

8.6 Substance Abuse

(Reference Jacobs Policy 810, Drugfree Workplace)

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. Jacobs does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing Jacobs work;
- Abuse of prescription or nonprescription drugs;
- Use or possession of illegal drugs or drugs obtained illegally;
- Sale, purchase, or transfer of legal, illegal or illegally obtained drugs; and
- Arrival at work under the influence of legal or illegal drugs or alcohol.

Drug and/or alcohol testing is applicable under Policy 810. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. This testing is performed in accordance with Policy 810, Drug-Free Workplace.

8.7 Shipping and Transportation of Chemical and Radioactive Products

(Reference Jacobs HSE Handbook, Hazardous Materials Transportation, and Radiation Safety Procedures)

The U.S. Department of Transportation (DOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods) including calibration gases used in personal exposure monitoring or field instruments. Chemicals brought to the site might be defined as hazardous materials by the U.S. DOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by U.S. DOT. Other wastes may also be U.S. DOT hazardous or radioactive materials. To confirm whether a material or a waste is a U.S. DOT hazardous radioactive material, check with the Waste Coordinator, the project EM, the Jacobs RSO, the Radioactive waste packaging/shipping SME, or the Jacobs Dangerous Goods Shipping Coordinators.

All staff who affect shipment of hazardous or radioactive materials, including receiving hazardous or radioactive materials, preparing profiles or manifests, packaging hazardous or radioactive wastes, labeling, or transporting hazardous or radioactive materials by road, are called HazMat employees (note Jacobs cannot transport hazardous wastes by public road). HazMat employees must receive Jacobs online training in shipping dangerous goods. Jacobs' online Dangerous Goods Shipping course can be found on the Jacobs HSE website.

All hazardous or radioactive materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (e.g., calibration gas, radioactive check sources, etc.), use the HazMat ShipRight tool for hazardous materials on the Jacobs E3 Learning (under Company Resources – Online Shipping) or for radioactive material shipments, contact the Jacobs radioactive materials shipping SME for direction and approval prior to offering the shipment for transport. Contact the Dangerous Goods Shipping coordinators, the Waste Coordinator, radioactive materials shipping SME, or the project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in Jacobs' Hazardous Materials work instructions and

radioactive materials security is addressed in the Jacobs Radiation Safety Procedures. The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous and radioactive materials;
- All transporters of hazardous and radioactive materials must be prequalified by a Contracts Administrator who evaluate the carrier's safety rating, security measures, and employee screening procedures;
- When shipping hazardous or radioactive materials, check driver credentials and ask about shipping details;
- When receiving a hazardous or radioactive materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver; and
- If there is suspicious or unusual behavior (e.g., driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the project manager, the Jacobs RSO (for radiological only), or the HSM.

Employees responsible for shipping hazardous or radioactive materials must also review the Jacobs Transportation Security Plan (HSE-417 Appendix A).

8.8 Extended Work Hours and Fatigue Management

A normal work shift is considered to be eight consecutive hours during the day, five days a week, with at least an eight hour rest period. Any shift that incorporates more continuous hours, requires more consecutive days of work, or requires work during the evening should be considered extended or unusual.

Extended or unusual work shifts are typically more stressful for workers physically, mentally, and emotionally, and can lead to increased fatigue, stress, and lack of concentration. These effects can lead to an increased risk of worker error, incidents, and injuries.

If your field project requires extended work hours, including drive time, you must consult with your PM and HSM for approval of the extended hours/days and to be certain that fatigue management practices are included in your safety plan.

Fatigue shall be managed by using a risk management approach which includes:

- Identifying the contributing factors (work hours, type of work to be performed, time of day, travel fatigue/jet lag), collaborating with employees, reviewing incident trends;
- Assessing the risks associated with workplace conditions that contribute to fatigue including time of day, opportunities to recover, how many people are fatigued, skills and experience of those who experience fatigue; and
- Determining and implementing controls to prevent or minimize the risk and reviewing the effectiveness of the controls.

8.9 Coronavirus Disease 2019 (COVID-19)

Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread rapidly from person to person. Field personnel can potentially be exposed to COVID-19 while mobilizing/demobilizing to and from the project site, while working in areas with ongoing spread of the virus, and while working in close

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proximity to other field staff that have been previously exposed to the virus. COVID-19 is thought to spread mainly between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person talks, coughs, or sneezes. It also may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes.

Common signs of infection include but are not limited to: fever or chills, cough, shortness of breath, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, diarrhea. Symptoms may appear 2 to 14 days after exposure to the virus. Currently, there is no specific treatment or vaccine to protect against COVID-19.

See Jacobs COVID Pandemic Management Strategy Guide, for further precautions and controls measures for COVID-19. If showing signs of COVID-19, do not report to project site for work. Contact the project SL, HSM, PM and supervisor to immediately report symptoms to your supervisor.

The following control measures should be implemented to reduce the risk of contracting, and further spreading of, COVID-19:

- Review and follow [Jacobs Global Security Companywide Travel Restriction and FAQ](#)
- Review signs and symptoms of Coronavirus with all field staff. Utilize CDC guidance document (Appendix A to Jacobs COVID-19 Management Plan) to review COVID-19 awareness information.
- If project team member has specific COVID-19 concerns (e.g. in high risk category, high risk locations), speak with PM and supervisor. Accommodations shall be made by the PM and supervisor.

Additional COVID-19 field project control measures:

- Jacobs is requiring that all individuals performing work will wear cloth face coverings when they cannot maintain 6 feet of social distance in public areas or work areas.
- On project sites, where possible, undertake site work such as inspections during quieter times (early mornings, scheduled breaks, and lunch) to reduce interaction with other employees and maintain social distancing of at least 6 ft or more from all persons at all times.
- Where close contact or contact with individuals is unavoidable but critical, the tasks must be risk assessed with the support of an HSE professional (and if necessary, industrial hygienist or medical professional). The principles of prevention must be applied, and if necessary, as a last resort, PPE must be provided such as disposable coveralls, safety glasses, face-masks, nitrile gloves, and any other protective clothing deemed necessary. However, where work presents a risk that cannot be mitigated, the work shall not continue. If there is a need to provide the disposable coveralls and nitrile gloves, ensure an appropriate disposal receptacle is provided. Garbage must be double bagged.
- Work in the smallest groups possible (e.g., alone where it makes sense for low-risk activities while staying in communication). Consider keeping similar teams together on shift or in working groups. This will limit the chance of cross-infection across multiple groups and limiting contact across groups can help reduce risk of large percentage of staff needing to be quarantined.
- Monitor local public health agencies communications and state requirements. Follow all local agency guidance and restrictions.
- Ensure FTL and Safety Liaison have cell phone number of all field staff for communication to project teams.
- Identify project specific telework opportunities where feasible (e.g. work from hotel room).

- Frequent hand washing is required. Hand wash facilities are typically required at temporary job locations (e.g. at portapotty at field office). Wash hands with soap and water for at least 20 seconds. If a handwashing sink is not feasible (e.g. mobile staff), utilize disinfectant hand wipes.
- Provide hand sanitizer at all field project locations. If using alcohol based (>60% alcohol) hand sanitizer, cover all surfaces of your hands and rub them together until they feel dry.
- Be familiar with cough and sneeze etiquette and avoid touching eyes, nose, mouth.
- Refrain from person to person contact (e.g., handshakes, high-fives, etc.). Refrain from sharing personal items such as pens, glasses/mugs, cellphone, etc.
- Use disinfectant to frequently clean shared surfaces including, but not limited to rental cars; hotel room touch points; temporary office trailer touch points (e.g. door handles, workstations). For rental cars: steering wheels, control knobs/touch screens, shift knob, door handles, window switches, locks.
- At temporary office entry points, post CDC Stop the Spread, Social Distancing and Hand Washing Notice Posters (attached).
- If entering residential project site locations – ask occupants if they have signs of illness prior to entry. Do not enter residential locations with occupants that have signs/symptoms.

Note: All references are frequently updated. Check Jacobs and CDC COVID-19 webpages frequently for updates.

9. Project-Specific Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Consult the appropriate Jacobs SOP to ensure all requirements are implemented. Jacobs employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. Jacobs employees and subcontractors who do not understand any of these provisions should contact the HSM for clarification. This section is not intended to address all chemical hazards. Section 12.0 (Contaminants of Concern) includes the chemicals of concern, location where the maximum concentration was found, exposure limits, and related information.

9.1 Arsenic

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

Cal-OSHA has set limits of 10 microgram arsenic per cubic meter of workplace air ($10 \mu\text{g}/\text{m}^3$) for 8 hour shifts and 40 hour work weeks. Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the U.S. Department of Health and Human Services (DHHS), and the U.S. EPA have determined that inorganic arsenic is a human carcinogen.

