. However, in the event that dusty conditions exist that are not related to investigative/remedial activities (dry, uncovered soils with high winds), personnel shall leave the area and contact the Task Leader and Project Health and Safety Coordinator for further instructions.

Nonetheless, to determine the likelihood of exposure from dusts, a theoretical “Total Dust” concentration in mg/m³ can be calculated to estimate the total dust concentration in which the concentration of the contaminant in the soil could equal and/or exceed its established exposure limit (EL). This equation is as follows:

$$\text{Total Dust (mg/m}^3\text{)} = (10^6 \text{ mg/kg}) (\text{EL mg/m}^3) / (\text{Conc. of contaminant in soil mg /kg}) (\text{SF})$$

Where:

EL = Exposure Limit of the contaminant of concern (e.g., its’ PEL or TLV in mg/m³); and

SF = Safety Factor, a number between one and ten. Used to account for the degree of confidence in the characterization data (a ten would represent a poor degree of confidence, for example only one soil sample was collected / analyzed to characterize the Site).

The **SF** is based upon the following assumptions: 1) the concentration of the contaminant in the airborne dust is the same as its' concentration in the sample matrix; 2) the soil data depicts a representative "worst-case" scenario; 3) the monitoring instrument used, accurately measures the ambient concentration of particulate matter in the air; and 4) a single contaminant of concern is present.

As an example, assume that Lead (with an EL of 0.05 mg/m^3) is the contaminant of concern and a soil concentration of 25,000 mg/kg has been identified. Depending on the SF used, the theoretical total dust concentration will range between 2 to 0.2 mg/m^3 . This means that when the in-situ particulate monitoring device is registering a concentration within 2 to 0.2 mg/m^3 range, there is a high probability that this dust contains enough lead to equal and/or exceed the EL. Hence, the level of PPE used would be increased until engineering controls are determined to be effective as documented by personal monitoring.

9 Confined Space Entry

ENVIRON's health and safety policy prohibits unauthorized entry into confined spaces.

In the event that entry into a confined space is required, prior to entering a confined space, ENVIRON employees (or its subcontractor's employees) will need additional training. Without Confined Space training, entry into confined spaces is prohibited. In addition, entry authorization will only be given after ENVIRON management has reviewed the nature of the confined space, the hazards present, and the measures needed to ensure safety. Under these circumstances, ENVIRON will work with the host facility/client to determine training requirements, sampling requirements, written program requirements, and equipment needed to safely enter the confined space.

It is not anticipated that confined space entry will be required for this project and/or the tasks listed in this HASP. If confined space entry is required, this HASP will be modified accordingly and all applicable regulations will be adhered to.

10 Spill Response

If warranted, before any spill clean-up work is initiated at the Site, applicable local, state, and/or Federal Emergency Response Authorities will be identified and contacted by either the Client Contact and/or a designated ENVIRON employee.

In addition to the guidelines below, the SMP (see Section 1.6.1) provides instructions for work to be done within 50 feet of any component of the GWETS including extraction wells, extraction well utilities, and treatment systems. The organization performing any such work must prepare a contingency plan to outline actions that would be taken if damage is caused to any remediation system component in a manner that causes the release of untreated groundwater. The plan must be submitted to NDEP and the Trust before beginning such activities. The plan shall identify any emergency equipment that may need to be retained on-Site during work activities to control or contain potential releases of untreated groundwater. If work activities result in the release of untreated groundwater, in addition to the steps outlined below, the organization responsible for the release shall immediately notify NDEP and the Trust of the release and the status of remediation system operations. If damage results in a system shutdown or if the system must be shut down to control the release, NDEP and the Trust will be provided with a written explanation and immediate actions must be taken to control the source of the spill and contain untreated groundwater that has been released, in accordance with the approved contingency plan. Efforts shall be made to avoid release of untreated groundwater into storm sewers.

10.1 Reporting and Initial Personnel Safety

Upon discovery of a hazardous substance spill, personnel are to:

- Immediately summon help by notifying the Task Leader and the Client Contact;
- Take action to ensure the safety of nearby personnel;
- Proceed to a safe location;
- If anyone is seriously injured, immediately contact emergency medical services; and
- Keep unauthorized personnel out of the area.

10.2 Initial Spill Reaction

Factors that limit the employee's response at the site of a spill are:

- Level of training,
- Personal safety,
- Available PPE, and
- Knowledge of the substance.

Employees should limit their actions to shutting off equipment or pumps and closing valves if possible, feasible and safe to do so.

10.3 Spill Response Evaluation

The identity and hazards of the spilled material should be determined before decisions regarding spill containment and control are made. The Client contact and Task Leader should evaluate the hazards regarding the spill and decide whether project employees or external response organizations should conduct the cleanup.

The Task Leader must contact the Project Manager and Corporate Health and Safety Director to discuss the spill incident for further input on deciding how the cleanup can be conducted, including:

- Levels of PPE and safety procedures,
- Safety and work zones,
- All steps of the response activities,
- Most effective procedures or methods for cleanup,
- Means of containment,
- Leak of spill control, and
- Decontamination procedures (including emergency decontamination)

11 Decontamination

Decontamination procedures will be implemented to protect personnel from hazardous substances that may contaminate and/or eventually permeate the protective clothing, respiratory protective equipment, tools, vehicles, and other equipment used on-site; to protect all Site personnel by minimizing the transfer of harmful materials into clean areas; to prevent mixing of incompatible chemicals; and to protect the community by preventing uncontrolled transportation of contaminants from the Site. The subcontractors shall provide water for equipment decontamination. In general, clean potable water should be used for equipment decontamination. Non-potable water may be used with the approval of the Task Leader. Sources of non-potable water must be clearly identified as unsafe for drinking, washing, or cooking purposes [See 29 CFR 1910.120(n)(2)].

11.1 Sampling and Construction Equipment Decontamination

Decontamination involves the orderly controlled removal of contaminants. All undedicated sampling equipment and sampling meters (if applicable) will be cleaned prior to and between each use. All on-site equipment will be decontaminated and allowed to air dry before leaving the Site. Decontamination may be accomplished using an approved cleaner, water, and steam. Subcontractors will be responsible for decontamination of their own equipment used during field operations, as well as disposal of the decontamination fluids. Decontamination fluids and soil cuttings will be temporarily stored in sealed and labeled 55-gallon drums, staged at a safe location which is mutually acceptable to ENVIRON and the host facility, pending off-site disposal. The decontamination methods will be as follows:

Entry to Exclusion Zones will be limited to avoid unnecessary exposure and related transfer of contaminated soil. In unavoidable circumstances, equipment and/or trucks should be decontaminated in a designated decontamination area before leaving the Site. Decontamination will occur prior to and after the removal activity has been completed using dry brush, hand washing, and/or steam cleaning methods. Equipment will be decontaminated in a pre-designated area in consultation with the Site Health and Safety Officer and Task Leader.

Down-hole drilling equipment will be decontaminated before equipment is mobilized to the Site, between drilling locations, and prior to leaving the Site. Down-hole drilling equipment and soil core samplers will be decontaminated by either steam cleaning with a high-pressure washer or washing in a low-phosphate detergent wash such as Alconox followed by multiple rinses with tap water. The decontamination activities will occur at the location where the equipment was last used.

Handheld equipment will be decontaminated prior to exiting the Site. Decontamination of all equipment will include washing with a non-phosphate detergent and triple-rinsing with tap water. Equipment will be decontaminated in a pre-designated area on containment pallets or plastic sheeting. Clean equipment will be stored on, and covered with, plastic sheeting as necessary. Cleaned small equipment will be stored in plastic bags as necessary.

All sampling devices will be decontaminated to prevent cross-contamination or mixing of incompatible chemicals. Sampling devices and tools will be decontaminated by scrubbing or

wiping using a decontamination solution and water. Tools that are difficult to decontaminate should be kept in the EZ and handled only by workers using the appropriate PPE. At the end of the task, tools that cannot be decontaminated should be properly disposed.

For sampling devices and equipment that could come into contact with samples, the following decontamination procedures will be used:

- Clean water rinse immediately after use;
- Clean with detergent (Alconox, Liquinox, or equivalent will be used) and scrub with brushes;
- Clean water rinse;
- Distilled water rinse;
- Air dry;
- Distilled water rinse (if equipment is not dry),
- Wrap in aluminum foil or clean plastic sheeting (if not to be used immediately); and
- Wastewater generated will be containerized and managed as either hazardous or non-hazardous waste depending upon the analytical results.

11.2 Personnel Decontamination

All Site personnel should minimize contact with contaminants. At a minimum, the gross removal of contaminants from PPE shall occur in a designated area and before leaving EZs. All disposable PPE will be disposed of in approved 55-gallon drums (including respirator cartridges). Non-disposal PPE must be decontaminated, particularly safety boots. Any PPE that cannot be decontaminated should be disposed of along with the waste generated from field operations. The drums will be sealed and labeled appropriately, stored at a single secure location on the Site, and be disposed of appropriately off-site. Personnel should wash their hands and face prior to departing from the Site and prior to eating, drinking, smoking and/or applying cosmetics. The decontamination methods will be as follows:

Modified Level D Personnel Decontamination

Where activities are performed in Modified Level D PPE personnel will perform decontamination using the following guidelines:

- Place tools, instruments, samples and trash at an appropriate location. The equipment drop area should be clean and dry and at a minimum, plastic bags should be available for trash. Waste PPE will not be placed in the same containers as general trash.
- Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples, and tools prior to removal from the decontamination areas.

- Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
- Remove outer work gloves and place in an appropriate container specified for waste PPE.
- Remove outer Tyvek coveralls (if used) and place them in an appropriate container specified for waste PPE.
- Remove inner protective gloves and place them in an appropriate container specified for waste PPE.
- Wash hands using soap and water (separate from other decontamination cleaners/solutions).

Level C Personnel Decontamination

Personnel involved in activities that require the use of Level C PPE will observe the following decontamination guidelines:

- Place tools, instruments, samples and trash at an appropriate location. These areas should be clean and dry, and at a minimum contain plastic bags for trash. Waste PPE will not be placed in the same containers as general trash.
- Inspection equipment, samples and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples and tools prior removal from the decontamination areas. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
- Untape wrists and ankles.
- Remove outer work gloves and place them in an appropriate container specified for waste PPE.
- Remove outer Tyvek coveralls and place them in an appropriate container specified for waste PPE.
- Wipe off and remove respirator mask (also goggles if worn).
- Remove inner protective gloves and place them in an appropriate container specified for waste PPE.
- Wash hands using soap and water (separate from other decontamination cleaners/solutions).

During emergencies, the need to quickly respond to an accident or injury must be weighed against the risk to the injured party from chemical exposure. It may be that the time lost decontaminating an individual may cause greater harm to the individual than from the potential for chemical exposure, particularly if the injury is life-threatening. In these instances, a non-

injured person needs to inform responding emergency personnel of the potential for chemical contamination on the victim, specifically mentioning the type and expected concentrations.

11.3 Investigation-Derived Waste Disposal

All water generated during decontamination of sampling equipment will be contained in 55-gallon DOT-approved steel drums and/or bins. Depending on the scope of work to be implemented and field conditions, water generated from decontamination of heavy equipment and vehicles (i.e., truck washing/wheel washing with steam cleaner) will be either contained using a washing pad or discharged to the ground surface at the location where the equipment was last used. Solid and liquid phase IDW will be contained in separate drums or bins and shall not be mixed. A log of the number and type of IDW drums or bins shall be kept with the investigation log book. Analysis and disposal of IDW will be handled according to procedures prescribed in the SMP (see Section 1.6.1).

11.4 Emergency Decontamination

During emergency situations, decontamination will be performed to the extent appropriate without compromising medical attention to the victim. If decontamination may aggravate or cause more serious health effects, or if the injuries are life-threatening, prompt first aid and medical treatment should be administered without decontamination or concurrently with it. Outer garments can be removed if it does not delay or interfere with medical treatment or aggravate the problem. Respirators must always be removed. If the emergency is due to a chemical exposure and the outer garments cannot be safely removed, the victim should be wrapped in plastic sheeting or blankets to minimize contamination of emergency transport vehicles and medical personnel. Whenever possible, Site personnel should accompany the contaminated victim to the medical facility to advise on matters involving decontamination.

12 Emergency Response Plan (ERP)

The ERP describes contingencies and emergency response procedures. The ERP defines the responsibilities of key personnel in planning, prevention, and response to emergency situations, and identifies agency contacts and medical care procedures. The ERP addresses measures to prevent and respond to emergency situations, such as fire or explosion; spill or release of hazardous material; personnel injury or illness; or other adverse events. General emergency guidelines are as follows:

12.1 Stop Work Authority

All ENVIRON employees have the authority and obligation to stop any task or operation where concerns and/or questions regarding the control of health and safety risk exist, are not clearly established, or are not understood. Management is responsible for creating a culture where Stop Work Authority is exercised freely and without fear of retribution or intimidation.

When an unsafe condition is identified, a Stop Work intervention will be initiated and treated as a “near miss”. As such, an incident report will be completed in accordance with Standard Practice Instruction 19 entitled “Incident Reporting” so that the unsafe condition can be documented, reviewed, and corrective actions and preventative measures be implemented as applicable.

These actions will be coordinated by the Site Coordinator, with support from the Project Manager or Task Leader and the Project Health and Safety Coordinator, and all affected personnel will be notified of the Stop Work issue. No work will resume until all Stop Work issues and concerns have been adequately addressed. Most issues can be resolved in a timely manner at the job site, but occasionally additional investigation and corrective actions may be required. Work may resume when it is safe to do so.

12.2 Personnel Involved in Emergency Response

Key personnel involved in Site emergency response include the Project Manager, Task Leader, Site Coordinator, and contractor Project Manager(s). Clear lines of authority have been established for implementing emergency response procedures and for ensuring safety compliance. All emergencies and personal injuries will be immediately reported to the Site Coordinator. The Site Coordinator will immediately report the incident to the Project Manager, Task Leader, Project Health and Safety Coordinator, and Corporate Health and Safety Director.

12.3 Emergency Response Telephone Roster

The Emergency Response Telephone Roster consists of persons and organizations both on- and off-site who would be involved in the ERP. This roster, provided in Appendix D as Table D-1A, will be kept in ENVIRON Site vehicle or trailer, a list of on-site personnel who are trained in first aid and CPR will also be kept in the file. All Site personnel will be familiar with the Emergency Response Telephone Roster and will understand the proper chain of command. A listing of on- and off-site emergency contacts and key personnel and their alternates will be posted in the Site office.

12.4 Emergency Communications

The external communication system between on-site and off-site emergency response personnel is necessary to report and coordinate emergency response. Personnel cell phone will be the primary means of external communication, and will be used to notify off-site emergency response agencies and to request assistance.

12.5 Emergency Medical Care and Treatment

Every injury and exposure will be reported according to the procedures outlined in section 6.7 of this HASP, regardless of whether the incident appears to be serious or not, or whether any adverse health effects or symptoms are apparent after the exposure. Precautions regarding bloodborne pathogens shall be observed while administering first aid.

12.6 Life-Threatening Emergency Response

Incidents are possible that would result in emergencies beyond the on-site emergency response capabilities. Such incidents might include:

- Life-threatening injuries or injuries/exposures requiring medical treatment; and
- Fires progressing beyond incipient stage.

