

Appendix E

Health and Safety Plan Including Community Air Monitoring Plan



Site-Specific Health and Safety Plan

Friedrichsohn Cooperage Site
153 155 Saratoga Avenue
Town of Waterford, New York

General Electric Company/SI Group Inc.

Appendix E



HEALTH AND SAFETY PLAN

Signature page

This HASP must be signed by the Project Manager and Safety Group. Without signatures, the HASP is incomplete due to not being reviewed by the Project Manager or Safety Professional.

Project Name: Friedrichsohn Cooperage Site | Appendix E

Project Number: 080987

Project Manager Signature:

Project Manager Approval Date:

Safety Group Signature:

Safety Group Approval Date:



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Attachments

Attachment A Job Safety Analysis (JSA) Forms

Attachment B Project Safety Forms

Attachment C Community Air Monitoring Program



1. Introduction

This Health and Safety Plan (HASP) describes the health and safety procedures and emergency response guidelines that will be implemented during the Remedial Action (RA) for the Friedrichsohn Cooperage Site (Site) located in Waterford, New York. The layout of the Site is presented on Figure 2.1 of the Remedial Design Report (RD Report). An Emergency Response Plan is included as part of this HASP. This HASP shall be implemented and adhered to during all RA activities.

The scope of work to be completed by GHD and the Contractor during the RA includes the following:

- i) Mobilization and demobilization of labor, materials, and equipment to and from the Site, which include Site preparation/setup and Site restoration activities.
- ii) Site reconnaissance activities.
- iii) Surveying activities.
- iv) Clearing and grubbing.
- v) Installation of erosion control measures around excavation areas.
- vi) Excavation, stockpiling and loading of impacted material.
- vii) Soil stabilization activities.
- viii) Collection, storage and treatment of accumulated water from excavations and the decontamination activities.
- ix) Canal restoration
- x) Stockpile soil/sediment sampling activities.
- xi) Oversight of construction activities.
- xii) Equipment and personnel decontamination activities.

During a portion of these activities, personnel may come in contact with waste materials, debris, sediment, and water which may contain hazardous substances. This HASP has been developed to minimize direct contact by project personnel with materials potentially having chemical presence by ensuring:

- i) That project personnel are not adversely exposed to the contaminants of concern.
- ii) That public health and the environment are not adversely impacted by materials with elevated chemical presence that may potentially migrate outside of the work zone during project activities at the Site.
- iii) Compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Part 1926, of Title 29 Code of Federal Regulations (CFR). Part 1926.65 will be implemented for all Site work where project personnel may come into contact with the health and safety hazards that are present at the Site.



- iv) Initiation of proper emergency response procedures to minimize the potential for any adverse impact to project personnel, the general public, or the environment.

A vital element of the selected contractor's Health and Safety Program will be the implementation of a Site-specific HASP for all field activities.

This project HASP requires the following measures:

- i) The communication of the contents of this HASP to project personnel.
- ii) The elimination of unsafe conditions. Efforts shall be initiated to identify conditions that can contribute to an accident and to remove exposure to these conditions.
- iii) The review of all activities prior to undertaking the task/job, after an incident, and/or as a result of any unusual circumstances. Stop activities to think about the task, analyze the task hazards, determine methods to reduce risk, and review the results with affected personnel.
- iv) The review of existing or the development of new Job Safety Analysis (JSA) forms for each project activity. Supervisors and affected personnel are responsible for the development and ongoing revisions of JSAs. The JSAs for known work activities are presented in Attachment A.
- v) The reduction of unsafe acts. Project personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so those safety factors involved in a task become an integral part of the task. Supervisory personnel shall ensure that project personnel committing unsafe acts are held accountable via counseling, mentoring, and, if necessary, reprimand.
- vi) The frequent inspection of project activities. Regular safety inspections of the work site, materials, and equipment by qualified persons ensure early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible, and project activities shall be temporarily suspended until the appropriate corrective actions are taken. Documentation of the daily inspections and corrective actions taken should be kept with the project files.

For the purpose of this HASP, activities performed at the Site involving contact with materials, which potentially have an elevated chemical presence will be considered contaminated operations requiring the use of Personal Protective Equipment (PPE). A detailed description of the required PPE is presented in Section 5.1 and is also identified on each JSA form.

The applicability of this HASP extends to all project personnel who will be on Site, including State and Federal Agency personnel, contractor personnel, subcontractor personnel, and visitors to the Site.

All project activities at the Site will be conducted in accordance with the provisions of an approved Site-specific HASP. A copy of the Site-specific HASP and employer-specific Standard Operating Procedures (SOPs) will be maintained on Site whenever activities are in progress. This HASP shall be used in conjunction with the selected contractor's Safety and Health Program.

1.1 Project Organization

All personnel conducting activities on the Site must conduct their activities in compliance with all applicable Safety and Health standards as specified by OSHA including, but not limited to, the



OSHA 29 CFR 1910, 29 CFR 1926. Project personnel must also be familiar with the procedures and requirements in their approved Site-specific HASP and the applicable procedures found within their company's SOPs and Safety and Health Policy Manual. In the event of any conflicting safety procedures/requirements, personnel shall implement those safety practices, which afford the highest level of safety and protection.

Project Management and Safety Organization

GHD Project Manager – Jamie Puskas (Contractor’s Construction Project Manager (CPM) – (to be determined))

GHD's Project Manager (PM) shall be responsible for the overall implementation of the HASP, and for ensuring that all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP; qualifying/directing subcontractors relative to safety and health performance; coordinating all safety and health submittals; providing the appropriate technical information to write submittals; and consultation with the Client regarding appropriate changes to the HASP.

Site Safety & Health Officer Contractor – (to be determined)

The Safety & Health Officer (SHO) is the person who, under the supervision of the Contractor's Corporate Safety and Health Manager, shall be responsible for the communication of the Site requirements to project personnel and any subcontractor personnel. Additional qualified safety officers will be assigned to work during shifts when the SHO is not on Site. These safety officers will be under the watchful eye of the SHO and will contact the SHO after hours if necessary. The SHO will have prior experience in working at hazardous waste sites and will be responsible for carrying out the health and safety responsibilities by making sure that:

- i) He/she is on Site at all times during active excavation activities and when other active remediation work is ongoing.
- ii) All necessary clean-up and maintenance of safety equipment is conducted by project personnel.
- iii) Emergency services are contacted when necessary.
- iv) A Site-specific Hazard Communication (HAZCOM) Program is maintained on Site.
- v) Project safety forms attached to the HASP are correctly completed and filed.
- vi) A pre-entry briefing is conducted, which will serve to familiarize project personnel with the procedures, requirements, and provisions of this HASP.
- vii) All necessary records are maintained in the project files (e.g., air monitoring results, calibration log sheets, incident reports, daily toolbox meeting sheets, daily safety logbook entries, training certificates and/or certifications, etc.). The selected Contractor may use either their employer-specific safety forms or the forms that are provided in Attachment B.
- viii) Daily safety meetings are held and documented.
- ix) Safe work practices for project personnel are enforced.
- x) Safety of any visitors who enter the Site is ensured.



- xi) Communication is maintained with GHD's PM.
- xii) Orders the immediate shutdown of Site activities in the case of a medical emergency, unsafe condition, or unsafe practice.
- xiii) Designates work areas and defines minimum PPE requirements.
- xiv) Provides the safety equipment, PPE, and other items necessary for project personnel.
- xv) Conducts the required air monitoring and air sampling programs.
- xvi) Enforces the use of required safety equipment, PPE, and other items necessary for project personnel safety.
- xvii) Oversees any potential confined space entry work including preplanning rescue activities with the local community responders.
- xviii) Ensures that there is a competent person in place who will be supervising trenching and excavation work.
- xix) Conducts job site inspections with the Construction Superintendent (CS) or Site Supervisor (SS) as a part of quality assurance for safety and health.
- xx) Reports safety and health concerns to the selected contractor's management as necessary.

Emergency Coordinator

The SHO or his/her designate will act as the Emergency Coordinator (EC). The EC shall be able to implement the emergency procedures and is responsible for implementing the following activities in the event of an emergency:

- i) The EC shall immediately respond to all imminent or actual emergency situations. The EC shall notify all project personnel and emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation.
- ii) The EC shall take all reasonable measures necessary to ensure that fire, explosion, emission or discharge does not occur, re-occur, or spread. These measures may include stopping operations, collecting and containing released materials, and/or removing or isolating containers.
- iii) The EC shall develop Emergency Evacuation Routes on a daily basis and communicate them to all project personnel.
- iv) The EC shall also be responsible for follow-up activities after any incident such as the cleanup of the affected area, maintenance and decontamination of emergency equipment, and completion and submission of an incident report.

Site Supervisor – Contractor (to be determined)

Health and safety is a line management responsibility, and as such, the SS will implement the overall onsite direction and enforcement of the health and safety for this project. The SS must meet the requirements of the "competent person" as per the OSHA regulations. The SS will report to the CPM for this project.



The SS is the person who, under the supervision of the PM, shall be responsible for the communication of the Site requirements to project personnel and subcontractors, and is responsible for carrying out the health and safety responsibilities by making sure that:

- i) All underground utilities have been properly located prior to initiating work activities.
- ii) Each work area is secured with fencing at the end of each day.
- iii) All necessary cleanup and maintenance of safety equipment is conducted by project personnel.
- iv) JSA forms are developed, reviewed, and revised accordingly.
- v) Project personnel stop, think about, act accordingly and review the work activities that they are about to start before initiating activities.
- vi) Project safety forms attached to the HASP are completed properly and then filed.
- vii) A pre-entry briefing is conducted for all project personnel, which will serve to familiarize everyone with the procedures, requirements, and provisions of this HASP.
- viii) Orders the immediate shutdown of project activities in the case of a medical emergency, unsafe condition, or unsafe practice.
- ix) Provides the safety equipment, PPE, and other items necessary for project personnel.
- x) Enforces the use of required safety equipment, PPE, and other items necessary for personnel or community safety.
- xi) Conducts job site inspections as a part of quality assurance for safety and health.
- xii) Reports safety and health concerns to GHD's PM as necessary.
- xiii) Is responsible for the overall implementation of the HASP, and ensuring that all health and safety responsibilities are carried out during the project work activities. This shall include, but is not limited to, review and approval of any subcontractor HASPs, communication of site requirements to personnel, and consultation with GHD's PM regarding appropriate changes to the HASP.
- xiv) The SS also have the responsibility for enforcing safe work practices for all project personnel.
- xv) The SS watch all personnel for any ill effects, especially those symptoms caused by heat stress and/or chemical exposure.
- xvi) The SS oversee the safety of any visitors who enter the Site.

GHD's Corporate Safety & Health Manager (Craig Gebhardt) (Contractor's Corporate Safety and Health Manager – (to be determined))

The Corporate Safety & Health Manager (CSHM) is an individual who is trained as a health and safety professional, works full-time for the selected contractor in a health and safety role, and who serves in a consulting role to the PM, SHO, and SS regarding potential health and safety issues.



Equipment Operators

All equipment operators are responsible for the safe operation of heavy equipment. Operators are responsible for inspecting their equipment on a daily basis to ensure safe performance. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Documentation of daily inspections will be required via an equipment inspection checklist. Heavy equipment inspections will be submitted to the SS for review and subsequently placed in the project files. Unsafe conditions/acts are to be immediately reported to the SS. Equipment will be taken out of service if an unsafe condition occurs.

Project Personnel Safety Responsibilities

Project personnel are responsible for their own safety as well as the safety of those around them and shall use any equipment provided in a safe and responsible manner, as directed by their supervisor. Project personnel will follow the policies set forth in this HASP and those in their employer-specific SOPs and Safety and Health Program.

Project personnel are directed to take the following actions when appropriate:

- i) Review all activity hazards and preventative measures before initiating work.
- ii) Assist in the development/revision of JSA forms that are appropriate to their current work activities.
- iii) Suspend any operations that may cause an imminent health hazard to project personnel.
- iv) Inspect tools and other equipment before each use or as the manufacturer and/or OSHA mandates.
- v) Correct job site hazards when possible without endangering life or health.
- vi) Report safety and health concerns to the SHO and SS.

Subcontractors

Selected subcontractor(s) will be responsible for providing a SS ("competent person") and a SHO to direct their activities and to meet all applicable OSHA Regulations. This may be the same individual if so qualified. These individuals will be responsible for ensuring that all contract specifications are met, including those related to project health and safety. The names of these individuals will be presented in the subcontractor Site-specific HASP.

The selected Contractor will review any subcontractor HASP prior to the subcontractor's mobilization to the Site. Subcontractors will be responsible for the health and safety of their personnel, which includes following all applicable OSHA Regulations and the subcontractors' Site-specific HASP. Subcontractors will be required to attend an initial Site briefing put on by the selected contractor and subsequent daily safety meetings.

Authorized Visitors

Authorized Visitors shall be provided with all known information with respect to the project operations and hazards, as applicable to the purpose of their visit.



2. Site Characterization and Potentially Hazardous Compounds

Table 2.1 presents the available information pertaining to the Site Contaminants of Concern (COCs) and their properties including the identification of the maximum detected concentrations of the COCs in Site soils and groundwater. The exposure routes and regulatory Time Weighted Averages (TWA) exposure levels for the COCs are also listed in Table 2.1. These levels are set to protect the health of workers.

3. Basis for Design

Regulations set forth by OSHA in Title 29, CFR, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Section 1926.65 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), 1910 Subpart Z (Toxic and Hazardous Substances), 1926 Subpart O (Motor Vehicles, and Mechanized Equipment), and 1926 Subpart F (Excavations). Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of U.S. EPA, and the National Institute for Occupational Safety and Health (NIOSH), regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and scheduling considerations for all project work.

4. Personnel Training

4.1 General

Required project personnel as discussed in Section 1.1 shall complete hazardous waste operations and emergency response related training, as required by the OSHA Standard 29 CFR 1926.65. Project personnel shall also initially receive a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of this project shall have also completed an 8-hour refresher course within the past 12 months. The SS shall complete the additional 8 hours of training that is required for supervisors along with any "competent persons" training that may be needed for the required work.

Additional safety training for specific tasks/activities may include safety training for fall protection, ladder safety, confined space entry work, excavation safety, and the control of hazardous energy etc. Further safety training may also be required based on the scheduled scope of work. This safety training is to be conducted and documented before any tasks that require additional training are initiated. It is the responsibility of the SHO, and SS to ensure that personnel have the necessary training and skills prior to activity assignment. Task safety training requirements are included on each JSA form.



4.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour training course:

- i) General safety procedures
- ii) Physical hazards (fall protection, noise, heat stress, cold stress)
- iii) Names and job descriptions of key personnel responsible for Site health and safety
- iv) Safety, health, and other hazards typically present at hazardous waste sites
- v) Use, application, and limitations of PPE
- vi) Work practices by which employees can minimize risks from hazards
- vii) Safe use of engineering controls and equipment on Site
- viii) Medical surveillance requirements
- ix) Recognition of symptoms and signs, which might indicate overexposure to hazards
- x) Worker right-to-know (Hazard Communication OSHA 1926.59/1910.1200)
- xi) Routes of exposure to contaminants
- xii) Engineering controls and safe work practices that may be implemented
- xiii) Components of a project HASP
- xiv) Decontamination practices for personnel and equipment
- xv) Confined space entry procedures
- xvi) General emergency response procedures

4.3 Supervisor Course

Management and supervisors (i.e., the SS) are required to receive an additional 8 hours of training in topics that are pertinent to the management of hazardous waste operations, which typically includes:

- i) Instruction in detailed project safety and health procedures dealing with emergencies
- ii) PPE programs
- iii) Implementation of specialized emergency response procedures
- iv) Air monitoring techniques

4.4 Site-Specific Training

All project personnel attending the initial safety meeting will accomplish the project-specific training on the contents of this HASP before work begins. The review will include a discussion of the chemical, physical, and biological hazards that may be present at the Site, the protective equipment and safety procedures to be used and followed, and emergency procedures that will be implemented at the Site. The Training Acknowledgment Form that project personnel will sign off on is provided in Attachment B (Project Safety Forms).



4.5 Daily Safety Meetings

Daily safety meetings (tailgate safety talks) will be held to cover the work that is anticipated to be accomplished each day, the associated hazards, the PPE, procedures required to minimize exposure to these hazards, and the required emergency response procedures. The SS and/or SHO will preside over these meetings prior to beginning the day's fieldwork. No work will be performed in an Exclusion Zone (EZ) before the daily safety meeting has been held. Additional safety meetings shall also be held prior to initiating new tasks, and repeated if new hazards are encountered. The form for documenting the daily safety meetings is also found in Attachment B.

4.6 First Aid and CPR

At least one individual with current certification in First Aid/CPR will be assigned to the work crew and will be on the Site during all field activities. Refresher training in First Aid and CPR is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens. Blood-borne pathogen training should be included as part of the First Aid/CPR training course delivered by the training provider.

5. Personal Protective Equipment

PPE will be required to safeguard project personnel from various hazards. Varying levels of protection may be used depending on the level of contaminants and the degree of any physical hazard. This section presents the various levels of personal protection and defines the conditions of use for each level. Contractor Site-specific HASPs, will adequately address PPE concerns for each specific task activity based on their proposed scope of work.

5.1 Levels of Protection

Protection levels are determined based upon chemicals and physical hazards present in the work area. The specific protection levels to be employed at the Site for each work task are presented on each JSA form, which are presented in Attachment A.

5.1.1 Level D Protection

The minimum level of protection that will be required for all project personnel will be Level D. Level D will only be used in clean areas where there is no potential for exposure to the COCs. The following equipment is to be worn as Level D PPE:

- i) Work clothing as prescribed by the weather.
- ii) Steel toed work boots meeting American National Standard Institute (ANSI) Z41.
- iii) Safety glasses or goggles, meeting ANSI Z87.
- iv) Leather work gloves.
- v) High visibility safety vest (Class II) when working near moving equipment.
- vi) Hard hat, meeting ANSI Z89.



- vii) Hearing protection, if necessary.

5.1.2 Modified Level D Protection

Modified Level D will be worn when airborne contaminants are not present at levels where respiratory protection is required, but where project activities present an increased potential for skin contact with hazardous substances. The following equipment is to be worn as Modified Level D:

- i) Tyvek® coveralls or polyethylene coated Tyvek® coveralls (if liquids/splash hazards are present).
- ii) Steel toed work boots meeting ANSI Z41.
- iii) Neoprene or polyvinyl chloride (PVC) over boots.
- iv) Safety glasses or goggles.
- v) Hard hat.
- vi) Face shield in addition to safety glasses or goggles when projectiles and/or splashing liquids pose a hazard.
- vii) Disposable nitrile inner gloves (NDEX 8005, as manufactured by Best, or equivalent).
- viii) Nitrile over gloves.
- ix) Hearing protection (if necessary) (if noise levels exceed 85 dBA, then hearing protection with a Noise Reduction Rating (NRR) of at least 20 dBA must be used).
- x) High visibility safety vest (Class II) when working near moving equipment.

5.1.3 Level C Protection

Level C protection will be required when the airborne concentration of suspected contaminants are present in the worker's breathing zone at sustained levels of greater than 1 part per million (ppm) as measured with a photoionization detector (PID) or 1.0 milligram per cubic meter (mg/m³) measured with a particulate monitor (MIE personal Data Ram or equivalent). Supplied air will be required when the PID readings are sustained at levels greater than 25 ppm. If PID readings subside, workers can downgrade as necessary. The selected Contractor shall attempt to obtain additional information on the chemicals present in the work area if readings are sustained above 25 ppm.

The following equipment will be used for Level C protection:

- i) Full-face air purifying respirator (APR) with organic vapor/acid gas cartridges in combination with particulate filters (P-100) which are NIOSH approved (MSA GME P100 cartridges or equivalent).
- ii) Polyethylene coated Tyvek® or Saranex® hooded suit (if liquids/splash hazards are present) or Tyvek® coveralls, ankles, and cuffs taped to boots and gloves.
- iii) A chemical splash apron and/or a polycoated Tyvek® suit when handling NAPL.
- iv) Nitrile over glove.
- v) Inner nitrile disposable gloves (NDEX 8005, as manufactured by Best, or equivalent).



- vi) Safety toe work boots, ANSI approved.
- vii) Chemical resistant neoprene or rubber boots with steel toes, or latex/PVC booties over safety toe shoes.
- viii) Hard hat, ANSI approved.
- ix) Hearing protection (if necessary).
- x) High visibility safety vest (Class II).

5.1.4 Level B Protection

Level B protection will be worn when the airborne concentrations of suspended contaminants are present at sustained levels greater than 25 ppm due to the presence of organic vapors or if carbon monoxide levels exceed 35 ppm. Therefore, Level B protection will be required when sustained readings reach 25 ppm as 25 ppm is the level where supplied air respiratory protection becomes required.

The action level necessitating Level B protection may be revised subject to determination of the compounds triggering the Level B protection requirement. However, if the SHO is unable to identify/quantify the contaminants, supplied air will continue to be required if the PID reading is greater than 25 ppm.

The following equipment will be used for Level B protection:

- i) Supplied air respirator (NIOSH approved). Respirators may be positive pressure-demand self-contained breathing apparatus (SCBA), or positive pressure-demand airline respirator (with 5-minute escape bottle for immediately dangerous to life and health (IDLH) situations).
- ii) Polyethylene coated Tyvek® (equipment operators) or Saranex® hooded coverall (directly exposed personnel or personnel working with NAPL) with ankles and cuffs taped to boots and gloves. (Note: Kimberly Clark Kleenguard A80 Hazard-Gard II Saranex® coveralls or equivalent).
- iii) A chemical splash apron and/or a polycoated Tyvek® suit when handling NAPL.
- iv) Nitrile over gloves.
- v) Inner nitrile disposable gloves (NDEX 8005, as manufactured by Best, or equivalent).
- vi) Safety toe work boots, ANSI approved.
- vii) Chemical resistant neoprene or rubber boots with steel toes, or latex/PVC booties over safety toe shoes.
- viii) Hard hat, ANSI approved.
- ix) Hearing protection (if necessary).
- x) High visibility safety vest (Class II).



5.1.5 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, Site conditions, ambient air quality, and the judgment of GHD's PM, SS, and the SHO. The PPE used will be chosen to be effective against the compound(s) present on the Site.

5.2 Respiratory Protection

Respiratory protection is an integral part of personnel health and safety at sites with potential airborne contamination.

5.2.1 Site Respiratory Protection Program

The Site respiratory protection program will consist of the following:

- i) All project personnel who may use respiratory protection will have an assigned respirator.
- ii) All project personnel who may use respiratory protection will have been fit tested and trained in the use of all respirators within the past 12 months.
- iii) All project personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SHO prior to commencement of Site work.
- iv) Only cleaned, maintained, NIOSH approved respirators are to be used on this Site.
- v) If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, prior to expected breakthrough, or when breathing becomes labored (filter load-up occurs).
- vi) Contact lenses may be worn with a full-face respirator.
- vii) All project personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not interfere with the sealing surface of the respirator.
- viii) Respirators will be inspected and a negative pressure test performed prior to each use.
- ix) After each use, the respirator will be wiped with a disinfectant cleansing wipe or washed during a formal respirator cleaning procedure. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the facepiece.