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

9.2 Benzene

(Reference Jacobs HSE Handbook)

Benzene is considered a "Confirmed Human Carcinogen." Jacobs is required to control employee workplace exposure to benzene when personal exposures is at or above 0.5 parts per million (ppm) as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the OSHA Benzene standard, 29 CFR 1910.1028. The elements of the Jacobs benzene program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment (PPE) and respirators;
- Medical surveillance;

- Training on hazards of benzene and control measures (includes project-specific training and the computer-based training on Jacobs' E3 Learning, *Benzene*); and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the HSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this PHSEP

9.3 Compressed Gas Cylinders

(Reference Jacobs HSE Handbook)

Below are the hazard controls and safe work practices to follow when working around or using compressed gas cylinders. Ensure the requirements in the referenced SOP are followed:

- Cylinders and pressure-controlling apparatus shall be inspected for defects and leakage prior to use. Damaged or defective items shall not be used. If a cylinder is found to be defective, the gas distributor shall be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area
- Cylinders shall be labeled with the identity of the contents. Cylinders not labeled shall be sent back to the cylinder distributor. The color of the cylinder shall not be used exclusively to identify cylinder contents
- Valve caps must be in place when cylinders are transported, moved, or stored;
- Cylinders must be secured in an upright position at all times;
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings
- Eye protection (safety glasses or goggles) shall be worn when using cylinders
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources
- Cylinders inside buildings shall be stored in dry, well-ventilated locations at least 20 feet (6.1 meters) from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas shall be located where cylinders will not be knocked over or damaged
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour
- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinder
- Complete the self-assessment checklist for compressed gas cylinders are being used.

9.4 Crystalline Silica

(Reference Jacobs HSE Handbook)

Jacobs subcontractors shall control employee exposure to crystalline silica when exposures are at or above the ACGIH TLV of 0.025 mg/m³ by submitting for review and approval a crystalline silica exposure monitoring plan. The elements of an exposure monitoring plan include, but are not limited to the following:

- A bulk sample representative of the material to be demolished must be sent with the air monitoring sample media for analysis;
- Initial monitoring and personal air sampling must be conducted to determine the potential worker exposure to respirable crystalline silica; and
- Real-time particulate monitors with a 10 micron respirable size fraction attachment may be used as part of the initial and ongoing monitoring plan to evaluate the potential worker exposure. This must include an action level established by their corporate or site health and safety professional and include actions required (e.g., implement engineering, administrative controls, respiratory protection).

Other exposure control measures include:

- Maintaining surfaces as clean as practicable to minimize accumulation of crystalline silica containing particulate material;
- Clean surfaces with a HEPA-filter vacuum or equivalent method;
- Implement dust suppression during demolition;
- Restricting access to the work area where crystalline silica exposure may exist to only those authorized to perform work or enter the area;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in these areas; and
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.

9.5 Demolition

(Reference Jacobs HSE Handbook)

This section is applicable to all forms of demolition. Demolition is defined as the removal or dismantling of structures or equipment by disassembly.

An engineering survey shall be completed prior to start of demolition operations. The survey shall determine the condition of the structure framing, floors, and walls; the presence of asbestos, polychlorobiphenyls (PCBs), lead paint, or other regulated hazardous substances; the presence of hazardous materials in tanks, pipes, and equipment; and the possibility of unplanned collapse of any portion of the structure. Any adjacent structure where personnel may be exposed shall also be similarly evaluated. The survey shall be conducted by a competent person and a written record of the survey findings shall be maintained at the project site.

The demolition subcontractor working on this project will provide Jacobs with a demolition safety plan prior to the start of work. Jacobs will use this plan to verify that the subcontractor is implementing the necessary safety precautions during this activity. In addition, the following safety precautions shall be

implemented by Jacobs personnel. Below are the hazard controls and safe work practices to follow when working around or performing demolition. Ensure the requirements in the referenced SOP are followed.

- Appropriate warning and instructional safety signs shall be conspicuously posted where necessary.
- Fugitive dust must be controlled during demolition by using water spray or other methods.
- Remain a safe distance from the demolition zone to reduce exposure to fragmentation of glass, steel, masonry, and other debris during demolition operations.
- Do not enter the demolition zone unless completely necessary, and only after the competent person has assessed the condition of the structure and has authorized entry.
- Follow all requirements established by the competent person. The competent person shall inform personnel of the areas that are safe to enter and the areas where entry is prohibited. When possible, the competent person should escort Jacobs personnel while in the demolition zone.
- All demolition activities that may affect the integrity of the structure or safety of personnel must cease until personnel have exited the demolition zone.
- During the course of demolition, work areas, passageways, stairs, ladders, and exits shall be kept free of demolition debris.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel
- Proper control measures shall be in place before welding or cutting on surfaces covered by coatings containing flammable or hazardous materials such as lead, cadmium, zinc, etc. Highly flammable or toxic coatings may require stripping of the coating a sufficient distance from the area to be heated. Welding and cutting shall be performed in accordance with the provisions of OSHA 1926, Subpart J, "Welding and Cutting." Follow "Welding and Cutting" SOP HSE-314.

The following lead-exposure-control procedures will be implemented during demolition operations involving potential exposure to lead:

- Site personnel will be provided lead-awareness training;
- Site personnel will be provided with hand-washing facilities and will wash their hands daily;
- An excavator equipped with hydraulic shears will be used only to cut painted wooden, concrete, and metal structures;
- Neither hand-held band/chop saws nor torch cutting equipment will be used on painted surfaces without proper PPE and engineering controls in place or removal of paint prior to cutting;
- During all demolition operations to control potential exposures to LBP, wet methods using water mist will be used;
- A direct-reading (real time) dust monitor will be used to monitor demolition operations that pose a potential lead-exposure hazard (that is, those with an action level requiring that additional dust control measures be employed and/or that respiratory protection be used.);
- Personal air samples will be collected and analyzed for lead to confirm that no personnel are exposed to levels above the lead action level of 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$); and
- The selection of respiratory protection and other exposure controls will be based on the most recent exposure monitoring results obtained from the lead-exposure-competent person.

For more information see Jacobs HSE Handbook, *Lead*.

9.6 Drilling Safety

(Reference Jacobs HSE Handbook)

Below are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. A minimum distance of 20 feet (6.1 meters) between mast and overhead lines (<50 kV) is recommended. Increased separation may be required for lines greater than 50 kV.
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.
- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this PHSEP to evaluate drilling operations.
- If the drilling method generates significant noise and work is being performed in an area with nearby site workers or pedestrian traffic, monitoring for noise should be conducted (reference Section 10.1 [Noise]).
- If the drilling method generates significant dust and work is being performed in an area with nearby site workers or pedestrian traffic, dust monitoring should be conducted. A direct-reading (real time) dust monitor will be used to monitor drilling operations that pose a potential silica-exposure hazard. (Primary source is native sandstone rock).

9.7 Drum Handling

Below are the hazard controls and safe work practices to follow when overseeing the movement of drums or when handling drums.

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries.
- Ensure drum bungs/lids are secured and drums are labeled prior to moving.
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.
- Ensure there are appropriately designed Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials.
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency.
- Supply operators with appropriate respiratory protective equipment when needed.
- Ensure that drums are secure and are not in the operator's view of the roadway.
- Prior to handling, all personnel should be warned about hazards of handling.
- Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved (e.g. small containers may have to be removed first to permit heavy equipment to enter and move the drums).
- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur.

9.8 Drum Sampling Safety

Personnel are permitted to handle and/or sample drums containing certain types of waste (drilling waste, investigation-derived waste (IDW), waste from known sources) only. Handling or sampling drums with unknown contents requires a plan revision or amendment approved by the HSM and the Jacobs RSO (for radiological only). The following control measures will be taken when sampling drums:

- Minimize transportation of drums.
- Sample only labeled drums or drums from a known waste stream.
- Do not sample bulging or swollen drums. Contact the HSM.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Use the proper tools to open and seal drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer/sample the content of drums using a method that minimizes contact with material.
- Use the PPE and perform air monitoring as specified in the PPE and Site Monitoring sections of this PHSEP.
- Have a spill kit accessible during sampling activities.
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

9.9 Earthmoving Equipment

(Reference Jacobs, HSE Handbook, *Earthmoving Equipment*)

Below are the hazard controls and safe work practices to follow when working around or operating heavy equipment. Ensure the requirements in the referenced SOP are followed.

- Jacobs authorizes only those employees qualified by training or previous experience to operate material handling equipment.
- Jacobs employees must be evaluated prior to operating earthmoving equipment by a Jacobs earthmoving equipment operator evaluation designated person. This evaluation will be documented according to SOP HSE-306, *Earthmoving Equipment*.
- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include: service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts and operating controls. All defects shall be corrected before the equipment is placed in service. Documentation of this inspection must be maintained onsite at all times (use the Earthmoving Equipment Inspection form if operated by Jacobs).
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls shall be in a neutral position, with the motors stopped and brakes set.
- Equipment which is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operators view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 feet (3 meters) from the power lines less than 50 kilovolts (kV). Provide an additional 4 feet (1.2 meters) for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered to be an energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- Underground utility lines must be located before excavation begins; refer to the Utilities (underground) section.
- Operators loading and unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake shall be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When not in operation, the blade or bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades or buckets landed and shift lever in neutral.

9.10 Electrical Safety

(Reference Jacobs SOP HSE Handbook, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed.

9.10.1 General Electrical Safety

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Jacobs employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the Jacobs HSE Handbook.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- Jacobs has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock.
 - GFCIs shall be used on all 120-volt, single phase 15 and 20-ampere receptacle outlets which are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
 - GFCIs cannot be utilized;
 - Client requires such a program to be implemented; or
 - Business group decides to implement program in addition to GFCI protection.
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory (UL) approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 20 feet (6.1 meters) from overhead power lines.
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

9.10.2 Portable Generator Hazards

- Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide (CO) poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.
- NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide CO very quickly. When you use a portable generator, remember that you cannot smell or see CO. Even if you can't smell exhaust fumes, you may still be exposed to CO.
- If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The CO from generators can rapidly lead to full incapacitation and death.
- If you experience serious symptoms, get medical attention immediately. Inform project staff that CO poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.
- Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow CO to come indoors.
- Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.
- Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.
- Most generators come with Ground Fault Circuit Interrupters (GFCI). Test the GFCIs daily to determine whether they are working
- If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.
- Never store fuel near the generator or near any sources of ignition.
- Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

9.11 Energized Electrical Work

All electrical systems shall be considered energized unless lockout/tagout procedures are implemented and zero energy verified in accordance with the Lockout/Tagout section of this plan.