12.7 Evacuation Procedures

During Site operations and in the event of an evacuation, a safe location (rally point) will be identified. As part of the Site orientation, all on-site personnel will be informed of the evacuation plan and rally points. For purposes of a safe and efficient means of vehicular egress, all vehicles will be backed into their designated parking location.

If evacuation is necessary, personnel will determine wind direction. Whenever possible, evacuation should be in the direction perpendicular to the wind direction without passing through the plume, smoke cloud and/or spilled material, if applicable. Personnel will report to their designated rally point. In the event that a workers' evacuation to their primary rally point is hindered by emergency conditions, workers shall evacuate to the secondary rally point. If the Site Health and Safety Officer and Contractor Health and Safety Site Coordinators are not involved in emergency response activities, they will assist in accounting for all Site personnel, otherwise their designated back-up(s) will account for all personnel and will report this information to the Site Coordinator.

Tronox operates an alert system in the event of emergency situations including fires and chemical releases. The alert system includes audible alarms that alert employees, contractors, and visitors to certain conditions requiring action depending the sequence of the alarm as described in the following table:

personnel and will report this information to the Site Coordinator. Evacuation points are shown on the attached Figure 4.

12.8 Training

All Site personnel will review the information in this HASP on the emergency response procedures, and the location and use of on-site emergency equipment, and will have received emergency response training. During the Site orientation and/or Site safety briefings, Site personnel will be trained in emergency response procedures, on-site communication systems and evacuation routes, as stated in this HASP. Visitors will be briefed on hazard recognition, safe work practices and basic emergency procedures by the Site Coordinator.

12.9 First Aid Procedures

If an employee is injured, general first aid will be administered. If safety concerns or hazardous conditions are still present (e.g., incipient fire, falling debris), the individual shall be moved to avoid further injury or risk. In the event that an employee is injured in a contaminated area, general first aid will be administered and then the employee will be moved to the support zone for decontamination (if applicable), additional first aid, and preparation for transportation, giving due consideration to which risk will be greater; the spread of contamination or the health/safety of the individual.

First aid kits will be maintained on-site at each activity location. The type of first aid kit to be maintained will be for minor emergencies, such as cuts and skin abrasions. Where applicable, first aid supplies will be stored in a water proof container. The Site Coordinator or designated person will ensure that adequate first aid supplies (listed below) are maintained.

Minimum List of First Aid Supplies

(1) First Aid Guide*	(6) Burn treatment applications
(1) Absorbent Compress >4"x8"	(4) 3"x3" Sterile gauze pads
(16) 1"x3" Adhesive bandages	(2) Pair medical exam gloves
(1) Adhesive tape 2.5yard roll	(1) Triangular bandage >40"x40"x56"
(10) Antiseptic treatment applications	(6) Antibiotic ointment applications

* Please see Appendix B Control Mechanisms for First Aid Guidance, print, and store with ANSI approved First Aid kit on-site.

Recommended List of First Aid Supplies

Analgesic (oral, non-drowsy)	Eye covering >1/4" thick
Bandage compress >2"x2"	Eye/face wash
Breathing barrier, single use	Roller bandage >2"x4yards
Cold pack >4"x5"	Hand sanitizer

The contents of the first aid kits shall be checked before being sent out to each job and at least weekly on each job to ensure that expended items are replaced. Where the eyes or body of any employee may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be available for use.

12.10 Uncovering an Underground Service (Intact)

In the event of any damage or dislocation of any underground facility/pipeline or utility in connection with ground disturbance activity, work activities shall cease in the area of the damaged facility. The Designated Person shall immediately call the applicable emergency phone number. Then, the affected utility and One Call service shall be notified, if applicable. The One Call service may be able to assist with contact numbers for notifying member companies in the event of any damage. NO ONE should attempt to repair, clamp or constrict the damaged utility.

ALWAYS ASSUME THAT ANY UNDERGROUND PIPE OR SUBSURFACE LINE IS LIVE!

- Stop Work; remove tools if safe to do so.
- Clear all persons from the scene.
- Call the emergency number.
- Contact the One Call/utility member for guidance, if applicable.
- Contact the Project Manager and/or Task Leader so they can contact the Client, Corporate Health and Safety Director and Project Health and Safety Coordinator.

12.11 Striking an Underground Electrical/Telecom Cable

- Stop work.
- Evacuate ENVIRON employees from the immediate area to a safe distance as Site conditions warrant, giving consideration to employees which may not be able to immediately evacuate (e.g., operator seats in excavators are normally electrically isolated, whereas other parts of the excavator may be energized).
- Call the emergency number.
- In the event of injuries provide first aid and summon medical assistance.
- Contact the One Call/utility member for guidance, if applicable.
- Contact the Project Manager and/or Task Leader so they can contact the Client, Corporate Health and Safety Director and Project Health and Safety Coordinator.
- Do not allow anyone to enter the area until the electricity/utility provider has made the cable safe.

12.12 Striking a Pressurized Gas Pipeline

- Stop work, leave tools in-place but shut off any running equipment, including engines.
- Evacuate the immediate area to a safe distance as Site conditions warrant.
- Ensure there are no sources of ignition in the area.
- Call the emergency number.
- Contact the pipeline owner and/or One Call, if applicable.

- Contact the Project Manager and/or Task Leader so they can contact the Client, Corporate Health and Safety Director and Project Health and Safety Coordinator.
- *Do not re-enter the immediate area until safe to do so.*

12.13 Striking a Pressurized Water Main

- Stop work, remove tools and confine jetting water if safe, necessary and appropriate to do so.
- Evacuate immediate area.
- Ensure that water flowing away is not creating potential hazards (e.g., electrical shorting, flooding, contaminant migration etc.) and where possible warn those likely to be affected.
- Call the emergency number.
- Contact the water utility and/or One Call, if applicable.
- Contact the Project Manager and/or Task Leader so they can contact the Client, Corporate Health and Safety Director and Project Health and Safety Coordinator.
- Do not re-enter the immediate area until safe to do so.

12.14 Follow-up Procedures

If a Site employee is injured on-site and immediate medical treatment beyond first aid is needed, the designated Site Coordinator is instructed to call 911 and/or the designated emergency phone number and then report the incident.

Any SSC work that results in an injury, illness, incident, near miss or unsafe act or condition MUST be verbally communicated by the affected employee or an ENVIRON employee witnessing the incident to either the Project Health and Safety Coordinator, Project Manager, or Task Leader immediately following the incident. Notification to the regional HR representative and the Corporate Health and Safety Director MUST also be made for incidents involving any employee injury and/or illness that happened while on company time including first aid, and doctor/hospital visits which may or may not involve restricted work and/or lost time.

As soon as possible after the incident but no later than 72 hours after the event, Page One of the Incident Reporting Form in SPI 19 Incident Reporting is to be completed by the employee and a witness that was involved in the incident and/or observed the incident.

Post-incident investigations and root cause analysis will be conducted by the Corporate Health and Safety Director to discover the exact circumstances and cause of the incident. Amendments to the HASP will be approved and implemented by the Project Health and Safety Coordinator and the Corporate Health and Safety Director, as needed. All Site personnel will be informed of any revisions to the site-specific HASP and the resolution of any outstanding safety concerns prior to returning to their Site functions. The necessary steps to ensure that operations can safely resume include:

- Ensure that all emergency equipment (fire extinguisher, communication system, first aid kits and first aid station) is in functional order;
- Clear all incident-caused debris from the Site, if safe to do so; and
- Inspect area and equipment.

NOTE: Specific emergency contact information is contained in Appendix D of this HASP. Applicable directions to the nearest medical facility are contained in the Figures section of this HASP. In the event that an emergency situation occurs, SECURE the safety of yourself and those working under your direction and then contact appropriate Site and ENVIRON representatives that are referenced in Table D-1A of this HASP.

13 Health & Safety Plan Field Team Signatures

Sign off sheet attesting that the HASP has been made available and reviewed by the individual prior to entry into the Site.

Project Personnel List & Safety Plan Distribution Record

1. ENVIRON Employees

All project staff must sign indicating they have read and understand the HASP. A copy of this Site Health and Safety Plan must be made available for their review and readily available at the job site.

Employee Name/ Job Title	Date Distributed	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. Contractors, Subcontractors

A copy of this HASP shall be provided to contractors and subcontractors who may be affected by activities covered under the scope of this HASP for their information only, although the contractors and subcontractors remain responsible for the safety of their own employees. All contractors and subcontractors must comply with applicable country, state and local government rules and regulations.

Firm Name	Contact Person	Date Distributed
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Health and Safety Meeting

All personnel participating in the project must receive initial Health and Safety Orientation. Thereafter, a brief tailgate safety meeting is required as deemed necessary by the Site Health and Safety Officer (or at least once every 10 working days).

Date	Topics	Name of Attendee	Employee Firm Name	Initials
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Visitor

It is ENVIRON'S policy that visitors must furnish their own personal protective equipment. All visitors are required to sign the visitor log and comply with Health and Safety Plan requirements. If the visitor represents a regulatory agency concerned with Site health and safety issues, the Site Health and Safety Officer shall also immediately notify Project Health and Safety Coordinator.

Name of Visitor	Firm Name	Date of Visit	Signature
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

14 Safety Meeting Checklist

The Site Coordinator should consider discussing the following topics with all field personnel conducting work as part of this HASP, as applicable.

Date and Time of Meeting: _____

Conducted By: _____

CHECK TOPIC(S) DISCUSSED:

HASP Content

- Chemicals of Concern
- Tasks to be Performed
- Location of Tasks
- Hazards/Risks of Tasks
- Site Limitations (e.g., cell phone use)

First Aid

- Facilities
- Reporting and Records
- Treatment of _____

Personal Protective Equipment

- Glasses, Goggles, and Shields
- Hard Hats
- Respirators
- Gloves
- Other _____

Emergency Procedures

- Communications
- Primary Rally Point:
- Secondary Rally Point:
- Headcount
- Hospital Location/Route
- PPE/Decon
- Other _____

Special Tools / Equipment

- Chain saws / Chop saws
- Other _____
- Other _____

HASP Content

- Personnel On-Site (Introductions)
- Responsibilities
- Monitoring equipment
- Other _____
- Other _____

Industrial Sanitation and Hygiene

- Drinking water
- Restrooms/Porta toilets
- Personal Cleanliness

Housekeeping

- Waste Containers
- Waste Materials
- Other _____

Fire Prevention

- Extinguisher Locations
- Designated Smoking Areas
- Hot Work
- Flammable Liquids Present
- Explosives Present
- Other _____

Vehicles/Heavy Equipment

- Transportation of Employees
- Operation and Inspection
- Preventative Maintenance
- Other _____

Discussion _____

Figures

Hospital Name: St. Rose Dominican Hospital
Hospital Address: 102 E Lake Mead Parkway Henderson, NV
Hospital Phone Number: (702) 564-2622

Directions to Area Hospital:

Starting from western side of site

- 1 Head **south** towards **Avenue F**
- 2 Turn **left** on **Avenue G**
- 3 Turn **right** on **5th Street**
- 4 Turn **right** on **Avenue H**
- 5 Turn **left** on **4th Street**
- 6 Turn **right** on **BMI Road**
- 7 Turn **left** on **Eastgate Road**
- 8 Turn **left** at **NV-564 E Lake Mead Parkway** (1.5 miles)

End: **102 E Lake Mead Parkway**, Henderson, NV (Destination will be on the left)



Data Sources:
ESRI 2011 Topographic Map



Image courtesy of USGS Image courtesy of the N
Committee © AND



2200 Powell St., Suite 700, Emeryville, CA 94608

**Route Description and Map to Hospital
From Western Side of Site**

Nevada Environmental Response Trust Site, Henderson, Nevada

Figure

1a

Drafter: EA Date: 1/17/2014 Contract Number: 21-32100104 Approved by: Revised:

Path: H:\Letomane\NERT\RI_FS_Workplan\HASP\Figure1a_NERT_HospitalRouteWest.mxd

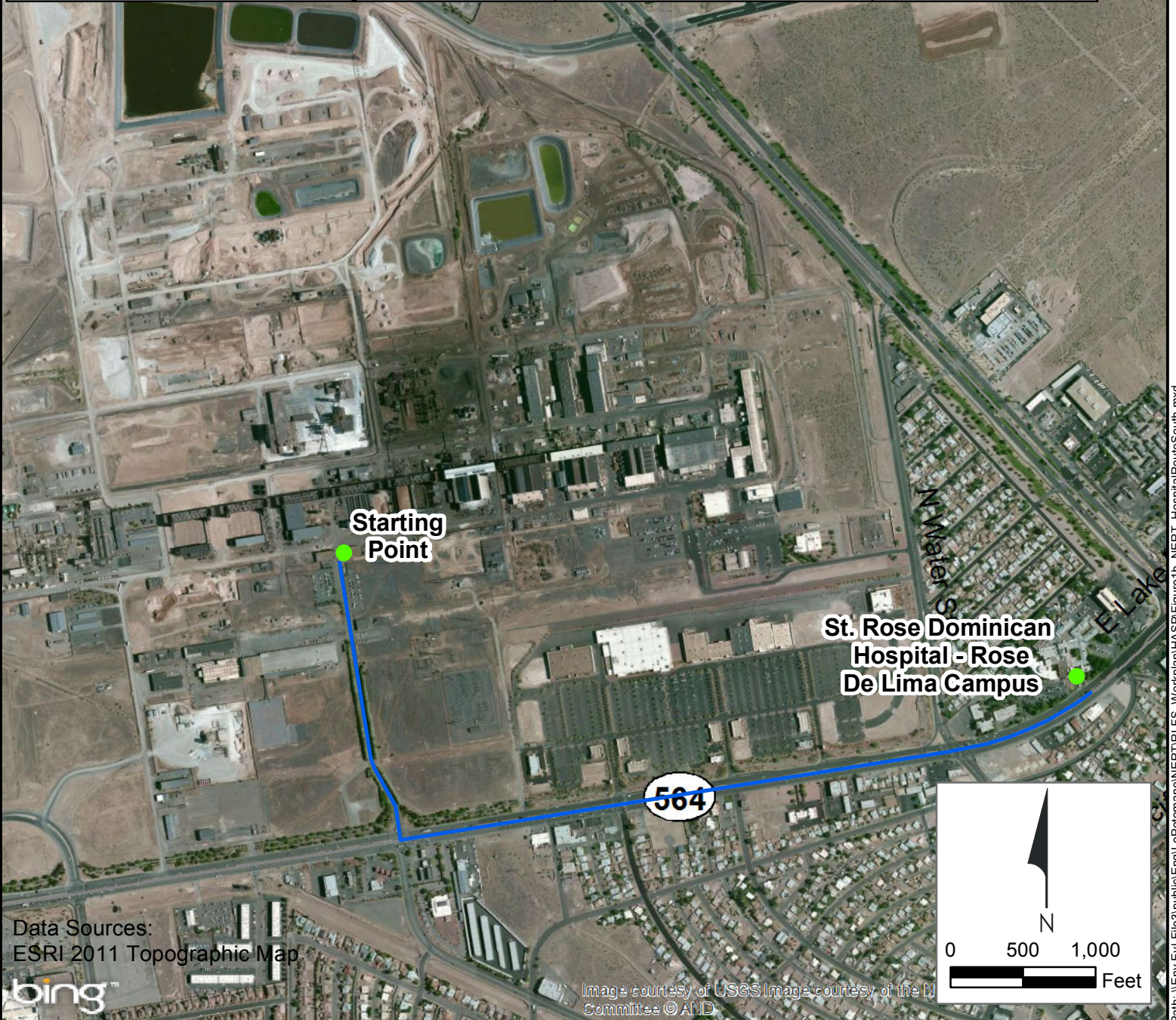
Hospital Name: St. Rose Dominican Hospital
Hospital Address: 102 E Lake Mead Parkway Henderson, NV
Hospital Phone Number: (702) 564-2622