Respiratory protection may be required during some of the project activities. This is to ensure worker protection from potentially contaminated particulates and volatile organic carbons (VOCs). It is expected that Modified Level D personal protection will be worn during the majority of the project activities involving the handling of impacted materials. However, the SHO will make the determination of the acceptable level of protection based upon the results of the air-monitoring program. Also, if during these field activities, the real-time air monitoring program indicates the need for an upgrade in protection to Level C or Level B, then these activities will be continued with the increased level of personal protection and additional source controls (e.g., forced ventilation, foam, plastic sheeting, modified production rate, water spray, etc.) to control vapors and/or particulates.



A PID with a 10.6 or greater eV lamp will be used to determine if organic vapors are present. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for organic vapors are based on the sustained (15-minute) concentration of COCs measured within the breathing zone. The action levels and appropriate respiratory protection are referenced in Table 8.1 of this document. The PID action levels have been set based on the presence of the known VOCs, which have been identified at the Site. However, if the ambient concentrations of organic vapors are due to identifiable substances, the level of respiratory protection may be altered by the SHO.

The appropriate air purifying respirator cartridges to be used at the Site are a combination organic vapor/acid gas and P-100 cartridge. The cartridge must be of the same manufacturer as the respirator face piece.

A personal aerosol monitor (e.g., MIE® Personal DataRam or equivalent) will also be utilized to determine airborne dust/particulate concentrations. A background reading will be established prior to commencing work activities at the upwind perimeter of each active work area.

Action levels to determine the level of respiratory protection necessary for dust levels are based on the concentration of the COCs measured within the breathing zone. The action levels and appropriate respiratory protection for particulates are included in Table 8.1 of this document.

5.3 Using PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level B or Level C PPE is used.

All personnel entering the EZ must put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of contamination.

5.3.1 Donning Procedures

These procedures are mandatory only if Level B or Level C PPE is used on the project:

- i) Remove bulky outerwear. Remove street clothes and store in clean location.
- ii) Put on work clothes or coveralls.
- iii) Put on the required chemical protective coveralls or rain gear.
- iv) Put on the required chemical protective boots or boot covers.
- v) Tape the legs of the coveralls to the boots with duct tape.
- vi) Put on the required chemical protective gloves.
- vii) Tape the wrists of the protective coveralls to the gloves.
- viii) Don the required respirator and perform appropriate fit check.
- ix) Put hood or head covering overhead and respirator straps and tape hood to facepiece.



- x) Check and secure all seams.
- xi) Don remaining PPE, such as hard hat.

When these procedures are instituted, one person (bottle watch/decon attendant) must remain outside the work area to ensure that each person entering has the proper protective equipment.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level B or C PPE is required for this project. Whenever a person leaves a Level B or C work site, the following decontamination sequence will be followed:

- i) Upon entering the Contamination Reduction Zone (CRZ) rinse contaminated materials from the boots or remove contaminated boot covers.
- ii) Clean reusable protective equipment.
- iii) Remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container, which is labeled.
- iv) Clean the respirator using the appropriate method as determined by the SHO.
- v) Wash hands, face, and neck and shower as soon as possible at the end of the day.
- vi) Proceed to clean area and dress in clean clothing.
- vii) Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be placed in covered containers and labeled for disposal. See Section 9 for detailed information on decontamination procedures.

5.4 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the SHO and/or SS of the potential for skin contact with contaminated materials. The PPE selection matrix is given in each JSA form that is provided in Attachment A. This matrix is based upon information available at the time this HASP was written.

5.5 Duration of Work Tasks

The duration of activities involving the usage of PPE will be established by the SHO based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 7.3) and the limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of air purifying respirator (APR) cartridges, etc.).

All rest breaks will be taken in the Support Zone (SZ) after full decontamination and PPE removal. Rest breaks will be observed based upon the heat stress monitoring guidelines presented in Section 7.3.



5.6 Limitations of Protective Clothing

PPE ensembles have been selected to provide protection against contaminants at anticipated concentrations. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

- i) When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift
- ii) Inspect all clothing, gloves, and boots both prior to and during use for:
 - a) Imperfect seams
 - b) Non-uniform coatings
 - c) Tears
 - d) Poorly functioning closures
- iii) Inspect reusable garments, boots, and gloves both prior to and during use for:
 - a) Visible signs of chemical permeation
 - b) Swelling
 - c) Discoloration
 - d) Stiffness
 - e) Brittleness
 - f) Cracks
 - g) Any sign of puncture
 - h) Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of contaminants will not be reused.

Project personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

- i) Familiarize themselves with this HASP.
- ii) Use the "buddy system" when working in a contaminated operation.
- iii) Use the safety equipment in accordance with training received, labeling instructions, and common sense.



- iv) Maintain safety equipment in good condition and proper working order.
- v) Refrain from activities that would create additional hazards (e.g., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces).
- vi) Smoking, eating, and drinking will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the SHO.
- vii) Soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the Site.

6. Site Control

Site control is provided by the implementation of the following measures:

- i) GHD's PM, SHO, and/or the SS are to be advised of the dates and purpose of all field activities
- ii) All visitors must sign in and sign out each time they pass the Site access gate

6.1 Authorization to Enter

All personnel working in EZs must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1926.65. They shall also have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a Site area designated as an EZ or CRZ. Personnel without such training or medical certification may enter the designated SZ only. The SHO will maintain a list of authorized persons; only personnel on the authorized list will be allowed within the EZ or CRZ.

6.2 Site Orientation and Hazard Briefing

No person will be allowed in the general work area during project activities without first being given a Site orientation and hazard briefing. This orientation will be presented by the SHO, and will consist of attending an initial safety meeting. This training will cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. A Training Acknowledgment Form for documentation purposes is provided in Attachment B. In addition to this meeting, daily safety meetings will be held each day before work begins. All individuals on Site, including visitors, must document their attendance to this briefing as well as to each daily safety meeting on the form that is also provided in Attachment B.

6.3 Certification Documents

The SHO will be responsible for verifying that all project personnel have the required training, medical, and respirator fit testing qualifications prior to starting work. Subcontractor personnel, if needed, will provide a copy of their training, respirator fit test, and medical documentation to the SHO prior to the start of fieldwork. Additional safety training certification documents (e.g., fall protection) may be necessary based on the scheduled task activity.



6.4 Entry Log

A log-in/log-out sheet must be maintained at the Site by the SHO. Personnel may sign in and out on a log sheet as they enter and leave the CRZ, or the SHO may document entry and exit in the field notebook.

6.5 Entry Requirements

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed to enter the Site unless he/she is wearing the minimum SZ PPE as described in Section 5. Personnel entering the EZ or CRZ must wear the required PPE for those locations as identified on each JSA form.

6.6 Emergency Entry and Exit

Individuals who must enter the Site on an emergency basis will be briefed of the hazards by the SHO. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

Individuals exiting the Site because of an emergency will gather in a safe area, as determined by the SHO for a head count. The SHO is responsible for ensuring that all individuals who entered the work area have exited in the event of an emergency. See Section 11 of this HASP for additional information.

6.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.7.1 Exclusion Zone (EZ)

The EZ consists of the specific work area, or may be the entire area of suspected contamination. All employees entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Barrier tape, fencing, or other appropriate means will identify the location of each EZ.

6.7.2 Contamination Reduction Zone (CRZ)

The CRZ or transition area will be established to perform decontamination of personnel and equipment and to provide a buffer zone around the EZ. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in the CRZ (or a separate CRZ decontamination area) that may be set up to better address equipment decontamination. The decontamination of all personnel will be performed on Site in the CRZ that is adjacent to each EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.



A separate CRZ may be set up at the boundary of the active excavation area and the outer ring of the EZ. The purpose of this CRZ will allow project personnel to replenish fluids and to sit down and cool off in the shade. These measures will help to prevent heat-related illness. Potable water will be available at this CRZ as will an umbrella or small tent with a couple of chairs. Personnel will not go through a full decontamination in this area but rather will partially unzip their polycoated Tyvek® suit and lower it to their waist. Respirators will then be removed followed by the removal of the gloves. Exposed skin areas will be washed and then personnel will be allowed to drink water and sit in the shade. Any personnel who have gross contamination on them will be directed to the primary CRZ where they will go through the full decontamination process and disposal of the contaminated polycoated Tyvek® suit.

6.7.3 Support Zone (SZ)

The SZ is a clean area outside of the CRZ located to prevent project personnel from exposure to hazardous substances. Eating and drinking will be permitted in the SZ only after proper decontamination. Smoking will not be allowed in any portion of the SZ.

7. Activity Hazard/Risk Analysis and General Safety Practices

This section identifies and evaluates the potential chemical, physical, and biological hazards, which may be encountered while conducting project activities. Specific JSA forms (see Attachment A) have been developed to address the hazards associated with scheduled/known project activities, which are outlined in Section 1 of this HASP.

Note: If a non-routine task or previously unidentified task becomes necessary, then a JSA that addresses the new task shall be developed and implemented before initiating the new activity.

In addition to the chemical hazards identified in Table 2.1 of this HASP, physical and biological hazards may exist at the Site including: potential heat/cold stress; hazards presented by the use of heavy equipment; underground/overhead utility hazards; hazards presented by excavations/trenches; biological hazards including, vegetation, stray dogs, mosquitoes, bees, wasps, snakes; uneven terrain and slippery surfaces; and the use of decontamination equipment. It will be the responsibility of the SHO and all project personnel to identify the physical and/or biological hazards posed by the various project activities that they are partaking in and implement all necessary preventative measures.

7.1 General Practices

Additional general safety practices to be implemented are as follows:

- i) At least one copy of this HASP must be at the Site, in a location readily available to all personnel.
- ii) All project personnel must use the buddy system (working in pairs or teams).
- iii) Food, beverages, or tobacco products must not be present or consumed in the EZ and CRZ. Cosmetics must not be applied within these zones.



- iv) Emergency equipment such as eyewash, fire extinguishers, etc., must be removed from storage areas and staged in readily accessible locations.
- v) Contaminated waste, debris, and clothing must be properly contained and legible and understandable precautionary labels must be affixed to the containers.
- vi) Removing contaminated soil or waste debris from protective clothing and/or equipment using compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- vii) Containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport.
- viii) Visitors to the Site must be instructed to stay outside of the EZ and CRZ and remain within the SZ during the extent of their stay. Visitors must be cautioned to avoid skin contact with surfaces, which are contaminated or suspected to be contaminated.
- ix) All project personnel are to stay a minimum of 50 feet away (50-foot zone) from operating equipment. The only exception to this rule will be when eye contact is made with the equipment operator and the equipment operator acknowledges the presence of the individual, lowers the excavation bucket or blade on the equipment to the ground and then motions for the individual to approach or enter the 50-foot zone.

7.1.1 Buddy System

All project personnel shall use the buddy system. Visual contact must be maintained between project team members at all times, and personnel must observe each other for signs of chemical exposure and heat stress. Indications of adverse effects include, but are not limited to:

- i) Changes in complexion and skin coloration
- ii) Changes in coordination
- iii) Excessive salivation and papillary response
- iv) Changes in speech pattern

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Personnel shall inform their partners, fellow team members, SHO and the SS of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

- i) Headaches
- ii) Dizziness
- iii) Nausea
- iv) Blurred vision
- v) Cramps
- vi) Irritation of eyes, skin, or respiratory tract

If protective equipment or noise levels impair communications, pre-arranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.



Downrange field teams in conjunction with the "buddy" system will use the following hand signals. These signals are very important when working with heavy equipment. The entire field team shall know them before operations commence.

Signal	Meaning
Hand Gripping Throat	Out of Air; Can't Breathe
Grip Partner's Wrist	Leave Area Immediately
Hands on Top of Head	Need Assistance
Thumbs Up	Ok, I'm All Right, I Understand
Thumbs Down	No, Negative

7.1.2 Sanitation

Sanitation at the Site will be maintained according to OSHA and Department of Health requirements.

7.1.3 Break Area

Breaks must be taken in the SZ, away from the active work area after project personnel go through decontamination procedures. There will be no eating, drinking, or chewing gum in any area other than the SZ.

7.1.4 Potable Water

The following rules apply for all project field operations:

- i) An adequate supply of potable water will be provided in each CRZ. Potable water must be kept away from hazardous materials, contaminated clothing, and contaminated equipment.
- ii) Portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be drunk directly from the container, nor dipped from the container.
- iii) Containers used for drinking water must be clearly marked and not used for any other purpose.
- iv) Disposable cups must be supplied, and both a sanitary container for unused cups and a receptacle for disposing of used cups must be provided.

7.1.5 Washing Facilities

Access to facilities for washing ones hands, face and neck before eating, drinking, or smoking will be provided by the Contractor.

7.1.6 Lavatory

If permanent toilet facilities are not available, an adequate number of portable chemical toilets will be provided by the Contractor or arrangements made for personnel to leave the Site and use local facilities.



7.1.7 Trash Collection

Trash collected from the CRZ will be separated as potentially contaminated waste. Trash collected in the support and break areas will be disposed of as non-hazardous waste. Trash receptacles will be set up in the CRZ and in the SZ.

7.2 Chemical Exposure

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact. The COCs and their properties are identified in Table 2.1

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a contaminant. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given contaminant, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become evident for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (e.g., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where



they are transported to vulnerable organs. Abrasions, cuts, heat, and moisture enhance skin absorption. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely; however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (e.g., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

Chemical Hazard Controls

Airborne exposure or contact with the contaminants of concern at the Site shall be controlled by:

- i) Skin contact with chemicals may be controlled by use of the proper PPE and good housekeeping procedures. The proper PPE (e.g., polycoated Tyvek®, gloves) as described in Section 5 of this HASP shall be worn for all activities where contact with potentially harmful media or materials is anticipated.
- ii) Monitoring air concentrations for VOCs and particulates shall be conducted in the breathing zone with a PID with a 10.6 eV lamp or greater and a particulate monitor, as described in Section 8.
- iii) Dust control measures, such as wetting the immediate area, shall be employed when visible dust is generated in active work areas.
- iv) Contact the CSHM for additional information regarding a particular product's or activity's exposure hazards.
- v) Using respiratory protection as appropriate, in areas known to have concentrations above the specified action level.

Hazard Communication

Personnel required to handle or to use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication Standard. The training shall include instruction on the safe usage, and handling procedures of hazardous materials, how to read and access Safety Data Sheets (SDSs), and the proper labeling requirements.

The SDSs for those chemicals in use at the Site will be available to project personnel. The SHO will be responsible for maintaining a copy of all SDSs on Site.



7.3 Heat Stress

Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load, and in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat Rashes: Are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Cramps: Are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3 percent NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Exhaustion: Occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin, heavy sweating, dizziness, nausea, headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat Stroke: Is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.



Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions: Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described below.

Adjusted Temperature ⁽¹⁾	Work-Rest Regimen Normal Work Ensemble ⁽²⁾	Work-Rest Regimen Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8°C to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F (30.8° to 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

Notes:

- (1) Calculate the adjusted air temperature ($t_{a\ adj}$) by using this equation:
 $t_{a\ adj} \text{ } ^\circ\text{F} = t_a \text{ } ^\circ\text{F} + (13 \times \text{percent sunshine})$. Measure air temperature (t_a) with a standard thermometer, with the bulk shielded from radiant heat. Estimate percent sunshine by judging what percent of the time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).
- (2) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

In order to determine if the work rest cycles are adequate for the personnel and specific Site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To



check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any Site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- i) Project personnel will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- ii) On-Site drinking water will be kept cool (50° to 60°F).
- iii) A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- iv) All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- v) Cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- vi) Project personnel shall be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- vii) A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- viii) Project personnel must not be assigned to other tasks during breaks.
- ix) Project personnel must remove impermeable garments during rest periods. This includes Tyvek® garments.
- x) All project personnel must be informed of the importance of adequate rest, acclimation (usually takes about 2 hours/day for 1 to 2 weeks to become acclimated), and proper diet in the prevention of heat stress disorders.

7.4 Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision problems, allergic reactions, and other skin concerns. Two types of UV rays are emitted from the sun: UVA and UVB rays.

UVB rays cause sunburn, skin cancer, and premature aging of the skin. UVB rays stimulate tanning but are also linked to other problems such as impaired vision, skin rashes, and some allergic and other reactions to certain drugs. Extra care should be taken if activities are to be conducted on or near water. Sunlight reflected off the surface of the water is intensified resulting in accelerated effects. The following steps should be taken to protect against overexposure to sunlight:

- i) Always use sunscreen: Apply a broad-spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when you towel off or sweat.



- ii) Cover up: Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays.
- iii) Wear a hat: A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck – areas particularly prone to overexposure to the sun.
- iv) Wear sunglasses that block 99 to 100 percent of UV radiation: Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses.
- v) Seek shade: Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.
- vi) Limit time in the midday sun: The sun's rays are strongest between 10 a.m. and 4 p.m. Whenever possible, limit exposure to the sun during these hours.

7.5 Cold Stress

Cold stress is similar to heat stress in that it is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Fatal exposures to cold have been reported in individuals failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the body's core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly, and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the individuals on Site, and cold exposures should be immediately terminated for any individual when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Predisposing Factors for Cold Stress

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the CSHO/SS to monitor an individual, if



necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- **Dehydration:** The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- **Fatigue during Physical Activity:** Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- **Age:** Some older and very young individuals may have an impaired ability to sense cold.
- **Poor Circulation:** Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- **Heavy Work Load:** Heavy workloads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.
- **The Use of PPE:** PPE usage that traps sweat inside the PPE may increase an individual's susceptibility to cold stress.
- **Lack of Acclimatization:** Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- **History of Cold Injury:** Previous injury from cold exposures may result in increased cold sensitivity.

Prevention of Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of individuals developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and personnel education.

- **Acclimatization:** Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiological changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- **Fluid and Electrolyte Replenishment:** Cold, dry air can cause individuals to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.
- **Eating a Well Balanced Diet:** Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day.
- **Warm Clothing:** It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.



- **Work/Rest Regimes:** Schedule work during the warmest part of the day, if possible. Rotate personnel and adjust the work/rest schedule to enable individuals to recover from the effects of cold stress.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

7.6 Working Over or Near Water

The procedures outlined in this section are to be implemented by all personnel when there is the potential for slipping or falling into water that is greater than 3 feet in depth. Additionally, these procedures are to be adhered to when water is flowing and has the potential to carry personnel away.

- When working at ground level, a 5-foot "no entry zone" can be established between the work area and the water hazard. The no entry zone is to be clearly defined and/or demarcated. Personnel will not be permitted to enter into this area unless the other provisions of this section are in place.
- Standard guardrails are required on any walking/working surface over or near water.
- Where guardrails are not practical due to impairment of work being performed, other types of safeguarding, such as safety harnesses, lifelines, and lanyards may be used .
- If providing fall protection is not feasible due to the scope of work or location, personnel will be required to wear U.S. Coast Guard-approved life jackets or buoyant work vests. Prior to each use and after each use, the buoyant work vests and life preservers must be inspected for defects that would affect strength and/or buoyancy. Any damaged or defective buoyant work vest or life preserver cannot be used.
- Call in or make prearranged contacts after each activity posing a drowning hazard is completed.
- If work on wet or slippery surfaces above water is necessary, non-slip tape or other methods are to be used to increase traction.
- Ring buoys with a minimum 90 feet of line must be readily available for emergency operations. The distance between buoys cannot exceed 200 feet.
- Due to the anticipated scope of work, a life saving skiff may be necessary. However, the SS in conjunction with the RSHM will evaluate current site conditions to determine if a skiff is required.

7.7 Earthwork - Excavation and Trenching

Project activities will involve excavation and stockpiling of contaminated soil. Prior to initiating excavation activities, the SS is responsible for making sure that the following conditions are in place:

- i) Ensure that all above and underground utilities have been properly located prior to initiating work activities.
- ii) Ensure that approved protective shoring devices are available for use at the Site if this means of protection is going to be used.



- iii) Ensure that the excavation safety checklist has been completed and put in place, should it become necessary, prior to allowing project personnel to enter any excavation. It is not expected that project personnel will need to enter any excavation but this section does include required procedures for project personnel to follow should it become necessary to enter any excavation.
- iv) Ensure that the competent person has inspected the excavation and determined that it is safe to enter prior to allowing project personnel to enter any excavation.
- v) Ensure that all excavation work is completed in accordance with 29 CFR 1926 Subpart P.
- vi) Ensure that the proper fencing materials are available to secure each active work area.

Before excavation begins, the existence and location of underground utilities (e.g., pipe, electrical equipment, and gas lines) will be determined. This will be done, by contacting the appropriate local utilities and using a private locator to mark the location of the lines. A Property Access Utility Clearance Form is presented in Attachment B to document that nearby utilities have been marked on the ground and that the excavation site has been cleared. The form shall be in the possession of the SS prior to commencement of the excavation.

The selected Contractor's competent person shall observe all excavation and trenching operations where project personnel will enter. The competent person shall be responsible for evaluating, classifying and inspecting excavation and trenching operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

It is the responsibility of the SS and SHO to implement the following components of the selected contractor's Excavation and Trenching Safety Program as they relate to project activities:

- i) Ensure that all excavations are completed in accordance with the approved Excavation and Trenching Safety Program.
- ii) Ensure that the proper protective materials and equipment are available and being used to complete the excavation and/or trenching procedures.
- iii) Ensure that the necessary inspections of the excavation are completed as required.

Personnel required to enter or work in the excavation at any time must be protected from the hazards of cave-ins. This requires the use of sloping and/or shoring systems that comply with State and Federal OSHA standards. Excavation and trenching operations require pre-planning to develop appropriate designs for such systems. The selected Contractor will make the appropriate plans.

The estimated location of all underground installations shall be determined before excavation begins. If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a person who is registered as a PE has determined that they will not be affected by the soil removal. OSHA requires using civil engineers or those with licenses in a related discipline and experience in the design and use of sloping and shoring systems. PE qualifications shall be documented in writing and available at the Site.



The selected Contractor's Excavation Safety Program and the OSHA Excavation Standard (29 CFR 1926 Subpart P) will be followed during all excavation activities and provide detailed information regarding such activities.

Access and Egress

Personnel access and egress from trench and/or excavations are as follows:

- i) A stairway, ladder, ramp, or other means of egress must be provided in excavations greater than 4 feet deep and for every 25 feet of lateral travel.
- ii) All ladders shall extend 3 feet above the top of the excavation.