Energized electrical work is defined as work performed on or near energized electrical systems or equipment with exposed components operating at 50 volts AC (or 100 volts DC) or greater. Working near energized live parts is any activity inside a Limited Approach Boundary.

Evaluate the use remote testing device for troubleshooting (e.g., Fluke 233 Remote Display Multimeter or equivalent). This type of testing device eliminates the exposure to unprotected energized electrical parts.

Electrical wiring and equipment shall be de-energized prior to conducting work unless it can be demonstrated that de-energizing introduces additional or increased hazards or is unfeasible due to equipment design or operational

limitations. When energized electrical work is the only means that work can be performed (e.g., for voltage testing or troubleshooting), all requirements must be implemented including the following:

- Only qualified personnel are permitted to work on unprotected energized electrical systems. To be a FES qualified person, an employee must meet all of the following bulleted requirements:
 - The employee must be assigned one of the two worker categories and up-to-date on the requirements:
 - Energized Electrical Trained Worker Limited (EETW-L) which is restricted to working on electrical systems 480 VAC and below or working in the Limited Approach Boundary of systems that have a designated Arc Flash PPE Category of ≤ 2 , which **does not** require First Aid/CPR or AED training or the buddy system.
 - Energized Electrical Trained Worker (EETW) allows individuals to work on equipment rated at Arc Flash PPE category 2, which requires the individual to complete First Aid/CPR or AED, and implement the buddy system.
 - Possess credentials, electrical educations, training and task specific knowledge, experience and capability (i.e., a qualified person may be qualified for one type of system or task, but not another).
 - “Energized Electrical Qualified Person Assessment” must be completed annually by the RHSM or applicable operations lead/supervisor which requires a skill demonstration performed by the qualified person while wearing the necessary PPE and using the required tools. This form must be submitted to the SPA and maintained with the project files.
 - Employees shall complete the Jacobs energized electrical refresher safety training every 3 years.
 - First Aid/CPR and AED training (EETW only), release of victim, completed annually (Release of victim refresher available on the E3 Learning). For annual the First Aid, CPR and AED requirement, an employee may retake the course through a certified provider (including local organizations), conduct a drill where CPR and AED skills are demonstrated, or complete the American Red Cross CPR/AED Refresher course.
- If FES personnel are only overseeing a qualified subcontractor performing energized electrical work and not entering the Limited Approach Boundary or tasked to perform troubleshooting near unprotected energized parts, then the ‘2015 NFPA 70E Awareness for Oversight of Work’ E3 Learning training is required (i.e., the above training requirements would not apply).
- The client sector HSE Lead must approve any energized electrical work that is above an Arc Flash PPE Category 2 or an incident energy greater than 8 calories/cm².
- An Electrical Hazard Analysis must be performed to identify energized electrical safe work practices before any person approaches exposed live parts within the Limited Approach Boundary (as determined by the shock hazard analysis), by performing both shock hazard analysis and flash hazard analysis, which comprise the electrical analysis.
- The Energized Electrical Work Permit must be completed prior to working on unprotected energized electrical systems. The Permit is attached to the PHSEP.
- Provisions for first responder equipment, such as a first aid kit, AED, communication devices, and non-conductive release equipment (when disconnect means is not in the immediate vicinity of the work) shall be made available. If an AED is available at the host employer’s facility, the location of the AED must be determined and personnel trained in its use.
- FES employees designated as qualified persons working on live parts of energized electrical systems 480 volts and above shall implement the buddy system. This means that two EEQPs must be engaged in this work. Working on live parts of energized electrical systems 480 volts and above means actual contact with live parts or working within the Prohibited Approach Boundary, which is one inch (2.54 cm) for 480 volt systems.
- The buddy system requires the presence of an additional EEQP who shall stand by and render assistance, or summon help for the first person, in the event the first person is inadvertently shocked while performing the

work. The second person shall not be assigned to additional distracting duties or tasks while the energized electrical work is being performed and shall know the location of the isolation device(s) for the equipment being worked on.

- Workers designated as qualified persons shall wear the required electric shock and arc-flash PPE, as specified by the qualified person responsible for the energized electrical operations.
- Safety signs, safety symbols or incident prevention tags, meeting applicable American National Standards Institute (ANSI) Standards, shall be used where necessary to warn employees about electrical hazards.
- Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing live parts. Conductive barricades shall not be used where it may cause an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary.
- If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect unqualified employees. The primary duty and responsibility of an attendant providing manual signaling and alerting shall be to keep unqualified employees outside a work area where the unqualified employee might be exposed to electrical hazards. An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.
- Employees shall not perform tasks near exposed energized parts where lack of illumination or an obstruction precludes observation of the work. Employees shall not reach blindly into areas that may contain energized parts.
- Work shall be performed in accordance with National Fire Protection Association (NFPA) 70E requirements (2015 edition).
- Follow all control measures and procedures identified on the Energized Electrical Work Permit and the HIIRA. The Permit is attached to the PHSEP. Complete the self-assessment checklist for energized electrical work.

9.12 Excavation Activities

(Reference Jacobs HSE Handbook, Excavation and Trenching Safety)

The requirements in this section shall be followed whenever excavation is being performed. Refer to the Earthmoving Equipment section for additional requirements applicable to operating/oversight of earthmoving equipment. Below are the hazard controls and safe work practices to follow when working around or performing excavation. Ensure the requirements in the referenced SOP are followed.

- Excavation entry is to be avoided during the project, sampling shall be from the excavator bucket.
- Do not enter the excavations unless completely necessary, and only after the excavation competent person has completed their daily inspection and has authorized entry. An inspection shall be conducted by the competent person prior to the start of work, as needed throughout the shift, after every rainstorm, and after any hazard increasing occurrence. Documentation of the inspection must be maintained onsite at all times.
- Follow all excavation entry requirements established by the excavation competent person and any excavation permit being used.
- Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet deep (1.5 meters) and there is no indication of possible cave-in, as determined by the excavation competent person. Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.
- Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).

- The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.
- Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.
- Excavations shall not be entered when:
 - Protective systems are damaged or unstable;
 - Objects or structures above the work location may become unstable and fall into the excavation;
 - The potential for a hazardous atmosphere exists, unless the air has been tested and found to be at safe levels; or
 - Accumulated water exists in the excavation, unless precautions have been taken to prevent excavation cave-in.
- The excavation self-assessment checklist shall be used to evaluate excavations prior to entry.

9.13 Fall Protection Activities

(Reference Jacobs, HSE Handbook, *Fall Protection*)

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are exposed to unprotected heights. Ensure the requirements in the referenced SOP are followed.

- Fall protection systems must be used to eliminate fall hazards when performing construction activities at a height of 6 feet (1.8 meters) or greater and when performing general industry activities at a height of 4 feet (1.2 meters) or greater.
- Jacobs staff exposed to fall hazards must complete initial fall protection training by completing either the Jacobs 10-Hour Construction Safety Awareness training course or the Fall Protection computer-based training module. Staff must also and receive project-specific fall protection training using the fall protection evaluation form attached to this PHSEP. Staff shall not use fall protection systems for which they have not been trained.
- The SL or designee must complete the Project Fall Protection Evaluation Form and provide project-specific fall protection training to all Jacobs staff exposed to fall hazards.
- The company responsible for the fall protection system shall provide a fall protection competent person to inspect and oversee the use of fall protection system. Jacobs staff shall be aware of and follow all requirements established by the fall protection competent person for the use and limitation of the fall protection system.
- When Jacobs designs or installs fall protection systems, staff shall be qualified as fall protection competent persons or work directly under the supervision of a Jacobs fall protection competent person.
- When horizontal lifelines are used, the company responsible for the lifeline system shall provide a fall protection qualified person to oversee the design, installation, and use of the horizontal lifeline.
- Inspect personal fall arrest system components prior to each use. Do not use damaged fall protection system components at any time, or for any reason. Fall protection equipment and components shall be used only to protect against falls, not to hoist materials. Personal fall arrest systems that have been

subjected to impact loading shall not be used. SL shall periodically inspect Jacobs fall protection equipment using the Fall Protection Inspection Log form.

- Personal fall arrest systems shall be configured so that individuals can neither free-fall more than 6 feet (1.8 meters) or contact any lower level.
- Only attach personal fall arrest systems to anchorage points capable of supporting at least 5,000 pounds (2268 kg). Do not attach personal fall arrest systems to guardrail systems or hoists.
- Remain within the guardrail system when provided. Leaning over or stepping across a guardrail system is not permitted. Do not stand on objects (boxes, buckets, bricks, blocks, etc.) or ladders to increase working height on top of platforms protected by guardrails.
- Only one person shall be simultaneously attached to a vertical lifeline and shall also be attached to a separate independent lifeline.