Directions to Area Hospital:

Starting from southern side of site

- 1 Head **south** on **8th Street**
- 2 Continue **south** on **W Van Wagenen Street** towards **NV-564 E Lake Mead Parkway** (0.4 miles)
- 3 Turn **left** at **NV-564 E Lake Mead Parkway** (1.0 miles)

End: 102 E Lake Mead Parkway, Henderson, NV (Destination will be on the left)



Data Sources:
ESRI 2011 Topographic Map



Image courtesy of USGS Image courtesy of the N
Committee © AND



2200 Powell St., Suite 700, Emeryville, CA 94608

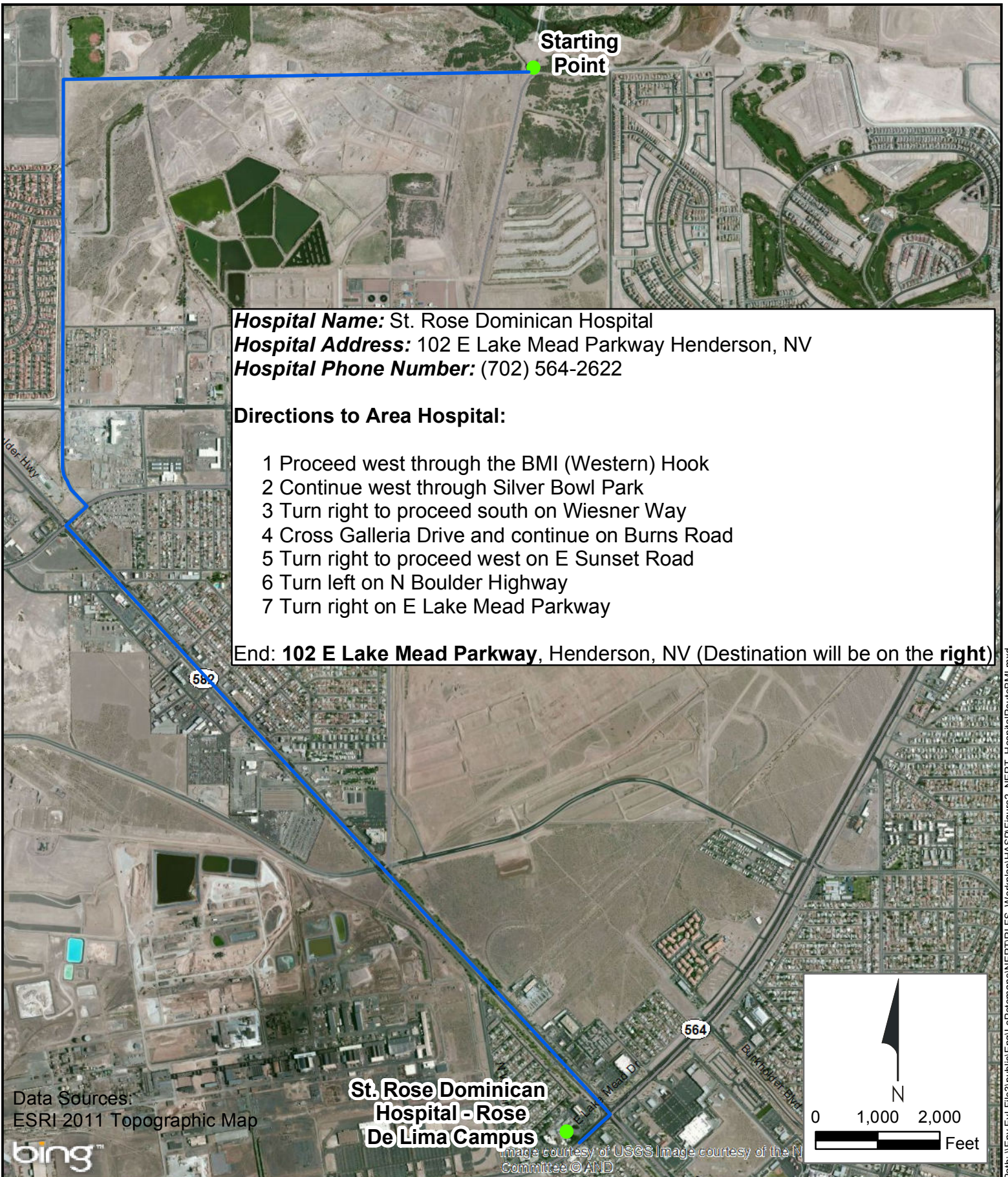
Route Description and Map to Hospital
From Southern Side of Site
Nevada Environmental Response Trust Site, Henderson, Nevada

Drafter: EA Date: 1/16/2014 Contract Number: 21-32100104 Approved by: Revised:

Figure

1b

Path: \\Env-EV1-Files3\public\Eng\LePetomane\NERT\I.FS_Workplan\HASPI\Figure1b_NERT_HospitalRouteSouth.mxd



Hospital Name: St. Rose Dominican Hospital
Hospital Address: 102 E Lake Mead Parkway Henderson, NV
Hospital Phone Number: (702) 564-2622

Directions to Area Hospital:

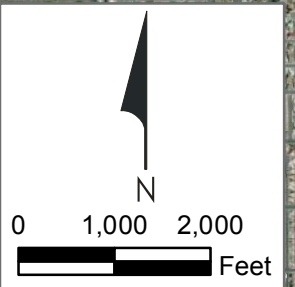
- 1 Proceed west through the BMI (Western) Hook
- 2 Continue west through Silver Bowl Park
- 3 Turn right to proceed south on Wiesner Way
- 4 Cross Galleria Drive and continue on Burns Road
- 5 Turn right to proceed west on E Sunset Road
- 6 Turn left on N Boulder Highway
- 7 Turn right on E Lake Mead Parkway

End: 102 E Lake Mead Parkway, Henderson, NV (Destination will be on the right)

Data Sources:
 ESRI 2011 Topographic Map



**St. Rose Dominican
 Hospital - Rose
 De Lima Campus**



2200 Powell St., Suite 700, Emeryville, CA 94608

**Route Description and Map to Hospital
 From BMI Hook Area**
 Nevada Environmental Response Trust Site, Henderson, Nevada

Figure
2

Drafter: EA Date: 1/16/2014 Contract Number: 21-32100104 Approved by: Revised:

Path: \\Env-EVI-Files3\public\Eng\LePetomane\NERT\I.F.S.\Workplan\HAS\PFigure2_NERT_HospitalRouteBMI.mxd

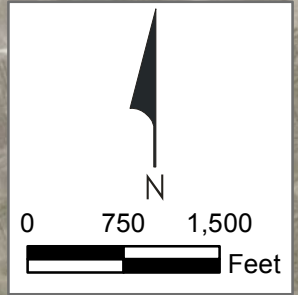
Hospital Name: St. Rose Dominican Hospital
Hospital Address: 102 E Lake Mead Parkway Henderson, NV
Hospital Phone Number: (702) 564-2622

Directions to Area Hospital:

- 1 Proceed south on Pabco Road
- 2 Turn right to proceed west on Warm Springs Road
- 3 Turn left on N Boulder Highway
- 4 Turn right on E Lake Mead Parkway

End: **102 E Lake Mead Parkway**, Henderson, NV
(Destination will be on the **right**)

Starting Point



Data Sources:
ESRI 2011 Topographic Map

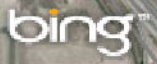


Image courtesy of USGS Image courtesy of the Nevada State Mapping Advisory Committee © AND

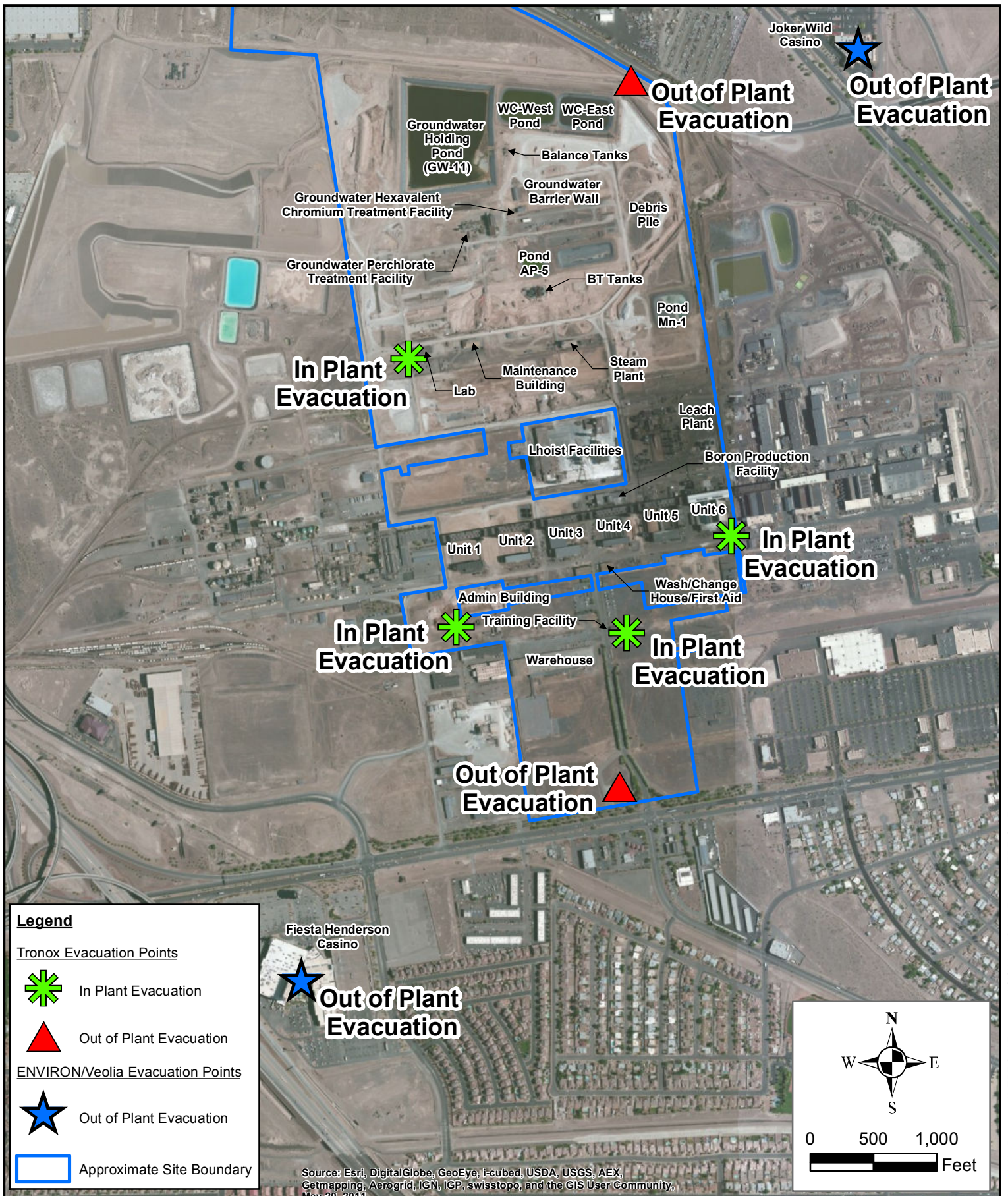
2200 Powell St., Suite 700, Emeryville, CA 94608

**Route Description and Map to Hospital
From Athens Well Field**
Nevada Environmental Response Trust Site, Henderson, Nevada

Drafter: EA Date: 1/16/2014 Contract Number: 21-32100104 Approved by: Revised:

Figure
3

Path: H:\LePetomane\NERT\RI.FS_Workplan\HASP\Figure3_NERT_HospitalRouteAWF.mxd



Legend

Tronox Evacuation Points

In Plant Evacuation

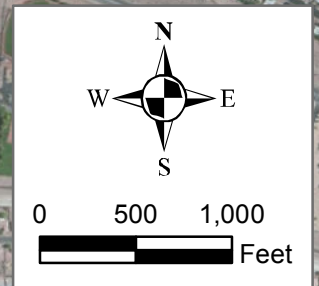
Out of Plant Evacuation

ENVIRON/Veolia Evacuation Points

Out of Plant Evacuation

Approximate Site Boundary

Fiesta Henderson Casino
Out of Plant Evacuation



Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, May 20, 2011.



2200 Powell St., Suite 700, Emeryville, CA 94608

Tronox and ENVIRON Evacuation Points

Nevada Environmental Response Trust Site, Henderson, Nevada

Figure

4

Drafter: EA/RS

Date: 1/16/2014

Contract Number: 21-32100FA

Approved by:

Appendix A

Chemical Information and Material Safety Data Sheets

Hazardous Property Information

Check if Present	Material (CAS #)	Water Solubility ^a	Specific Gravity	Flash Point ^c (Degrees F)	Vapor Pressure ^d	LEL UEL	Ca/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
Volatile Organic Compounds (VOCs)									
<input type="checkbox"/>	Acetic acid (64-19-7)	Miscible	1.05	103	11 mm	4.0% 19.9%	10 ppm	50 ppm	0.074 (d)
<input type="checkbox"/>	Acetone (67-64-1)	Miscible	0.79	0	180 mm	2.5% 12.8%	250 ppm	2,500 ppm	62 (d) 130 (r)
<input type="checkbox"/>	Acrolein (107-02-8)	40%	0.84	-15	210 mm	2.8% 31%	C 0.1 ppm Skin	2 ppm	1.8 (d)
<input type="checkbox"/>	Acrylonitrile (107-13-1)	7%	0.81	30	83 mm	3% 17%	2 ppm Skin	85 ppm Ca	1.6 (d)
<input type="checkbox"/>	Benzene (71-43-2)	0.07%	0.88	12	75 mm	1.2% 7.8%	1 ppm Skin	500 ppm Ca	61 (d) 97 (r)
<input type="checkbox"/>	Bromodichloromethane (75-27-4)	4500 mg/l	1.98	--	50 mm	Non-flam	None established	None determined	--
<input type="checkbox"/>	Bromoform (75-25-2)	0.10%	2.89	--	5 mm	Non-flam	0.5 ppm Skin	850 ppm	1.3 ^j
<input type="checkbox"/>	Bromomethane (74-83-9)	2%	1.73	--	1.9 atm	10% 16.0%	1 ppm Skin	250 ppm Ca	80 ^j
<input type="checkbox"/>	Carbon Tetrachloride (56-23-5)	0.05%	1.59	--	91 mm	Non-flam	2 ppm Skin	200 ppm Ca	252 (d)
<input type="checkbox"/>	Chlorobenzene (108-90-7)	0.05%	1.11	82	9 mm	1.3% 9.6%	10 ppm	1000 ppm	1.3 (d)
<input type="checkbox"/>	2-Chloroethyl-vinyl Ether (110-75-8)	0.02%	1.05	61	27 mm	--	None established	None determined	--
<input type="checkbox"/>	Chloroethane (75-00-3)	0.60%	0.92	-58	1000 mm	3.8% 15.4%	100 ppm Skin	3800 ppm	4.2 ^j
<input checked="" type="checkbox"/>	Chloroform (67-66-3)	0.50%	1.48	--	160 mm	Non-flam	2 ppm	500 ppm Ca	192 (d)
<input type="checkbox"/>	Chloromethane (74-87-3)	0.50%	0.92	--	5 ATM	8.1% 17.4%	50 ppm	2000 ppm Ca	10 ^j
<input type="checkbox"/>	Dibromochloromethane (124-48-1)	2700 mg/l	2.5	--	76 mm	--	None established	None Determined	--
<input type="checkbox"/>	Dibutyl phthalate (84-74-2)	0.001% (77°F)	1.05	315	0.00007 mm	0.5% --	5 mg/m ³	4,000 mg/m ³	--
<input type="checkbox"/>	1,2-Dichlorobenzene (95-50-1)	0.01%	1.3	151	1 mm	2.2% 9.2%	25 ppm Skin	200 ppm	--
<input type="checkbox"/>	1,1-Dichloroethane (75-34-3)	0.60%	1.18	2	182 mm	5.4% 11.40%	100 ppm	3,000 ppm	--
<input type="checkbox"/>	1,1-Dichloroethylene (DCE) (75-35-4)	0.04%	1.21	-2	500 mm	6.5% 15.5%	1 ppm	None determined	190 ^j
<input type="checkbox"/>	1,2-Dichloroethane (107-06-2)	0.90%	1.24	56	64 mm	6.2% 16%	1 ppm	50 ppm Ca	26 (d) 87 (r)
<input type="checkbox"/>	1,2-Dichloroethylene (540-59-0)	0.40%	1.27	36-39	180-265 mm	5.6% 12.8%	200 ppm	1,000 ppm	17 - 170 ^k
<input type="checkbox"/>	1,2-Dichloropropane (78-87-5)	0.30%	1.16	60	40 mm	3.4% 14.5%	75 ppm	400 ppm Ca	0.26 (d) 0.52 (r)
<input type="checkbox"/>	1,3-Dichloropropene (542-75-6)	0.20%	1.21	77	28 mm	5.3% 14.5%	1 ppm Skin	None Determined Ca	1 ^j
<input type="checkbox"/>	Bis-(2-Ethylhexyl)-phthalate (DEHP) (117-81-7)	0.00%	0.99	420	<0.01 mm	0.3% --	5 mg/m ³	5,000 mg/m ³ Ca	--
<input type="checkbox"/>	Diethyl phthalate (84-66-2)	0.10%	1.12	322	0.002 mm	0.7% --	5 mg/m ³	None Determined	--
<input type="checkbox"/>	Dinitrotoluene (DNT) (25321-14-6)	Insoluble	1.32	404	1 mm	-- --	0.15 mg/m ³ Skin	50 mg/m ³ Ca	--
<input type="checkbox"/>	Endrin (72-20-8)	Insoluble	1.7	--	0.00001 mm Low	--	0.1 mg/m ³ Skin	2 mg/m ³	--
<input type="checkbox"/>	Ethyl benzene (100-41-4)	0.01%	0.87	55	7 mm	0.8% 6.7%	100 ppm	800 ppm	2.3 ^j

Check if Present	Material (CAS #)	Water Solubility ^a	Specific Gravity	Flash Point ^c (Degrees F)	Vapor Pressure ^d	LEL UEL	Ca/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)	
<input type="checkbox"/>	Hydrazine (302-01-2)	Miscible	1.01	99	10 mm	2.9% 98%	0.01 ppm Skin	50 ppm Ca	3.7 (d)	
<input type="checkbox"/>	Methyl ethyl ketone (MEK) (78-93-3)	28%	0.81	16	78 mm	1.4% 11.4%	200 ppm	3000 ppm	16 (d) 17 (r)	
<input type="checkbox"/>	Methyl tert-butyl ether (MTBE) (1634-04-4)	5.1 g/100ml	0.7	-18	245 mm	1.6% 8.4%	40 ppm	None determined	0.32 – 0.47mg/m ³ ⁱ	
<input type="checkbox"/>	Methylene chloride (75-09-2)	2%	1.33	--	350 mm	13% 23%	25 ppm	2,300 ppm Ca	160 (d) 230 (r)	
<input type="checkbox"/>	Phenol (108-95-2)	9% (77°F)	1.06	175	0.4 mm	1.8% 8.6%	5 ppm Skin	250 ppm	0.06 (d)	
<input type="checkbox"/>	1,1,2,2-Tetrachloroethane (79-34-5)	0.30%	1.59	--	5 mm	Non-flam	1 ppm Skin	100ppm Ca	7.3 (d)	
<input type="checkbox"/>	Tetrachloroethylene (PCE) (127-18-4)	0.02%	1.62	--	14 mm	Non-flam	25 ppm	150 ppm Ca	47 (d) 71 (r)	
<input type="checkbox"/>	Toluene (108-88-3)	0.07% (74°F)	0.87	40	21 mm	1.1% 7.1%	10 ppm Skin	500 ppm	1.6 (d) 11 (r)	
<input type="checkbox"/>	1,1,1-Trichloroethane (71-55-6)	0.40%	1.34	--	100 mm	7.5% 12.5%	350 ppm	700 ppm	390 (d) 710 (r)	
<input type="checkbox"/>	1,1,2-Trichloro-ethane (79-00-5)	0.40%	1.44	--	19 mm	6% 15.5%	10 ppm Skin	100 ppm Ca	--	
<input type="checkbox"/>	1,2,4-Trichlorobenzene (120-82-1)	0.003%	1.45	222	1 mm	2.5% 6.6% (302°F)	C 5 ppm	None Determined	3 ^j	
<input type="checkbox"/>	Trichloroethylene (TCE) (79-01-6)	0.1% (77°F)	1.46	--	58 mm	8% 10.5%	25 ppm	1,000 ppm Ca	82 (d) 110 (r)	
<input type="checkbox"/>	Trichlorofluoromethane (75-69-4)	0.1% (75°F)	1.47	--	690 mm	Non-flam	C 1,000 ppm	2000 ppm	--	
<input type="checkbox"/>	1,1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	0.02%	1.56	--	285 mm	--	1,000 ppm	2,000 ppm	--	
<input type="checkbox"/>	1,2,4-Trimethylbenzene (95-63-6)	0.006%	0.88	112	1 mm	0.9% 6.4%	25 ppm	None determined	2.4 (d)	
<input type="checkbox"/>	Vinyl Chloride (75-01-4)	0.1% (77°F)	0.91	--	3.3 atm	3.6% 33%	1 ppm Skin	None Determined Ca	--	
<input type="checkbox"/>	Xylene (o, p, m, mix) (1330-20-7)	Slightly soluble	0.86-0.88	81-90	7-9 mm	0.9% 7%	100 ppm	900 ppm	20 (d) 40 (r)	
Metals										
<input type="checkbox"/>	Aluminum metal and oxide (as Al)	b	2.7	--	0 mm	e	10 mg/m ³ (respirable)	None determined	--	
<input type="checkbox"/>	Antimony (7440-36-0)	b	6.69	--	0 mm	e	0.5 mg/m ³	50 mg/m ³	--	
<input checked="" type="checkbox"/>	Arsenic (inorganic compounds, as As)	b	5.73	--	0 mm	e	0.010mg/m ³	5 mg/m ³ Ca	--	
<input type="checkbox"/>	Arsenic (organic compounds, as As)	Properties vary depending upon the specific organic arsenic compound.						0.2mg/m ³	None determined	--
<input type="checkbox"/>	Barium chloride(as Ba) (10361-37-2)	38%	3.86	--	low	Non-flam	0.5 mg/m ³	50 mg/m ³	--	
<input type="checkbox"/>	Barium nitrate (as Ba) (10022-31-8)	9%	3.24	--	Low	e	0.5 mg/m ³	50 mg/m ³	--	
<input type="checkbox"/>	Beryllium and compounds (as Be)	b	1.85	--	0 mm	e	0.0002 mg/m ³	4 mg/m ³ Ca	--	
<input type="checkbox"/>	Cadmium dust (as Cd)	b	8.65	--	--	e	0.005 mg/m ³	9 mg/m ³ Ca	--	
<input checked="" type="checkbox"/>	Chromium (III) compounds (as Cr)	b	Properties vary depending upon the specific compound.					0.5 mg/m ³	25 mg/m ³	--

Check if Present	Material (CAS #)	Water Solubility ^a	Specific Gravity	Flash Point ^c (Degrees F)	Vapor Pressure ^d	LEL UEL	Ca/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)	
<input type="checkbox"/>	Cobalt metal dust and fume (as Co) (7440-48-4)	Insoluble	8.92	--	0 mm	e	0.02 mg/m ³	20 mg/m ³	--	
<input type="checkbox"/>	Copper dust and mist (as Cu)	b	8.94	--	0 mm	e	1 mg/m ³	100 mg/m ³	--	
<input type="checkbox"/>	Lead	Insoluble	11.34	--	0 mm	e	0.05 mg/m ³	100 mg/m ³	--	
<input checked="" type="checkbox"/>	Manganese, Fume and compounds (as Mn) (7439-96-5)	Insoluble	7.2	--	0 mm	Combustible	0.2 mg/m ³	500 mg/m ³	--	
<input type="checkbox"/>	Mercury compounds (as Hg) Except alkyl compound	b	13.6	--	0.0012 mm	e	0.025 mg/m ³ Skin	10 mg/m ³	--	
<input type="checkbox"/>	Molybdenum (7439-98-7)	Insoluble	10.28	--	0 mm	Combustible	10 mg/m ³ 3 mg/m ³ (resp.)	5,000 mg/m ³	--	
<input type="checkbox"/>	Nickel and other compounds (as Ni)	Insoluble	8.9	--	0 mm	e	1 mg/m ³	10 mg/m ³ Ca	--	
<input type="checkbox"/>	Selenium (7782-49-2)	Insoluble	4.28	--	0 mm	Combustible	0.2 mg/m ³	1 mg/m ³	--	
<input type="checkbox"/>	Silver, metal dust, and soluble compounds (as Ag)	b	10.49	--	0 mm	e	0.01 mg/m ³	10 mg/m ³	--	
<input type="checkbox"/>	Thallium (soluble compounds, as Ti)	b	Properties vary depending upon the specific compound.					0.1 mg/m ³ Skin	15 mg/m ³	--
<input type="checkbox"/>	Vanadium pentoxide dust and Fume (1314-62-1)	0.8%	3.36	--	0 mm	e	0.05 mg/m ³ (Respirable)	35 mg/m ³	--	
<input type="checkbox"/>	Zinc oxide (1314-13-2)	b	5.61	--	0 mm	e	5 mg/m ³	500 mg/m ³	--	
Miscellaneous										
<input checked="" type="checkbox"/>	Ammonia (7664-41-7)	34%	--	--	8.5 atm	15% 28%	25 ppm	300 ppm	17 (d)	
<input checked="" type="checkbox"/>	Asbestos (1332-21-4)	Insoluble	--	--	0 mm	Non-flam	0.1 fibers/cc	None determined	--	
<input checked="" type="checkbox"/>	Chromic Acid and chromates (hexachrome) (1333-82-0)	63%	2.7	--	Very low	Non-flam	0.005 mg/m ³	15 mg/m ³ Ca	--	
<input type="checkbox"/>	Cyanide (as CN)	--	--	--	--	Non-flam	5 mg/m ³ Skin	--	--	
<input type="checkbox"/>	DDT (50-29-3)	Insoluble	0.99	162-171	0.0000002 mm	--	1 mg/m ³ Skin	500 mg/m ³ Ca	--	
<input type="checkbox"/>	Diesel Fuel #2 (68476-34-6)	Insoluble	0.81-0.90	130	--	0.6-1.3 6-7.5	None established	None determined	--	
<input type="checkbox"/>	Fluorides, as F	--	--	--	--	--	2.5 mg/m ³	None determined	--	
<input type="checkbox"/>	Gasoline (8006-61-9)	Insoluble	0.72-0.76	-45	38-300 mm	1.4% 7.6%	300 ppm	Ca None determined	--	
<input type="checkbox"/>	Kerosene (8008-20-6)	Insoluble	0.81	100-162	5 (100°F)	0.7% 5.0%	200 mg/m ³ Skin	None determined	--	
<input type="checkbox"/>	Naphthalene (91-20-3)	0.003%	1.15	174	0.08 mm	0.9% 5.9%	10 ppm	250 ppm	0.038 (d)	
<input type="checkbox"/>	PCB (42% chlorine) (53469-21-9)	Insoluble	1.39	--	0.001 mm	Non-flam	1 mg/m ³ Skin	5 mg/m ³ Ca	--	
<input type="checkbox"/>	PCB (54% chlorine) (11097-69-1)	Insoluble	1.38	--	0.00006 mm	Non-flam	0.5 mg/m ³ Skin	5 mg/m ³ Ca	--	
<input type="checkbox"/>	Phosphorus (yellow) (7723-14-0)	0.0003%	1.82	--	0.03 mm	--	0.1 mg/m ³	5 mg/m ³	--	
<input checked="" type="checkbox"/>	Polycyclic Aromatic Hydrocarbons (PAH)	Properties vary depending upon the specific compound. Listed in NIOSH as Coal Tar Pitch Volatiles						0.2 mg/m ³	80 mg/m ³ Ca	--

Check if Present	Material (CAS #)	Water Solubility ^a	Specific Gravity	Flash Point ^c (Degrees F)	Vapor Pressure ^d	LEL UEL	Cal/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
EXPLANATIONS AND FOOTNOTES:									
<p>^a Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per million or part per billion level. Gasoline, for example, is insoluble in the gross sense, and will be found as a discrete layer on top of the ground water. But certain gasoline constituents, such as benzene, toluene, and xylene, will also be found in solution in the ground water at the part per million or part per billion levels.</p> <p>^b Solubility of metals depends on the compound in which they are present.</p> <p>^c Several chlorinated hydrocarbons exhibit no flash point in a conventional sense, but will burn in the presence of high energy ignition source or will form explosive mixtures at temperatures above 200 degrees F.</p> <p>^d Expressed as mm Hg under standard conditions.</p> <p>^e Explosive concentrations of airborne dust can occur in confined areas.</p> <p>^f Cal/OSHA Time-weighted Average (TWA) Permissible Exposure Limits (PELs) except where noted in g. The substances designated by "Skin" in the PEL column may be absorbed into the bloodstream through the skin, the mucous membranes and/or the eye, and contribute to the overall exposure. "C" notation indicates the number given is a ceiling value.</p> <p>^g TLV-TWA adopted by the American Conference of Governmental Industrial Hygienists (ACGIH). Currently, there is no Cal/OSHA PEL.</p> <p>^h The substances with a "Ca" notation in the IDLH column are considered to be potential occupational carcinogens by NIOSH.</p> <p>ⁱ Odor thresholds values extracted from "<i>ODOR THRESHOLDS for Chemicals with established Occupational Health Standards</i>", American Industrial Hygiene Association, 1997.</p> <p>(d) Odor detection threshold: Lowest concentration at which a stimulus is being detected.</p> <p>(r) Odor recognition threshold: Lowest concentration at which a definite odor character is detected.</p> <p>^j Values extracted from the U.S. Environmental Protection Agency Technology Transfer Network, Air Toxics website. URL: www.epa.gov/ttn/atw/, 2006</p> <p>^k Value extracted from "<i>HESIS Guide to Solvent Safety</i>" California Department of Health Services, 2004. URL: http://www.dhs.ca.gov/ohb/HESIS/solv_ch.htm</p> <p>^l Value extracted from "<i>Chemical Summary For Methyl-Tert-Butyl Ether</i>", U.S. Environmental Protection Agency, Office Of Pollution Prevention and Toxics, August 1994. URL: http://www.epa.gov/chemfact/s_mtbe.txt</p>									

Appendix B

Control Mechanisms

The following Control Methods should be implemented for Hazards that were identified as part of the Tasks that will be conducted as part of this Project.