Atmosphere Monitoring and Testing

Air quality is measured by the following three parameters:

- Oxygen concentration
- Flammability
- Presence of toxic substances

There is a potential for hazardous atmospheres to exist in each proposed excavation. As such, project personnel will not be allowed to be exposed to any hazardous atmosphere. Whenever potentially hazardous atmospheres are suspected in excavations, the competent person shall test the atmosphere. A gas monitor capable of measuring the oxygen level, lower explosive limit (LEL) and toxicity will be used to take readings prior to and while workers are in any excavation. A hazardous atmosphere is defined as one that could contain less than 19.5 percent of oxygen, concentrations of hazardous substances greater than their permissible exposure level (PEL) including carbon monoxide and a LEL reading greater than 10 percent. A forced air ventilator will first be used to pump fresh air into the excavation and to push out (purge) any potentially contaminated air.

In the event that an unusual odor or liquid is suspected in excavations, the competent person shall stop work and arrange for air quality assessment and mitigation, if necessary.

Daily Inspections

The competent person shall perform daily inspections of excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

The competent person shall inspect, evaluate, and document the inspection of the excavation on an Excavation Inspection Checklist at the following intervals:

- i) Prior to the start of work, after each extended halt in work, and as needed throughout the shift as new sections of the excavation are opened
- ii) After every rainstorm and other natural or man-made event that may increase the load on the walls of the excavation, or otherwise affect their stability

The SS shall use the safety inspection checklist for excavations that is presented in Attachment B. The competent person shall stop the work and instruct all project personnel to leave the excavation



when any potential hazards are detected. The competent person has the ***authority*** to immediately suspend work if any unsafe condition is detected.

7.8 Heavy Equipment Safety

Heavy Equipment

The following practices shall be adhered to by personnel operating heavy equipment (such as backhoes) and personnel working in the vicinity of heavy equipment:

- Heavy equipment is to be inspected when equipment is initially mobilized, delivered to a job site, or after it is repaired and returned to service, to ensure that it meets all manufacturer and OSHA specifications (e.g., fire extinguishers, backup alarms, etc.).
- Heavy equipment is to be inspected on a daily basis. Documentation of this daily pre-operational inspection is to be filed with the project files.
- Heavy equipment is only to be operated by authorized, competent operators.
- Seat belts are to be provided on heavy equipment that is not designed for stand-up operation.
- Equipment/vehicles whose payload is loaded by crane, excavator, loader, etc. will have a cab shield and/or canopy to protect the operator.
- Personnel will not be raised/lowered in buckets.
- Personnel will not ride on fender steps or any place outside the cab.
- Before leaving the equipment controls, ensure that the equipment is in its safe resting position. For a backhoe, apply the parking brake, put the front loader bucket down on the ground level, and ensure that the rear excavator bucket is locked in the travel position. Bulldozers and scraper blades, loader buckets, dump bodies, and similar equipment will be fully lowered or blocked when not in use.
- Before raising any booms, buckets, etc., check for overhead obstructions.
- Employees involved in the operation shall not wear any loose-fitting clothing, as it has the potential to be caught in moving machinery.
- Personnel shall wear high visibility safety vests, steel toed shoes, safety glasses, hearing protection, and hard hats during heavy equipment operations.
- When moving heavy equipment or when working within 10 feet of a stationary object or in tight quarters, a spotter will be used.

7.9 Fall Hazards

Site personnel may be exposed to fall hazards greater than 6 feet above another surface and where there are no barriers in place to protect them. These hazards may be found next to each excavation and on top of any of the structures that are on Site. Project personnel exposed to fall hazards greater than 6 feet will follow the selected Contractor's Fall Protection Program.



The SHO and SS will control all fall hazards as they relate to project activities. It is their responsibility to implement the following components of the project's fall protection requirements as they relate to project activities:

- i) Ensure appropriate fall protection systems are utilized for project activities.
- ii) Verify that all project personnel are fully protected from fall hazards.
- iii) Ensure that necessary materials for proper fall protection (PPE including a harness and lanyard etc.) are available for project activities.
- iv) Provide for proper inspection and replacement of fall protection devices.
- v) Provide and ensure that all personnel have received the required training in the use, inspection, and the need for fall protection devices (proper fit, proper use, and proper inspection procedures). Note: This includes additional training required for the usage of ladders, scaffolds, and manlifts/aerial lifts.
- vi) Develop a written emergency rescue plan for retrieval of any worker who falls and is suspended in air while wearing personal fall arrest equipment.

Slip/Trip/Hit/Fall Injuries

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

- i) Spot check the work area to identify hazards
- ii) Establish and utilize a pathway which is free of slip and trip hazards
- iii) Beware of trip hazards such as slippery and uneven surfaces or terrain
- iv) Carry only loads which you can see over
- v) Keep work areas clean and free of clutter, especially walkways
- vi) Communicate hazards to project personnel

7.10 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on Site. The selected contractor's Hearing Conservation Program will be implemented for affected project personnel.

Control: All personnel must wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All Site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss.



Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

7.11 Electrical Hazards

Electricity may pose a particular hazard to project personnel due to the use of portable electrical equipment. When electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- i) All electrical wiring and equipment must be a type listed by Underwriters Laboratory (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- ii) All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations.
- iii) A multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle must ground portable and semi-portable tools and equipment.
- iv) 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.
- v) Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- vi) 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.
- vii) All circuits must be protected from overload.
- viii) Temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- ix) Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- x) All extension outlets must be equipped with ground fault circuit interrupters (GFCIs).
- xi) Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- xii) 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.
- xiii) Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.
- xiv) The OSHA requirements for electrical safety will be adhered to as minimum requirements to be followed by all Site personnel, including subcontractors. Electrical inspections are to occur during initial Site setup and monthly thereafter. These inspections are to be documented via either the CS's and/or the SS's logbook, the CSHO's logbook, or on specific forms that the selected contractor may have as part of their Electrical Safety Program.



7.12 Material Handling

Material handling operations to be conducted at the Site will include manual lifting of materials to and from trucks, placement of soil in stockpiles, placement and compaction of soil in excavations, and the setup/maintenance of thermal treatment units, soil handling equipment, soil storage areas, and storage enclosures.

Hoisting and Rigging

Wire ropes, chains, ropes, and other rigging equipment will be inspected prior to each use and as necessary during use to assure their safety. Defective rigging equipment will be immediately removed from service.

Rigging will not be used unless the weight of the load falls within the rigging's safe work operating range. The authorized rigger prior to any "pick" or lifting operation must verify this.

Only personnel trained in safe rigging procedures will be authorized to engage in rigging procedures. Additionally, the rigger must understand and use recognized crane signals.

Job or shop hooks and links and other makeshift fasteners **will not** be used. When U-bolts are used for eye splices, the U-bolt will be applied so the "U" section is in contact with the dead end of the rope.

Wire ropes, chains, ropes, and other rigging equipment will be stored where they will remain clean, dry, and protected from the weather and corrosive fumes.

The proper length of rope or chain slings will be used to avoid wide-angle lifts and dangerous slack. Knotted ropes or lengths of ropes reduced by bolts, knots, or other keepers will not be used.

General Storage Practices

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

- i) Bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- ii) All stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected.
- iii) Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- iv) Storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices.
- v) Stored materials shall not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes.
- vi) "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled.



- vii) Cylindrical materials such as pipes and poles shall be stored in racks, or stacked on the ground and blocked.

Special Precautions for Hazardous or Incompatible Materials Storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with MSDSs, which describe their hazardous characteristics, and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDSs. The following special precautions shall be followed regarding the storage of hazardous materials:

- i) Based on the information available on the MSDSs, incompatible materials shall be kept in separate storage areas.
- ii) Warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored.

Hand Protection

Hand protection is the most important form of PPE when handling materials manually. The CSHO will select the appropriate hand protection for the task/activity. Gloves are often relied upon to prevent against abrasions, cuts and burns during material handling activities and many types of gloves actually improve your grip factor. Therefore, it is most important that the most appropriate glove (leather, cotton, Kevlar, metal mesh, nitrile, etc.) is selected for the given situation. The following table presents protection factors for commonly used gloves.

Type of Glove	Protection
Rubber	Acids, bases, alcohol – moderate resistance to cuts
Canvas or cloth	Dirt, wood splinters, sharp edges – some resistance to cuts
Metal mesh or Kevlar	Highly resistant to cuts and scratches and caught between hazards (crushing, etc.)
Insulated	Electrical charges
Cuffed	Protects against liquids trickling into glove and protects the wrist/forearm area from cuts and abrasions
Leather	Moderate resistance to cuts and abrasions and caught between hazards

It is important to wash hands frequently when wearing gloves to prevent the build-up of sweat and dirt on the hands. Check gloves regularly for cracks, holes and rips/tears. Keep gloves clean and dry as much as possible.

7.12.1 Manual Lifting

When lifting objects, use the following proper lifting techniques:

- i) Feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift.
- ii) Do not lift more than 50 pounds without the assistance of another individual.



- iii) Use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause a hernia.
- iv) Grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you're going to lift - using the full palm. Fingers have very little power - use the strength of your entire hand.
- v) The load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered.
- vi) The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist your back while lifting or moving heavy objects.

7.13 Hand and Power Tools

Hand Tools Requirements:

- i) Hand tools must meet the manufacturer's safety standards
- ii) Hand tools must not be altered in any way
- iii) At a minimum, eye protection must be used when working with hand tools
- iv) Wrenches (including adjustable, pipe, end, and socket wrenches) must not be used when jaws are sprung to the point that slippage occurs
- v) Impact tools (such as drift pins, wedges, and chisels) must be kept free of mushroom heads
- vi) Wooden handles must be free of splinters or cracks and secured tightly to the tool

Power Tools Requirements:

- i) All power tools must be inspected regularly and used in accordance with the manufacturer's instructions and the tool's capabilities
- ii) Electric tools must not be used in areas subject to fire or explosion hazards, unless they are approved for that purpose
- iii) Portable electric tools must be connected to a Ground Fault Circuit Interrupter (GFCI) when working in wet areas
- iv) Proper eye protection must be used when working with power tools
- v) Personnel must be trained in the proper use of each specific tool
- vi) Any damaged or defective power tools must be immediately tagged and removed from service

7.14 Adverse Weather Conditions

The SHO and SS shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, tornado warnings, and strong winds (approximately



40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of the Site. Strong winds can generate hazardous conditions during the handling of materials.

In addition, no work with elevated super structures (e.g., drilling, crane operations, etc.) will be permitted during any type of electrical storm or during wind events that have wind speeds exceeding 25 mph.

7.15 Biological Hazards

Biological hazards may include snakes, thorny bushes, ticks, mosquitoes, and other pests.

7.15.1 Vegetation Overgrowth

Overgrown weeds, bushes, trees, grass and other vegetation are fire and safety hazards. There are a number of hidden hazards not immediately recognized due to the overgrowth of vegetation in areas where field activities may occur, including discarded junk, litter, and debris. Construction materials such as boards, nails, concrete, and other debris may be hidden beneath blades of tall grass, weeds, and bushes. Other hazards may include steep slopes, potholes, trenches, soft spots, dips, etc.; all dangerously concealed from the view of the individual walking or operating motorized equipment in the area. Additionally, there are biological hazards such as snakes, ticks, chiggers, and mosquitoes that breed in overgrowth conditions.

Actions to be taken are:

- i) Assess the work area and determine if the area requires vegetation clearance. Consider that overgrowth that extends above the lowest level of motorized equipment (i.e., bumper or fender) or 6 inches above your ankle has hidden hazards that you will not be able to readily identify.
- ii) Determine if the area is safe to walk or whether you need motorized equipment. Consider the limitations of the equipment.
- iii) Identify slip, trip, and fall hazards and remove from the general work area. Remember to give adequate clearance so that the items being removed do not pose future hazards.
- iv) Adequately protect yourself against the hazards by wearing boots that protect the ankles, long pants, and using insecticides.
- v) Consider the limitations of manual or mechanical equipment for the clearance of overgrowth, particularly the safety hazards when using sling blades, machetes, weed eaters, bush hogs, or other brush removing equipment.

Before taking any action, determine whether there are any ecological issues that would affect or prevent the removal of overgrowth in protected areas such as wetlands, wildlife habitats, or sanctuaries for endangered and/or protected species.

7.15.2 Tick-Borne Diseases

Lyme Disease, Erlichiosis, and Rocky Mountain Spotted Fever (RMSF) are diseases transmitted by ticks and occur throughout the United States during spring, summer, and fall.



Lyme Disease: The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island Minnesota, and Wisconsin. Few cases have been identified in other states.

Erlchiosis: The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island Minnesota, and Wisconsin. Few cases have been identified in other states.

Primarily the Deer Tick transmits these diseases, which is smaller and redder than the common Wood Tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis. Symptoms of Erlchiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Control: Tick repellent containing diethyltoluamide (DEET) should be used in tick-infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every 3 or 4 hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

7.15.3 Poisonous Plants

Common Poison Ivy (*Rhus radicans*) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison Sumac (*Rhus vernix*) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction. This reaction is called contact dermatitis.

Dermatitis, in Rhus-sensitive persons, can result from contact with the milky sap found in the roots, stems, leaves, and fruit. The sap may retain its potency for months or years in a dry atmosphere, and can occur during any time of the year. The sap may also be carried by animals, equipment or apparel.

The best form of prevention is to avoid contact. This can occur by wearing long sleeves and gloves if necessary. Disposable clothing, such as Tyvek®, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

7.15.4 Insects

Construction work presents many opportunities to be exposed to a variety of insects. Many these insects may present health and safety hazards. Wasps, bees, spiders, and mosquitoes present the bulk of these hazards.



Bees and wasps present problems to people working outdoors due to being stung and having adverse reactions to the venom injected during the sting. Mosquitoes on the other hand cause hazards by transmitting disease(s) from other infected animals and humans.

It is important to recognize the venomous spiders (spiders dangerous to humans) that are present in your work environment. Inspect boots, clothing, and other areas before using/entering, as spiders tend to hide in dark places. Many spiders are nocturnal.

Preventing Exposure

Preventing exposure to insects can be accomplished by the following:

- i) Wearing proper clothing and PPE
- ii) Inspecting work areas for wasp or bee nests prior to conducting work activities
- iii) Awareness of regional insects and their behavioral habits
- iv) Shaking out clothing and shoes and inspecting areas for spiders
- v) Using repellants

Proper Clothing

While working outdoors it is important to wear proper clothing and PPE. Insects tend to be attracted to bright colors, floral, prints, black, white, green, tan and khaki colors. Also it is important to wear long pants and if possible a long-sleeved shirt. Personnel should tuck the pant bottoms into the tops of boots and use insect proof work gloves (leather, thick cloth, etc.).

Repellants

It is important to ensure that there is an adequate supply of insect repellent. Use insect repellent, which contains DEET. Apply it to any exposed skin in accordance with the manufacturer's directions.

Reaction to insect bites can range from mild reactions to severe allergic reactions. In addition, mosquitoes may carry life-threatening diseases such as West Nile virus.

Bee (and Wasp) Stings

Reaction to bee stings may range from painful swelling, redness, itching all the way to shock. Swelling, redness, and itching should stop hurting within a day or two. Treatment for these items can be done at home. The treatment will involve initially removing any stinger left in the skin by scraping away from the skin and towards the venom sac (thus preventing one from squeezing more venom into the wound). Afterwards apply ice and anti-histamine cream. If irritation, swelling and/or pain persist seek medical attention.

If the victim of a bee sting is aware that they are allergic to bees, or if they begin to exhibit signs such as difficulty swallowing, difficulty breathing, abdominal cramps, nausea, and then they may be going into anaphylactic shock and will require medical treatment.

If personnel know that they are allergic to insects then they will be required to carry their own insect sting kit as directed by their personal physician. The victim must be taken to hospital immediately.



Mosquito Bites

Mosquito bites can range from mild skin irritation to severe viral infections. One of the most common viruses that mosquitoes carry is the West Nile virus. West Nile virus can cause encephalitis (swelling of the brain) and meningitis (swelling of the spinal cord).

First symptoms are as follows: rapid onset of headaches, dizziness, difficulty swallowing, and deep muscle aches, nausea, stiff neck, high-fever, high fever, confusion, muscle weakness. Once any of these symptoms are exhibited seek medical attention.

7.15.5 Poisonous Spiders

Spider Bites

Spider bites can range from mild skin irritation to severe infections and tissue damage depending on the type of spider. The United States has only two spiders that are considered dangerous to humans (the black widow and the brown recluse).

A brown recluse spider (or fiddleback) possesses a V-shaped marking on its back. Its bite will cause tissue damage/destruction for up to 6 weeks. Symptoms can start with little initial pain followed by severe pain, headaches, fever, skin rash, muscle spasms, renal failure and possible coma. A halo may form around the bite. Medical treatment is to be sought immediately.

A black widow spider is an outdoor, nocturnal and non-aggressive spider. It is shiny, black with an hourglass shape on her abdomen. Only about 1 percent of its bites are fatal. The bite is not painful and may not be noticed until later when stomach, muscular, or feet pains begin. Other symptoms include heavy sweating, swollen eyelids, erratic saliva production, and difficulty breathing. Seek medical treatment if bitten.

7.15.6 Threatening Dogs

If you are approached by a frightened or menacing dog:

- i) Do not attempt to run and don't turn your back.
- ii) Stay quiet, and remember to breathe.
- iii) Be still, with arms at sides or folded over chest with hands in fists.
- iv) Slowly walk away sideways.
- v) Don't stare a dog in the eyes, as this will be interpreted as a threat.
- vi) Avoid eye contact.
- vii) If you have a jacket, you could wrap it around your arm and should he snap, take the bite harmlessly.
- viii) Try calling its bluff. Yell, "sit!" "stay!" or "go home!". You might convince the dog that you are the stronger in the situation.



7.15.7 Rodents

Rodentia: (rats, mice, beavers, squirrels, guinea pigs, capybaras, coypu)

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of rats; the most common being the black and brown rat.

The **Brown Rat** has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, shops, super-markets, in fact, anywhere there is an easy meal and potential nesting sites.

The **Black Rat** can be identified by its' tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The **House Mouse** has the amazing ability to adapt and it now occurs more or less in human dwellings. In buildings, mice will live anywhere and they are very difficult to keep out. Mice are also totally omnivorous; in other words, they will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

There are six major problems caused by rats and mice:

- i) They eat food and contaminate it with urine and excrement.
- ii) They gnaw into materials such as paper, books, wood, or upholstery, which they use as nest material. They also gnaw plastic, cinder blocks, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard.
- iii) Rats occasionally bite people and may kill small animals.
- iv) They, or the parasites they carry (such as fleas, mites, and worms), spread many diseases such as salmonella, trichinosis, rat bite fever, Hantavirus, Weils disease, and the bubonic plague.
- v) Rats can damage ornamental plants by burrowing among the roots or feeding on new growth or twigs. They also eat some garden vegetables, such as corn and squash.
- vi) Rats and mice are socially unacceptable. These rodents have been a problem for centuries, chiefly because they have an incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

The CHSO will determine what actions to take should rodents become an issue.



7.16 Fugitive Dust and Odor Control

During the performance of the RA, the Contractor will be responsible for the control and monitoring of fugitive particulates generated by the excavation, stabilization, and transportation of sediments/soil and backfilling of soil. This may involve the following:

- i) Maintaining fugitive air emissions control measures such as a water misting system to prevent the generation of fugitive air emissions.
- ii) Use of potable water for fugitive air emissions controls.
- iii) The Contractor will not use any chemical means for dust and particulate control without prior review by the Engineer.
- iv) Use appropriate covers on trucks hauling material.
- v) In the event that the Contractor's dust control is not sufficient to control dust from the Site, work will be stopped and changes to the operations made prior to resuming work.

Odors typical of organic rich materials are expected during removal of sediments and impacted soils. During the performance of the RA, the Contractor will be responsible for control and monitoring of odors. Abatement measures may include some or all of the following:

- i) Applying odor suppressants approved by the GHD PM and NYSDEC.
- ii) Reducing or temporarily stopping active excavation to allow odors to dissipate.
- iii) Covering soil and sediment stockpiles.

8. Air Monitoring Program

This section of the HASP presents the requirements for conducting air monitoring at the Site. The air-monitoring program is designed to ensure protection for personnel working on Site as well as the surrounding community. The on-Site monitoring program will be conducted by the SHO or designee (i.e., Environmental Monitoring Technician) and will consist of monitoring project personnel exposures to VOCs and dust/particulate matter when intrusive activities or waste handling activities are taking place. The air monitoring program will be completed with the use of real-time direct reading instruments.

Inhalation hazards are caused from the intake of vapors. Air monitoring shall be performed when potential exposure to on-Site contaminants is anticipated. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, but the determination of its concentration (quantification) must wait subsequent testing. The principle approaches available for identifying and/or quantifying airborne contaminants:

- i) The use of real-time (on-Site) reading instruments (i.e., photoionization detector etc.)

Direct reading instruments may be used to rapidly detect certain gases and vapors, and dusts. They are the primary tools of initial Site characterization and remediation. The information provided by direct reading instruments can be used to institute appropriate measures (i.e., PPE, evacuation),



and determine the most appropriate equipment for future monitoring. All direct reading instruments have inherent constraints in their ability to detect hazards. It is imperative that direct reading instruments are operated, and the data interpreted by qualified individuals who are thoroughly familiar with the particular devices, operating principles and limitations. At hazardous waste sites, where unknown and multiple contaminants are the rule rather than the exception, instrument readings should be interpreted conservatively. The following guidelines may facilitate accurate recording and interpretation:

- i) Calibrate instruments according to the manufacturer's instructions before and after each use.
- ii) Develop chemical response curves if the instrument manufacturer does not provide these. Response curves/response factors are necessary to adapt PID action levels to actual PID readings when a specific contaminant of concern is detected via air sampling.
- iii) Remember that the instrument readings have limited value where contaminants are unknown. When reading unknown contaminants, report them as "needle deflection", or "positive instruments response", or "units", rather than a specific concentration (i.e., ppm). Conduct additional monitoring at any location where a positive response occurs.
- iv) A reading of zero should be reported as "no instrument response" rather than "clean" because quantities of the chemicals may be present that is not detectable by the instrument.
- v) The survey should be repeated with several detection systems to maximize the number of chemicals detected.

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection.

8.1 Site Air Monitoring

The SHO or designee (i.e., Environmental Monitoring Technician) will perform air monitoring to evaluate the exposure of project personnel to chemical and physical hazards, verify the effectiveness of engineering controls, evaluate the effectiveness of Site control measures, and to determine the proper level of PPE. During the progress of remedial activities, the SHO will monitor the levels of VOCs on an hourly basis or more frequently as necessary based on Site conditions. The following monitoring equipment will be used for this purpose:

- i) A PID equipped with an 10.6 or greater eV lamp
- ii) A particulate monitor

An EZ perimeter air monitoring program will be implemented. PID and particulate monitoring will be conducted on an hourly basis or more frequently as necessary at the perimeter of the EZ in order to evaluate the effectiveness of Site control measures and verifies the integrity of the Site's clean areas. If necessary, the SHO in conjunction with the SS will adjust the EZ and CRZ boundaries.