9.14 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.
- Maintain a first aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.
- Conduct a 360-degree walk-around inspection of the vehicle prior to operation, with particular attention paid to tire inflation level.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.
- Car rentals must meet the following requirements:
 - Dual air bags
 - Antilock brakes
 - Be midsize or larger
- Familiarize yourself with rental vehicle features prior to operating the vehicle:
 - Vision Fields and Blind Spots
 - Vehicle Size
 - Mirror adjustments
 - Seat adjustments
 - Cruise control features, if offered
 - Pre-program radio stations and Global Positioning System (GPS), if equipped
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See Attachment 16 for Jacobs Vehicle Accident Guidelines.

9.15 Field Ergonomics and Manual Lifting

(Reference Jacobs HSE Handbook, *Manual Lifting*)

Some of the most common injuries during field work are the result of performing work in an awkward body position (poor ergonomics) or pushing the body beyond its natural limits. Workers who have to lift, stoop, kneel, twist, grip, stretch, reach overhead, or work in other awkward positions regularly are at risk of developing discomfort or even an injury. Additionally, back injuries are one of the leading causes of work disability and most back injuries are the result of improper lifting techniques or overexertion.

Contact the HSM to determine hazard control measures if your task involves:

- Repetitive motions;
- Lifting and carrying items over long distances (100 feet) or on uneven, steep, or sloped terrain;
- Heavy lifting;
- Use of vibrating tools or equipment; or
- Being in a static position for extended periods of time;

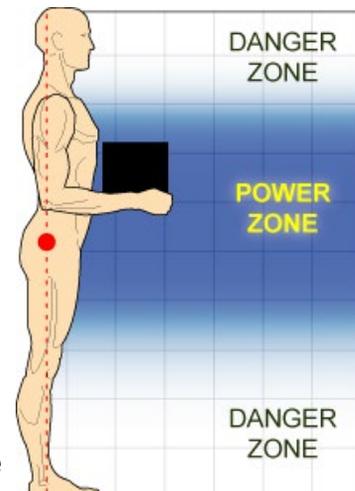
There are a variety of ergonomically designed tools and work practices that can reduce the potential for discomfort and injury. Following are requirements (“must” or “shall”) and recommendations (“should”) to aid in the prevention of discomfort or injuries while working in the field.

9.15.1 Fitness for Duty

If manual lifting and repetitive activities are not part of your normal work duties, contact your PM and/or HSM to help determine if you have the physical capability to perform the work. In many cases adding lifting or repetitive tasks to a subcontractor’s scope of work is desirable to prevent injury. If the work task causes any pain or discomfort stop and get assistance.

9.15.2 Manual Lifting

- All Jacobs workers must have training in proper manual lifting either through New Employee Orientation or through the Manual Lifting module located on the E3 Learning;
- When possible, the task should be modified to minimize manual lifting hazards or awkward body positions;
- Lifting occasional loads weighing more than 40 pounds (18 kilograms) should be evaluated by the SL using the Lifting Evaluation Form contained in SOP HSE-112;
- When performing repetitive lifting tasks with loads over 40 pounds, the Lifting Evaluation Form contained in SOP HSE-112 shall be used, and mechanical means used where possible;
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities;
- Using mechanical lifting devices such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys; is the preferred means of lifting heavy objects;
- Lift and Work in the Power Zone - The power zone for lifting or working is close to the body, between mid-thigh and mid-chest height. This zone is where arms and back can lift the most with the least amount of effort. This zone is sometimes referred to as the “strike zone”;



- Work near elbow height to avoid excessive bending (avoid working above the shoulders and below the knees);
- Plan before carrying:
 - Wear appropriate shoes to avoid slips, trips or falls
 - If you wear gloves, wear gloves that fit. Tight-fitting gloves can put pressure on the hands, while loose-fitting gloves reduce grip strength and pose other safety hazards.
 - Avoid carrying large or bulky loads that limit or obstruct your vision
 - Slide, push, or roll instead of carrying when appropriate
 - When there is a choice, push instead of pull
 - Carry only as much as you can safely handle
 - Try to avoid slopes, stairs, or other obstacles that make carrying materials more difficult
 - Beware of and try to avoid slippery floors (e.g., liquids, ice, oil, and fine powders)
 - Use extra caution when moving loads that may be unstable
- In general, the following steps must be practiced when planning and performing manual lifts:
 - Examine the load and the surrounding area
 - Bend knees when lifting a load
 - Look forward to keep back straight
 - Position the load close to the body
 - Maintain a firm grip on the load
 - Test the load for stability and weight prior to lifting
 - Use smooth, controlled movements
 - Keep arms in front of body
 - Turn feet in direction of movement to avoid twisting
- Avoid carrying objects more than 100 feet;

9.15.3 Ergonomic Work Practices

- Avoid repetitive motions, overhead reaching, and kneeling when possible;
- If prolonged awkward postures are unavoidable, use a “supported” posture to compensate; a supported posture uses part of your body to support the weight of another body segment that is in an awkward position;
- Watch your pace—attempting to do something faster can cause you to lose proper form;
- Use a table or move work to a location where you don’t have to be in a bent-over position to do your work; and
- Where awkward postures or repetitive motions are unavoidable, rotate with another worker, change tasks, stretch, and take short breaks frequently.

9.16 Fire Prevention

(Reference Jacobs HSE Handbook, *Hazardous Material Handling*)

Follow the fire prevention and control procedures listed below.

9.16.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters). Extinguishers must:
 - be maintained in a fully charged and operable condition;
 - be visually inspected each month; and
 - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.

9.16.2 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.
- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (22.7 liters) or less. Do not use plastic gas cans.
- For quantities of 1 gallon (4.5 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

9.16.3 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (113.7 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (113.7 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (272.8 liters) of flammable or 120 gallons (545.5 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

9.16.4 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [272.8 liters] each) shall not exceed 1,100 gallons (5000 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

9.16.5 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) (shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage or other means shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

9.17 Forklift Operations

(Reference Jacobs, HSE Handbook, *Forklifts*)

Below are the hazard controls and safe work practices to follow when working around or operating forklifts. Ensure the requirements in the referenced SOP are followed.

- A rated lifting capacity must be posted in a location readily visible to the operator.
- A forklift truck must not be used to elevate employees unless a platform with guardrails, a back guard, and a kill switch is provided on the vehicle. When guardrails are not possible, fall arrest protection is required.
- The subcontractor operating the forklift must post and enforce a set of operating rules for forklift trucks.
- Only certified forklift operators shall operate forklifts.
- Stunt driving and horseplay are prohibited.
- Employees must not ride on the forks.
- Employees must never be permitted under the forks (unless forks are blocked).
- The driver must inspect the forklift once a shift and document this inspection.
- The operator must look in the direction of travel and must not move the vehicle until all persons are clear of the vehicle.
- Forks must be carried as low as possible.
- The operator must lower the forks, shut off the engine, and set the brakes (or block the wheels) before leaving the forklift operator's position unless maintenance or safety inspections require the forklift to be running.
- Trucks must be blocked and have brakes set when forklifts are driven onto their beds.
- Extreme care must be taken when tilting elevated loads.
- Every forklift must have operable brakes capable of safely stopping it when fully loaded.
- Forklifts must have parking brakes and an operable horn.
- When the operator is exposed to possible falling objects, industrial trucks must be equipped with overhead protection (canopy).

- If using certified Jacobs forklift operators—forklifts must be inspected and documented daily using the forklift inspection form.

9.18 Groundwater Sampling/Water Level Measurements

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are performing groundwater sampling and/or water level measurements.

- Wear the appropriate PPE when sampling, including safety glasses, nitrile gloves, and steel toe boots (see PPE section of this PHSEP).
- Monitor headspace of wells prior to sampling to minimize any vapor inhalation (refer to the “Site Monitoring” section of this PHSEP).
- Use caution when opening well lids. Wellheads may contain poisonous spiders and hornet or wasp nests.
- Use the appropriate lifting procedures (see Jacobs SOP HSE-112) when unloading equipment and sampling at each well.
- Avoid sharp edges on well casings.
- If dermal contact occurs with groundwater or the acid used in sample preservation, immediately wash all affected skin thoroughly with soap and water.
- Avoid eating and drinking on site and during sampling.
- Use ear plugs during sampling if sampling involves a generator.
- Containerize all purge water and transport to the appropriate storage area.
- Full coolers are heavy. Plan in advance to have two people available at the end of the sampling effort to load full coolers into vehicles. If two people won't be available use several smaller coolers instead of fewer large ones, or use a dolly to move coolers. If the coolers weigh more than 40 pounds, Attachment 1 of the HSE-112, *Manual Lifting*, shall be completed by the SL. If the coolers weigh more than 50 pounds they should never be lifted by one person.

9.19 Hand and Power Tools

(Reference Jacobs, HSE Handbook, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are followed.

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand and power tools in a safe condition.
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool.
- Do not carry or lower a power tool by its cord or hose.
- Portable power tools will be plugged into GFCI protected outlets; and
- Portable power tools will be Underwriters Laboratories (UL) listed and have a three-wire grounded plug or be double insulated.

- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

9.19.1 Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

9.20 Hexavalent Chromium (Cr VI) Exposure

(Reference the Jacobs HSE Handbook, *Hexavalent Chromium - Chromium VI*)

The OSHA permissible exposure limit (PEL) and ACGIH Threshold Limit Value (TLV) for Chromium VI is 5 $\mu\text{g}/\text{m}^3$ (insoluble) and 1 $\mu\text{g}/\text{m}^3$ (soluble) with an action level (AL) of 2.5 $\mu\text{g}/\text{m}^3$ for insoluble and 0.5 $\mu\text{g}/\text{m}^3$ for soluble. Hexavalent Chromium is considered a Human Carcinogen.