B1 Chemical Hazards – ENVIRON personnel, contractors, subcontractors, and visitors shall wear appropriate personal protective equipment (PPE) while performing Site activities. At a minimum, equipment shall include safety glasses, steel-toed boots, and hard hats (when overhead work being performed or when overhead hazards exist). Additional PPE requirements will be outlined in the site-specific Health and safety Plan (HASP) and ENVIRON personnel shall familiarize themselves with the appropriate health and safety responses for exposure to known on-site chemicals prior to beginning work at the Site. See Attachment A for chemical safety data. Consult with your local Health and Safety Coordinator for any personal air monitoring requirements.

B2 Physical Hazards – Hazards from floor and wall openings, careless movements, protruding objects, debris, spills, placement of materials on paths or foot traffic areas, present a problem with regards to slips, trips, falls, and puncture wounds.

ENVIRON personnel shall minimize the risk of slips, trips, and falls by keeping the work area clear of excess equipment and cleaning up wet surfaces as soon as possible. In addition, the floor of every workroom shall be maintained in a clean and, as much as possible, a dry condition. Employees should avoid walking through/on wet and/or cluttered surfaces and be conscious of the fact the wet surfaces could be slippery and could cause injury. Spilled materials should be cleaned up immediately.

Personnel should stay alert at all times and if tired or distracted, take this into account when working at the Site. To minimize the possibility of injury:

- Wear sturdy work boots with good tread are required and steel toed boots are recommended.
- Do not run.
- Slide feet when walking on slick/wet surfaces.
- Don't walk up or down steep embankments/hills if possible. If not possible, walk at an angle when going up/down embankments/hills.
- Don't carry items that block your vision.
- Use handrails/grips when available and maintain 3-point contact whenever possible.
- Don't jump down from equipment and look down before you step down.
- Use appropriate fall protection when working at elevation.
- Report any floor openings that are not clearly marked and/or guarded.
- Don't use ladders/scaffolds during high winds or when ice or snow is on the rungs/work surface.
- Don't use ladder substitutes like a box or truck fender, and don't use ladders/scaffolding that is not in good conditions.
- Keep paths and work areas clear of tools, equipment, boxes, cords, etc. Tape or secure cords, wires, etc. to minimize trip/fall hazard.
- If a protruding object cannot be moved, make sure the object can be easily seen or guard/pad the object if possible.
- Use ancillary lighting such as flashlights and headband lights when necessary.

Sufficient illumination should be provided in all areas at all times. Employees should notify the responsible person of conditions where there is an absence of sufficient natural and/or permanent artificial light.

Emergency exit doors will be kept free of any obstacles at all times. Any employee finding an emergency door blocked should immediately report the condition and correct it when possible. Exit lights and signs will also be maintained in proper condition at all times and immediately reported if deficient.

B3 Mechanical Hazards – Working within the vicinity of operating drill rigs poses unique safety situations such as high pressure hazards from hoses, pipes or the well, and gas releases. Also, other hazards may be present such as falls from elevation, electrical contact, and improper machine guarding. ENVIRON personnel shall not attempt to operate equipment they are not familiar with and/or are not equipped with protection devices. Personnel shall familiarize themselves with the equipment being utilized on-site, and shall at a minimum, know how to stop or turn off the equipment. Although ENVIRON personnel do not operate or have control over the operation of drilling equipment, it is every employees responsibility to recognize potential or existing hazards related to drill rigs, and to walk away from any unsafe operations.

Depending upon the work to be done by ENVIRON personnel; a preliminary site field survey may need to be performed prior to ENVIRON involvement in drilling operations. The survey should include verification that utilities and any hazardous buried material or structures have been located and marked and that the nearest emergency facility has been identified. It may also include information on safe access to the drilling areas, hazards on-site, location of a clean water source and weather conditions and related shelter areas.

Employee Restrictions and Responsibilities

Under no circumstances will an ENVIRON employee operate a drilling rig, a portion thereof, or any piece of contractor equipment. In addition, employees will not:

- Guide a drill rig to a drill location, assist in the movement of equipment, or participate in the movement or breaking down of any portion of the rig.
- Climb on the rig, stand too close to the rig (especially its moving parts), stand below or close to a pipe hoist, walk on drilling rods or casing, or walk on the edge of a mud pit.
- Watch a driller arc-weld.
- Smoke while at a drilling rig site.
- Refuel an engine while it is still running or hot, siphon gasoline, or park near a rig exhaust.
- Wear loose fitting clothing or PPE near the drill rod or stem.

ENVIRON employees will not place tools, meters, etc. in a position that could create a fall, trip or slip hazard. As much as is possible, employees will work with the appropriate Site personnel to ensure the area in the vicinity of the drill rig is clean, orderly and free of slip, trip and fall hazards.

If the drilling is being done at hazardous waste site, the PPE requirements will be forwarded as noted in the site HASP. Clean water will be kept available for decontamination, washing, and dust control. Kneeling, lying in, or sitting on contaminated ground or materials must be avoided or a protective barrier must be used. Avoid or minimize handling of contaminated materials.

Non-powered hand trucks should be used whenever feasible to move heavy objects, objects with poor hand holds or large bulky objects. Some things to consider are:

- Keep the center of gravity of the load as low as possible, and place heavy objects below lighter ones.
- Place loads where the weight of the load will be carried by the axle, not the handles, and where it will not slip, shift or fall during movement.
- Load only to height to allow a clear view ahead. Only walk backwards with a hand truck in specific instances such as when going up an incline.
- When going down an incline the hand truck should be in front of the operator and when going up an incline, it should be downhill from the operator.
- Move the hand truck at a safe speed.

B4 Traffic/Heavy Equipment Safety - ENVIRON personnel should, under no circumstances, operate or ride on heavy equipment which is being used by a subcontractor. Site personnel will maintain a safe distance of at least 20 feet (6.5 meters) or more, depending on circumstances and directives, from all heavy equipment in operation. If activities warrant closer proximities to operating equipment, personnel will don brightly colored vests and a second person will stand watch to keep him/her out of the path of equipment while performing the required activity. Eye contact with the equipment operator will be maintained.

Heavy Equipment can represent a substantial hazard to workers. The following procedures should be followed when heavy equipment is in use:

- Employees will not handle or attempt to operate power tools or motorized vehicles without proper training.
- Use common sense. Do not assume that the equipment operator is keeping track of your whereabouts. Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge.
- All heavy equipment must be shut down during refueling.
- Maintain visual contact of moving equipment at all times.
- Establish hand signal communication when verbal communication is difficult.
- All heavy equipment shall have backup alarms of some type.
- Use chains, hoist, straps, and any other equipment to safely aid in moving heavy materials.
- Never use a piece of equipment unless you are familiar with its operation. This applies to heavy as well as light equipment (i.e. steam cleaners, hand tools, etc.).
- Be sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines, will present a hazard in the work area.
- Restrict all non-essential people out of the work area.
- Prohibit loose-fitting clothing or loose long hair around moving machinery.
- Instruct equipment operators to report any abnormalities such as equipment failures, unusual odors, etc.
- Implement an ongoing maintenance program for all tools and equipment. Inspect all tools and moving equipment regularly to ensure that parts are secured and intact. Promptly repair or replace any defective items.

- Store tools in clean, secure areas so that they will not be damaged, lost, or stolen.
- When an equipment operator must negotiate in tight quarters, provide a second person to ensure adequate clearance.
- All heavy equipment must be properly leveled and supported prior to use.
- Heavy equipment and trucks will be operated in specific Site control zones and marked traffic lanes.
- Materials, tools, or other objects will not be thrown, tossed, or dropped. Always hand off or lower items as needed.

Working Near Railroads - In the event that work activities are conducted near and/or adjacent to railroad tracks, the following procedures will be implemented:

- The hazards of working near and/or adjacent to railroads will be included in job briefings prior to work activity commencing and subsequently when the activity changes;
- Mounting, dismounting, or crossing over moving locomotives or cars is prohibited;
- Employees will be alert for the movement of cars, locomotives, or equipment at any time, in either direction, on any track and will remain at least 25 feet (8 meters) from the end of standing cars, equipment, or locomotives, except when proper protection is provided (e.g., a flagman is present or the track is taken out of service by the proper authority, prior to starting any work on or about the tracks);
- Employees will not cross over coupled, moving freight cars; take refuge under any car, equipment, or locomotive; attempt to mount, dismount, or cross over moving equipment.

B5 Electrical Hazards – Electricity may pose a particular hazard to Site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

Properly ground all electrical equipment. Avoid standing in water when operating electrical equipment. Ground fault outlets or adapters shall be used for any electrical equipment. Apparatus, tools, equipment, and machinery will not be repaired while in operation. Lockout/Tagout (LOTO) procedures will be implemented when necessary. If equipment must be connected by splicing wires, electrical work must be performed by a licensed and competent electrician.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All portable generators or other portable internal combustion type devices used on-site will be grounded. All grounds will be validated twice daily with a multimeter to confirm a resistance of less than ten ohms.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations.
- Portable and semiportable tools and equipment must be grounded by a multiconductor cord having an identified grounding conductor and a multicontact polarized plug-in receptacle.

- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground-fault-circuit interrupters (GFCIs).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged.
- Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

B6 Fire and Explosion Hazards – The presence of petroleum and solvent contaminated material presents a potential fire hazard. Smoking and use of open flame will be prohibited. The use of non-sparking tools and equipment will be implemented if conditions warrant. Where the potential of fire exists, ENVIRON will provide portable fire extinguishers. Where applicable, all fire extinguishers shall be mounted no higher and no lower than 4 feet (1.22 m) from the floor and/or shall be readily accessible for use, where applicable. All fire extinguishers shall be maintained as follows:

- Fully charged and in operable condition
- Clean and free of defects
- Readily accessible at all times

Fire prevention and protection measures include elimination of ignition sources, where feasible, identification of combustion sources and atmospheres, and early detection and rapid response to fire/explosion situations. In addition to standard operating procedures, the following safe work practices will be implemented:

- Site activities will comply with National Electric Code and explosion proof criteria;
- Smoking will only be allowed in designated areas;
- Appropriate air monitoring procedures will be conducted, when necessary;
- Welding, open flame or spark-producing operations will not be allowed on-site;

- Solvents with a flash point of less than or equal to 100oF will not be used for cleaning purposes;
- Fire extinguishers shall be kept in all work vehicles
- Extinguishers must:
 - Be maintained in a fully charged and operable condition;
 - Be visually inspected each month; and
 - Undergo a maintenance check each year.

All fires and visible smoke that are detected at the Site will be dealt with immediately by the individual recognizing the fire and/or smoke. In the event of visible smoke, fire or explosion, the following emergency response procedures will be implemented:

- Immediately cease operations; and
- In all emergency situations contact emergency services.

For small fires, personnel may attempt to extinguish the fire, if safe to do so and they have been trained. One fire extinguisher ONLY may be used to fight the fire. After one fire extinguisher is depleted, personnel must evacuate the area. For larger fires, perform site evacuation.

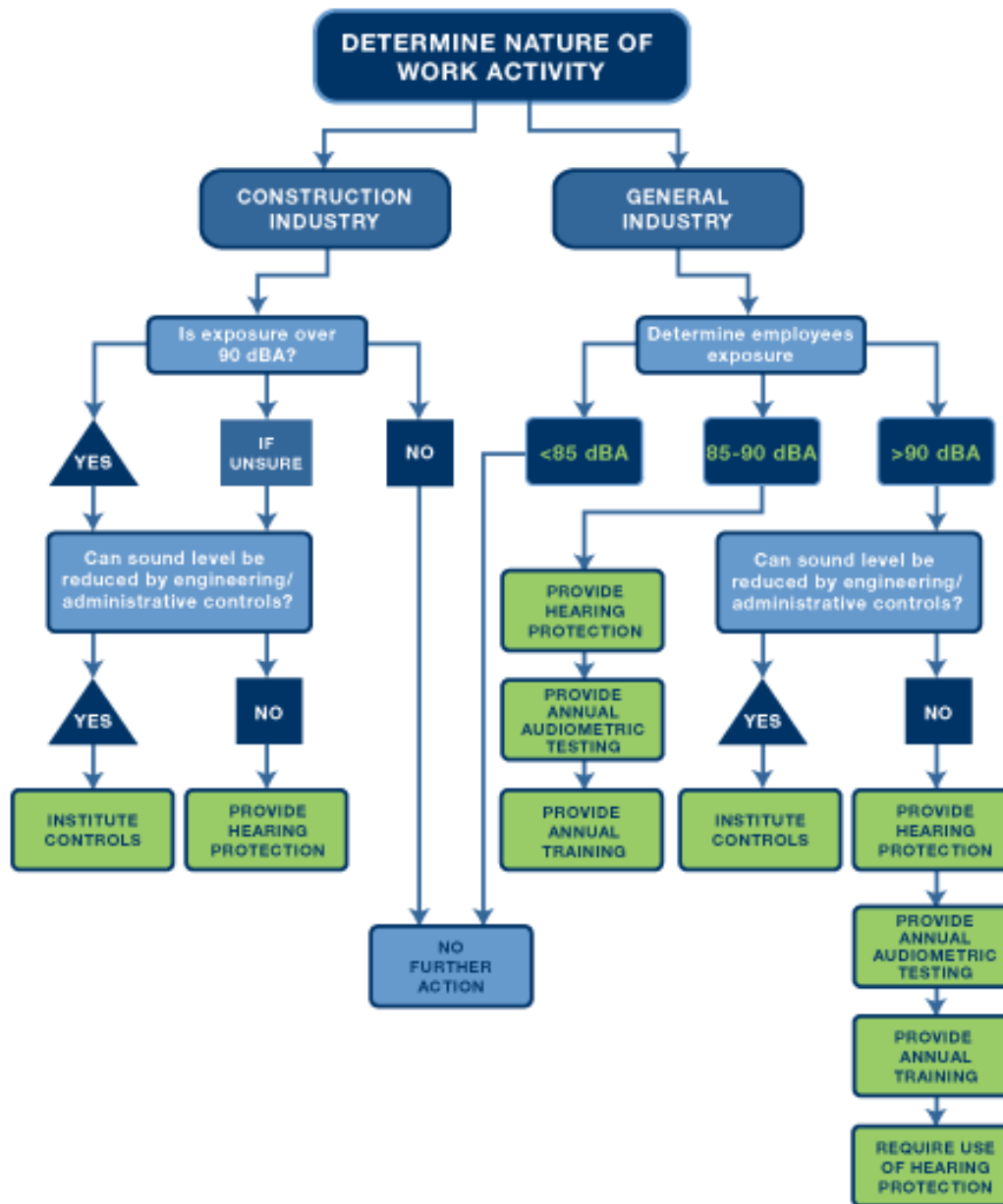
B7 Acoustical Hazards – Hearing protection will be worn by all personnel operating or working within the vicinity of equipment when noise is sufficient to interfere with general conversation at a normal speaking volume; when noise levels exceed 85dBA; and/or when manufacturers' requirements indicates that it's usage is mandatory. Personal hearing protectors, such as earplugs or earmuffs, may be used to reduce the amount of noise exposure while the above control measures are being evaluated or if such controls fail to reduce the exposure levels to below the PELs.