In the event that an EZ perimeter air monitor reading identifies levels that are above background conditions, then air monitoring readings will also be taken at the Site perimeter. The SHO will evaluate all air monitor readings and modify operating conditions on the Site as necessary to ensure all potentially exposed receptors are within safe limits.



All instruments will be calibrated on a daily basis in accordance with the manufacturer's instructions. Records of all calibrations and real-time measurements will be kept in a bound field logbook or documented via air monitoring and calibration log sheets. All air monitoring data collected by SHO will be filed and made available upon request.

8.1.1 Real-Time VOC Monitoring

The SHO or designee will continuously monitor for the presence of VOCs during the handling of impacted soil and intrusive activities. PID readings will be taken in and around all EZs. Action levels for upgrading or downgrading of PPE have been established and Table 8.1 presents the action levels for the on-Site Air Monitoring Program.

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. Most activities shall be initiated in Modified Level D. The appropriate actions will be taken at designated action levels.

In addition to the action levels, an upgrade to Level C, supplied air, or evacuation of the immediate area is required if:

- i) Any symptoms occur, as described in Section 7.2
- ii) Sustained readings (15 minutes or greater) occur in the worker's breathing zone that are above the applicable action levels
- iii) Requested by an individual performing the task
- iv) Any irritation to eye, nose, throat, or skin occurs

8.1.2 Particulate Monitoring

Based upon the results of an industrial hygiene air monitoring modelling program, the mixture PEL total dust levels have been calculated using "worst case" scenario concentrations for the principal contaminant identified in the Site soil, which is polychlorinated biphenyls (PCBs). The particulate action level of 5 mg/m³ (respirable fraction) is presented in Table 8.1. Dust control measures (water spray, etc.) should be implemented at the Site to control visible dust emissions. All readings shall be taken in the worker's breathing zone.

8.1.3 Personal Air Sampling Program

The selected RA Contractor shall implement a personal air sampling program for those project personnel who have the highest risk of potential for exposure to chemicals present on Site. This monitoring will be done in compliance with 29 CFR 1926.65(h)(4) and will at a minimum measure project personnel's exposures to PCBs.

9. Decontamination Procedures

In general, everything that enters the EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any State and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) which has a built in sump and the equipment



will be inspected by the SHO before it is moved into the clean zone. A decontamination facility complete with water supply and sump for collection of wash water will be constructed at the Site. Any material that is generated by decontamination procedures will be collected and stored in a designated area in the EZ until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for heavy equipment and for any reusable PPE is Alconox/Liqui-nox soap. The SDSs for Liqui-nox and any other chemical containing products brought to the Site will be maintained on Site by the SHO.

9.1 Equipment Decontamination Procedures

All equipment that comes in contact with waste material must be decontaminated within the CRZ by high-pressure water cleaner upon exit from the EZ. Decontamination procedures will include knocking soil/mud from machines; water brush scrubbing using a solution of water and Liqui-nox; and a final water rinse. Personnel shall wear Level C or Modified Level D protection, as determined by the SHO, when decontaminating equipment. All decontamination wash water and residues will be carefully collected and disposed of in accordance with the appropriate environmental regulations. Following decontamination and prior to exiting from the EZ, the SHO shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the Site log.

9.2 Personnel Decontamination Procedures

Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure. Personnel decontamination will be completed in accordance with the procedures that are presented below. Potentially contaminated PPE and trash will be stored in covered and labeled containers until disposal arrangements are made. It will be kept separate from trash generated in clean areas of the Site.

All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work. Spent PPE will be kept in covered containers.

Personnel - Decontamination will take place upon exiting the contaminated work area in the CRZ.

Modified Level D decontamination procedures are as follows:

Step 1: Remove all visible contamination and loose debris by washing with clean water

Step 2: Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse

Step 3: Remove protective clothing; dispose of in used PPE storage container

Step 4: Remove inner gloves, dispose of in used PPE storage container

Step 5: Wash and rinse hands

Level C decontamination procedures to be utilized as follows:



- Step 1:** Remove all visible contamination and loose debris by washing with clean water
- Step 2:** Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in used PPE container or wash in detergent solution and rinse
- Step 3:** Remove protective clothing; dispose of in used PPE container
- Step 4:** Remove respirator, sanitize prior to reuse
- Step 5:** Remove inner gloves; dispose of in used PPE container
- Step 6:** Wash and rinse hands with soap and water

10. Medical Surveillance

In accordance with the requirements detailed in 29 CFR 1926.65 and 29 CFR 1910.134, all project personnel who will come in contact with potentially contaminated materials will have received medical surveillance by a licensed physician or physician's group.

Medical records for all project personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the individual's suitability for work as per the employer's medical surveillance program which is to be in accordance with 29 CFR 1926.65.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

If it becomes necessary to use subcontractors, they will also provide certifications to the CSHO showing that their personnel involved in Site activities have all necessary medical examinations prior to commencing work. The certifications will show proof of medical surveillance and respiratory fit testing. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any project activity or when accidental exposure to elevated concentrations of contaminants occur.

11. Emergency Response and Contingency Procedures

It is essential that project personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies.

Emergency information should be posted as appropriate. Radios will be provided for contact purposes. All emergencies will be reported to the appropriate emergency responders. They may



give the selected contractor further direction as to the responsibilities during any emergency situation. In general, project personnel will shut down equipment and evacuate to a safe pre-determined meeting area (rally point) during Site emergencies.

The SHO will contact and meet on Site with local emergency response agencies (e.g., fire department, police department, etc.) prior to initiating construction activities. The purpose of this meeting is to inform these local authorities of the nature of the work and potential risks, to ensure that these responders are equipped to respond to a Site emergency, and to identify and resolve any potential problems, concerns, or conflicts.

The SHO will be informed of Site hazards and activities prior to project initiation so those emergency situations can be handled most efficiently. A general orientation meeting to discuss emergency response procedures is to be held prior to initiating project activities.

In case of an emergency, an evacuation alarm would sound, which means that all the personnel should evacuate the area and proceed to a rally point for further instruction.

The SHO will notify all project personnel of the emergency through radio/cell phone communications. Radios and cell phones will be taken to the rally point to enable further receipt of instruction(s) from the SHO.

11.1 Accident, Injury, and Illness Reporting

Any work-related incident, accident, injury, illness, exposure, or property loss shall be immediately reported to the SHO and the SS. The SS and/or SHO will report the accident details to the CSHM and will submit a completed accident report form. A sample Incident Reporting Form is provided in Attachment B. The selected contractor may use their own company-specific form if they so choose. The report must be filed for the following circumstances:

- i) Accident, injury, illness, or exposure to project personnel
- ii) Injury to any subcontractor personnel
- iii) Damage, loss, or theft of property
- iv) Any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the individual is acting in the course of employment for the Site

The SHO and PM will investigate occupational accidents resulting in employee injury or illness. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All project personnel have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If anyone wish to make such a report, it may be made orally to the SHO, a supervisor, or other member of management, or it may be submitted in writing, either signed or anonymously.



11.2 Emergency Contacts

Fire Department	911
Police Department.....	911
Ambulance.....	911
Hospital: Samaritan Hospital.....	(518) 271-3300

See Figure 11.1 – Hospital Route Map Directions to the Hospital.

Communication between work areas and the command post, located within the CZ, will be via verbal communication, auto horn, or two-way radio. The SHO will use a mobile telephone to communicate with outside emergency and medical facilities.

The following signals shall be established for use with auto or compressed air-type horns:

- i) Three Blasts: Evacuate exclusion area and meet at the northwest corner of the intersection of 47th Street and Royal Avenue
- ii) An "All Clear" will be conveyed by radio communication

11.3 Additional Emergency Numbers

National Response Center (NRC)	(800) 424-8802
Poison Information	(800) 764-7661
Utility Locating Commission (One Call Nationwide)	811
Agency for Toxic Substances and Disease Registry	(404) 488-4100 (24 Hours)
U.S. EPA Emergency Response.....	(800) 424-8802
State of New York Emergency Response Commission	(513) 457-9996
GHD Project Manager-Jamie Puskas	(519) 884-0510

Contractor Project Manager.....	TO BE DETERMINED
GHD Corporate Safety and Health Manager-Craig Gebhardt	(716) 205-1906
Contractor Site Superintendent.....	TO BE DETERMINED
Contractor Safety and Health Officer.....	TO BE DETERMINED

11.4 Emergency and First Aid Equipment

Emergency safety equipment will be available for use by project personnel and will be located and maintained on Site. The safety equipment will include, but is not limited to, the following:

- i) Portable emergency eye wash
- ii) Two 20-pound ABC type dry chemical fire extinguishers



- iii) Eye wash/flush bottles
- iv) Approved first-aid kit for a minimum of twenty personnel
- v) Fire blanket
- vi) Spill response kit containing absorbent materials (booms/socks, pads, and earth/clay), overpack drum, shop vacuum, and hand tools (shovel, rake/hoe, etc.)
- vii) Portable air horn

11.5 Project Personnel Responsibilities During Emergencies

Safety and Health Officer (SHO)

As the administrator of the HASP, the SHO has primary responsibility for responding to and correcting emergency situations. The SHO will:

- i) Take appropriate measures to protect personnel including: posting of acceptable Site evacuation routes, withdrawal from the EZ, total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection.
- ii) Take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters, and ending or controlling the emergency to the extent possible.
- iii) Ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- iv) Ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained.
- v) Determine the cause of the incident and make recommendations to prevent the reoccurrence.
- vi) Ensure that all required reports have been prepared.

11.6 Medical Emergencies

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the SHO, SS, and PM.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on Site to which they may have been exposed.



Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

11.7 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the SHO or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel should:

- i) Report to the GHD's PM
- ii) Use firefighting equipment available on Site
- iii) Remove or isolate flammable or other hazardous materials, which may contribute to the fire

11.8 Spill Control and Countermeasures

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination if possible. Contractor personnel will immediately contact the CPM and/or CSHO to inform them of the spill and activate emergency spill procedures.

General Spill Response Procedures

If a spill occurs, the following general procedures will be followed:

- i) Notify the SHO, SS, GHD's PM.
- ii) Evacuate immediate area of spill
- iii) Determine the needed level of PPE
- iv) Don required levels of PPE and prepare to make entry to apply spill containment and control procedures
- v) No entry will be made until atmosphere is less than 20 percent of the LEL
- vi) After obtaining the proper spill response tools (shovels, booms and pads, absorbent socks, etc.) and PPE, personnel will attempt to contain the spill so that it does not enter any conveyance (sewer, drainage ditch, etc.) that eventually discharges to surface water
- vii) Locate and abate source of spill
- viii) Absorb or otherwise clean up the spill and containerize the material, sorbent, and affected soils
- ix) Clean and decontaminate the affected area(s)
- x) Replace used/spent spill kit contents

All spill material and debris will be managed in a manner that complies with applicable federal, state, and local environmental rules regarding recycling or disposal of wastes.

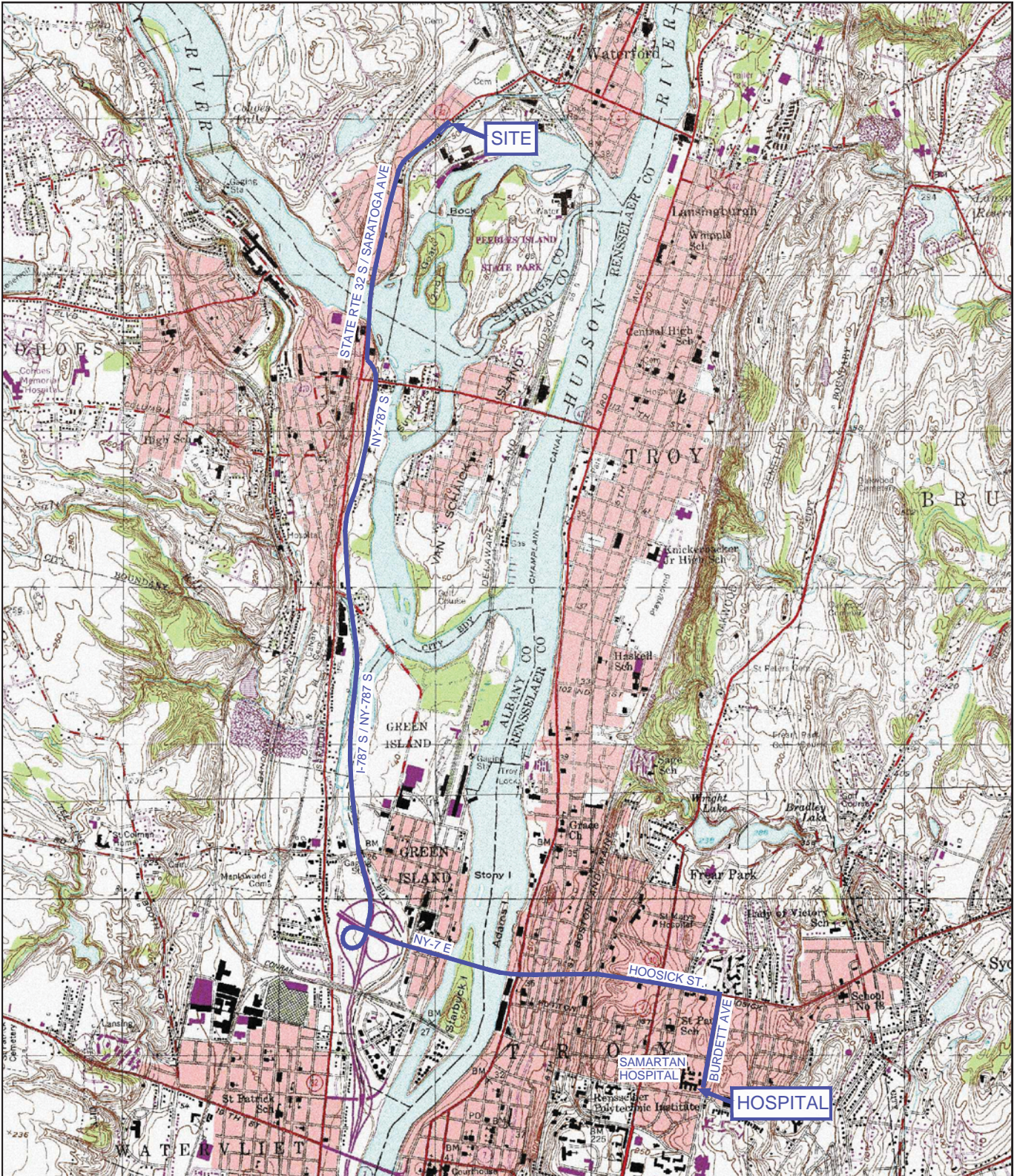
The SHO and SS have the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.



12. Recordkeeping

The SHO shall establish and maintain records of all necessary and prudent monitoring activities as described below:

- i) Name and job classification of the employees involved on specific tasks
- ii) Records of fit testing and medical surveillance results for project personnel
- iii) Records of all OSHA and other applicable safety training certifications for project personnel
- iv) Records of Site safety inspections
- v) Records of training acknowledgment forms and daily safety meetings
- vi) Emergency report sheets describing any incidents or accidents
- vii) Air monitoring equipment calibrations
- viii) Air monitoring data



USGS QUADRANGLE MAP
NORTH TROY, NEW YORK



HOSPITAL DRIVING DIRECTIONS

1. Head south on NY-32 S / RTE32 S / State 32 S / State Route 32 S / Saratoga Ave toward Hill St.
2. Turn left onto NY-787 S
3. Continue onto I-787 S / NY-787 S
4. Take exit 9E to merge onto NY-7 E toward Troy / Bennington
5. Continue onto I-787 / NY-7 E
6. Slight left onto Hoosick St. (signs for New York 7 E)
7. Turn right onto Burdett Ave.

figure 11.1

**HOSPITAL ROUTE
HEALTH & SAFETY PLAN
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave., Waterford, N. Y.**

Table 2.1
Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
cis-1,2-Dichloroethene Acetylene dichloride 1,2-Dichloroethylene CAS-540-59-0	0-250 ppb	TLV: 200 ppm PEL: 200 ppm STEL: NE IDLH: 1000 ppm	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation of the eyes and respiratory tract. CNS depression. Exposure could cause lowering of consciousness. CHRONIC: Defatting of the skin. May cause damage to liver.	(FP) 36-39°F (VP) 180-265 mm (IP) 9.65 eV (UEL) 12.8% (LEL) 5.6%	Colorless liquid (usually a mixture of the cis and trans isomers) with a slightly acrid, chloroform-like odor.
Arsenic CAS-7440-38-2	0-168 ppb	TLV: 0.01 mg/m3 PEL: 0.010 mg/m3 STEL: NE IDLH: 5 mg/m3 (as As)	Inhalation Absorption Ingestion	ACUTE: Contact dermatitis, gastrointestinal disturbances, ulceration of the nasal septum, and respiratory irritation. CHRONIC: Hyperpigmentation of the skin and cancers of the skin, lungs, and lymphatic system.	(FP) NA (VP) 0 mm (approx.) (IP) NA (UEL) NA (LEL) NA	Silver-gray or tin-white, brittle, odorless, solid.
Barium and soluble compounds as BA (excluding barium sulfate) CAS-7440-39-3	6.08-1,860 ppb	TLV: 0.5 mg/m3 PEL: 0.5 mg/m3 STEL: NE IDLH: 50 mg/m3	Inhalation Ingestion Skin/eye contact	ACUTE: Irritation to the eyes, skin, upper respiratory system; skin burns CHRONIC: Gastroenteritis; muscle spasms; slow pulse; extrasystoles; hypokalemia (low blood potassium)	(FP) NE (VP) 0 mm (IP) NE (UEL) NE (LEL) NE	Yellow-white, slightly lustrous solid.
Benzene Benzol CAS-71-43-2	0-190 ppb	TLV: 0.5 ppm [skin] PEL: 1 ppm STEL: 2.5 ppm IDLH: 500 ppm	Inhalation Absorption (skin) Ingestion	ACUTE: Irritation to eyes, skin, respiratory tract; dizziness; headache; nausea; staggered gait; fatigue, abdominal pain. CHRONIC: Defatting of the skin, may have effects on bone marrow and immune system, decrease in blood cells. Carcinogenic to humans.	(FP) 12°F (VP) 75 mm (IP) 9.24 eV (UEL) 7.8% (LEL) 1.2%	Colorless to light-yellow liquid with an aromatic odor. Solid below 42°F.

Notes:

FP - Flash Point
IDLH - Immediately Dangerous to Life or Health
IP - Ionization Potential
NE - Not Established (Information Not Available)
NA - Not Applicable
CNS - Central Nervous System
PNS - Peripheral Nervous System
ppm - parts per million
mg/m3 - milligrams per cubic meter
PEL - OSHA Permissible Exposure Limit
STEL - Short Term Exposure Limit
TLV - ACGIH Threshold Limit Value
VP - Vapor Pressure
C - Ceiling Exposure Limit
[skin] - potential for dermal absorption
mm - millimeters Hg (mercury)
eV - electronvolts

Table 8.1

**On-Site Air Monitoring Program Action Levels
Health and Safety Plan
Friedrichsohn Cooperage Site
Waterford, New York**

Monitoring Device	Action Level	Action
Photoionization Detector (PID) - Check correction factors (CF) from the manufacturer to convert PID reading to actual gas concentration 11.7 or greater eV lamp	< 1.0 ppm or Background	Full-Face Respirator Available
	≥ 1 ppm and ≤ 25 ppm	Full-face air purifying respirator Level C PPE
	>25 ppm and < 500 ppm	Supplied air respirator Level B PPE. Implement additional engineering controls.
	≥ 500 ppm	Shut down activities. Notify CSHO. Implement additional engineering controls.
Dust / Particulate - (Impacted Soils)	Areas where PCBs are present 500 ppm up to 50,000 ppm < 0.02 mg/m ³ or Background	Full-Face Respirator Available
	≥ 0.02 mg/m ³	Wear Full-Face Respirator - Level C PPE
	Areas where PCBs are present 50 ppm up to 500 ppm < 2.0 mg/m ³ or Background	Full-Face Respirator Available
	≥ 2.0 mg/m ³	Wear Full-Face Respirator - Level C PPE
	Areas where PCBs are present < 50 ppm < 15.0 mg/m ³ or Background	Full-Face Respirator Available
	≥ 15.0 mg/m ³	Wear Full-Face Respirator - Level C PPE

Notes:

CSHO Safety and Health Officer (Contractor)
LEL Lower Explosive Limit.
PPE Personal Protection Equipment.
ppm Parts Per Million.

Table 2.1
Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
Cadmium (dust/metal) CAS-7440-43-9	-	TLV: 0.01 mg/m3 PEL: 0.005 mg/m3 STEL: NE IDLH: 9 mg/m3	Inhalation Ingestion	ACUTE: Irritation to eyes and respiratory tract. Pulmonary edema, coughing, tightness in chest, headache, chills, muscle aches, nausea, mild anemia. CHRONIC: Damage to respiratory system and kidneys, resulting in proteinuria and kidney dysfunction. Potential occupational carcinogen	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Metal: silver-white, blue tinged, lustrous, odorless solid.
Chlorobenzene Benzene chloride Chlorobenzol Phenyl chloride CAS-108-90-7	0-30 ppb	TLV: 10 ppm PEL: 75 ppm STEL: NE IDLH: 1,000 ppm	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation of the eyes, nose and skin; causes drowsiness and uncoordination. Chemical pneumonitis if swallowed. CNS depression CHRONIC: Defatting of the skin. May cause liver and kidney damage.	(FP) 82°F (VP) 9 mm (IP) 9.07 eV (UEL) 9.6% (LEL) 1.3%	Colorless liquid with an almond-like odor.
Chromium (metal) Chrome CAS-7440-47-3	0-197 ppb	TLV: 0.5 mg/m3 PEL: 1 mg/m3 STEL: NE IDLH: 250 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation to eyes, skin and lungs. CHRONIC: Skin sensitization, fibrosis (histologic)	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Blue-white to steel gray, lustrous, brittle, hard, odorless solid.
DDT p,p-DDT Dichlorodiphenyltrichloroethane 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane CAS-50-29-3	-	TLV: 1 mg/m3 PEL: 1 mg/m3 [skin] STEL: NE IDLH: 500 mg/m3 (ca)	Inhalation Ingestion Skin contact Absorption Eye contact	ACUTE: Inhalation - Nausea, drowsiness, loss of appetite, visual disturbances, and insomnia. Skin - See ingestion. Ingestion - Headaches, nausea, insomnia, profuse sweating, frothing at the mouth, convulsions, and lack of consciousness. CHRONIC: Dizziness, nausea, muscle twitch, convulsions, enlarged liver, and skin irritation. Suspected carcinogen.	(FP) 162-171°F (VP) 0.00000002 mm (IP) NI (UEL) NI (LEL) NI	White to yellow crystalline powder with a slight musty aromatic odor, (pesticide).