The precautions listed below shall be followed when exposed to Cr VI:

- Exposure assessments must be performed for workers who may be exposed to Cr VI above the AL.
- Avoid exposure by inhalation, skin and eye contact with fume, liquid and/or particulate Cr VI.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.
- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.

9.21 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job;
- An approved HIRA or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training); and
- Knife users have been trained and follow the HIRA.

9.22 Lead

(Reference Jacobs SOP HSE Handbook, *Lead*)

Jacobs is required to control employee exposure to lead when exposures are at or above 30 µg/m³ by implementing a program that meets the requirements of the OSHA Lead standard, 29 CFR 1910.1025 and 29 CFR 1926.62. The elements of the Jacobs lead program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment PPE and respirators;
- Medical surveillance;
- Training on hazards of lead and control measures (includes project-specific training and the computer-based training on Jacobs' HSE Handbook, *Lead Exposure Training*); and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the HSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this PHSEP.

9.23 Lock Out Tag Out

Lockout/tagout (LO/TO) shall be performed whenever service or maintenance is necessary on equipment that could cause injury to personnel from the unexpected equipment energizing or start-up or unexpected release of stored energy. Energy sources requiring lockout/tagout may include electrical, pneumatic, kinetic, and potential.

If work on energized electrical systems is necessary—contact the HSM. Specific training and procedures are required to be followed before any work on energized electrical systems can be performed and are NOT covered in this section. Energized electrical work is defined as work performed **on or near** energized electrical systems or equipment with exposed components operating at 50 volts or greater. Working near energized live parts is any activity inside a Limited Approach Boundary (anywhere from 3.5 feet to 24 feet [1 meter to 7.3 meters] depending on voltage). Examples of energized electrical work include using a voltmeter to troubleshoot electrical systems and changing out controllers.

Project Health, Safety and Environment Plan

When lockout/tagout is necessary to perform maintenance/repair of a system, all the requirements of the Jacobs Lockout and Tagout procedure, shall be met including the following bulleted items:

- When FES controls the work, FES must verify that subcontractors affected by the unexpected operation of equipment develop a written lockout/tagout program, provide training on lockout/tagout procedures and coordinate its program with other affected subcontractors. This may include compliance with the owner or facility lockout/tagout program.
- When FES personnel are affected by the unexpected operation of equipment they must complete the electrical safety awareness module in E3. Authorized personnel shall inform the affected personnel of the LO/TO. Affected personnel shall not tamper with LO/TO devices.
- Standard lockout/tagout procedures include the following six steps: 1) notify all personnel in the affected area of the lockout/tagout, 2) shut down the equipment using normal operating controls, 3) isolate all energy sources, 4) apply individual lock and tag to each energy isolating device, 5) relieve or restrain all potentially hazardous stored or residual energy, and 6) verify that isolation and deenergization of the equipment has been accomplished. Once verified that the equipment is at the zero energy state, work may begin.
- All safe guards must be put back in place, all affected personnel notified that lockout has been removed and controls positioned in the safe mode prior to lockout removal. Only the individual who applied the lock and tag may remove them.
- FES authorized employees shall complete the LO/TO training module and the electrical safety training module in E3. The authorized employee must also be trained and qualified on the system they are working on (e.g., qualified electrician for working on electrical components of a system).
- When equipment-specific LO/TO procedures are not available or when existing procedures are determined to be insufficient, FES authorized employees shall also complete the Equipment-Specific LO/TO Procedure Development Form to create an equipment-specific lockout/tagout procedure. Each lockout/tagout event shall be recorded on the Logout/Tagout Log to manage work and identify every point where locks and tags are applied. The Procedure is attached to the PHSEP.

9.24 Manual Lifting

(Reference Jacobs HSE Handbook, *Manual Lifting*)

Back injuries are the leading cause of disabling work and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards;
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SL using the Lifting Evaluation Form contained in SOP HSE-112;
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys;
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities;
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices; and
- All Jacobs workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the E3 Learning.

9.25 Munitions and Explosives of Concern and Material Potentially Presenting an Explosive Hazard

(Reference Jacobs HSE Handbook, Explosives Usage and Munitions Response)

Munitions and explosives of concern (MEC)/ material potentially presenting an explosive hazard (MPPEH) are not anticipated at the project site. However, as a cautionary measure, all site personnel will have completed the 3R (Recognize, Retreat, Report) awareness training before performing work onsite. If suspect MEC or MPPEH are encountered, work will stop and 3R requirement will be followed. The primary hazard associated with exposure to an MEC/MPPEH item is the possibility of severe injury or fatality, resulting from an unplanned detonation or ignition of an item if it is intentionally handled, unintentionally disturbed, or when detonated and ignited from stray electromagnetic sources.

Although there is a low probability of finding MEC/MPPEH, the following minimum procedures shall be executed if found:

Immediately Stop Work (RECOGNIZE).

RECOGNIZE: Do not disturb or move the item, as MEC/MPPEH can become very unstable over time. They can detonate with movement or sometimes as a result of ground vibration or a stray electromagnetic source. MEC/MPPEH can be present in all shapes, sizes or colors, or as items not normally considered a hazard (for example, flares or soil with propellant). It must also be recognized that exposure to weather and time can alter or remove identification markings.

Secure area/location where the MEC/MPPEH item is discovered (RETREAT).

RETREAT: Stop and secure any operating equipment to the extent possible. Mark the general area/location of the MEC/MPPEH hazard with tape, colored cloth, or colored ribbon. If available, attach the marker to a branch, structure, or other existing object so that it is about 3 feet (0.9 meter) off the ground and visible from all approaches. Place the marker no closer than the point where you first recognized the MEC/MPPEH hazard and DO NOT drive stakes into the ground or otherwise disturb the surface. Leave by the same route you entered the area if possible. Clear site of all workers and secure from unauthorized entry.

Do not transmit any radio/cellular phone frequencies unless maximum fragmentation distances separation distances are established for the suspected type of MEC/MPPEH discovered. Signals transmitted from items such as cell phones, short-wave radios, single side-band radios, or other communications and navigation devices may detonate the MEC/MPPEH item.

Immediately notify the Project Manager (REPORT).

REPORT: Once the area has been evacuated, appropriate notifications shall be made immediately. The MR Manager will be notified. Provide as much information as possible, including location and approximate size, shape, color, and any other distinguishing features such as nomenclature, wiring, or fins.

The Field Team Lead immediately notifies the chain-of-command personnel who need to make proper notification of the situation to the proper authorities, so that the appropriate response can be coordinated to mitigate hazards from the encountered item.

Secure the site so that unauthorized personnel cannot have access to the area where the potential MEC/MPPEH item was encountered.

Operations will not resume until authorization is received to safely continue the assigned work.

9.26 Methylene Chloride

(Reference Jacobs HSE Handbook, *Methylene Chloride*)

Methylene chloride has a faint, sweet odor which is not noticeable at dangerous concentrations. Methylene chloride is shipped as liquefied compressed gas and will cause frostbite on contact.

Jacobs is required to control employee workplace exposure to methylene chloride when personal exposures are at or above 12.5 parts per million (ppm) as an 8-hour time-weighted average (TWA) or above 125 ppm short-term exposure limit (STEL) by implementing a program that meets the requirements of the OSHA Methylene Chloride standard, *29 Code of Federal Regulations (CFR) 1910.1052*. The elements of the Jacobs methylene chloride program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment (PPE) and respirators;
- Medical surveillance;
- Training on hazards of methylene chloride and control measures (includes project-specific training and the computer-based training on Jacobs' HSE Handbook, *Methylene Chloride*) and;
- Recordkeeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the HSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person;
- Appropriate **air-supplied respirators** must be used when methylene chloride exposures exceed PEL or STEL;
- Air supplied to respirators must meet Grade D breathing air requirements; and
- Review the fact sheet included as an attachment to this PHSEP.

9.27 Night Work

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness requires enough illumination intensity to read a newspaper without difficulty.
- Vehicles should be equipped with amber flashing strobe lights compliant with state requirements.
- Personnel to wear on the outside of other garments, a reflective vest, at all times, when working outside the vehicle at night.

- Personnel to remain extra vigilant of equipment traffic and never cross in front of any moving equipment. Establish eye contact with operator and proceed when operator signals that they have stopped the equipment while you cross.
- Keep emergency lighting such as flashlights available in vehicle. Spare batteries should also be kept in reserve.
- Only proceed through dimly lit corridors or areas when using a flashlight to illuminate the surrounding ground.
- Wearing of personal flasher recommended when conducting night work around excavation equipment.

9.28 Pressure Washing Operations

Below are the hazard controls and safe work practices to follow when working around or performing pressure washing.

- Only trained, authorized personnel may operate the high-pressure washer.
- Follow manufacturer's safety and operating instructions.
- Inspect pressure washer before use and confirm deadman trigger is fully operational.
- The wand must always be pointed at the work area.
- The trigger should never be tied down.
- Never point the wand at yourself or another worker.
- The wand must be at least 42 inches (1.1 meter) from the trigger to the tip and utilize greater than 10 degree tips.
- The operator must maintain good footing.
- Non-operators must remain a safe distance from the operator.
- No unauthorized attachment may be made to the unit.
- Do not modify the wand.
- All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- Polycoated Tyvek or equivalent, 16-inch-high steel-toed rubber boots, safety glasses, hard hat with face shield, and inner and outer nitrile gloves will be worn, at a minimum.