Any environmental condition where a person must shout to be heard from a distance of 3 feet indicates a hazardous noise environment. Under these conditions, personnel must be protected through the use of appropriate hearing protective devices.

Hearing protection shall be worn:

- In any situation where normal conversation cannot be heard at a distance of 3 feet regardless of the source of the noise or where noise levels as measured with approved noise monitoring equipment is above 85 dBA.
- When operating gasoline or electric powered machinery.
- When working within 25 feet of operating heavy equipment (earth working equipment, etc.) as working around this type of equipment can result in exposure to hazardous levels of noise (levels greater than 90 dBA).

Refer to the decision tree below:



B8 Ventilation/Oxygen Deficiency Hazards – ENVIRON personnel shall monitor the work area for oxygen deficiency hazards using monitoring devices that have been appropriately calibrated and are recommended for this specific use, as applicable. If direct air monitoring readings suggest an oxygen deficiency and/or the build-up of harmful substances, leave the area and contact your Project Manager. Implementation of corrective actions may include but not be limited to increasing work zone ventilation or evaluating alternatives (e.g., removing equipment that is generating combustion exhaust or venting the exhaust to the exterior of the building). However, work will not continue until the ventilation/oxygen deficiency hazard has been properly addressed, implemented, and verified.

B9 Heat Stress – Heat stress can be a significant hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in

the identification of a heat stress victim, the first-aid treatment procedures for the victim and in the prevention of heat stress incidents.

Workers will be encouraged to immediately report any heat-related problems that they experience or observe in fellow workers. Any worker exhibiting signs of heat stress and exhaustion should be made to rest in a cool location and drink plenty of water. Emergency help by a medical professional is required immediately for anyone exhibiting symptoms of heat stroke, such as red, dry skin, confusion, delirium, or unconsciousness. Heat stroke is a life threatening condition that must be treated by competent medical authority.

ACGIH screening criteria for heat stress exposure in degrees Celsius for an 8 hour work day 5 days per week with conventional breaks will be used in determining safe exposure for acclimatized and unacclimatized employees.

Allocation of Work in a Work/Rest Cycle	Acclimatized				Action Limit (Unacclimatized)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0 (87.8F)	28.0 (82.4F)	--	--	28.0 (82.4F)	25.0 (77F)	--	--
50-75%	31.0 (87.8F)	29.0 (84.2F)	27.5 (81.5)	--	28.5 (83.3F)	26.0 (78.8F)	24.0 (75.2F)	--
25-50%	32.0 (89.6F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	29.5 (85.1F)	27.0 (80.6F)	25.5 (77.9)	24.5 (76.1F)
0-25%	32.5 (90.5F)	31.5 (88.7F)	30.5 (86.9F)	30.0 (86F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	27.0 (80.6F)

Heat Stress Prevention

Whenever possible or within the control of ENVIRON, engineering controls should be utilized to protect workers from heat related hazards. For example, isolation from the heat source, ventilation such as open windows, fans or other methods of creating air flow, and heat shielding such as awnings or umbrellas.

Appropriate work practices can also lessen the chances of heat related hazards. Some of these include:

- Water intake should be about equal to the amount of sweat produced (i.e., drinking 5-7 ounces of water every 15-20 minutes). Electrolyte fluids may also be necessary.
- Whenever possible, gradual exposure to heat is preferred to allow the body's internal temperature to actuate to the working conditions.
- Whenever possible, adjust the work schedule to reduce risk of heat stress. For example, postpone nonessential or heavier work to the cooler part of the day and perform work in the shade if portable.
- Rotate personnel to reduce the amount of time spent working in direct sun and heat.
- Increase the number and/or duration of rest breaks, and whenever possible, rest break areas should be in a cool area and as close to the work area as is feasible.

Wear appropriate PPE when necessary, such as thermally conditioned clothing, self-contained air conditioning in a backpack, and plastic jackets/vests with pockets that can be filled with dry ice or ice. However, based on the type of work being done, where work is being performed, or other required PPE, these options may be prohibited or make the use of this PPE impossible or impractical.

Heat-Related Illnesses

Heat Stress: This is the mildest heat-related illness, but prompt action may prevent it from turning into a more severe heat-related illness. Symptoms include irritability, lethargy, significant sweating, headache, or nausea. The following guidance can be used in the identification and treatment of heat related illness.

Heat Stress First Aid:

- Take victim to a protected (e.g., shaded, cool) area, remove any excess protective clothing, and provide cool fluids.
- If an air-conditioned spot is available, this is an ideal break location.
- Once the victim shows improvement he/she may resume working, however the work pace and practices (e.g., does fluid intake need to be increased) should be moderated to prevent recurrence of the symptoms.

Heat Exhaustion: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Symptoms include pale, clammy skin, and profuse sweating, vomiting, and the bowels may move involuntarily. The pulse is weak and fast, breathing is shallow. Fainting can occur.

Heat Exhaustion First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling – you do not want the victim to shiver).
- Call a physician or emergency service, or transport the victim to medical care.
- Remove all protective outerwear.
- If the victim is conscious, it may be helpful to give him/her sips of water.

Heat Stroke: Heat stroke is a severe medical condition requiring first aid and emergency treatment by a medical professional as death can occur without appropriate care. Heat Stroke represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105 – 110 F. As the victim progresses toward heat stroke symptoms include hot and usually dry, red and spotted skin, headache, dizziness, nausea, mental confusion, delirium, possible convulsions and loss of consciousness.

Heat Stroke First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling – you do not want the victim to shiver).
- Summon emergency medical help to provide on-site treatment and transportation to a medical facility.
- Remove all protective outerwear and loosen personal clothing.
- Apply cool wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or even place the victim in a tub of cool water.

Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments.

- Protect exposed skin with an appropriate sunscreen. A sunscreen with a sun protection factor (SPF) of 15 or greater is required for work in the sun with reapplication at breaks and lunch.
- Heat rash, also known as prickly heat, can be prevented by the application of a hydrophobic, water repellent barrier cream such as Kerodex 71.

B10 Cold Stress - The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds (wind chill), dampness, and cold water. One or any combination of these factors can cause cold-related hazards. Cold stress, including frostbite and hypothermia, can result in severe health effects.

A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures. Major risk factors for cold-related stresses include:

- Wearing inadequate or wet clothing increases the effects of cold on the body.
- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.
- Having a cold or certain diseases, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.
- Being male increases a person's risk to cold-related stresses. Men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition, or other physiological differences.
- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.
- Aging -- the elderly are more vulnerable to the effects of harsh winter weather.

TABLE 2. Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security			INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.				
Trenchfoot and immersion foot may occur at any point on this chart.												

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

■ Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress TLV

Cold Stress Prevention

Engineering controls should be utilized whenever possible to protect workers from cold related hazards. For example, on-site heat sources, heated shelters, work areas shielded from drafty or windy conditions, and the use of thermal insulating material on equipment handles.

Effects arising from cold exposure will be minimized by the following control measures:

- Personnel will be trained to recognize cold stress symptoms.
- Field activities will be curtailed or halted if the equivalent chill temperature is below 20 F.
- As much as possible, work that exposes personnel to the cold will be done during the warmest hours of the day.
- Inactivity in cold conditions will be kept to a minimum.
- Frequent short breaks in warm, dry shelters will be taken.
- Vehicles will be equipped with supplies in case the vehicle becomes inoperable (e.g., blanket, dry clothing, water, food, a shovel, etc).

The following PPE will be provided during work in cold environments

- Workers will be provided with insulated dry clothing when the equivalent chill temperature is less the 30 F.
- Feet, hands, the face, and the head should be protected (40% of the body's heat can be lost when the head is exposed).
- Foot and hand wear may also need to be waterproof.
- Clothing should be layered so that adjustments can be made to changing environmental temperatures and conditions. For example, an outer layer to break the wind, a middle layer that will absorb sweat and retain insulation when wet, and an inner layer that allows ventilation.

Cold-Related Illness

Hypothermia: Hypothermia occurs when the body temperature falls to a level where normal muscular and cerebral functions are impaired. Although it usually occurs in freezing air and water temperatures, it can occur in any climate if a person's internal body temperature falls below normal. Symptoms should not be ignored, and a supervisor should be notified as soon as hypothermia is suspected.

Initially, symptoms may include shivering, an inability to do complex motor functions, sluggishness and mild confusion as the body temperature drops to around 95 F. As the body temperature falls, speech may become slurred, and behavior may be irrational, simple motor functions may be difficult to do and a state of "dazed consciousness" may exist. In severe state (below 90 F), heart rate, blood flow, and breathing will slow. Unconsciousness and full heart failure can occur.

Hypothermia First Aid:

On land:

- Call for emergency, and then help move the victim (unless other injuries prohibit their being moved) to a warm, dry area and replace wet clothing with warm, dry clothing or a blanket. Move the person carefully because movement can increase the irritability of the heart.
- If the person is conscious and lucid, warm liquids can be provided, but never alcohol or caffeinated drinks. If possible, have them to move their arms and legs to create muscle heat.
- If the person is unconscious or unable to assist, place warm bottles/packs in the person's arm pits, groin, neck and head areas.
- Do not rub the person's body or place them in warm water.

In water:

- Call for emergency help and get the victim out of the water. Move them carefully because movement can increase the irritability of the heart.
- If it is you in the water, do not swim unless a floating object or person can be reached quickly as swimming uses the body's heat and reduces survival time by about 50%.
- If you are in the water, conserve body heat by folding arms across the chest, keeping thighs together, bending knees and crossing ankles, if another person is in the water with you, huddle together.
- If you are in the water, do not remove clothing-button, buckle, zip, and tighten collars, cuffs, shoes, and hoods as the water trapped next to the body provides a layer of insulation that may slow the loss of heat.

Frostbite: Frostbite occurs when the skin literally freezes, and deep frostbite can affect deeper tissues such as tendons and muscles. Frostbite usually occurs when temperatures drop below 30 F, but wind chill effects can cause frostbite at above-freezing temperatures. The ears, fingers, toes, cheeks, and nose are the most commonly affected body parts. Initially, symptoms include an uncomfortable sensation of coldness. Tingling, stinging or an aching feeling of the exposed area is followed by numbness. Frostbitten areas appear white and cold to the touch and with deeper frostbite, the area becomes numb, painless, and hard, and can turn black.

Frostbite First Aid:

- Seek medical attention as soon as possible and treat any existing hypothermia first.
- Warm liquid can be provided, but not alcohol or caffeinated drinks such as tea and coffee.
- Do not rub the affected areas, but cover them with dry, sterile gauze or soft, clean bandages.
- Do not try rewarming the affected area if you have not been specifically trained to do so and/or if there is a chance the affected area will get cold again.

Trench Foot: Trench Foot is caused by a continuous exposure to a wet, cold environment. Symptoms include tingling and/or itching sensation, burning pain and swelling and, in more extreme cases, blisters.

Trench Foot First Aid:

- Seek medical attention as soon as possible and move the victim to a warm, dry area.
- Affected tissue can be treated with careful washing and drying, slight elevation. Do not try rewarming the affected area if you have not been specifically trained to do so.

TABLE 3. Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift*

Air Temperature— Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm. Breaks)		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

Notes for Table 3

1. Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
2. The following is suggested as a guide for estimating wind velocity if accurate information is not available:
5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
3. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.
4. TLVs apply only for workers in dry clothing.

*Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labour.

B11 Insects, Snakes and Spiders - Care will be taken by all Site workers to avoid stinging or biting insects such as ticks, spiders, bees, wasps, hornets, and yellow jackets. Workers allergic to any particular insect sting or bite should seek medical attention if stung or bitten and may need to carry emergency medicine prescribed by their doctor.

Care should always be taken to avoid these insects and increased vigilance is necessary during high infestation seasons, when opening protective casings of monitoring wells, and when walking through areas of heavy vegetation or areas known to be infested.

To minimize the chance of bites/stings:

- Wear appropriate PPE such as light colored clothing so you can see insects, long pants tucked into boots, long sleeves when possible, a hat, and gloves if you are cutting brush or need to handle or move vegetation.

- Check your body and clothing for insects, shower after work and wash/dry clothes at as high temperature as possible.
- Don't swat at insects and don't eat in areas where there are insects.
- Avoid sweet smelling personal hygiene products and, unless contraindicated by the work being performed (e.g., sampling, data collection), wear EPA approved repellants such as those containing DEET.



Black Widow Spider



Brown Recluse Spider

Spider bites generally cause only localized reactions such as swelling, pain, and redness. However, bites from a Black Widow or Brown Recluse, or if you are allergic to spiders, can cause symptoms that are more serious.

First Aid for spider bites:

- Clean the bite area with soap and water and place a cold pack over the bite area to reduce swelling.
- Monitor for allergic reactions. If victim has more than minor pain, or if nausea, vomiting, difficulty breathing, or swallowing occurs, medical attention should be sought immediately.



Tick



Removing a tick

Ticks are common, especially in the warmer weather months and may carry diseases such as Rocky Mountain Spotted Fever and Lyme disease.

First Aid for tick bites:

- Use a fine tipped tweezers, grasp tick firmly as close to skin as possible and pull the body away from skin. Avoid crushing the body and don't twist.

- If parts of the tick remain in the skin, don't be alarmed as the mouth will dislodge as skin sloughs off.
- Wash area with soap and water and apply antiseptic or antibiotic ointment to prevent infection.
- If unexplained symptoms develop such as severe headaches, fever, or rash within 10 days of the bite, seek medical attention.
- If possible, contain tick in an air tight container for identification purposes in the event of a serious reaction.



1: Chigger
2: Bites

Chiggers are tiny, 8-legged wingless organisms that grow up to become a type of mite. They are found in tall grass and weeds and their bites cause severe itching.

First Aid for chiggers:

- Reduce discomfort and prevent infection
- The affected area should be kept clean by washing with soap and water
- A topical hydrocortisone cream, antihistamine, or local anesthetic may be of value in reducing the itching
- The wounds should not be scratched, if possible
- If signs of infection occur, consult your physician



Bees and wasps belong to the phylum Arthropod family, and they are crucially important to the pollination of plants, specifically flowers, fruits, and vegetables. A sting from a bee or wasp will cause itching, irritation, redness and/or swelling at the sting site.