Notes:

- FP - Flash Point
- IDLH - Immediately Dangerous to Life or Health
- IP - Ionization Potential
- NE - Not Established (Information Not Available)
- NA - Not Applicable
- CNS - Central Nervous System
- PNS - Peripheral Nervous System
- ppm - parts per million
- mg/m3 - milligrams per cubic meter
- PEL - OSHA Permissible Exposure Limit
- STEL - Short Term Exposure Limit
- TLV - ACGIH Threshold Limit Value
- VP - Vapor Pressure
- C - Ceiling Exposure Limit
- [skin] - potential for dermal absorption
- mm - millimeters Hg (mercury)
- eV - electronvolts

Table 2.1
Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
Styrene Vinyl Benzene Ethanyl Benzene CAS-100-42-5	0-650 ppb	TLV: 20 ppm PEL: 100 ppm C 200 ppm STEL: 40 ppm IDLH: 700 ppm	Inhalation Skin Contact Eye Contact Ingestion	ACUTE: The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. Exposure could cause lowering of consciousness. CHRONIC: Repeated or prolonged contact skin with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. The substance may have effects on the central nervous system. This substance is possibly carcinogenic to humans.	(FP) 88°F (VP) 5 mm (IP) 8.40 eV (UEL) 6.8% (LEL) 0.9%	Colorless to yellow, oily liquid with a sweet floral odor.
Hexachlorobenzene HCB Perchlorobenzene Phenyl perchloryl CAS-118-74-1	0-9.3 ppb	TLV: 0.002 mg/m3 [skin] PEL: NE STEL: NE IDLH: NE	Inhalation Ingestion Skin contact Absorption Eye contact	ACUTE: Inhalation - Coughing, shortness of breath. Skin - May cause slight irritation and burns may occur at higher doses. Eyes - May cause irritation of the eyes and blurred vision. Ingestion - Headache, dizziness, nausea, vomiting, numbness of hands and arms, apprehension, excitement, tremors, partial paralysis of arms and legs, loss of muscle control, loss of sensory perception, convulsions and coma may result from high doses. CHRONIC: May affect liver and CNS, resulting in impaired organ functions and skin lesions. Possible human carcinogen.	(FP) 468 °F (VP) NE (IP) NE (UEL) NE (LEL) NE	Colorless to white solid in various forms.
Lead (metal) CAS-7439-92-1	0-321 ppb	TLV: 0.05 mg/m3 PEL: 0.05 mg/m3 STEL: NE IDLH: 100 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Lead is a cumulative poison, however, it may cause eye and skin irritation. CHRONIC: Effects blood, bone marrow, CNS, PNS and kidneys resulting in anemia, convulsions, peripheral nerve disease and kidney impairment. Toxicity to human reproduction or development.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	A heavy, ductile, soft, gray solid. Turns tarnished on exposure to air.
Mercury (metal) Quicksilver Liquid silver CAS-7439-97-6	0-1.03 ppb	TLV: 0.025 mg/m3 PEL: 0.1 mg/m3 STEL: 0.03 mg/m3 IDLH: 10 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Irritation to skin. Vapor inhalation may cause pneumonitis. May effect CNS and kidneys. CHRONIC: May effect CNS and kidneys, resulting in irritability, tremors, speech disorders, mental/memory disturbances. Inflammation/dyscoloration of gums. Danger of cumulative effects.	(FP) NA (VP) 0.0012 mm (IP) NE (UEL) NA (LEL) NA	Odorless, heavy and mobile silvery-white liquid metal

Notes:

FP - Flash Point
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IP - Ionization Potential
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NA - Not Applicable
CNS - Central Nervous System
PNS - Peripheral Nervous System
ppm - parts per million
mg/m3 - milligrams per cubic meter
PEL - OSHA Permissible Exposure Limit
STEL - Short Term Exposure Limit
TLV - ACGIH Threshold Limit Value
VP - Vapor Pressure
C - Ceiling Exposure Limit
[skin] - potential for dermal absorption
mm - millimeters Hg (mercury)
eV - electronvolts

Table 2.1
Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
Polychlorinated Biphenyls PCB (54%) Chlorodiphenyl (54% chlorine) Aroclor 1254 CAS-11097-69-1	0 - 50000 ppm	TLV: 0.5 mg/m ³ [skin] PEL: 0.5 mg/m ³ [skin] STEL: NE IDLH: 5 mg/m ³	Inhalation Absorption (skin) Ingestion	ACUTE: Eye irritation. CHRONIC: Dermatitis, chloracne, liver damage, reproductive system damage. Potential occupational carcinogen.	(FP) NA (VP) 0.00006 mm (IP) NA (UEL) NA (LEL) NA	Colorless to pale yellow viscous liquid or solid (<50°F) with a mild hydrocarbon odor.
Tetrachloroethene PCE Perchloroethylene Tetrachloroethylene CAS-127-18-4	0-86 ppb	TLV: 25 ppm PEL: 100 ppm STEL: 100 ppm IDLH: 150 ppm	Inhalation Ingestion Absorption	ACUTE: Irritation to skin, eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. Unconsciousness at high level exposures. CHRONIC: Dermatitis. May cause liver and kidney damage. Probable human carcinogen.	(FP) NA (VP) 14 mm (IP) 9.32 eV (UEL) NA (LEL) NA	Colorless liquid with a mild, chloroform-like odor.
Phenol Hydroxybenzene Carbolic acid CAS-108-95-2	0-80000 ppb	TLV: 5 ppm [skin] PEL: 5 ppm [skin] STEL: NE IDLH: 250 ppm	Inhalation Absorption Ingestion	ACUTE: CORROSIVE to eyes, skin and respiratory tract. May cause lung edema, affects CNS, heart, and kidneys, resulting in convulsions, coma, cardiac disorders and respiratory failure. CHRONIC: Dermatitis. May damage liver and kidneys.	(FP) 175°F (VP) 0.4 mm (IP) 8.50 eV (UEL) 8.6% (LEL) 1.8%	Colorless to yellow or light pink, crystalline solid with a sweet, acrid odor.
Toluene Methylbenzene Toluol CAS-108-88-3	0-25000 ppb	TLV: 20 ppm PEL: 200 ppm STEL: NE IDLH: 500 ppm	Inhalation Ingestion Absorption	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. Unconsciousness and cardiac dysrhythmia at high level exposures. CHRONIC: Defatting of the skin. Affects CNS. Enhanced hearing damage.	(FP) 40°F (VP) 21 mm (IP) 8.82 eV (UEL) 7.1% (LEL) 1.1%	Colorless liquid with a sweet, pungent, benzene-like odor.

Notes:

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- NA - Not Applicable
- CNS - Central Nervous System
- PNS - Peripheral Nervous System
- ppm - parts per million
- mg/m³ - milligrams per cubic meter
- PEL - OSHA Permissible Exposure Limit
- STEL - Short Term Exposure Limit
- TLV - ACGIH Threshold Limit Value
- VP - Vapor Pressure
- C - Ceiling Exposure Limit
- [skin] - potential for dermal absorption
- mm - millimeters Hg (mercury)
- eV - electronvolts

Table 2.1
Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
Vinyl Chloride Chloroethene VCM Chloroethylene CAS-75-01-4	0-31 ppb	TLV: 1 ppm PEL: 1 ppm STEL: NE IDLH: NE	Inhalation Skin contact Eye contact	ACUTE: Irritation to eyes. Affects CNS. May cause unconsciousness. CHRONIC: Affects liver, spleen, blood and peripheral blood vessels, tissue and bones in fingers. Human carcinogen.	(FP) NA (gas) (VP) 3.3 atm (IP) 9.99 eV (UEL) 33.0% (LEL) 3.6%	Colorless gas or liquid (<7°F) with a pleasant odor at high concentrations.
Xylene (o,m,p isomers) CAS-106-42-3	0-550 ppb	TLV: 100 ppm PEL: 100 ppm STEL: 150 ppm IDLH: 900 ppm	Inhalation Absorption Ingestion	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. CHRONIC: Defatting of the skin, lung damage resulting in chronic bronchitis. Affects CNS and blood.	(FP) 90/82/81°F (IP) 7/9/9 mm (IP) 8.56eV (UEL) 6.7% (LEL) 0.9%	Colorless liquid with an aromatic odor. (p-isomer solid <56°F).

Notes:

FP - Flash Point
IDLH - Immediately Dangerous to Life and Health
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NA - Not Applicable
CNS - Central Nervous System
PNS - Peripheral Nervous System
ppm - parts per million
mg/m³ - milligrams per cubic meter

PEL - OSHA Permissible Exposure Limit
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[skin] - potential for dermal absorption
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Attachment **A**

Job Safety Analysis (JSA) Forms

Job Safety Analysis (JSA) CLEARING ACTIVITIES - BULLDOZER

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA)**.

Date Issued/Revised		JSA Type	Clearing Activities – Bulldozer
Work Type	Construction	Client	
Work Activity	Clearing Activities – Bulldozer		
Work Site			
Key Equipment	Bulldozer		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)			
	Supplied Air	APR	
<input checked="" type="checkbox"/> Reflective Vest	<input type="checkbox"/> Goggles	<input checked="" type="checkbox"/> Gloves*	<input type="checkbox"/> Full Face APR
<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Face Shield*	<input type="checkbox"/> Coveralls*	<input type="checkbox"/> Particulate
<input type="checkbox"/> Lifeline/Harness*	<input checked="" type="checkbox"/> Hearing Protection*	<input type="checkbox"/> PPE Clothing*	<input type="checkbox"/> Half Mask APR
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety-toed Boots		<input type="checkbox"/> Particulate/Organic Vapor Combined
<input type="checkbox"/> Other*		<input type="checkbox"/> Other*	<input type="checkbox"/> Acid Gas
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)			
Gloves - Leather			

Reviewed By	Position/Title	Reviewed By	Date

Job Safety Analysis (JSA) CLEARING ACTIVITIES - BULLDOZER

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Corrective Measure(s) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks - use STAR; 	<ul style="list-style-type: none"> Verify that personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	All Project Personnel
2	Inspect heavy equipment and PPE	<ul style="list-style-type: none"> Equipment failure; PPE failure; Slip/trip/fall hazards; Pinch points; Hot surfaces; Fuel (fire hazard) 	<ul style="list-style-type: none"> Don all necessary PPE: <ul style="list-style-type: none"> Hearing protection Hard hat Safety boots Training on inspection procedures Inspect travel path for weather related hazards (i.e., wet, puddles, mud, obstacles); Use three points of contact; do not jump off of equipment; Equipment must pass inspection prior to operation. If not, remove from service until repaired and report problem(s) to supervisor; 	Bulldozer Operator and Laborer
3	Completion of daily inspection report while inspecting machine	<ul style="list-style-type: none"> Equipment problems PPE failure 	<ul style="list-style-type: none"> Don all necessary PPE Trained on inspection procedures 	Bulldozer Operator
4	Transporting equipment to the work area	<ul style="list-style-type: none"> Backing into or running over objects 	<ul style="list-style-type: none"> Walk around the equipment or use a spotter when necessary 	Bulldozer Operator
5	Clearing Activities -Operating equipment after making sure area is cleared of all unnecessary personnel; pulling out stuck equipment	<ul style="list-style-type: none"> Cable or shackle breaks (becomes a flying projectile) Bulldozer becomes stuck Cuts Pinched fingers/limbs Struck by flying objects or falling trees 	<ul style="list-style-type: none"> Don all necessary PPE After hooking up cables, let all personnel retreat to a safe area Inspect cables and shackles before hooking up each time Use a qualified operator 	Bulldozer Operator and Laborer
6	Shutdown and exiting of equipment	<ul style="list-style-type: none"> Slip/trip/fall hazards Situational risks 	<ul style="list-style-type: none"> Keep the blade on the ground when the machine is not running Maintain three points of contact when entering or exiting 	Bulldozer Operator

- (1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Job Safety Analysis (JSA) COMMUNITY AIR MONITORING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Community Air Monitoring Activities
Work Type	Construction	Client	
Work Activity	Community Air Monitoring Activities		
Work Site			
Key Equipment	GPS Unit, Grade Rod, Stakes, Hammer, Wood Lathe, Ribbon, Tripods, Air Monitoring Equipment		
Task-specific Training	Flagger safety; Traffic control devices; PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _____ *	<input checked="" type="checkbox"/> GLOVES* Leather
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest – Class II			
Gloves - Leather gloves for mobilization and demobilization equipment			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) COMMUNITY AIR MONITORING ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review). Discuss Stop Work Authority (SWA) Perform Review "General Site Activities" JSA.	<ul style="list-style-type: none"> Failing to identify hazardous conditions resulting in losses or near losses. 	<ul style="list-style-type: none"> Perform the STAR Process STAR. Assess the risks. Determine the hazards of performing the task and survey the work area. Consider weather conditions such as fog that could reduce visibility. Always consider the worst case scenario. Analyze the hazards determined. Decide a plan of action to eliminate or reduce the hazards and act on it. 	Survey or Air Monitoring Technician
2	Mob equipment to monitoring location/area	<ul style="list-style-type: none"> Potential back Injuries loading equipment; Pinch points; Moving or flying projectiles inside vehicle while transporting equipment; Slip/trip/fall; Biological hazards. Struck by moving vehicles 	<ul style="list-style-type: none"> Follow proper lifting procedure identified in the HASP; Wear leather gloves when moving equipment around; Review JSA and HASP; Practice STAR; Properly secure all equipment inside the vehicle. Contact the owner of any public roadway (State or City) to determine requirements for surveying on or along their roadway. Develop a Temporary Traffic Control Plan (TTCP) if surveying activities will be taking place on or along the shoulder of a public highway. Set up a Temporary Traffic Control Zone (TTCZ) if surveying activities will be taking place on or along the shoulder of a public highway. The TTCP will describe the set up of the TTCZ. 	Survey or Air Monitoring Technician
3	Setup in work zone	<ul style="list-style-type: none"> Slip/trip/fall; Biological hazards; Potential back injuries from moving equipment; Heat/Cold Stress; Struck by moving equipment Struck by oncoming traffic; Slip/trip/fall; Potential injuries from misuse of tools or use of tools in disrepair; Splinters, eye injuries from broken stakes; Utility strikes; Biological hazards; Weather Struck by moving vehicles 	<ul style="list-style-type: none"> Communication with other personnel/heavy equipment operators to notify them of survey team presence; Position a company truck with flashers on for added protection and to aid in the protection of the survey crew as they set up the TTCZ; Follow hot/cold stress procedures presented in the HASP. Ensure fluid intake and clothing/PPE is appropriate for conditions. Wear hi-visibility safety vest, steel-toed boots, safety glasses, and hard hat; Do not use old or faded PPE; Make sure that proper PPE is being worn; Notify nearby equipment of changes in you activities/movement through work area; Inspect tools; Repair/replace tools as necessary; Visually inspect stakes prior to driving into ground. Do not use stakes that are cracked, split, have large knots, etc; Perform utility clearance to with clients representative to verify presence of underground utilities to avoid driving grade stakes through any underground obstructions; Watch for snakes, insects, animals, etc; avoid walking through tall grass and shrubs as much as possible; Check weather prior to entering work area; Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; Wear sunscreen, as required; If thunder is heard or lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen 	Survey or Air Monitoring Technician
4	Conduct survey activities			Survey or Air Monitoring Technician

Job Safety Analysis (JSA) COMMUNITY AIR MONITORING ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
5	Exit work zone	<ul style="list-style-type: none"> • Struck by oncoming traffic; • Slip/trip/fall; • Biological hazards; • Weather • Struck by moving vehicles 	<ul style="list-style-type: none"> • Walk through clear paths, especially when carrying equipment; watch for and avoid rough terrain as much as possible; • Note traffic patterns, make sure path to vehicle is clear and notify nearby equipment you are moving through their path; • Watch for snakes, insects, animals, etc; avoid walking through tall grass and shrubs as much as possible; • Check weather prior to entering work area; • Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; • Wear sunscreen, as required; • If thunder is heard or lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen. 	Survey or Air Monitoring Technician

- (1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fail** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) EQUIPMENT FUELING

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type:	Excavation
Work Type	Construction	Client:	
Work Activity	Pumping fuel into equipment		
Work Site			
Key Equipment	Pickup Truck w/ Fuel Tank and Temporary fuel storage tank w/ secondary containment		
Task-specific Training	HAZCOM, PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _____ *	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) EQUIPMENT FUELING

JOB STEPS (1)	TASK ACTIVITY	POTENTIAL HAZARD(S) (2)	CORRECTIVE MEASURE(S)(3)	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks - use STAR; 	<ul style="list-style-type: none"> Verify that personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	Fueling Technician
2	Refer to the equipment manufacturer's operating manual before using any machinery. Place Nozzle in tank	<ul style="list-style-type: none"> Property damage and personal injury from fire; Fire potential from static/contact spark 	<ul style="list-style-type: none"> No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Use a bonding wire to establish a connection between the two tanks. 	Fueling Technician
3	Turn on pump and dispense fuel into equipment	<ul style="list-style-type: none"> Property damage and personal injury from fire; Fire potential from static/contact spark; Personal injury due to skin /eye contact with fuel due to splash/ spills of fuel 	<ul style="list-style-type: none"> No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel. Wear the proper PPE. Stay upwind when fueling equipment. Remain in attendance of the nozzle at all times during fueling. Avoid overfilling of the equipment. Use a bonding wire to establish a connection between the two tanks. 	Fueling Technician
4	Turn off pump and return nozzle to the fuel tank	<ul style="list-style-type: none"> Property damage and personal injury from fire; Fire potential from static/contact spark; Slips/ trips/ falls; pinch points 	<ul style="list-style-type: none"> No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel. Wear the proper PPE. Stay upwind when fueling equipment. Remain in attendance of the nozzle at all times during fueling. Avoid overfilling of the equipment. Pay Attention to surroundings. Pick up tools, equipment, and trash in the fueling area. Pay attention to the surroundings. Wear gloves. Do not rush. 	Fueling Technician

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) EXCAVATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type:	Excavation Activities
Work Type	Construction	Client:	
Work Activity	Excavation Activities		
Work Site			
Key Equipment	Excavator; air monitoring equipment (PID and 4-gas); Excavation Safety Checklist		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Mobile Equipment Operations, Excavation Safety Training; Excavation Competent Person (for supervisors); Heavy Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input checked="" type="checkbox"/> APR: Full-Facepiece*	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest- Class II Gloves - Leather			
APR –Full-Facepiece equipped with organic vapor and particulate cartridges			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) EXCAVATION ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; situational risks - use STAR; 	<ul style="list-style-type: none"> Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	All Affected Personnel
2	Verify Utility Clearance procedures completed (overhead and underground); verify excavation trench layout	<ul style="list-style-type: none"> Underground utility strike Overhead utilities 	<ul style="list-style-type: none"> Clear all underground utilities Utility Locate Ticket number on file within 10 days of excavation startup? Mark work area and safe distances for overhead lines Use spotter as necessary 	Site Supervisor Project Manager
3	Setup necessary work area and traffic controls	<ul style="list-style-type: none"> Fall-in Caught-between and struck-by hazards 	<ul style="list-style-type: none"> Demarcate site and work areas to ensure that personnel and truck/equipment traffic is maintained safely and smoothly Stockpile and laydown area are setup properly 	Site Supervisor Laborers
4	Hand digging and pot holing activities conducted (where/if necessary based on utility locates)	<ul style="list-style-type: none"> Underground utility strike 	<ul style="list-style-type: none"> Use preventive techniques Maintain proper utility clearances with heavy equipment and use hand digging/pot holing when necessary 	Site Supervisor Laborers Operator
5	Heavy equipment operations to excavate and handle soils and spoils	<ul style="list-style-type: none"> Caught-between and struck-by hazards Underground/overhead utilities 	<ul style="list-style-type: none"> Stay out of swing radius Use spotters to verify clear route of travel and work area; maintain eye contact with operator and/or signal operator; keep soil 2 feet from edges Inspect heavy equipment – document inspection Ensure above utility clearances and safe work protocols are followed 	All Affected Personnel
6	Excavation Activities	<ul style="list-style-type: none"> Soil cave-in; noise Struck-by/against Encountering impacted soils 	<ul style="list-style-type: none"> Keep proper distances from edge of excavation Limit equipment operations in trench area Keep work area free of trip hazards Perform necessary soil classification Use hearing protection as necessary Follow air monitoring protocols Contact site supervisor if odors and/or discolored soils are encountered 	Operator Laborers Site Supervisor
7	Entry into an Excavation	<ul style="list-style-type: none"> Soil cave-in Struck-by/against Encountering slag Hazardous atmospheres Slip/trip/fall hazards Emergency egress 	<ul style="list-style-type: none"> Keep proper distances from edge of excavation Limit equipment operations in trench area Keep work area free of trip hazards Perform necessary soil classification Use daily inspection form to document/meet competent person inspection requirements Inspect trench after any change in conditions (rain, equipment vibrations, etc.) Utilize trench box properly; ensure that tabulated data sheet is on site (as required) Use 4-gas monitor and PID to screen excavation air prior to and during entry Ladder safety and proper slope of ladder If necessary based on air monitoring and/or other site conditions use harness and lifeline when entering trenches over 5 feet deep 	Site Supervisor Operators Laborers

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

Job Safety Analysis (JSA) EXCAVATION ACTIVITIES

- 2 A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"
- 3 Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) EXCAVATOR OPERATION

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Loading Soil and/or Waste Material
Work Type	Construction	Client	
Work Activity	Excavator Operation		
Work Site			
Key Equipment	Excavator		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Mobile Equipment Operations, Excavation Safety Training, Heavy Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)

<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input checked="" type="checkbox"/> APR: Full Facepiece*	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input checked="" type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input checked="" type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Reflective Vest - Class II Gloves - Leather
 APR - Full-Facepiece equipped with organic vapor and particulate cartridges

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) EXCAVATOR OPERATION

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks - use STAR; 	<ul style="list-style-type: none"> Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	Site Supervisor on all
2	Inspect equipment	<ul style="list-style-type: none"> Equipment malfunction or damage Hydraulic fluid, fuel, oil leaks/spills Loss of steering, loss of brakes, etc.; accidents, decreased visibility Fire Slip/trip/fall hazards Unexpected operation of equipment Swing radius signage missing 	<ul style="list-style-type: none"> Follow Equipment Inspection Form/Tag Out if malfunction found Grease moving parts Check all fluids Ensure that fluids are not too low or too full Walk around equipment and look for leaking fluids Ensure that tracks are acceptable (no unacceptable wear and no objects present) Ensure that windows and mirrors are clean. Adjust mirrors! Remove trash or other debris from cab Ensure that back up alarm and horn are operational Correct any problems immediately and inform supervisor If equipment appears as though it has been tampered with or vandalized, do not start it Ensure that fire extinguisher is in place and functioning Inspect the fire extinguisher monthly Use three point mount/dismount at all times Be cautious of where you step and be aware of your surroundings Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity 	Site Supervisor and Operator
3	Entering equipment	<ul style="list-style-type: none"> Reduced visibility Uncomfortable seating - back strain Debris on floor getting stuck under pedals Unexpected movement of excavator 	<ul style="list-style-type: none"> Adjust seat and mirrors so that you are able to see where traveling Adjust controls and seat to your comfort and safety Ensure that all materials inside cab are secured Be cautious of where you step and be aware of your surroundings Ensure steps are clear of water, mud, and other debris Ensure parking brake is engaged and gear is in neutral Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity 	Site Supervisor and Operator
4	Configure controls and seating	<ul style="list-style-type: none"> Ergonomics/unnecessary physical stress/ back injury Incapable of reaching controls Visual blocks 	<ul style="list-style-type: none"> Upon sitting, adjust seat fully to accommodate reach and comfort zone Fasten seat belt Make certain all controls are set in neutral positions Adjust mirrors 	Site Supervisor and Operator
5	Starting and warming up	<ul style="list-style-type: none"> Unanticipated rolling or movement, engine fire, or mechanical/electrical faults 	<ul style="list-style-type: none"> Review operator's manual if new to this particular machine Start engine and check controls to ensure all are in working conditions Allow a minimum of 2 minutes to warm up 	Site Supervisor and Operator