9.29 Stairways and Ladders

(Reference Jacobs HSE Handbook, *Stairways and Ladders*)

Below are the hazard controls and safe work practices to follow when using stairways and ladders. Ensure the requirements in the referenced SOP are followed.

- Stairway or ladder is generally required when a break in elevation of 19 inches (48.3 cm) or greater exists.
- Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra precautions.
- Personnel must not use pan and skeleton metal stairs until permanent or temporary treads and landings are provided the full width and depth of each step and landing.
- Ladders must be inspected by a competent person for visible defects prior to each day's use. Defective ladders must be tagged and removed from service.
- Ladders must be used only for the purpose for which they were designed and shall not be loaded beyond their rated capacity.
- Only one person at a time shall climb on or work from an individual ladder.

- User must face the ladder when climbing; keep belt buckle between side rails.
- Ladders shall not be moved, shifted, or extended while in use.
- User must use both hands to climb; use rope to raise and lower equipment and materials.
- Straight and extension ladders must be tied off to prevent displacement.
- Ladders that may be displaced by work activities or traffic must be secured or barricaded.
- Portable ladders must extend at least 3 feet (91.5 cm) above landing surface.
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder.
- Stepladders are to be used in the fully opened and locked position.
- Users are not to stand on the top two steps of a stepladder; nor are users to sit on top or straddle a stepladder.
- Fixed ladders \geq 24 feet (7.3 meters) in height must be provided with fall protection devices.
- Fall protection should be considered when working from extension, straight, or fixed ladders greater than six feet (1.8 meters) from lower levels and both hands are needed to perform the work, or when reaching or working outside of the plane of ladder side rails.

9.30 Traffic Control

(Reference Jacobs HSE Handbook, *Traffic Control*)

For this Boeing SSFL site, the WATCH manual (APWA 2012 version) on traffic control will be implemented. The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by a subcontractor. Ensure the requirements in the referenced SOP are followed.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route (e.g., behind an established barrier, parked vehicle, guardrail, etc.).
- Always pay attention to moving traffic – never assume drivers are looking out for you.
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a “buddy system” should be used, where one worker is looking towards traffic.
- When working on highway projects, obtain a copy of the contractor’s traffic control plan.

- Work area should be protected by a physical barrier – such as a K-rail or Jersey barrier.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.
- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet (12.2 meters) of traffic should have an orange flashing hazard light atop the vehicle.
- Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers.
- Vehicles should be parked at least 40 feet (12.2 meters) away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.
- Traffic control training module on the E3 Learning shall be completed when Jacobs workers who work in and around roadways and who exposed to public vehicular traffic.

9.31 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact subsurface utilities or similar obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand augering, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include:

1. An assessment of known utilities;
2. An assessment by a utility locating service; and
3. A visual survey of the area to validate the chosen location.

When any of these steps identifies a utility within 5 feet (1.5 meters) of intrusive work then, non-aggressive means must be used to identify the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified utility.

Known Utility Assessment/As-Built Drawing Review

Identify any client- or location-specific permit and/or procedural requirements (e.g., dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility. At SSFL, contact Plant Services to obtain utility diagrams and/or other site knowledge.

Project Health, Safety and Environment Plan

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

Utility Locating Service

Use a qualified utility locating service and obtain clearances in writing and signed by the party conducting the clearance.

Jacobs or our subcontractor performing the intrusive work must always arrange for a utility locate service. This is in addition to any utility marking arranged or performed by another party, such as the owner or a military base utility locating service.

Always contact your local utility locating service (e.g., Dig-Safe, Blue Stake, One Call) (Local Service) to identify and mark the location of utilities. Call 811 in the US or go to www.call811.com to identify the appropriate local service group. The use of the Local Service is a legal requirement.

Contact an independent service if the Local Service is restricted from the work location or otherwise cannot locate all utilities at the work location. The use of the Local Service is still required.

A Jacobs or subcontractor representative must be present during the utility locate to ensure that the work area and the underground utilities are properly identified and marked.

- The Local Service or independent utility locate service personnel shall determine the most appropriate technique or combinations of techniques to identify the buried utilities on the project, based on their experience and expertise, types of utilities anticipated to be present, and specific site conditions.
- The markings from utility locates must be protected and preserved until the markings are no longer required. If the utility location markings are destroyed or removed before intrusive work commences or is completed, the PM, SL, or designee must notify the utility company or utility protection service to remark the area.

Visual Assessment before and during Intrusive Activities

Perform a "360 degree" assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area. If any anticipated items are found, conduct further research before initiating intrusive activities.

The visual survey shall include all surface landmarks, including manholes, previous liner cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility (or when there is uncertainty about utility locations), locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, (preferably using wood or fiberglass-handled tools), or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the

utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

Subsurface Activities within 3 feet of an Underground Utility

Use non-aggressive methods, (hand digging, vacuum excavation etc.) to perform intrusive activities within 3 feet of a high risk utility (e.g., a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

Spotter

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered, stop work immediately, and contact the PM or HSM. The spotter must have a method to alert an operator to stop the intrusive activity (e.g., air horn, hand signals).

Complete the Underground Utility Verification form to ensure utility locate requirements are completed and request variances from the PM and HSM (e.g., site maps unavailable or independent utility locate not completed).

9.32 Utilities (overhead)

Proximity to Power Lines

No work is to be conducted within 50 feet (15.2 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15.2 meters) of overhead power lines without first making this determination.

Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:

- Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the table.

Minimum Distances from Powerlines

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
0-50	20
51-100	20
101-200	20
201-300	20 (6.1)
301-500	25 (7.6)

Minimum Distances from Powerlines

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
501-750	35 (10.7)
751-1000	45 (13.7)

(These distances have been determined to eliminate the potential for arcing based on the line voltage.)

- The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative’s signature.
- All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

9.33 Vacuum Trucks

When Jacobs personnel are exposed to vacuum truck operations, the following safe work practices/hazard controls shall be implemented.

- A pre-operational check should be performed on the vacuum truck before use. Operators must be familiar with the operator’s manual.
- Operators of vacuum trucks should be trained and familiar with the equipment. At least one person should be operating the boom and one person signaling and assisting the boom operator.
- Before use the hoses and lines should be checked for fraying and connections checked for leakage. Proper selection of hose diameter and type of hose (smooth bore hose vs. corrugated hose) is vital before the job is performed.
- The amount of force produced by a vacuum truck can kill hose operators. If an eight-inch hose gets stuck to your body at 27 inches Hg, it can be fatal. All trucks should be equipped with an emergency release the hose operator or assistant can initiate if a worker gets sucked into a hose. A remote release, manual release near the truck and an inline “T” should be present on the truck. The inline “T” should be installed between the very last section of hose and the working section of hose. The cord that releases the in-line relief should be tethered to the hose handler’s belt or a watch buddy should be nearby holding the cord and ready to relieve in the event of an emergency. Operators should never attempt to vacuum hose with any part of their body to check for suction.
- Tanks on vacuum trucks are a confined space. Before the tank is opened and anyone enters a confined space assessment should be performed.
- The truck should always be grounded before use. The static electricity produced when sucking materials into the system can produce a spark and ignite anything in the tank or hose. Use of a grounding wire will prevent static electric explosions. Vacuum trucks should not be used to pump mixtures with a flash point less than 140 degrees or less – this is an accepted industry standard – refer to the operators manual for more information.
- When positioning truck to work, be extra cautious of personnel and other equipment located next to truck.
- Wet and dry material should not be mixed in the tank.
- When swinging the boom, change directions slowly.

- Do not load dump body beyond rated capacity. Be aware of possible load surge when turning or braking.

9.34 Vinyl Chloride

(Reference Jacobs, HSE Handbook, *Vinyl Chloride*)

Vinyl Chloride is considered a "Confirmed Human Carcinogen." Vinyl Chloride has a mild, sweet, chloroform-like odor.

Jacobs is required to control employee workplace exposure to vinyl chloride when personal exposures are at or above 1.0 ppm as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the Occupational Safety and Health Administration (OSHA) Vinyl Chloride standard, 29 CFR 1910.1017. The elements of the Jacobs vinyl chloride program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of vinyl chloride and control measures (includes project-specific training and the computer-based training on Jacobs' E3 Learning, *Vinyl Chloride*)
- Record keeping requirements

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the HSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.
- Review the fact sheet included as an attachment to this PHSEP.

9.35 Visible Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (e.g., work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed.

- While work is in progress outside construction areas shall have at least 33 lux (lx).
- Construction work conducted inside buildings should be provided with at least 55 lx light.
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb will not leave any area in total darkness.

9.36 Working Alone

(Reference Jacobs HSE Handbook, *Working Alone*)

Personnel can only be tasked to work alone by the Project Manager who shall assess potential hazards and appropriate control measures, with assistance from the Responsible Health and Safety Manager (HSM).

“Lone workers” with an accountability system in place is permitted, depending on the hazards presented during the execution of the task. Reference the “Lone Worker Protocol” included as an attachment to this PHSEP.

The employee shall at all times be equipped with a working voice communication device such as a cellular phone and two-way radio to check-in to their project contact (s) at pre-determined times.

Call in contact name:	• Elizabeth Bryant
Phone numbers:	• 714-697-9028 (cell)

Check-in or contact times must be based on the risk associated with the task, or the timeframe expected to complete the task, but at a minimum of at least four times during an 8 hour work shift. Check-in during high heat conditions must be hourly.