First Aid for bee stings:

- Remove the stinger as quickly as possible - venom continues to enter the skin from the stinger for 45 to 60 seconds following a sting – using a flat dull object, like a credit card. Slid the flat object in the opposite direction of the stinger to remove it from the skin
- Wash the wound using soap and water
- Apply ice for swelling and pain
- A topical hydrocortisone cream, antihistamine, or local anesthetic may be of value in reducing itching
- If the sting occurs on the neck or mouth, seek medical attention immediately, swelling in these areas may cause suffocation

A small percentage of people are allergic to stings and a sting can be fatal, caused by a disruption to breathing and circulatory systems called anaphylactic shock. If the sting is followed by severe symptoms, seek medical attention immediately. Allergic people should never be alone for outdoor activities since help may be needed for prompt emergency treatment. Allergic people should have an identification bracelet as well as carry something like an “EpiPen” for immediate treatment for anaphylactic shock.



Fire ants are a variety of stinging ants with over 280 species worldwide. Typically, a colony produces large mounds in open areas, and feeds mostly on young plants, seeds, and insects. They nest in the soil, often near moist areas such as river banks and pond edges. Unlike other ants which bite and then spray acid on the wound, fire ants bite only to get a grip and then sting, injecting toxic alkaloid venom. This results in a painful stinging sensation, similar to what a fire burn feels like.

First Aid for fire ant bites:

- Move rapidly away from the nest
- Quickly remove or kill ants on skin and clothing to prevent further stings
- Wash the area gently with soap and water to rid the skin of any venom
- Place cool cloth or ice cloth on sites for 15 minutes, and to relieve pain, dab the area with calamine lotion, a topical (cortisone) or oral antihistamine (e.g. benadryl) to help with swelling
- Do not scratch the blister because this can lead to infection
- Allergic response is rare, but symptoms are difficulty breathing, light headedness, and weakness. Immediate medical attention is required

Snakes serve as an important role as predators in the ecosystem, and help maintain populations of rodents and other prey.

First Aid for venomous snake bites:

- Wash and immobilize the injured area, keeping it lower than the heart if possible
- Seek medical attention immediately
- DO NOT apply ice, cut the wound, apply a tourniquet, or suck the bite
- Remain calm and try not to move the bitten body part
- Wash the bite with soap and water
- Remove jewelry or other items that may be affected by rapid swelling of affected body parts
- Try to identify the type of snake: note color, size, patterns, and markings
- The bite will be painful and have two distinct puncture wounds
- If venom is injected there will be burning and swelling
- ONLY FOR CORAL SNAKE BITES: apply a mild wrapping on the wound



Water Moccasin (aka cotton mouth)



Rattlesnake



Coral Snake



Copperhead

B12 Poisonous Plants – Plants poison on contact, through ingestion, or by absorption or inhalation. They cause painful skin irritations upon contact and can cause internal poisoning when eaten.



Poison Ivy



Poisonous Sumac

Giant Hogweed



Poison Pacific Oaks



First Aid for poisonous plants:

- Wash exposed areas with cold running water as soon as you can
- When possible, wash your clothing
- Relieve itching by taking cool showers and applying topical anti-itch medications or hydrocortisone
- The rash is often arranged in streaks or lines where you brushed against the plant
- In a few days, the blisters become crusted and take 10 days or longer to heal
- If the reaction is severe or worsens, seek medical attention

B13 Personal Safety - If it is deemed that a work site is in an area where an employee's personal safety may be at risk from potential criminal acts, wild animals, etc. the risks will be evaluated and implementation of preventative measures will be taken to minimize the risk. Informational resources such as the client, local law enforcement officials, Park or Wildlife Service, and Animal Control could be utilized to assess the risk and to ensure the safest possible work environment. For example, local law enforcement can be made present or make

frequent drive-bys while work is being done, outside security can be hired, and work can occur only during certain times of the day or work may not proceed at all. Some general guidelines are provided here, but each situation is different and actions must be taken based on the specifics of each.

In areas of risk, employees will communicate via cell phones or 2-way radios, and will check-in at predetermined times throughout each workday. If employees do not call in to the Project Manager or designated representative, the team will be contacted, and if unsuccessful, local law enforcement will be notified.

If you see wild animals while driving, stay in your vehicle. Never get out for a photo or a closer look. Keep windows up and don't try to keep the animal from crossing a road with your vehicle. If you see a wild animal while on foot, never approach the animal. If the animal has not seen you, go back the way you came. Do NOT turn your back and run which could evoke their natural predator instinct. Instead, keep facing the animal and back away at a steady pace. Let it know you are human by talking in a low voice and waving your hands slowly. If you are near a car or building, get inside. In addition, in areas of higher risk (i.e., contacted officials have indicated that wild animals are a nuisance), employees may want to consider carrying "pepper spray".

If, while on the project site, and despite any precautions set forth, if an employee feels that their personal safety is at risk, they shall cease work, leave the work area and immediately report their concerns so that appropriate steps can be taken.

B14 Working Alone and Working in Isolated Areas - Site and Operations employees will assess the risk of working alone as outlined in section 4 in this HASP. And whenever possible, employees will not work alone in isolated areas. If the isolated area involves hiking/walking into areas that are unmarked or if there is potential to become directionally disoriented (e.g., no trails, unmarked trails, forested or highly vegetated areas), employees will be trained on the use of a compass and trail/topography maps and if necessary, will take wilderness safety training. The employee will work with the Park/Wildlife service on what emergency planning if necessary (e.g., unexpected weather, animal attack, and search/rescue).

Communicating through cell phones or 2-Way Radios will be utilized whenever possible. Employees will check-in at predetermined times throughout each workday and as the risk rating increases, employees will check-in more frequently. If employees do not call in to the Project Manager or designated representative, the team will attempt to be contacted. If contacting the employee is unsuccessful, the appropriate authorities will be notified. In addition, and especially if communication is not possible during the day, the planned start and estimated finish times for the day will be communicated, and employees will check in at the beginning and end of the work day.

If employees will be moving from isolated area to isolated area, there will be established beginning and ending locations, planned start and estimated finish times, and planned routes that will be followed throughout the day. Employees will not deviate from this schedule without first contacting the appropriate personnel. It may also be necessary to notify the client, law enforcement, or Park/Wildlife officials of these schedules.

Local authorities should be contacted about any hunting season that may be in session, and if it is possible that hunters may be present in the area in which ENVIRON personnel will be working. If so, employees will wear brightly colored hardhats/hats and reflective vests, will not work before dusk, and work will end 30 minutes before dusk.

If this is not possible to complete work during day light hours, employees will wear appropriate reflective apparel and have appropriate lighting, such as portable lighting, flashlights, or headlamps as appropriate for the activity being conducted. Personal security will be assessed and measures taken as discussed above if appropriate.

B15 Severe Weather

Severe weather conditions include high winds, electrical storms, and heavy rain. At a minimum, all work outdoors will cease during these events. When lightning is spotted, Site personnel should use the following steps to avoid injury:

- Workers should note the flash-boom ratio (i.e., count the seconds after the lightning was seen until the thunder was heard).
- By counting the seconds between seeing lightning and hearing thunder and dividing by 5, you can estimate your distance from the storm (in miles or kilometers). If the storm is 6 miles (9.6 kilometers) away or less (30 seconds between when lightning was seen and thunder was heard) workers must stop work and take shelter.
- If the storm is more than 6 miles (9.6 kilometers) away (greater than 30 seconds between lightning and thunder), the Site Coordinator should monitor the storm and be prepared to cease work if the storm approaches an unsafe distance. Since storms can travel at varying speeds and the amount of time it takes to cease and secure operations will also vary, so prudent judgment should be exercised when storms are in the vicinity and/or developing (e.g., darkening skies, increasing wind speeds, etc.).
- Workers should not stay in exposed areas (outdoors on the ground, on a roof, in an aerial lift, on a steel truss, on an ungrounded steel structure, in a golf cart, un-sided building, etc.) after lightning has been witnessed. All personnel must move to a safe location.
- Workers should wait 30 minutes from the last sight of lightning or sound of thunder before returning to work.
- Those required to travel from one building to another during the 30 minute wait time should do so only by enclosed vehicle.
- Once the 30 minute wait time period has elapsed and no additional lightning or thunder has been seen or heard, individuals may resume normal work.

B16 Aboveground and Underground Utilities - Various forms of underground and aboveground utility lines or pipes (carrying water, wastewater, gas, and or electricity) may be encountered during work activities. Every effort shall be made to locate and mark underground utilities prior to the start of intrusive work. At a minimum, ENVIRON will conduct a historical Site review to develop a plot plan with the most up to date utility information, contact the appropriate One Call service (where available), contract a Private utility locating service (where available), and clear the critical zone around any intrusive location to 5 feet (1.3 m) in every direction. Please reference section 4 of the site-specific HASP and SPI 27 Subsurface Clearance for more information.

Work involving machinery with high extensions (backhoes, etc.) will remain **at least** 10 feet (3.3 meters) from overhead power lines. As line voltage increases, your safe working distance will also increase. If overhead lines are present, call the utility company and find out what voltage is on the lines so the safe working distance can be calculated, or stay at least 28 feet (9m) from cables supported on wooden poles, and 50 feet (15m) from cables supported on metal poles.

Should any operations cause equipment to come into contact with utility lines, the appropriate authority will be notified immediately and an Incident Report will be completed. Work will be suspended until the appropriate actions for the particular situation can be taken.

B17 Trenching/Excavation - An excavation is any manmade cut, cavity, trench, or depression in an earth surface, formed by earth removal. A trench is narrow excavation (in relation to its length) made below the surface of the ground. The following safe operating guidelines apply to open trenches or excavations exceeding four (4) feet (1.3 meters) in depth **or** of any depth if in unstable soil conditions.

- Excavated materials will be stored and retained at least 2 feet (0.6 meters) from the edge of the excavation. This procedure must be observed even when excavation/trench entry will not occur.
- Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
- Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
- Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall will not be permitted, unless the wall is underpinned and all other precautions have been taken to ensure the stability of the adjacent walls.
- Excavations will be inspected at least daily, or more often as conditions warrant, by a **competent person** to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibrations, or nearby equipment operation has not caused weakening of sides, faces, and flows. Before an employee enters an excavation greater than four (4) feet (1.3 meters) in depth (or less if soil is deemed unstable by a competent person), the atmosphere must be tested to ensure that an oxygen deficient or hazardous atmosphere does not exist. If the concentration of any airborne contaminant exceeds one-half its permissible exposure limit (PEL) or other applicable occupational exposure limit (OEL), the airborne oxygen concentration is less the 19.5 percent, or explosivity exceeds ten percent of the lower explosive limit (LEL), then no personnel shall be permitted to enter the excavation until such engineering controls or other hazard controls are instituted to eliminate or control the hazard.
- Diversion ditches, dikes, or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.
- When mobile equipment is used or allowed adjacent to excavations, stop logs, or barricades will be installed. The grade will always be away from the excavation.
- A means of egress (ladder, ramps, stairways, etc.) shall be accessible at any location inside the excavation without requiring more than 25 feet (8.3 meters) of lateral travel distance.

- Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used when appropriate.
- Field personnel shall not enter any excavation, without specific direction, for any reason except to rescue injured individuals who have fallen into the excavation.
- All excavations will be marked and protected at all times to ensure Site personnel, visitors, or unauthorized personnel do not enter without permission or fall into the trench.
- Personnel will work in pairs when working around an excavation of 2' (0.6 meters) or more.

B18 Water Safety - All personnel and visitors when immediately near water (i.e., within 4 feet/1.22 meter), over water, wading in water or on any vessel, where the danger of drowning exists, must wear a USCG approved personal floatation device (PFD). This PFD must be properly secured to the wearer. The PFD must be free of all defects including rips, tears, stress, and fading, and be kept clean and free of excessive dirt and oil. However, several factors are relevant to determining whether a danger of drowning exists. These include the type of water body (i.e., a pool, a river, and a canal), depth, presence, or absence of a current, height above the water surface, and the use of fall protection when working above a water body.

Depending on the factors present, there are some circumstances where a drowning hazard could exist where workers are near or over water that is relatively shallow (i.e., less than 2 feet (0.6meters) in depth). For example, where workers are not using fall protection and are 10 feet above a river, a worker may fall and be knocked unconscious. Without the use of a life jacket or buoyant work vest, a worker in such a scenario could drown.

A life ring equipped with 90 feet of solid braid polycarbonate line, or equivalent must close to the working area and accessible for use. This includes activities being on board all vessels and kept readily available.

USCG boating safety guidelines or equivalent should be adhered to when operating a boat during sampling activities. Boats must be equipped with the required running lights for night-time or poor visibility conditions. Boats must be equipped with an anchor and alternate means of locomotion (e.g., extra motor, floatable oars).

B19 Material Handling/Ergonomics – Handling and storing materials involve diverse operations such as hoisting with a crane, driving a truck loaded with materials, carrying bags or materials manually, and stacking materials such as drums, barrels, or lumber. When moving materials manually, employees should attach handles or holders to loads in addition to wearing appropriate personal protective equipment and using proper lifting techniques.

Employees should seek help when handling loads that are too bulky to grasp or lift, when employees cannot see around or over a load, or when they cannot safely handle a load of any other reason. Personal protective equipment should be worn when moving materials to prevent needless injuries. Hand and forearm protection, such as gloves should be worn when working with loads that have sharp or rough edges. Blocking materials can be used to manage and move loads, but ensure the materials are large and strong enough to support the load safely.

When mechanical equipment is used to move materials, allow the weight, shape and size of the material dictate the type of equipment used to move it, based on its rated capacity and making sure not to overload. Equipment-rated capacity should be displayed on each piece of equipment in use. When picking up items with a powered truck, center the load as close to the mast as possible, avoid overloading and do not put extra weight on the rear to counterbalance

the equipment, adjust the load to the lowest possible safe position when traveling, and always follow the manufacturer's operational instructions.

Lifting, carrying and lowering objects represents a potential physical hazard to ENVIRON personnel. Therefore, it is every employee's responsibility to realistically evaluate the object to determine if the weight and size exceeds the employee's ability to lift, lower, or carry it. To eliminate or minimize the risk of lifting hazards, utilize proper techniques, such as keeping the back straight and legs bent. Objects should always be lifted, lowered and carried as close to the body as possible. If the equipment cannot be lifted in this manner, it is too heavy to lift alone. Call other personnel, or use a mechanical device for aid in lifting. Mechanical aids like hand trucks and carts or the buddy system should be used to move heavy objects, objects with poor handgrips or large bulky objects. Some other things to consider:

- Evaluate the object for the presence of any physical hazards such as pinch points, sharp or jagged edges, burrs or rough and slippery surfaces.
- The route in which the object will be moved should be free from obstructions, which could cause difficulty in moving the object.
- Assess other hazards such as stairs before you move the object and consider smaller loads with multiple trips as a safe alternative
- If an object is stored at a level higher than five feet, or on the floor, an appropriate mechanical device may be necessary to move the object.
- Recognized lifting hazards should be designed out of the work process whenever possible.