Job Safety Analysis (JSA) EXCAVATOR OPERATION

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
6	Moving equipment work area	<ul style="list-style-type: none"> Other equipment, personnel, or objects in work area Uneven terrain 	<ul style="list-style-type: none"> Perform STAR – be aware of surroundings Know the daily task and other people and equipment in the area Make eye contact with other operators and site personnel in the immediate vicinity Inspect pathway prior to moving equipment to ensure clear pathway 	Site Supervisor and Operator
7	Performing tasks	<ul style="list-style-type: none"> Other equipment (collision) Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities Dust 	<ul style="list-style-type: none"> Perform STAR Know where utilities are located – know where your bucket is in relation to any underground utilities at all times Be aware of the scope of work to be performed Use a spotter Know the paths of other equipment or persons entering and leaving your work area Communicate with supervisors and other operators throughout the day with any questions Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss Wear dust mask if conditions warrant 	Site Supervisor and Operator
8	Stopping at end of day	<ul style="list-style-type: none"> Slip/trip/fall hazards Overnight parking of equipment 	<ul style="list-style-type: none"> Be cautious of where you step and be aware of your surroundings Park in designated area Set brake/control locks Idle for 2 minutes if engine is hot Lower bucket to ground – zero energy state Turn equipment off; remove keys Use three-point dismount Secure inside equipment (i.e., fire extinguisher) 	Site Supervisor and Operator

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) HEAVY EQUIPMENT OPERATION DOZER/LOADER

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Construction
Work Type	Construction	Client	
Work Activity	Heavy Equipment Operation: Dozer / Loader		
Work Site			
Key Equipment	Dozer and or Loader		
Task-specific Training	40 HR and 8 HR HAZWOPER, Heavy equipment operation; Mobile Equipment Operations, HAZCOM, PPE		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)

<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input checked="" type="checkbox"/> APR: Full-Facepiece*	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input checked="" type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input checked="" type="checkbox"/> OTHER* Fire Extinguisher
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Gloves - Leather Hearing Protection - NNR 20 Reflective Vest - Class 2
 APR - Full-Facepiece equipped with organic vapor and particulate cartridges

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) HEAVY EQUIPMENT OPERATION DOZER/LOADER

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) Perform Review "General Site Activities" JSA.	<ul style="list-style-type: none"> • Failing to identify hazardous conditions resulting in losses or near losses. 	<ul style="list-style-type: none"> • Perform the STAR Process STAR. • Assess the risks and verify personnel training is sufficient for scheduled task(s). • Determine the hazards of performing the task and survey the work area. • Consider weather conditions such as fog that could reduce visibility. • Always consider the worst case scenario. • Analyze the hazards determined. • Decide a plan of action to eliminate or reduce the hazards and act on it. 	Construction Superintendent and Operator
2	Inspect Equipment	<ul style="list-style-type: none"> • Equipment malfunction or damage. • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc. – accidents decreased visibility. • Fire. • Slips, trips, falls. • Unexpected operation of equipment. 	<ul style="list-style-type: none"> • Follow equipment inspection form/tag out if malfunction found. • Grease moving parts. • Check all fluids. • Ensure that fluids are not too low or too full. • Walk around equipment and look for leaking fluids. • Ensure that dozer tracks are acceptable (no unacceptable wear and no objects present). Check loader tires • Ensure that windows and mirrors are clean. • Remove trash or other debris from cab. • Ensure that back up alarm and horn are operational. • Correct any problems immediately and inform supervisor. • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning. • Inspect the fire extinguisher monthly. • Use three point mount/dismount at all times. • Be cautious of where you step and be aware of your surroundings. • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged. 	Construction Superintendent and Operator
3	Entering Equipment	<ul style="list-style-type: none"> • Reduced visibility, uncomfortable seating-back strain. • Debris on floor getting stuck under pedals. • Unexpected movement of truck. • Unexpected movement of truck. 	<ul style="list-style-type: none"> • Adjust seat and mirrors so that you are able to see where traveling. • Adjust controls and seat to your comfort and safety. • Ensure that all materials inside cab are secured. • Be cautious of where you step and be aware of your surroundings. • Ensure steps are clear of water, mud and other debris • Ensure parking brake is engaged and gear is in neutral. 	Construction Superintendent and Operator
4	Configure controls and seating.	<ul style="list-style-type: none"> • Ergonomics / unnecessary physical stress. • Incapable of reaching controls. • Visual blocks. 	<ul style="list-style-type: none"> • Upon sitting, adjust seat fully to accommodate reach and comfort zone. • Fasten seat belt • Make certain all controls are set in neutral positions. • Adjust mirrors. 	Construction Superintendent and Operator

Job Safety Analysis (JSA) HEAVY EQUIPMENT OPERATION DOZER/LOADER

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
5	Starting and warming up.	<ul style="list-style-type: none"> Unanticipated rolling or movement, engine fire, or mechanical/electrical faults 	<ul style="list-style-type: none"> Review operator's manual if new to this particular machine. Start engine and check controls to ensure all are in working conditions. Allow a minimum of two minutes to warm up. 	Construction Superintendent and Operator
6	Moving equipment work area.	<ul style="list-style-type: none"> Other equipment, personnel, or objects in work area. Uneven terrain. 	<ul style="list-style-type: none"> Perform the STAR Process. Know the daily task and other people and equipment in the area. Make eye contact with other operators and site personnel in the immediate vicinity. Inspect pathway prior to moving equipment to ensure clear pathway. 	Construction Superintendent and Operator
7	Performing tasks.	<ul style="list-style-type: none"> Other equipment (collision), slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities. Organic Vapors/Dust. 	<ul style="list-style-type: none"> Perform the STAR Process Know where utilities are located. Be aware of the scope of work to be performed. Know the paths of other equipment or persons entering and leaving your work area. Communicate with supervisors and other operators throughout the day with any questions. Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss. Wear respirator if conditions warrant. 	Construction Superintendent and Operator
8	Stopping at end of day.	<ul style="list-style-type: none"> Slips, trips and falls. Overnight parking of equipment. 	<ul style="list-style-type: none"> Be cautious of where you step and be aware of your surroundings. Park in designated area. Set brake/control locks. Idle for two minutes if engine is hot. Lower blade or bucket to ground. Turn equipment off. Use 3-point dismount. Secure inside instruments (i.e., fire extinguisher). 	Construction Superintendent and Operator

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² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a taigate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Material Handling Activities
Work Type	Construction	Client	
Work Activity	Rigging and Placement of Materials		
Work Site			
Key Equipment	Excavator, Backhoe, or Crane		
Task-specific Training	Rigging; lifting signals; heavy equipment safety; use of taglines; 40 HR and 8 HR HAZWOPER, HAZCOM, PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _____ *	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER* _____
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II			
Gloves - Leather			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) Equipment Inspection and rigging	<ul style="list-style-type: none"> Hydraulic failure 	<ul style="list-style-type: none"> Inspect equipment lines and fluid reservoirs 	Operator
2	Rigging components – Inspection of load and rigging	<ul style="list-style-type: none"> Attachment point failure 	<ul style="list-style-type: none"> Inspect attachment hook/ring for fractures, dents or abuse. Certify load capability of attachment point. 	Operator, Qualified Rigger and all field personnel involved in the operation
3	Rigging components – Continue inspection of load, rigging, and material to be lifted	<ul style="list-style-type: none"> Rigging assembly failure 	<ul style="list-style-type: none"> Inspect rigging chains, wire rope, cables, hooks, slings, d-rings, splitters, spreaders and all other components for unusual shape, fractures, fraying, dents, abuse or abnormalities. Inspect components used have annual certification, proper load rating and are implemented as recommended by training and the manufacturer. 	Operator, Labor and all field personnel involved in operation.
4	Rigging components	<ul style="list-style-type: none"> Improper component attachment, lifting point usage, incorrect balance or component orientation 	<ul style="list-style-type: none"> Use the manufacturer's recommended lifting attachment points, slots or cable points to secure load to be rigged. Use proper rigging components to assure load is evenly distributed, proper balance is achieved and place hoisting equipment and rigged components in proper orientation to assure placement logistics are correct. 	Operator, Labor and all field personnel involved in operation.
5	Tag lines – Proper placement of taglines to ensure control of load. No one is to work under a suspended load	<ul style="list-style-type: none"> Lift control failure 	<ul style="list-style-type: none"> Use of tag lines, as a lifting control measure is mandatory as appropriate for correct placement of rigged component. Personnel assisting rigging or lift should never physically be in contact with rigged or lifted components as a measure of component control. 	Operator, Labor and all field personnel involved in operation.
6	Pre-plan the lift and prepare the landing zone	<ul style="list-style-type: none"> Objects/personnel in swing radius path; Lifting outside of equipment's load safe load radius 	<ul style="list-style-type: none"> Pre-plan the lift to ensure swing radius does not impact other operations. Ensure that load and load path stays within load radius of lifting equipment. 	Rigger, And Operator
7	Component placement – Pick the load and place the item in the correct position.	<ul style="list-style-type: none"> Improper preparation of location receiving rigged or lifted component resulting in need for multiple lifts. 	<ul style="list-style-type: none"> Preparation of the area receiving the rigged or lifted component to avoid and necessary re-lift or multiple lifts. 	Operator, Labor and all field personnel involved in operation.
8	Maintain Control of Area	<ul style="list-style-type: none"> Unauthorized personnel or equipment in rigging or lifting exclusion zone 	<ul style="list-style-type: none"> Area marking and clearance of all personnel and equipment to prevent interference during rigging or lifting activities. Spotter action to terminate rigging or lifting if situational changes occur putting personnel or equipment at risk. 	Operator, Labor and all field personnel involved in operation.
9	Control of communication between task personnel	<ul style="list-style-type: none"> Multiple signals interfering with operator 	<ul style="list-style-type: none"> During lifting or rigging activities, a communication order must be established previous to any attempt to hoist load. Spotters communicate to one load controller; load controller communicates to operator. 	Operator, Labor and all field personnel involved in operation.
10	Trench entry in order to place materials and piping – see JSA for Excavation Activities	<ul style="list-style-type: none"> Excavation Hazards (review of that JSA) 	<ul style="list-style-type: none"> Operator must maintain visual contact with load controller at all times. All operations are controlled by ground controller. Follow JSA for Excavation. 	All Affected Personnel

Job Safety Analysis (JSA) MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

- ¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- ² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"
- ³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) MOBILE EQUIPMENT OPERATION AND SOIL STABILIZATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised	JSA Type:	Mobile Equipment Operation and Soil Stabilization Activities
Work Type	Client:	
Work Activity	Mobile Equipment Operation Activities	
Work Site		
Key Equipment	Excavator; Dozer, Loader, Skidsteer, Compactor, Grader, Off-road Dump Truck, Pickup Trucks	
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Mobile Equipment Operations	

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _with organic vapor and P-100 cartridges for stabilization activities *	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest- Class II Gloves – Outer Leather			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) MOBILE EQUIPMENT OPERATION AND SOIL STABILIZATION ACTIVITIES

JOB STEPS (1)	TASK ACTIVITY	POTENTIAL HAZARD(S) (2)	CORRECTIVE MEASURE(S) (3)	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks 	<ul style="list-style-type: none"> Verify that personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	Operator
2	Perform daily (pre-shift) equipment inspection include area around the equipment and PPE and perform a complete walk around inspection	<ul style="list-style-type: none"> Equipment failure PPE failure 	<ul style="list-style-type: none"> Don all necessary PPE Provide training to personnel on inspection procedures Document daily inspection Defects must be corrected before operating unit 	Operator
3	Mount/dismount the equipment	<ul style="list-style-type: none"> Slip/trip/fall hazards Sprains/Strains Potential injury 	<ul style="list-style-type: none"> Use three points of contact Never jump from the machine Clear tracks and personnel access points of debris and mud as necessary Only a trained operator will be allowed on equipment Never carry riders unless unit is so designed 	Operator
4	Starting heavy/mobile equipment	<ul style="list-style-type: none"> Struck-by Caught between Equipment failure 	<ul style="list-style-type: none"> Perform inspection (see Task 2) Check to be certain all workers and equipment are a safe distance from unit All operators manuals should be available for each piece of equipment and used in employee training Allow proper warm-up and wait for gauges to register properly Raise the blade, cable and chokers, boom, grapple, or other attachments before moving the unit 	Operator
5	Operation of heavy/mobile equipment	<ul style="list-style-type: none"> Struck-by/Caught in Overhead/underground utilities Flying debris Rollover Fire Broken and/or frayed cables 	<ul style="list-style-type: none"> Appropriate guarding (according to machine type and use) shall be in place at all times unit is in operation Backup alarms shall be functional Seat belts shall be provided and their use enforced Fire extinguishers and first aid kits shall be provided on each unit Fire extinguishers shall be inspected for functionality on a daily basis Do not operate equipment unless you have been trained to safely operate the equipment 	Operator
6	Perform equipment maintenance	<ul style="list-style-type: none"> Equipment failure/loss Sharp objects Pinch points 	<ul style="list-style-type: none"> Use STAR process Follow equipment manufacturer's preventive maintenance procedures and instructions Only qualified individuals should perform maintenance activities on equipment 	Operator
7	Cleaning and housekeeping of equipment	<ul style="list-style-type: none"> Fire Slip/trip/fall hazards Equipment failure 	<ul style="list-style-type: none"> Remove loose items and all trash from the operator's compartment Clean equipment as necessary to prevent buildup of debris that may cause fire 	Operator

- (1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) MOBILIZATION AND DEMOBILIZATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Mobilization and Demobilization Activities
Work Type	Construction	Client	
Work Activity	Mobilization of Equipment and Supplies to and from the job site		
Work Site			
Key Equipment	Pickup trucks and trailers		
Task-specific Training	PPE, HAZCOM, Motor Vehicle Safety, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _____ *	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER* _____
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II			
Gloves - Leather			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) MOBILIZATION AND DEMOBILIZATION ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Discuss STAR (Stop, Think, Act and Review) and Stop Work Authority (SWA)	<ul style="list-style-type: none"> Site personnel not aware of STAR & SWA 	<ul style="list-style-type: none"> Project team discusses importance of and documentation procedures for SWA during pre-job safety meeting. Use SWA to stop any work that is unsafe. 	Personnel Taking Part in this Activity
2	Check weather	<ul style="list-style-type: none"> Unexpected storm; Fog; Rain; Snow; Lightening/Thunder; Heat/Cold stress 	<ul style="list-style-type: none"> Check local weather forecast. Discuss weather issues and precautions to take while driving and on-site during the pre-job safety meeting. If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation. While on-site, at first sign of lightening/thunder utilize SWA and assess weather conditions. In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, and glove warmers). 	Personnel Taking Part in this Activity
3	Load equipment into vehicle	<ul style="list-style-type: none"> Back strain; Cuts; Pinch points; Hand/Foot injury; Forgotten equipment; Damaged equipment 	<ul style="list-style-type: none"> Use proper lifting techniques and buddy system if needed. Wear leather/cotton gloves and avoid placing hands/fingers in pinch point locations. Wear steel toe boots. Verify requested equipment against warehouse form. Load equipment in an organized manner to prevent shifting during transport or use cargo netting. 	Personnel Taking Part in this Activity
4	Complete Daily Operator Vehicle Checklist	<ul style="list-style-type: none"> Damaged vehicle lights, tires, windows, mirrors, horn, inadequate vehicle documents and/or safety items 	<ul style="list-style-type: none"> Check for fluid leaks under vehicle. Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers. Visually check the pressure/wear of tires. Ensure the vehicle has a spare tire. Assure windshield and window glass is clean and free from obstructions. Test the windshield wipers and horn. Verify vehicle registration, insurance card, and inspection sticker is present and valid. Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit. 	Personnel Taking Part in this Activity
5	Check and adjust seat, steering wheel, headrest, and mirrors	<ul style="list-style-type: none"> Back/body strain; Blind spots; Impaired vision. 	<ul style="list-style-type: none"> Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach. Ensure mirrors are properly adjusted. 	Personnel Taking Part in this Activity
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	<ul style="list-style-type: none"> Serious injury, ejection, or death from collision and/or traffic citation 	<ul style="list-style-type: none"> Verify driver and passenger(s) seat belts are in good condition and properly latched. 	Personnel Taking Part in this Activity
7	Ensure vehicle doors are locked	<ul style="list-style-type: none"> Serious injury, ejection, or death from collision; Unwanted intrusion; Lost equipment 	<ul style="list-style-type: none"> Manually lock all doors to vehicle. 	Personnel Taking Part in this Activity
8	Start engine and check gauges and warning lights	<ul style="list-style-type: none"> Vehicle breakdown 	<ul style="list-style-type: none"> Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit. 	Personnel Taking Part in this Activity

Job Safety Analysis (JSA) MOBILIZATION AND DEMOBILIZATION ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
9	Mobilize to site	<ul style="list-style-type: none"> • Arriving late; • Collision; • Injury or Death to occupants or other parties 	<ul style="list-style-type: none"> • Do not use cell phones or perform other distracting activities while vehicle is in motion. • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale). • Maintain safety cushion around vehicle (front, sides, and rear) and 4 second following distance. • Utilize all driving defensive techniques. • Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone. 	Personnel Taking Part in this Activity
10	Arrive at site	<ul style="list-style-type: none"> • Pedestrian injury; • Collision 	<ul style="list-style-type: none"> • Perform perimeter vehicle check. • Maintain awareness of pedestrian/vehicular traffic when exiting site. • Utilize defensive driving techniques. • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency. 	Personnel Taking Part in this Activity
11	Park vehicle	<ul style="list-style-type: none"> • Pedestrian injury; • Collision; • Property damage 	<ul style="list-style-type: none"> • Park vehicle in pull-through parking space or facing the exit. • Use caution and mirrors/spotter when backing vehicle. 	Personnel Taking Part in this Activity
12	Demobilization	<ul style="list-style-type: none"> • Collision; • Injury or Death to occupants or other parties 	<ul style="list-style-type: none"> • Perform perimeter vehicle check. • Maintain awareness of pedestrian/vehicular traffic when exiting site. • Utilize defensive driving techniques. • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency. 	Personnel Taking Part in this Activity

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² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) SEDIMENT AND SURFACE WATER SAMPLING

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Sediment and Surface Water Sampling
Work Type	Construction	Client	
Work Activity	Sediment and Surface Water Sampling		
Work Site			
Key Equipment	Sampling Equipment and supplies and potentially a boat		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Hazard Communication and Potential Boating Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)			
<input type="checkbox"/> Reflective Vest	<input type="checkbox"/> Goggles	<input checked="" type="checkbox"/> Gloves*	Supplied Air
<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Face Shield*	<input type="checkbox"/> Coveralls*	<input type="checkbox"/> SCBA
<input type="checkbox"/> Lifeline/Harness*	<input type="checkbox"/> Hearing Protection*	<input type="checkbox"/> PPE Clothing*	<input type="checkbox"/> Airline Respirator (attach description)
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety-toed Boots		<input type="checkbox"/> Particulate <input type="checkbox"/> Organic Vapor
<input checked="" type="checkbox"/> Other*	Personal Flotation Device (PFD) and sunscreen	<input type="checkbox"/> Other*	<input type="checkbox"/> Particulate/Organic Vapor Combined <input type="checkbox"/> Acid Gas
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)			
Gloves – Nitrile			

Reviewed By	Position/Title	Reviewed By	Date

Job Safety Analysis (JSA) SEDIMENT AND SURFACE WATER SAMPLING

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Corrective Measure(s) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA)	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks - use STAR; 	<ul style="list-style-type: none"> Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	Sampling Technician
2	Inspection and setup of sampling equipment including on boat	<ul style="list-style-type: none"> Lost time from improperly functioning equipment Incorrect sampling procedures/ collection due to malfunctioning equipment Potential Drowning Potential back injuries from lifting or moving a boat if used 	<ul style="list-style-type: none"> Ensure all PPE is worn including PFD for each person Ensure all equipment is functioning properly; complete Quality Control documents Ensure boat sufficiently stable for retrieval of samples Obtain training in boating safety Do not lift more than 50 pounds without getting assistance. Practice good lifting procedures that are presented in the HASP 	Sampling Technician
3	Prepare to lower sampler into water	<ul style="list-style-type: none"> Lifting hazards Back injury Manual material handling Pinch points Cuts Punctures Sample misidentification 	<ul style="list-style-type: none"> Reduce travel distance when there is a need to carry/lift materials Make sure grip is adequate; wear leather gloves Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position Avoid one-handed carrying if possible; maintain awareness of footing Sampler will be heavier when raised; take breaks to rest arms/shoulders Avoid placing hands/fingers in pinch point locations Use proper tools when opening container packaging Do not use fixed open blade knives when opening boxes or containers Ensure the sample id label matches sample location with site plan Site Supervisor/subcontractor 	Sampling Technician
4	Retrieve sampler when sample collected	<ul style="list-style-type: none"> Cuts due to sharp edges of sample sleeve; Contaminant exposure Lifting hazards Back injury Manual material handling Cuts from sharp objects retrieved by sampler Contamination hazards 	<ul style="list-style-type: none"> Refer to step 3 and the HASP for additional lifting information Wear nitrile gloves Maintain awareness of sharp edges from objects that may be in sampler 	Sampling Technician
5	Sieving sample collection using mesh sieve (if applicable)	<ul style="list-style-type: none"> Contaminant exposure Cuts from container breakage Sample misidentification Chemical exposure to reagent if used 	<ul style="list-style-type: none"> Wear nitrile gloves and replace between samples Inspect glass bottles for breaks/cracks; do not attempt to use any suspect containers Close glass sample containers carefully to avoid breakage Check sample labels for accuracy prior to placing in cooler 	Sampling Technician
6	Headspace screening of samples (if applicable)	<ul style="list-style-type: none"> Contaminant exposure Incorrect headspace readings 	<ul style="list-style-type: none"> Wear nitrile gloves Ensure proper calibration of equipment 	Sampling Technician