The Call in contact Form shall be completed by lone worker and given to call in contact prior to going into the field. Refer to the “Lone Worker Protocol” attached to this PHSEP.

Work tasks will cease if communication is lost during work day. Work may resume when communication is re-established.

Subcontractors must use an equivalent lone worker protocol.

9.37 Utility Type Vehicles

(Reference Jacobs HSE Handbook, *Vehicle Safety*)

Utility-type vehicle (UTV) means any recreational motor vehicle other than an All-Terrain Vehicle (ATV) or four-wheeler, motorbike, or snowmobile designed for and capable of travel over designated roads, traveling on four (4) or more tires.

Motorcycles, motorbikes, or other motorized devices with two or three wheels, ATVs or quads are not allowed to be used for company related business.

Four-wheeled, cabbed vehicles and vehicles with rollover protection structures (ROPS), with seatbelts for all passengers such, as Yamaha Mules and Polaris Rangers (and similarly designed vehicles including golf carts) are allowed for use.

Doors (plastic, metal or net) supplied by the manufacturer at the time of purchase must be utilized.

Operators shall have the proper safety training and must follow all facility, and client rules for safe operation of the vehicle.

UTVs shall not be operated on site unless determined to be the most appropriate vehicle(s) to use and their use is pre-approved by the PM and HSM.

Operators shall be trained and qualified before operation of the UTV onsite and will possess a valid driver's license.

UTV operators are prohibited from using any wireless device while operating UTVs. Equipment must be stopped before using devices such as two way radios or cell phones. If a wireless device is required for a certain operation, the PM and HSM must authorize the wireless use on a case by case basis and make sure limitations are addressed in the project safety plan.

Training shall consist of manufacturer's operating manual, hands-on training by a competent person, a demonstration of basic skills, and completion of an UTV safety course. An HIIRA shall also be developed for the use of UTVs and operators shall be trained on the HIIRA. All individuals are required meet all training aspects before UTV use and documentation of training shall be maintained at the site.

Some states and provinces may require an UTV license or a motorcycle endorsement on the operator's current driver's license.

Daily inspections of vehicles for safety and maintenance are required.

Minimum PPE required for operators and passengers on UTVs include:

- Safety glasses, goggles, or face-shield at all times when moving;
- Leather boots or shoes (if safety-toed boots are not required by the project safety plan).

Other safety requirements include:

- UTVs shall be operated in accordance with the manufacturer's operating manual, any state, or client requirements, and task-specific HIIRA;
- Speed is not to exceed 32 km/hr. (20 mph). Keep all parts of your body inside any roll over protection;
- Always use the seat belt on UTVs;
- Make sure the engine is turned off before dismounting the vehicle;
- Avoid driving over any extremely large obstacles (i.e., wood/logs, fences, boulders, etc.);
- When using trailers, watch your turning radius;
- Shut engine down prior to refueling;
- UTVs must have fenders;
- Utilize high visibility flag and wear high visibility vest when operating adjacent to heavy equipment or haul vehicles.

9.38 Trichloroethylene (TCE)

TCE is a colorless, heavy liquid with a chloroform-like odor. It is stable, has a low boiling point, is miscible with common organic solvents and is slightly soluble in water. TCE encountered in site work would be present at low concentrations in soil and/or in an aqueous solution and is unlikely to have a discernible odor, but would be detectable by a PID at detectable levels. TCE is a moderate fire risk, is toxic by inhalation and moderately toxic by ingestion or skin absorption.

The Cal-OSHA PEL for TCE is 25 ppm as an 8-hour time weighted average (TWA); an acceptable ceiling concentration of 300 ppm; and a STEL of 100 ppm. The standard routes of entry in the body are through inhalation, percutaneous absorption, ingestion, skin and eye contact. The points of attack are the respiratory system, heart, liver, kidneys, central nervous system and skin.

9.39 1,1,1-Trichloroethane

Inhalation of 1,1,1-TCA vapors will irritate the respiratory tract. 1,1,1-TCA affects the central nervous system. Symptoms include headache, dizziness, weakness, and nausea. Higher levels of exposure (> 5000 PPM) can cause irregular heartbeat, kidney and liver damage, fall in blood pressure, unconsciousness and even death. Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis, which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems. 1,1,1-TCA causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin. Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, and swelling. Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. The OSHA PEL for 1,1,1-TCA is 350 PPM for an 8-hour TWA.

9.40 BTEX

BTEX refers to benzene, toluene, ethyl benzene, and xylene, which are common components of gasoline and are frequently present in aqueous solutions as a result of fuel spills. Benzene is a colorless to light yellow, strongly aromatic liquid, which is highly flammable and highly toxic by ingestion, inhalation and skin absorption. Benzene can be detected at very low concentrations by odor. Toluene and ethyl benzene are colorless liquids with a strong odor, similar to benzene. Both are also highly flammable and moderately toxic by ingestion, inhalation or skin absorption. Xylene is a clear, aromatic liquid, soluble in alcohol and ether, but insoluble in water, making it unlikely to be present in groundwater at the site. It is highly flammable and moderately toxic by ingestion, inhalation or skin absorption. Cal-OSHA has set permissible exposure limits for all of these contaminants that may be found at this worksite during your work activity. The levels that are set are based on an 8-hour TWA.

Below are those values:

- Benzene 1 ppm / 8-hr TWA
- Toluene 50 ppm / 8-hr TWA
- Ethyl Benzene 100 ppm / 8-hr TWA
- Xylene 100 ppm / 8-hr TWA

9.41 Chromium

Chromium (Soluble) is a bright, yellowish-red crystalline solid. It is used as an oxidizing agent, an analytical reagent, and in electroplating, explosives, dyeing, and printing. All forms of chromium can be toxic at high levels, but chromium (VI) is more toxic than others. Breathing very high levels of chromium (VI) in air can damage and irritate your nose, lungs, stomach, and intestines. People who are allergic to chromium may also have asthma attacks after breathing high levels of either chromium (VI) or (III). Long term exposures to high or moderate levels of chromium (VI) cause damage to the nose (bleeding, itching, sores) and lungs, and can increase your risk of non-cancer lung diseases. Ingesting very large amounts of chromium can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death. It is not known whether chromium harms the fetus or our ability to reproduce. Skin contact with liquids or solids containing chromium (VI) may lead to skin ulcers. Some people have allergic reactions including severe redness and swelling.

9.42 Cyanides

Cal-OSHA and (other recommendations) the American Conference of Governmental Industrial Hygienists (ACGIH) have set a permissible exposure limit (PEL) of 5 milligrams of cyanide per cubic meter of air (5 mg/m³) in the workplace during an 8-hour workday, 40-hour work week.

In large amounts, cyanide is very harmful to human health. Exposure to high levels of cyanide in the air for a short time harms the brain and heart, and may cause coma and death. Exposure to lower levels of cyanide for a long time may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland.

9.43 Dioxin

Dioxin is a general term that describes a group of hundreds of chemicals, of which the most toxic compound is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Generally, the toxicity of other dioxins is measured in relation to TCDD. Dioxin can be formed by burning chlorine-based chemical compounds with hydrocarbons. Dioxin is found in all media, including air, soil, sediment, and water. The highest levels are typically found in soil and sediment, while very low levels are typically found in water and air. Short term exposure to high levels of dioxin may result in skin lesions and patchy darkening of the skin, and altered liver function. Long-term exposure is linked to impairment of the immune system, the developing nervous system, the endocrine system, and reproductive functions. Based on human epidemiology data, dioxin is categorized as a "known human carcinogen"; however, TCDD does not affect genetic material and there is a level of exposure below which cancer risk would be negligible.

9.44 Mercury

The mercury vapor is highly toxic via this route, and causes severe respiratory tract damage. Symptoms of inhalation include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Mercury can be absorbed through ingestion with symptoms similar to inhalation. Symptoms of ingestion include burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, and bloody diarrhea. These initial symptoms may be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointestinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort. Mercury can cause irritation and burns to skin, including redness and pain. Skin contact with mercury may cause skin allergy and sensitization. Mercury can also be absorbed through the skin with symptoms to similar to ingestion. With eye contact, mercury causes irritation and burns to eyes, redness, pain, and blurred vision; it may cause serious and permanent eye damage.

Chronic exposure through any route can produce central nervous system damage, may cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Repeated skin contact can cause the skin to turn gray in color. Mercury is a suspected reproductive hazard, and may damage the developing fetus and decrease fertility in males and females. Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

9.45 Perchlorate

Perchlorate is a naturally occurring and man-made anion commonly associated with the solid salts of ammonium, potassium, and sodium perchlorate. These salts are highly soluble in water, and because perchlorate sorbs poorly to mineral surfaces and organic material, it can be relatively mobile in surface and subsurface aqueous systems. Perchlorate interferes with iodide uptake into the thyroid gland. Because iodide is an essential component of thyroid hormones, perchlorate disrupts how the thyroid functions. In adults, the thyroid helps to regulate the metabolism. In children, the thyroid plays a major role in proper development, in addition to metabolism. Impairment of thyroid function in pregnant mothers may impact the fetus and result in such effects as changes in behavior, delayed development and decreased learning capability. Perchlorate can enter the body by inhalation or ingestion of contaminated water or soil.