Proper lifting and lowering techniques should be followed even if the object or material to be lifted is of lighter weight. Keep the objects as close to the body as possible and:

- Establish a firm footing with feet at approximately shoulder width and one foot slightly ahead of the other. This posture will aid in keeping good balance and will establish a stable lifting base.
- Always bend at the knees, not at the waist when lifting or lowering an object.
- Obtain a good secure grip on the object.
- When beginning to lift, tighten your stomach muscles and use your legs to lift the object, as leg muscles are generally stronger than back muscles.
- Lift slowly and smoothly.
- If you need to turn as you lift, do not twist at the waist, but instead pivot with the feet.

When lowering the object, reverse the procedure.

B20 Power Tools – Tools can be hazardous when improperly used since these types of tools utilize energy: Electric, liquid fuel, hydraulic, pneumatic, and powder-actuated. The following precautions will be taken by employees to prevent injury:

- Power tools will always be operated within their design limitations, and only by employees who have been appropriately trained in the use, operation, and proper handling of such tools.
- Guards are not to be removed or rendered inoperative.

- Eye protection, gloves, and safety footwear are recommended during operation.
- Store tools in an appropriate dry location when not in use.
- Work only in well illuminated locations.
- Tools will not be carried by the cord or hose, and cords or hoses will not be yanked to disconnect it from the receptacle.
- Cords and hoses will be kept away from heat, oils, and sharp edges or any other source that could result in damage.
- Tools will be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- Observers will be kept at a safe distance at all times from the work area.
- Tools will be maintained in a clean manner, and properly maintained in accordance with the manufacturer's guidelines. Periodic inspection of hand and portable power tools should occur.
- Ensure that the work area is kept clean to maintain proper footing and good balance.
- Ensure that proper apparel is worn. Loose clothing, ties, or jewelry can become caught in moving parts.
- Tools that are damaged will be removed from service immediately and tagged "Do Not Use".

B21 Vehicle Use – Work areas and Site conditions must be considered when designating and selecting a vehicle for use. The vehicle shall be maintained in safe working order as required by the manufacturer. This would include a routine preventive maintenance schedule for servicing and checking of safety-related equipment. Special consideration should be taken when weather conditions reduce the safety and visibility while driving. Appropriate measures should be taken while driving during inclement weather including snow, icy, and/or wet conditions; high winds; hail, heavy rains; debris or other impairments to safe driving caused by natural weather.

Special-use vehicles (e.g., All-Terrain Vehicles (ATV), snowmobiles, etc.) are vehicles with a light engine or electric motor, other than construction equipment, and are not intended and/or allowed for highway use. These vehicles may **not** have seat belts or **do not** have substantial roll protection (i.e., ROPS, FOPS, steel roll-cage, etc.). In addition, the following general practice will be followed:

- All vehicles will be operated in accordance with the Manufacturer's requirements and specifications;
- Drivers should use prudent judgment and proceed cautiously when driving on non-paved roads;
- Operators of special-use vehicles shall be trained by a competent person. At a minimum, training will be hands-on by a competent person and the operator shall demonstrate of basic skills. All individuals are required meet all training aspects before use;
- All vehicles shall remain on flat surfaces at all times and shall not be operated on slopes steeper than a 30% grade;
- Daily inspections of vehicles for safety and maintenance will be required (i.e., fluid leaks/levels, tire pressure, tire surfaces, lights, fuel levels, brakes, etc.); Speed limits shall be maintained to safe operating speeds;

- Make sure the engine is turned OFF before dismounting the vehicle;
- Avoid driving over any extreme obstacles (i.e. wood/logs, fences, boulders, etc.);
- Watch for pedestrians and other vehicles;
- Only drive during daylight hours;
- Do not carry passengers;
- Slow down before coming to a stop;
- Shut engine down prior to refueling;
- Each driver will have a valid driver's license.
- Operators shall wear:
 - wear safety glasses, goggles, or face-shield at all times when moving
 - leather boots
 - a **PROPERLY FITTED** DOT/ANSI/SNELL approved helmet
 - Leather gloves

B22 Seasonal Hunting Hazards – During recreational hunting seasons, field personnel will wear appropriate clothing, such as fluorescent orange Hi-Vis vests, so as to be visible to hunters and not blend in with the landscape. Field personnel should also use whistles, air horns and/or other means to make their presence known to hunters and wildlife alike. The schedule of the hunting season, if applicable, will be included as an addendum to this HASP in order to inform personnel of the type of game (e.g., deer, pheasant, duck, etc.) that is being hunted and the type of weapon being used (e.g., bow & arrow, shot gun, single shot rifle, etc.). Be aware that even if “No Trespassing” and/or “No Hunting Allowed” signs are posted, trespassers and/or hunting may still be on-site. At no point should field personnel or contractors confront trespassers.

B23 Demolition – Personnel shall not be permitted in any area that can be adversely affected by mechanical demolition operations. Only those workers necessary for the performance of the operations shall be permitted in the area. The area shall be barricaded as necessary to prevent unauthorized personnel or anyone not associated with the demolition operation from entering the area.

All roof cornices or other ornamental stonework shall be removed prior to removing the walls. When removing walls or portions thereof, all steel members affected shall be cut prior to wall removal. During demolition, continuing inspections by a competent person shall be made as the work progresses to detect hazards resulting from the weakened or deteriorated floors, walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

B24 Unexploded Ordinances – Some sites (e.g., mines, firing ranges, ordinance manufacturing facilities, etc.) may have old explosives, blasting caps, or other types of unexploded ordinances that may be stored on-site (e.g., in mines, in structures surrounding the mine or buried on-site). Individuals must take immediate action in the event of finding and/or suspecting that explosives may be present. These include not touching or disturbing suspected explosives or making loud noises in their immediate vicinity. Slowly retreat from the area and immediately report to the Project Manager, Project Health and Safety Coordinator, and Corporate Health and Safety Director so that ordinance experts can be contacted.

B25 Closed / Abandoned Mines – The underground mine and associated buildings and equipment may not have been maintained over the years. The structural soundness of the mine, buildings and equipment may be compromised and could collapse. Personnel are to avoid all contact with mine or building supports. Personnel are not to venture into mines or perform any work in areas should they appear structurally unstable. These conditions are to be immediately reported to the PC, Project Health and Safety Coordinator, and Corporate Health and Safety Director.

B26 Small Chemical Spills – Chemical hazards present in environmental samples or in the environment being sampled are NOT the only “chemicals of concern”. Toxic chemicals may also be brought onto the Site as part of the sampling event in the form of sample preservatives. In general, sample preservation is required for most water samples. Two practices exist for adding a preservative: 1) addition of the preservative to samples in the field; and 2) addition of the preservative to the sampling containers prior to sending the containers into the field. In either case, EXTREME caution MUST be exercised when adding a preservative to a sample vial or using vials which already contain a preservative since these preservatives will vary in concentration and type. Some examples of the type of preservatives which may be encountered include sodium thiosulfate to remove chlorine, hydrochloric acid or ammonium chloride to stabilize pH and reduce biological activity; or sodium bisulfate.

Chemical First Aid (Body)

In the event that you suspect that you have been exposed to a chemical, whether or not you were wearing PPE, you should:

- Remove yourself or the victim from the accident area.
- Remove any contaminated clothing.
- Wash the injured area to dilute or remove the substance, using large volumes of water.
- Wash for at least 20 minutes, taking care not to allow runoff to contact unaffected parts of your body.
- Gently brush away any solid materials, again avoiding unaffected body surfaces.
- Especially wash away any chemical in your eye. Sometimes the best way to get large amounts of water to your eye is to step into a shower.

Chemical First Aid (Eye)

For all chemical injuries to the eye, the first thing you should do is immediately irrigate the eye copiously. Ideally, specific eye irrigating solutions should be used for this, but if none are available regular tap water is acceptable.

- Begin washing your eye before taking any other action and continue for at least 10 minutes. The longer a chemical is in your eye, the more damage will occur. Diluting the substance and washing away any particulates that may have been in the chemical are extremely important.
- Ideally, in a work setting, you would be placed in an emergency eyewash or shower station and your eye washed with sterile isotonic saline solution. If sterile saline is not available, use cold tap water.

- All acid or alkali eye burns require immediate treatment and evaluation by a doctor. You should be taken immediately to the closest emergency department. If you suspect a serious injury may have occurred or are otherwise not able to make the trip to the emergency room quickly, you should call an ambulance to shorten transport time. Take the Material Safety Data Sheet (MSDS) on the chemical you were exposed to with you to the hospital.
- Any time you experience pain, tearing, redness, irritation, or vision loss associated with chemical exposure, go to the nearest emergency department for immediate evaluation, even if you believe the chemical is only a mild irritant.

Appendix C

Subsurface Clearance Field Checklist



SUBSURFACE CLEARANCE (SSC) FIELD CHECK LIST

(Use this form to document & identify field elements of SSC. Retain the completed form with the project file)

Site Name/Project No.: _____

Designated Person: _____

Walkover Date: _____

PIC/PM: _____

Intrusive Locations Surveyed: _____

(ENVIRON MANAGED SUBSURFACE CLEARANCE ACTIVITIES)	Yes	No	N/A	Comments
1. The potential for unexploded ordnance (UXO) has been assessed and a UXO survey performed, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Public utility markings are present for all utility companies notified. List the companies with public utilities present on-site and cross check with expected utilities and on-site indicators:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Natural gas/oil/petroleum lines and associated tanks:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Electric:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Potable water pipes, hydrants:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sewers (storm/process water/sanitary) and/or Manways/Grates/Culverts:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public lighting (street and traffic):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Telephone and Data Lines:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other underground utilities:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Private utilities marked and scope discussed with/provided to locator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Subcontractor Name: _____ Contact #: _____
Alternate intrusive locations chosen in case of refusal or presence of utilities/indicators in Critical Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Describe nonconformity or unexpected conditions found by locator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Site Walkover performed to confirm utility markouts and assess the presence of Visual Indicators. If visual indicators are present, note location in comments/Plot Plan:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Indication of underground storage tank/piping and dispenser islands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non-native soils, surface depressions, new/dead vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Saw cuts, patched surfaces, warning tape or other surficial indicators of below ground work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pumps, pump galleries, piping manifolds and/or racks, process equipment, compressors, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
On or below-grade transformers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fuel oil lines, tanks, fill ports, observation wells, vent stacks, hydraulic lift systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Adjacent/supplemental buildings with no apparent utility feeds (electricity, water, gas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Plot Plan updated to reflect most accurate site SSC information. Describe any on-site additions/changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Ground Disturbance location(s) and Critical Zones (5ft/1.5m distance in every horizontal direction surrounding disturbance locations) cleared of utilities and visual indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Contact PIC/PM and H&S Director if utilities pass through the Critical Zone of a planned ground disturbance location
A mark has been placed on each intrusive location and radial marks extending to the edge of the Critical Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Intrusive locations and Critical Zones cleared of utilities using sweep and search method or other applicable SSC investigative methods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Once evaluated and cleared of utilities, intrusive locations cannot be moved and a Critical Zone must be maintained around the locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Alternative intrusive locations used due to obstructions within Critical Zone. Describe abandoned and alternative locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Pre-start H&S meeting conducted and SSC risk/hazards discussed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Locate results and intrusive locations/Critical Zones understood by all parties involved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Form completed by: _____

name

date

signature

Appendix D

Emergency Information

Table D-1A: Emergency Response Telephone Roster

	Office	Cell
PERSONNEL		
ENVIRON Corporation		
Project Manager: Allan DeLorme	(510) 420-2565	(925) 487-7594
Task Leader: John Pekala	(602) 734-7710	(707) 815-7474
Site Coordinator: Nita Shinn	Not Available	(312) 927-1146
Site Health and Safety Officer: Nita Shinn	Not Available	(312) 927-1146
Project Health & Safety Coordinators: Chris Ritchie Dan Clark	(510) 420-2542 (510) 420-2563	(510) 418-0535 (510) 299-7036
Corporate Health and Safety Director: Mark Watka	(312) 288-3875	(312) 927-1140
Contractors		
Company: Envirogen Technologies Contact: Wendy Prescott	Not Available	(702) 371-9307
Test America Analytical Laboratory Contact: Sushmitha Reddy	(949) 261-1022	Not Available
Client/Security		
Tronox Contact: John Holmstrom	(702) 651-2305	(702) 465-6703
Tronox Security Department	(702) 651-2200	Not Available
Client Contact: Andy Steinberg	(312) 498-2800	(312) 498-2800
Site Security Contact: Brandon Buffington, Custom Security Co.	(702) 614-3800	Not Available
EMERGENCY RESPONSE AGENCIES		
Hospital St. Rose Dominican Hospital	(702) 564-2622	
Emergency Fire	911	
Emergency Police	911	
NDEP 24-hr Spill Hotline – In State	888-331-6337	
NDEP 24-hr Spill Hotline – Out of State	775-687-9485	
Ambulance Service	911	
Other:	N/A	
OTHER EMERGENCY ASSISTANCE		
CHEMTREC	800-424-9300	
National Response Center (oil and chemical spills)	800-424-8802	
Poison Control Center	800-222-1222	
Federal Emergency Management Agency (FEMA)	202-646-2500	
OFF-SITE AGENCIES – NON EMERGENCY		
Police: City of Henderson, NV	(702) 267-5000	
Hospital: St. Rose Dominican Hospital	(702) 564-2622	
Fire: City of Henderson, NV	(702) 267-2222	
Fire: Clark County, NV	(702) 455-7311	
State Agency – Weiquan Dong, Special Projects Branch, NDEP Bureau of Corrective Actions – Las Vegas Office	(702) 486-2850 x252	
State Agency – James Dotchin, Special Projects Branch, NDEP Bureau of Corrective Actions – Las Vegas Office	(702) 486-2850 x230	
State Agency – NDEP Bureau of Water Pollution Control, Carson City Office	(775) 687-9418	
Other		

Table D-1B: Emergency Services Instructions

For Emergency Medical Incidents, Emergency Fire Response, or Hazardous Materials Incidents

Emergency Telephone Numbers: **911**

- **Hospital:** (702) 564-2622 (*verified by Dan Clark on January 15, 2014*)
- **Police:** 911
- **Fire Department:** 911
- **Site Security/Client:**
 - Custom Security: (702) 614-3800
 - Tronox Security: (702) 651-2200
 - Client Contact: Andy Steinberg (312) 498-2800

1. **Remember to speak SLOWLY and CLEARLY. Do NOT hang up first: let the dispatcher conclude the call.**
2. **Provide the following information:**
 - A Location: 500 Fourth Street, Henderson, Nevada
 - B. Your name and phone number
 - C Explain that this is a facility where hazardous materials are present (the former Tronox facility)
3. **Describe nature of Incident:**
 - A. Emergency Medical Incident
 - How many victims
 - Type of incident - physical injury, etc.
 - Assessment of victims' condition if known (whether victim is conscious/unconscious, breathing/not breathing, pulse/no pulse, nature of injuries, first aid measures used, etc.)
 - Where incident occurred
 - B. Fire:
 - Location of Fire
 - C. Hazardous Materials Incident:
 - This is a hazardous materials incident requiring dispatch of HAZMAT unit
 - Type of incident (fire, explosion, spill, etc.)
 - Type of material (specific chemicals or general description)
 - Whether there is also a Medical Emergency
4. **Give your location at the Site**

Note: Security, Site Health and Safety Officer, or designee must meet the emergency personnel at the staging area to brief them on the situation.