Job Safety Analysis (JSA) SEDIMENT AND SURFACE WATER SAMPLING

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Corrective Measure(s) ⁽³⁾	Person Responsible
7	Sample selection	<ul style="list-style-type: none"> Bottle breakage Contaminant exposure Pinch points Lost time due to incorrect sample selection 	<ul style="list-style-type: none"> Wear nitrile gloves when handling sample containers Confirm selected samples are correct based on work plan selection criteria, PID readings, and soil boring logs Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) 	Sampling Technician
8	Packing samples in cooler(s)	<ul style="list-style-type: none"> Bottle breakage Contaminant exposure Cuts Pinch points Lifting hazards Back injury Manual material handling Lost time due to incorrect sample packaging or hold time exceedances 	<ul style="list-style-type: none"> Wear nitrile gloves when handling sample containers Pack glass containers in bubble wrap Check COC against sample labels and SSOW for accuracy before shipping Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) Refer to step 3 and the HASP for additional lifting information Ensure equipment and supplies are loaded correctly and do not shift during transport 	Sampling Technician
9	Investigation derived waste (IDW) management	<ul style="list-style-type: none"> Contaminant exposure Heavy lifting Pinch points Slips/trips/fall hazards Mislabeled waste 	<ul style="list-style-type: none"> Wear nitrile gloves when handling IDW Use proper lifting techniques to transport/dispose of IDW into drums and use buddy system if needed Avoid placing hands/fingers in pinch point locations Maintain awareness of walking surfaces Label IDW with generator, a contact number, identification of contents, and site location Specify IDW as either hazardous or non-hazardous material 	Sampling Technician

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- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Job Safety Analysis (JSA) SILT FENCE INSTALLATION

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a taigate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Construction
Work Type	Construction	Client	
Work Activity	Silt Fence Installation		
Work Site			
Key Equipment	Skidsteer, Sledge Hammer, Shovel		
Task-specific Training	Mobile Equipment Operations, PPE, Hand and Power Tool Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)

<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR*	<input checked="" type="checkbox"/> GLOVES*
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Reflective Vest - Class II	Gloves - Leather

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) SILT FENCE INSTALLATION

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) Equipment Inspection	<ul style="list-style-type: none"> Hydraulic failure Instrument/monitor failure 	<ul style="list-style-type: none"> Inspect equipment lines and fluid reservoirs – document inspection. Calibrate instrument prior to use – document calibration. 	Personnel involved in this activity
2	Underground Utilities	<ul style="list-style-type: none"> Impact, breach or rupture of underground utilities 	<ul style="list-style-type: none"> Inspect area. Call underground utility locator and monitor locator during locating activities. Verify all markings, locations and procedures prior to installation work. 	Personnel involved in this activity
3	Installation zone inspection	<ul style="list-style-type: none"> Underground Insects, nests and hives; Poisonous plants; Stinging/biting insects Chemical hazards 	<ul style="list-style-type: none"> Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants or termites. A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds and trails. 	Personnel involved in this activity
4	Silt fence trough (pathway) excavation	<ul style="list-style-type: none"> Struck-by/against; Utilities; Chemical hazards; Cross-contamination 	<ul style="list-style-type: none"> Setup safe work area. Use a spotter when moving equipment. Use a spotter when digging to assist with observing for underground installations. Spotter will be used when working near overhead lines to assist equipment operator and keep machine away/out of lines. Control areas where excavator will travel. Attempt to keep excavator tires out of impacted spoils and areas. Employees are to setup work area access to minimize spread of contamination. 	Personnel involved in this activity
5	Hand tool use	<ul style="list-style-type: none"> Improper hammer/tool selection; Improper stapler use Potential cuts/abrasions Chemical hazards 	<ul style="list-style-type: none"> Use only a hammer of a weight and handle length appropriate to individual laborers' capability. Inspect every post and hammer for signs of metal fatigue/fractures. Inspect stapler for correct staple installation. Inspect stapler and test operation for gauging correct drive pressure. Use staples of a length needed for the job. Safety glasses and awareness of installer hand location during use of a hammer or staple gun. Ensure that all hand tools (fence post driver, shovel, etc.) are in good working condition. Wear proper PPE such as stout leather gloves to prevent trauma to hands. Use work practices that do not generate visible dust levels. 	Personnel involved in this activity
6	Fence layout activities	<ul style="list-style-type: none"> Back or muscle strain 	<ul style="list-style-type: none"> Use the 'buddy system' during fence installation. 100' fence rolls require a coordinated two-man effort to place fence correctly and according to Mfg. requirements. 	Personnel involved in this activity

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) STOCKPILE SOIL SAMPLING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type:	Stockpile Soil Sampling Activities
Work Type	Construction	Client:	
Work Activity	Stockpile Soil Sampling Activities		
Work Site			
Key Equipment			
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)			
<input checked="" type="checkbox"/> Reflective Vest	<input type="checkbox"/> Goggles	<input checked="" type="checkbox"/> Gloves*	Supplied Air
<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Face Shield*	<input type="checkbox"/> Coveralls*	<input type="checkbox"/> SCBA
<input type="checkbox"/> Lifeline/Harness*	<input type="checkbox"/> Hearing Protection*	<input checked="" type="checkbox"/> PPE Clothing*	<input type="checkbox"/> Airline Respirator (attach description)
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety-toed Boots		<input type="checkbox"/> Acid Gas
<input type="checkbox"/> Other*		<input type="checkbox"/> Other*	<input type="checkbox"/> Other*
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)			
Gloves – nitrile for sampling. Light duty mechanic style gloves for moving equipment and supplies around the site			

Reviewed By	Position/Title	Reviewed By	Date

Job Safety Analysis (JSA) STOCKPILE SOIL SAMPLING ACTIVITIES

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Mitigating Measure(s) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Site personnel not aware of STAR and SWA 	<ul style="list-style-type: none"> Project team to discuss importance of and documentation procedures for SWA during pre-job safety meeting Use SWA to stop any work that is unsafe 	Site Personnel
2	Inspect and calibrate sampling and monitoring equipment	<ul style="list-style-type: none"> Lost time from improperly functioning equipment Incorrect sampling procedures/ collection due to malfunctioning equipment 	<ul style="list-style-type: none"> Ensure all equipment is functioning properly Wear light duty mechanic style gloves Complete Quality Control documents 	Sampling Technician
3	Prepare to collect soil samples	<ul style="list-style-type: none"> Lifting hazards Back injury Manual material handling Pinch points Cuts Punctures Sample misidentification 	<ul style="list-style-type: none"> Wear Ndex nitrile gloves over light duty mechanic style gloves Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position Avoid one-handed carrying if possible; maintain awareness of footing No bending or twisting while under load Refer to the HASP for additional lifting information Avoid placing hands/fingers in pinch point locations Use proper tools when opening container packaging Do not use fixed open blade knives when opening boxes or containers Ensure the sample id label matches sample location with site plan site supervisor/subcontractor 	Sampling Technician
4	Sample collection	<ul style="list-style-type: none"> Contaminant exposure Cuts from container breakage Sample misidentification 	<ul style="list-style-type: none"> Wear Ndex nitrile gloves over light duty mechanic style Inspect glass bottles for breaks/cracks Do not attempt to use any suspect containers Close glass sample containers carefully to avoid breakage Check sample labels for accuracy prior to placing in cooler 	Sampling Technician
5	Headspace screening of samples	<ul style="list-style-type: none"> Contaminant exposure Incorrect headspace readings 	<ul style="list-style-type: none"> Wear Ndex nitrile gloves over light duty mechanic style Ensure proper calibration of equipment 	Sampling Technician
6	Sample selection	<ul style="list-style-type: none"> Bottle breakage Contaminant exposure Pinch points Lost time due to incorrect sample selection 	<ul style="list-style-type: none"> Wear Ndex nitrile gloves over light duty mechanic style Confirm selected samples are correct based on work plan selection criteria, PID readings, and soil boring logs Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) 	Sampling Technician

Job Safety Analysis (JSA) STOCKPILE SOIL SAMPLING ACTIVITIES

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Mitigating Measure(s) ⁽³⁾	Person Responsible
7	Packing samples in cooler(s)	<ul style="list-style-type: none"> • Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances 	<ul style="list-style-type: none"> • Wear Ndex nitrile gloves over light duty mechanic style • Pack glass containers in bubble wrap • Check COC against sample labels and SSOV for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • Use proper lifting techniques as discussed in step 3 • If possible use a dolly or cart if cooler is heavy or has to be moved over a long distance • Ensure equipment and supplies are loaded correctly and do not shift during transport 	Sampling Technician
8	Investigation derived waste (IDW) management	<ul style="list-style-type: none"> • Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Pinch points • Slips/trips/fall hazards • Mislabeled waste 	<ul style="list-style-type: none"> • Wear Ndex nitrile gloves over light duty mechanic style • Use proper lifting techniques as discussed in step 3 • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material 	Sampling Technician

- (1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Job Safety Analysis (JSA) SURVEYING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a taigate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Surveying Activities
Work Type	Construction	Client	
Work Activity	Surveying Activities		
Work Site			
Key Equipment	Topcon GPS, grade rod, stakes, hammer, wood lathe, ribbon		
Task-specific Training	Flagger safety, Traffic control devices; PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> APR: _____ *	<input checked="" type="checkbox"/> GLOVES* Leather
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER*
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest – Class II			
Gloves - Leather gloves for mobilization and demobilization equipment			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) SURVEYING ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) Perform Review "General Site Activities" JSA.	<ul style="list-style-type: none"> • Failing to identify hazardous conditions resulting in losses or near losses. 	<ul style="list-style-type: none"> • Perform the STAR Process STAR. • Assess the risks. • Determine the hazards of performing the task and survey the work area. • Consider weather conditions such as fog that could reduce visibility. • Always consider the worst case scenario. • Analyze the hazards determined. • Decide a plan of action to eliminate or reduce the hazards and act on it. 	Survey Team
2	Mob equipment to surveying area	<ul style="list-style-type: none"> • Potential back injuries loading equipment; • Pinch points; • Moving or flying projectiles inside vehicle while transporting equipment; • Slip/trip/fall; • Biological hazards. 	<ul style="list-style-type: none"> • Follow proper lifting procedure identified in the HASP; • Wear leather gloves when moving equipment around; • Review JSA and HASP; • Practice STAR; • Properly secure all equipment inside the vehicle. • Contact the owner of any public roadway (State or City) to determine requirements for surveying on or along their roadway. • Develop a Temporary Traffic Control Plan (TTCP) if surveying activities will be taking place on or along the shoulder of a public highway. • Set up a Temporary Traffic Control Zone (TTCZ) if surveying activities will be taking place on or along the shoulder of a public highway. The TTCP will describe the set up of the TTCZ. 	Survey Team
3	Setup in work zone	<ul style="list-style-type: none"> • Struck by oncoming traffic/heavy equipment; • Slip/trip/fall; • Biological hazards; • Potential back injuries from moving equipment; • Heat/Cold Stress; 	<ul style="list-style-type: none"> • Communication with other personnel/heavy equipment operators to notify them of survey team presence; • Position a company truck with flashers on for added protection and to aid in the protection of the survey crew as they set up the TTCZ; • Follow hot/cold stress procedures presented in the HASP. Ensure fluid intake and clothing/PPE is appropriate for conditions. 	Survey Team

Job Safety Analysis (JSA) SURVEYING ACTIVITIES

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
4	Conduct survey activities	<ul style="list-style-type: none"> • Struck by oncoming traffic; • Slip/trip/fall; • Potential injuries from misuse of tools or use of tools in disrepair; • Splinters, eye injuries from broken stakes; • Utility strikes; • Biological hazards; • Weather. 	<ul style="list-style-type: none"> • Wear hi-visibility safety vest, steel-toed boots, safety glasses, and hard hat; • Do not use old or faded PPE; • Make sure that proper PPE is being worn; • Notify nearby equipment of changes in you activities/movement through work area; • Inspect tools; • Repair/replace tools as necessary; • Visually inspect stakes prior to driving into ground. Do not use stakes that are cracked, split, have large knots, etc; • Perform utility clearance to with clients representative to verify presence of underground utilities to avoid driving grade stakes through any underground obstructions; • Watch for snakes, insects, animals, etc; avoid walking through tall grass and shrubs as much as possible; • Check weather prior to entering work area; • Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; • Wear sunscreen, as required; • If thunder is heard o lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen 	Survey Team
5	Exit work zone	<ul style="list-style-type: none"> • Struck by oncoming traffic; • Slip/trip/fall; • Biological hazards; • Weather. 	<ul style="list-style-type: none"> • Walk through clear paths, especially when carrying equipment; watch for and avoid rough terrain as much as possible; • Note traffic patterns, make sure path to vehicle is clear and notify nearby equipment you are moving through their path; • Watch for snakes, insects, animals, etc; avoid walking through tall grass and shrubs as much as possible; • Check weather prior to entering work area; • Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; • Wear sunscreen, as required; • If thunder is heard o lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen. 	Survey Team

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) TRASH PUMP SETUP AND OPERATION

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a taigate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority**.

Date Issued/Revised		JSA Type	Construction
Work Type	Construction	Client	
Work Activity	Setup and operation of 2" and 3" trash pumps		
Work Site			
Key Equipment	Trash pump; fittings; hose sections; safety fuel can;		
Task-specific Training	40 HR and 8 HR HAZWOPER, HAZCOM, PPE Hand and Power Tool Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)

<input checked="" type="checkbox"/> REFLECTIVE VEST*	<input checked="" type="checkbox"/> GOGGLES – as necessary	<input type="checkbox"/> APR: _____*	<input checked="" type="checkbox"/> GLOVES* see below
<input checked="" type="checkbox"/> HARD HAT	<input type="checkbox"/> FACE SHIELD*	<input type="checkbox"/> SUPPLIED AIR RESPIRATOR*	<input type="checkbox"/> COVERALLS*
<input type="checkbox"/> LIFELINE / HARNESS*	<input checked="" type="checkbox"/> HEARING PROTECTION*	<input type="checkbox"/> PPE CLOTHING*	<input type="checkbox"/> OTHER* _____
<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> STEEL TOED BOOTS	<input type="checkbox"/> OTHER*	<input type="checkbox"/> OTHER* _____

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Reflective Vest - Class II	Gloves - Leather
Hearing Protection	- NRR 20

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

Job Safety Analysis (JSA) TRASH PUMP SETUP AND OPERATION

JOB STEPS ⁽¹⁾	TASK ACTIVITY	POTENTIAL HAZARD(S) ⁽²⁾	CORRECTIVE MEASURE(S) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA)	<ul style="list-style-type: none"> Slips, Trips, Falls Situational risks 	<ul style="list-style-type: none"> Verify personnel's training is sufficient for the scheduled task(s). Is job instruction training (hands-on) training necessary? Employees should remove finger rings, necklaces, or jewelry, which may be hazardous in equipment operation. 	All Affected Personnel
2	Equipment Safety Checklist	<ul style="list-style-type: none"> Faulty hose connections; Damaged hoses and fittings 	<ul style="list-style-type: none"> Replace worn or damaged hoses and fittings. Replace hose connections with operational connections. Perform an overall inspection of the equipment for any defects or signs of damage. Refer to the specific pump's equipment manufacturer's operating manual before using the equipment. 	All Affected Personnel
3	Pump and hose set-up	<ul style="list-style-type: none"> Slip, Trip, Fall; Uneven terrain; Wet, icy, and muddy conditions; Material Handling – Back sprains and strains; Struck-by and Line of Fire; Pinch-points. 	<ul style="list-style-type: none"> Be aware of your surrounding conditions (footing, weather conditions, etc.) Use proper lifting techniques; "straight back-bent knee" lifting approach. Have a "buddy" assist with the lift. Use gloves to ensure a secure grip. Grab the equipment only at designated handles or if none are available, at locations where the hands and fingers will not get caught in the equipment or smashed. Test the weight of the equipment before lifting. Straighten out hoses before connection and keep them out of high traffic areas. Be aware of "stored energy" hazards presented by hoses. 	All Affected Personnel
4	Equipment Fueling/Refueling	<ul style="list-style-type: none"> Fires; Explosions; Chemical hazard 	<ul style="list-style-type: none"> Turn off equipment before fueling and let it first cool down prior to refueling. No smoking while fueling. Do not use cell phones while fueling. Store fuel in proper safety containers only. If transferring fuel from large vessels into portable cans, use proper grounding or bonding techniques. Do not fuel the equipment when it is hot. Wear gloves and wash hands after fueling. 	All Affected Personnel
5	Starting the pump	<ul style="list-style-type: none"> Back Strains; Slippery Conditions 	<ul style="list-style-type: none"> Make sure the starting cord is free pulling. Test the cord before pulling. Be aware of your surrounding conditions. Make sure Slip/Trip/Fall/ hazards were properly identified and corrected. 	Assigned Laborer
6	Pump Operation	<ul style="list-style-type: none"> Splash Hazards; Hot Surfaces; Noise 	<ul style="list-style-type: none"> Remove worn or damaged hoses until they can be repaired or replaced. Keep hands away from the exhaust or hot components of the equipment. Be aware of any unguarded moving parts on the equipment. 	Assigned Laborer

¹ Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

² A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

³ Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

Job Safety Analysis (JSA) WASTEWATER TANK SAMPLING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA)**.

Date Issued/Revised		JSA Type	Wastewater Tank Sampling Activities
Work Type	Construction	Client	
Work Activity	Wastewater Tank Sampling Activities		
Work Site			
Key Equipment			
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)			
<input type="checkbox"/> Reflective Vest	<input type="checkbox"/> Goggles	<input checked="" type="checkbox"/> Gloves*	Supplied Air
<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Face Shield*	<input type="checkbox"/> Coveralls*	<input type="checkbox"/> SCBA
<input type="checkbox"/> Lifeline/Harness*	<input type="checkbox"/> Hearing Protection*	<input type="checkbox"/> PPE Clothing*	<input type="checkbox"/> Airline Respirator (attach description)
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety-toed Boots		<input type="checkbox"/> Particulate <input type="checkbox"/> Organic Vapor
<input checked="" type="checkbox"/> Other* Fire Retardant Coveralls		<input type="checkbox"/> Other*	<input type="checkbox"/> Particulate/Organic Vapor Combined <input type="checkbox"/> Acid Gas
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)			
Gloves - nitrile			

Reviewed By	Position/Title	Reviewed By	Date

Job Safety Analysis (JSA) WASTEWATER TANK SAMPLING ACTIVITIES

Job Steps ⁽¹⁾	Task Activity	Potential Hazard(s) ⁽²⁾	Corrective Measure(s) ⁽³⁾	Person Responsible
1	Perform the STAR Process (Stop, Think, Act and Review) and discuss Stop Work Authority (SWA) -	<ul style="list-style-type: none"> Slips, trips, falls; Situational risks - use STAR; 	<ul style="list-style-type: none"> Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary? 	All Project Personnel
2	Locate the sampling point	<ul style="list-style-type: none"> Pinch fingers/hands Sharp edges Slips and trips while on top of tanks Falls from ladders, stairways or on top of tanks 	<ul style="list-style-type: none"> Wear eye protection Wear nitrile gloves Use caution when climbing ladders or stairs Keep workboots free of mud 	All Project Personnel
3	Sample collection	<ul style="list-style-type: none"> Slip/trip/fall hazards Contaminant exposure Sample misidentification 	<ul style="list-style-type: none"> Prepare the proper sample container Wear nitrile gloves while collecting the sample Wear cut resistant gloves to prevent cuts from broken sample containers Do not use any suspect containers Close containers carefully to avoid breakage Check sample labels for accuracy prior to placing in cooler 	All Project Personnel
4	Cover the sampling port (location)	<ul style="list-style-type: none"> Pinch fingers/hands Sharp edges Slips and trips while on top of tanks Falls from ladders, stairways or on top of tanks 	<ul style="list-style-type: none"> Wear leather gloves Use caution when unfastening the cover straps Use two people remover box cover Wear eye protection 	All Project Personnel
5	Packing samples in cooler(s)	<ul style="list-style-type: none"> Bottle breakage Back injury Contaminant exposure Cuts Pinch points Back strain Lost time due to incorrect sample packaging or hold time exceedances 	<ul style="list-style-type: none"> Wear nitrile gloves when handling sample containers Wear cut resistant gloves to prevent cuts from broke sample containers Pack glass containers in bubble wrap Check COC against sample labels for accuracy before shipping Avoid placing hands/fingers in pinch point locations Use proper lifting techniques and buddy system if needed Ensure equipment and supplies are loaded correctly and do not shift during transport Use proper lifting techniques – no bending or twisting while under load Refer to the HASP for additional lifting information 	All Project Personnel

- (1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- (2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
- (3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Attachment **B** Project Safety Forms

ACCIDENT REPORTING FORM

Report all accidents immediately to the Safety and Health Officer

Instructions: For Personal Injuries, Property Damage, and Near Miss Reports, Complete Sections 1 and 2.
For Vehicle Accidents, Complete Sections 1, 2, and 4. Form must be completed within 24 hours.

SECTION 1

A. Employee Identification					<input type="checkbox"/> Employee		<input type="checkbox"/> Temporary Employee		<input type="checkbox"/> Subcontractor							
Employee No.		Last Name			First Name			Middle Name/Initial		M or F						
Area Code ()		Telephone Number		Address (Street, City, State, Province, Zip Code)												
Date of Hire / /		Position/Title			Supervisor			Employee's Company/Office Location								
B. General Information																
Where did the accident occur? <input type="checkbox"/> Office <input type="checkbox"/> Project Site				Type of Occurrence <input type="checkbox"/> Near Miss <input type="checkbox"/> Employee Injury <input type="checkbox"/> Vehicle Accident <input type="checkbox"/> Property Damage Only												
Date and Hour of Accident			Date and Hour Reported to Employer			Date and Hour Last Worked			Time Employee Began Work							
Month	Day	Year	a.m.	p.m.	Month	Day	Year	a.m.	p.m.	Month	Day	Year	a.m.	p.m.	a.m.	p.m.
Normal Work Hours on Last Day Worked				Witnesses? <input type="checkbox"/> () <input type="checkbox"/> () Yes		Witness Name and Telephone Number					No					
C. Project Information (Project Related Accidents/Near Misses Only)																
Project #		Project Name			Project Manager			Site Telephone Number ()		Employee Cell Number ()						
Was the Client Advised of the Accident? <input type="checkbox"/> Yes <input type="checkbox"/> No				Project Address (Street, City, State, Province, Zip Code)												
Name:				Specific Location of Accident												

SECTION 2

A. Details of the Accident/Near Miss	
1. What job/task was being performed when the accident occurred?	
2. Describe the employee's specific activities at the time of the accident. Include details of equipment/materials being used, including the size and weights of objects being handled.	
3. For injuries, identify the part of body injured, and specify left or right side.	
4. Identify the object or substance that directly injured employee and how.	
5. Identify Property Damaged (include owner of property, nature and source of damage, model and serial number, if appropriate).	
B. Health Care/Medical Treatment	
Employee received health care? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Identify the type of health care provided and where it was performed. (Check all that apply). <input type="checkbox"/> First Aid <input type="checkbox"/> Medical treatment other than first aid (sutures, etc.) <input type="checkbox"/> Hospitalized <input type="checkbox"/> Clinic <input type="checkbox"/> Hospital emergency room <input type="checkbox"/> On location by self or co-worker <input type="checkbox"/> On site by EMT	
Name of Health Care Provider, Physician's Name, Address (Street, City, Province/State, and Postal/Zip Code)	

Section 2 (Continued)

C. Accident Investigation

H&S plan prepared and on site?
 Yes Not applicable

Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured?
 Yes No If no, why not? (Explain).

Did the employee have the proper safety training to conduct these tasks or use the equipment? Yes No If not, why not?

Identify all of the potential contributing factors and how they led to the occurrence of the accident. (Lack of attention, wrong use of equipment, lack of training, etc.)

What contributing factor above was the underlying root cause of the accident.

Is any training or retraining recommended? If yes, describe.

What actions have been or will be taken to correct this accident from reoccurring?

Additional information: Attach photos, accident diagrams, as applicable.

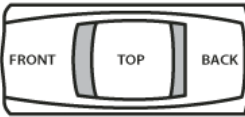
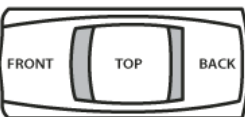
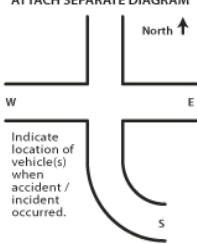
Report Date
 Month Day Year

Report Prepared by: (please print)

Report Prepared by: (signature)

VEHICLE ACCIDENT SECTION
(Complete this Section for all Vehicle Accidents)

SECTION 4

A. Vehicle					
License Plate No.	State	Police Department	City	State	
Vehicle Year/Make/Model	Odometer Reading at Time of Accident		Police Report Number	Weather Conditions	
Name of Person Operating Vehicle		<div style="text-align: center;"> <p>"X" IN AREA OF VEHICLE DAMAGE</p>  </div> <div style="margin-top: 5px;"> <p>CIRCLE</p> <p>0 No Damage 1 Light 2 Moderate 3 Heavy 4 Rolled 5 Burned</p> </div>			
Address					
City	State/Province				Zip Code
Telephone: Area Code ()					
Vehicle Type: () Personal () Rental () CRA-Own Description of Vehicle Damage:					
B. Other Vehicles Involved					
Name of Owner		Address	City/State/Zip	Area Code and Telephone Number ()	
Operator's Name (if different from above)		Address	City/State/Zip	Area Code and Telephone Number ()	
Year/Make/Model	Description of Property Damage:		<div style="text-align: center;"> <p>"x" IN AREA OF VEHICLE DAMAGE</p>  </div> <div style="margin-top: 5px;"> <p>CIRCLE</p> <p>0 No Damage 1 Light 2 Moderate 3 Heavy 4 Rolled 5 Burned</p> </div>		
Insurance Co. Name & Telephone					
License Plate No./State/Province					
C. Injured Persons					
Name	Address Street, City, State/Zip Code	Phone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/ Passenger, Employee, Other, or Pedestrian	
1.					
2.					
3.					
D. Witnesses					
Name		Address Street, City, State/Prov./Zip Code		Area Code and Telephone Number	
1.				()	
2.				()	
E. Description of Accident					
PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM					
					
Indicate location of vehicle(s) when accident / incident occurred.					
Was Ticket Issued: _____ Reason: _____ Other Operator <input type="checkbox"/> _____ Company Operator <input type="checkbox"/> _____ _____ _____					
Report Date Month Day Year		Report Prepared by: (please print)		Report Prepared by: (signature)	

Note: If Additional Space is Required to Complete this Report, Use Separate Sheet of Paper and Attach.

DAILY SAFETY MEETING FORM

PROJECT: _____

LOCATION: _____

DATE/TIME: _____

1. Safety Issues or Topics Discussed:	
2. Work Summary and Physical/Chemical Hazards of Concern:	
Planned Activities:	
Physical hazards:	
Biological hazards:	
Chemicals onsite:	
3. Protective Equipment/Procedures:	
4. Emergency Procedure:	
MUSTERING POINT: Across the street from the main gate	
In event of an emergency gather/proceed to mustering point(s). Review Contingency	
Emergency Procedures for Area(s) of activity.	
5. Signatures of Attendees (Handwriting must be legible):	

HASP ACKNOWLEDGMENT FORM

This is to certify that I have received a pre-entry briefing regarding this HASP for the Friedrichsohn Site in Waterford, New York and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or removal from the Site.

Print Name

Signature

Date

_____	_____	_____
_____	_____	_____
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_____	_____	_____
_____	_____	_____
_____	_____	_____

HOT WORK PERMIT AND HOT WORK CHECKLIST

Location (facility, well name, rig, etc.):									
Description of Hot Work:									
I have reviewed the proposed work, agree that hot work is necessary and may proceed without unreasonable risk.									
Initial authorization:			Date:			Expiration time:			
The following precautions must be taken to complete the work safely (attach details of specific procedures or checklist if appropriate).									
Check	Yes	NA	Check	Yes	NA	Check	Yes	NA	
All lines depressurized?			Area/space gas free?			Standby man/fire watch?			
All liquids drained?			Combustibles removed?			Pre-job safety meeting complete?			
Space cleaned and purged?			Continuous atmosphere monitoring?			Emergency procedure established?			
Space properly ventilated?			Fire extinguisher/water available?			Special PPE required?			
Lockout/tagout complete?			Respiratory protection required?						
Positive Isolation <input type="checkbox"/> NA <input type="checkbox"/> Blind <input type="checkbox"/> Double Block and Bleed <input type="checkbox"/> Disconnect <input type="checkbox"/> Full thickness Skillet			Electric lighting and equipment properly rated for hazardous area location <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			Communication Method <input type="checkbox"/> NA <input type="checkbox"/> Hand signal <input type="checkbox"/> Voice <input type="checkbox"/> Radio <input type="checkbox"/> Horn			
PPE			Rescue Equipment			Emergency Phone Numbers			
Head: <input type="checkbox"/> Hardhat <input type="checkbox"/> Other: _____ Eye/Face: <input type="checkbox"/> Safety glasses w/side shields <input type="checkbox"/> Face shield <input type="checkbox"/> Goggles <input type="checkbox"/> Other: _____ Arms/ Hands: <input type="checkbox"/> Leather gloves <input type="checkbox"/> Leather gloves w/long sleeves <input type="checkbox"/> Other: _____ Footwear: <input type="checkbox"/> Leather Boots Clothing: <input type="checkbox"/> Flame-resistant clothing			Emergency Response Plan? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA If no, notify outside rescue services GPS Coordinates: _____ <input type="checkbox"/> Full body harness <input type="checkbox"/> Lifeline <input type="checkbox"/> Personnel basket <input type="checkbox"/> Rigid stretcher <input type="checkbox"/> Mechanical lift for >5 degrees vertical			Ambulance/EMS: Rescue Services: Air Rescue: Fire Department: Other:			
Atmospheric Testing Acceptable Conditions		Time →	Results : AM/PM	Results : AM/PM	Results : AM/PM	Results : AM/PM	Results : AM/PM	Results : AM/PM	
Oxygen	19.5% to 23.5%								
Flammability	<10% LEL								
H ₂ S	<10 ppm								
Norm	<50 Micrograms								
Vessel Temperature	<100°F (43°C)								
Tester Signature:									
X		Initials	Initials	Initials	Initials	Initials	Initials	Initials	
Direct Reading Monitor			Model and Unit Number:			Calibration Date: / /			
This permit is approved for ____ hours on this date ____/____/____					Signature of person(s) performing Hot Work:				
Signature of On-site Supervisor:					X				
X					Start Time: :				
Only the On-site Supervisor may extend the permit time (Max. 12 hours)					X				
Time was extended to: _____ hours.					X				
Rep. Initials: _____ Time: :					X				
Permit start time shall be the same as the initial test time.									
Cancellation of Permit					Signature of Fire Watch:				
Signature of On-site Supervisor:					X				
X					Date: ____/____/____				
Permit Retention: 1 year or until audited					Signature of Contract Supervisor:				
					X				
Distribution: Original - Client Representative and Work Site Copy - Initial Authorization									

HOT WORK CHECKLIST

Signature	All welding machines shall be located in an unclassified area while in use (for offshore welding, machines must be 3 m or 10 feet away from a well-bay or production area and 0.5 m or 18 inches or away from deck drains – refer to Electrical Area Classification drawing).
	Welding machines with AC power convenience receptacles shall be labeled as AC power and shall be used with ground fault circuit interrupter (GFCI) adapters. The adapters should be placed as close to the welding machine as possible.
	Welding machines with DC power convenience receptacles shall be removed or otherwise disabled and must not be used.
	Welding machines used offshore shall be equipped with drip pans, shut down devices, and spark arresters.
	All welding leads shall be grounded as close as possible to the work area.
	All welding leads and extension cords shall be completely insulated, UL rated, and in good working condition.
	Welding rods shall not be left in the electrode holder when laid down on steel decks. The stud ends shall be put into a container – not on the floor or deck.
	Oxygen and acetylene bottles shall be separated by a or 5-foot high metal barrier, secured in a rack. Acetylene bottles shall be kept in an upright position.
	Regulators shall be equipped with properly operating gauges.
	Oxygen and acetylene hoses shall be leak-free and routed to prevent mechanical damage.
	Oxygen and acetylene hoses shall not be hung on cylinders when in use.
	Oxygen and acetylene shall be turned off at the cylinder valve and hoses bled anytime the equipment is not in use. Regulators shall be removed and protective cylinder caps put in place anytime cylinders are to be moved.
	Acetylene pressure downstream of the regulator shall be kept at or below 15 psi.
	Check valves/flame arresters shall be installed on the torch and the regulator.
	Only friction spark devices shall be used for ignition of cutting torches. Due to a potential ignition source, friction sparkers shall not be permitted to be carried throughout the facility.
	When lighting the cutting torch, the fuel gas valve shall be opened before opening the oxygen valve.
	Equipment containing hydrocarbons or other flammable substances has been relocated at least 35 feet horizontally from the hot work site. Similar equipment located at a lower elevation where slag, sparks, or other burning material could fall has been relocated at least 35 feet from the point of impact. When relocation is impractical, the equipment has been either shielded or the contents rendered inert.
	Fire resistant blankets (if used) shall be of a good quality and should be installed in a manner that does not create pockets or folds.
	Instrument gas systems and devices isolated or shielded.

On-Site Supervisor: _____ Date: _____

Welder: _____ Date: _____

**SAFETY INSPECTION CHECKLIST FOR EXCAVATIONS
REFERENCED BY OSHA STANDARDS**

This checklist is to be completed by the competent person at the start of work and as needed throughout the shift (i.e., after rain events, etc.). **(A competent person has been trained in the current OSHA excavation standard, is knowledgeable about soil analysis and protective systems, and has the authority to shut down the job.)**

Site Location: _____	Project #: _____
Date: _____ Time: _____	Competent Person: _____
Were visual soil tests made? If Yes, what type? _____	YES NO <input type="checkbox"/> Type: _____
Were manual soil tests made? If yes, what type? _____	YES NO <input type="checkbox"/> Type: _____
Soil Type: _____	Signature: _____
Soil Classification: _____	
Excavation Depth: _____	Excavation Width: _____
Protective System Used: _____	

In the following table, please place a Y for Yes, N for No, or N/A for Not Applicable in the right hand column for each item. If No, place the date of correction.

	Y, N, or NA	Date Corrected
GENERAL INSPECTION OF THE JOB SITE		
1. Does the competent person have the authority to remove employees from the excavation immediately?		
2. ARE SURFACE OBSTRUCTIONS REMOVED OR SUPPORTED?		
3. Are employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation?		
4. Are hard hats worn by all employees?		
5. Are excavated soil, materials, and equipment placed at least 2 feet from the edge of the excavation?		
6. Are walkways and bridges over excavations 4 feet or more in depth equipped with standard guardrails and toe-boards?		
7. Are warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic?		
8. Are employees required to stand away from vehicles being loaded or unloaded?		
9. Is a warning system established and used when mobile equipment operates near the edge of the excavation?		
10. Are employees prohibited from going beneath suspended loads?		
11. Are employees prohibited from working on the faces of sloped or benched excavations above other employees?		
UTILITIES		
12. Were utility companies contacted and/or utilities located?		
13. Are the exact locations of the utilities marked?		
14. Are underground installations protected, supported, or removed when excavation is opened?		
MEANS OF ENTERING AND EXITING THE TRENCH		
15. Is the distance along the trench to an exit no greater than 25 feet in excavations 4 feet or more in depth?		
16. IS A SUPPORT SYSTEM, SUCH AS UNDERPINNING, BEING USED?		
17. Are ladders used in excavations secured and extended 3 feet above edge of the trench?		
18. Are structural ramps used by employees designed by a competent person?		
19. Are structural ramps used for equipment designed by a registered professional		

Subject		Y, N, or NA	Date Corrected
	engineer?		
20.	Are employees protected from cave-ins when entering or exiting the excavation?		
WET CONDITIONS			
21.	Is water removal equipment monitored by a competent person?		
22.	Is surface water or run-off diverted or controlled to prevent accumulation in the excavation?		
23.	Are inspections made after every rainstorm or other hazard-increasing occurrence?		
HAZARDOUS ATMOSPHERE			
24.	Is the atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard?		
25.	Are adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or other hazardous atmospheres?		
26.	Is ventilation provided to prevent employee exposure to an atmosphere containing flammable gas 10% above the lower explosive limit of a gas?		
27.	Is testing conducted often to ensure that the atmosphere remains safe?		
28.	Is emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist?		
SUPPORT SYSTEMS			
29.	Are materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads?		
30.	Are materials and equipment used for protective systems inspected and in good condition?		
31.	Are protective systems installed without exposing employees to the hazards of cave-ins (including end walls), collapses, or threat of being struck by materials or equipment?		
32.	Are excavations below the level of the base, or footing supported, approved by a registered professional engineer?		
33.	Does the removal of support systems progress from the bottom and members are released slowly? Note any indication of possible failure.		
34.	Is the excavation of material a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth?		
35.	Is there a shield system placed to prevent lateral movement?		

SAFETY INSPECTION CHECKLIST – MOBILE EQUIPMENT SAFETY

Superintendent: _____ Week Ending: _____ Job No.: _____ Equipment: _____

(This form is to be completed daily by the operator. Deficiencies should be addressed immediately.)

	Date:	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Comments
Equipment Hours:	Start:								
	Stop:								
Fluid Levels:									
Oil									
Hydraulic									
Transmission									
Radiator									
Grease Fittings									
Fuel									
Safety Checks:									
Fire Extinguisher									
Seat and Safety Belts									
Warning Devices (backup alarms, lights, etc.)									
Housekeeping									
Brakes									
Mirrors									
Windshield and Wipers									
Steering									
Horn									
Lights									
Tires									
Guards									
Instruments									
Exhaust System									
Accessories:									
Boom or Mast									
Controls									
Level Indicators									
Tracks									
Other									
Sign-Off:									
Operator's Initials									
Supervisor's Initials									

Additional Comments: (Please write any additional comments here. Use the back of this form if necessary.)

√ = OK NR = Needs Repair NA = Not Applicable

Underground Utilities Checklist
Pre-Drilling/Excavation Checklist and Utility Clearance Log

(QSF-019)

Project number:	Project name:
Date:	Project location:
Public utility locator:	Public utility locator phone number:
Date of public utility locator request:	Public locator call reference number:
Private utility locator (if applicable):	Private utility locator phone number:

Utilities (indicate that location/utility presence was checked)

Borehole/ Excavation location	Date (mm/dd/yyyy)	Telephone	Water	Storm sewer	Sanitary sewer	Process sewer	Gas	Electrical	Cable	Overhead utilities	Other	Comments/Warnings
Utility owner												

Instructions: This checklist is to be completed by GHD personnel prior to initiation of field activities as a safety measure, to ensure that all underground utility lines, other underground structures, and above-ground power lines are clearly marked in the area selected for boring or excavation.

Notes: _____

Client: _____ **Client representative:** _____ **Phone number:** _____

Client or property owner acknowledgement of utility clearance: _____ (Client, property owner, or authorized agent signature)

Subcontractor acknowledgement of utility clearance: _____ (Subcontractor or subcontractor representative signature)

GHD field representative name: _____ **Signature:** _____

GHD project manager's review/confirmation of locate completion: _____

In the event that client or property owner acknowledgement cannot be obtained, all boreholes shall be hydro vacuumed and the costs passed on to the client. Attach any clearance documentation from utility owner/operator to this document.

Underground Utilities Checklist for GHD Personnel

Pre-Drilling/Excavation Checklist and Utility Clearance Log

Drilling or excavation work may not proceed if any of the questions answered below are answered "No." Implement stop work authority and contact the GHD project manager to discuss and resolve any concerns or issues. Document the reason for a "No" answer in the comments section below.

Yes	No	N/A	Pre-Mobilization
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Has a utility locator request been completed within the last 30 days (verify time limit with state or provincial law)? If no, stop work and comment below.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. Does each borehole and excavation location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast (or boom) and operating the drill rig and all support equipment? Ensure that the minimum OSHA/state/provincial utility clearance requirements between the mast or boom and the power line(s) are met. For instance, OSHA requires a minimum approach distance of 10 feet for systems below 50 kV and an increase of 4" for every 10 kV over 50 kV. Confirm if additional permits are required if the boom or mast will be working 5 meters (15 feet) or less from the electrical lines.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface or above-ground utilities shown on client's building plans? Check here <input type="checkbox"/> if plans not provided by client (therefore not applicable to this job).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface or above-ground utilities shown on public right-of-way street improvement or other public property plan or site map?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. Has the site representative, familiar with the site, indicated no knowledge of any subsurface or above-ground utilities within 3 metres (10 feet) of the proposed borehole and excavation locations? (Review locations with site representative)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface utilities identified during a geophysical survey? Check here <input type="checkbox"/> if no geophysical survey has been completed (therefore not applicable to this job).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. Have all utility locating service providers, notified by the public line locator, marked out their facilities in the vicinity of the borehole and excavation locations or otherwise notified us that they do not have any facilities near the proposed locations? (Attached confirmation and utility locate sheets from public locator)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. Are all proposed borehole and excavation locations at least 1.5 meters (5 feet) from a visual line connecting two similar looking manhole covers?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. Are all proposed borehole and excavation locations at least 1.5 meters (5 feet) from a visual line perpendicular to the street from the water, gas, and electrical meters?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11. Are all proposed boring and excavation locations clear of pavement joints, curbs, crash posts, or other engineered structures?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12. Does the ground surface/pavement lack signs of previous excavation (e.g., no pavement subsidence, no differences in pavement texture or relief, no pavement patching)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pre-Drilling and Excavation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13. Has it been verified that the proposed drilling or excavation work will not affect any work currently in progress?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14. Has the drill rig or heavy equipment been inspected prior to use and documented? (See Drill Rig Inspection Checklist or Mobile Equipment Safety Inspection Checklist)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15. Have barricades been erected to prevent unauthorized access, where applicable?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16. Have all known live electrical or product lines within 3 meters (10 feet) of the dig path been visually verified? If no, comment below.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17. For boreholes that have not been cleared or are within 3 meters of a utility:
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	a. Before drilling have you cleared a hole to 2.4 meters (8 feet) below grade using an air-knife, or equivalent, before drilling and is the diameter of this hole greater than the final outside diameter of the boring? If not required comment below.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	b. Does the soil you encountered in the hand-dug hole appear to be native material (i.e., free of clean gravel, clean sand, aggregate base [gravelly sand ~ 10% fines] or other non-native looking material)? If not required comment below.

Have the above concerns been discussed with the GHD project manager?
 Yes No Not Applicable

Has the start of subsurface work been communicated to the GHD project manager?
 Yes No Not Applicable

Have the above concerns been discussed with the client?
 Yes No Not Applicable

Has the scope of work been approved by the client?
 Yes No Not Applicable

Comments: _____

GHD field representative name: _____ **Date:** _____

Attachment **C** Community Air Monitoring Program

Community Air Monitoring Plan

Friedrichsohn Cooperage Site

Town of Waterford, New York

Overview

This Community Air Monitoring Plan (CAMP) will be implemented as determined by GHD's Project Manager and only during times when excavation or soil and sediment handling activities (remedial activities) are in progress. This site-specific Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of remedial work activities. The action levels specified herein require increased monitoring and corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP will help to confirm that work activities do not spread contamination off site through the air.

Air monitoring station locations will be established around the perimeter of the site for use as monitoring locations. The site-specific CAMP presented below will be implemented during the soil handling activities at the site, which include the building of site roadways, excavation activities, soil/sediment loading activities and site restoration activities. Each day that these activities are in progress one upwind and two downwind air monitoring stations will be set up to collect data. The instruments that will be used to collect the air monitoring data will have data logging capabilities. The data will be downloaded periodically, stored electronically and will be available to agency personnel for review.

Reliance on this CAMP should not preclude simple, common sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Real-time air monitoring for VOCs and particulate levels at the perimeter of the site will be necessary, as described below.

Continuous monitoring will be required during all soil handling activities at the site, which include the building of site roadways, excavation activities, soil/sediment-loading activities and site restoration activities.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples. Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while overturning soil/sediment and then taking a reading prior to leaving a sample location.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the site on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The specific type of air monitoring equipment that will be used at the site for VOC monitoring will be a MiniRae 3000, or equivalent. The equipment will be calibrated in accordance with the manufacturer's guidelines. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of VOCs at the downwind perimeter of the site exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the site persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the designated work area or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the site, activities must be shutdown.
4. All 15-minute readings must be recorded and be available for agency personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate/Fugitive Dust Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at one upwind and two downwind monitoring stations on the site perimeter. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than

10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The particulate monitor that will be used will be a TSI 8520 DustTrak, or equivalent. The equipment will be equipped with an audible and/or visible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the designated work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the designated work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for agency personnel to review.

The following fugitive dust suppression and corrective procedures will be employed at the site.

1. Reasonable fugitive dust suppression techniques will be employed during all remedial activities, which may generate fugitive dust.
2. The following techniques are generally effective for the controlling of the generation and migration of dust during construction activities and may be employed as necessary:
 - (a) Applying water on haul roads
 - (b) Wetting equipment and excavation faces
 - (c) Spraying water on buckets during excavation and dumping
 - (d) Hauling materials in properly tarped or watertight containers
 - (e) Restricting vehicle speeds to 10 mph
 - (f) Covering excavated areas and material after excavation activity ceases
 - (g) Reducing the excavation size and/or number of excavations

When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays

will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

Appendix F

Lock Operations Plan



Lock Operating Plan for OCC Sediment Remediation Project Erie Canal – Flights E2 to E6

Draft for Review

This document is in draft form. A final version of this document may differ from this draft. As such, the contents of this draft document shall not be relied upon. GHD disclaims any responsibility or liability arising from decisions made based on this draft document.