9.46 Formaldehyde

Formaldehyde has the following advisories:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Formaldehyde is considered a "Suspected Human Carcinogen."
- A Short Term Exposure Limit (STEL: 15 minutes) exists for this material.
- Formaldehyde has a pungent, suffocating odor.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.

9.47 Pentachlorophenol (PCP)

PCP is a non-flammable solid with benzene like odor, which does not evaporate easily. PCP may be absorbed into the body by inhalation, ingestion, or through the skin. Short-term exposure can lead to poisoning that is fatal. Absorption through the skin can cause sweating, high fever, breathing trouble, chest and abdomen pain, and death. Brief exposure can damage the liver, kidney, skin, blood, lungs, nervous system, and gastro-intestinal tract. Direct contact can irritate the eyes, nose, and throat. Long-term exposure may cause mutations in living cells and may damage a developing fetus. Repeated exposure may damage the liver, kidneys, blood, and nervous system; it can also cause bronchitis and skin rash. The Cal OSHA PEL for PCP is 0.5 mg/m³ as an 8-hour TWA, and the IDLH is 2.5 mg/m³.

9.48 Ionizing Radiation

The issues regarding ionizing radiation are covered in the Radiation Protection Plan in Attachment 11.

10. HSE Handbook Physical Hazards and Controls

10.1 Noise

(Reference Jacobs HSE Handbook, *Hearing Conservation*)

Jacobs is required to control employee exposure to occupational noise levels of 85 decibels, A-weighted, (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the HSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 84 dBA or a noise dose of 50% must participate in the Hearing Conservation program including initial and annual (as required) audiograms.
- The HSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on Jacobs' E3 Learning.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner.

10.2 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion" style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

10.3 Temperature Extremes

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress;
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections); and
- Communicating any concerns regarding heat and cold stress to their supervisor or SL.

10.3.1 Heat

California has a specific heat illness prevention regulation that must be implemented. This includes,

- Having enough water onsite so that each worker can consume at a minimum, **one quart per hour per shift**.

- Frequent reminders and/or water breaks shall be taken so that each person can consume enough water.
- Access to shade (i.e., blockage from direct sunlight) shall be provided at all times and shall be reasonably close to the work area. Keep in mind that a vehicle or other enclosed area with no air conditioning is NOT considered shade (must be a well ventilated area or have air conditioning).
- Workers suffering from heat illness-related symptoms OR if needed for preventative recovery shall be provided access to shade for at least 5 minutes, or longer, for recovery (if heat related symptoms are occurring, contact the HSM).
- Training on risk factors, signs and symptoms of heat illness, importance of hydration and acclimatization, and importance of reporting symptoms and what to do in case of heat illness emergency, and contacting emergency medical services (see sections that follow).

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retrained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is the degree to which a worker's body has physiologically adjusted or acclimatized to working under hot conditions. Acclimatization affects their ability to do work. Acclimatized individuals sweat sooner and more profusely than un-acclimatized individuals. Acclimatization occurs gradually over 1 to 2 weeks of continuous exposure, but it can be lost in as little as 3 days in a cooler environment.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

10.3.1.1 Determination of the Initial Work/Rest Cycles

Measure the air temperature with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual). Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow. 100 percent sunshine – no cloud cover = 1.0; 50 percent sunshine – 50 percent cloud cover = 0.5; 0 percent sunshine – full cloud cover = 0.0.

Plug these variables into the following equation to determine the adjusted temperature:

$$T \text{ (adjusted)} = T \text{ (actual)} + (13 \times \text{fraction sunshine})$$

Use the chart below to determine the length of the first work shift. At the first break, initiate the heart rate monitoring as described in the next section.

Initial Work/Monitoring Cycles		
Adjusted Temperature	Normal Work Clothes	Protective Clothing
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

10.3.1.2 Heart Rate Monitoring

The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

Symptoms and Treatment of Heat Stress					
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool-but not cold-water. Call ambulance, and get medical attention immediately!

10.3.1.3 Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°Fahrenheit (10 degrees Celsius [C]) to 60°Fahrenheit (F) (15.6 degrees C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (do not begin with extremely demanding activities).

- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

10.3.1.4 Thermal Stress Monitoring

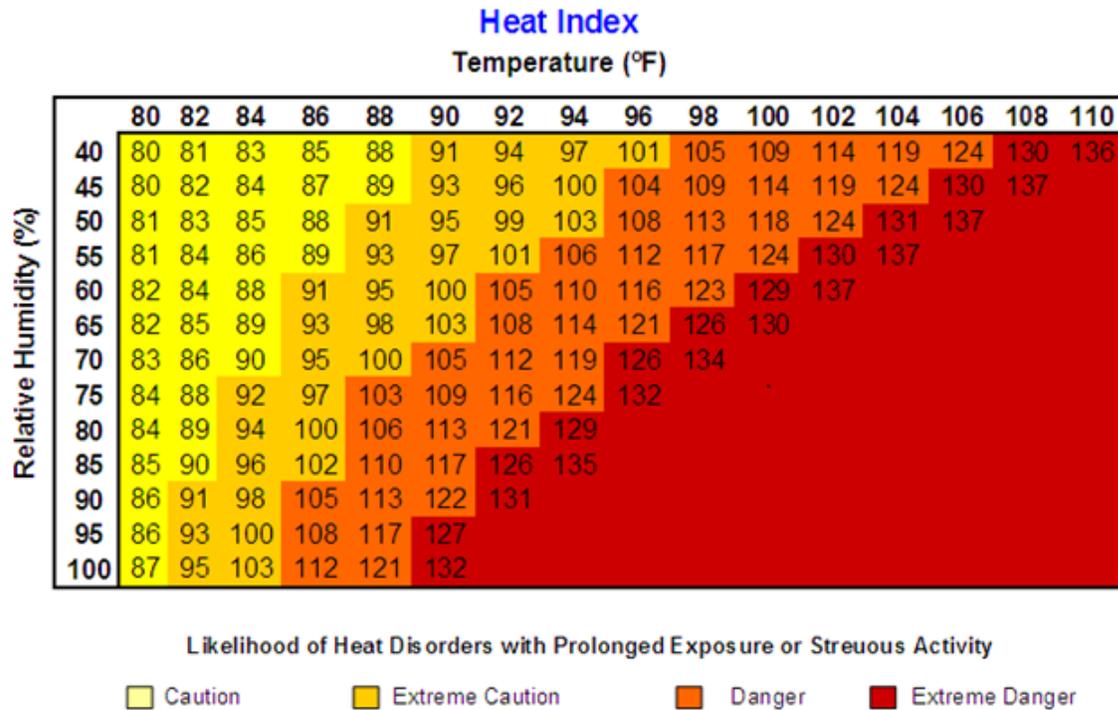
The following procedures should be implemented when the ambient air temperature exceeds 70° F (21 degrees C), the relative humidity is high (greater than 50 percent), or when the workers exhibit symptoms of heat stress.

- The heart rate should be measured by the radial pulse for 30 seconds, as early as possible in the resting period.
- The heart rate at the beginning of the rest period should not exceed 110 beats per minute, or 20 beats per minute above resting pulse.
- If the heart rate is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 110 beats per minute, or 20 beats per minute above resting pulse.
- Alternately, the oral temperature can be measured before the workers have something to drink.
- If the oral temperature exceeds 99.6 degrees F (37.6 degrees C) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral temperature is maintained below 99.6 degrees F (37.6 degrees C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field.

10.3.1.5 Thermal Stress Monitoring – Permeable or Impermeable Clothing

- When **permeable work clothes** are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80° F (27° C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8°C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.
- When wearing **impermeable clothing** (e.g., clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below shall be conducted when the ambient

temperature reaches 70°F (21°C) or sooner when climatic conditions may present greater risk of heat stress combined with wearing unique variations of impermeable clothing, or workers exhibit symptoms of heat stress



10.3.1.6 Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the HSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a Jacobs worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this PHSEP.
- Follow the Incident Notification, Reporting, and Investigation section of this PHSEP.

10.3.2 Cold

10.3.2.1 General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

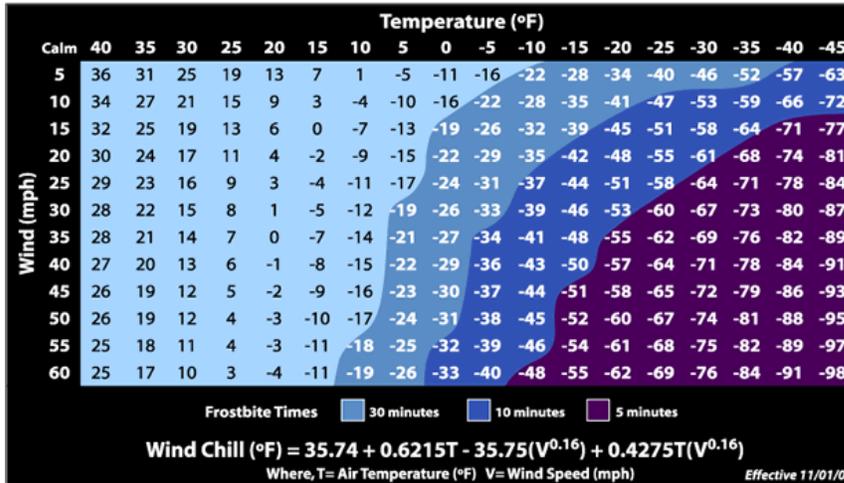
Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

10.3.2.2 Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- The Wind-Chill Index (see chart below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

Symptoms and Treatment of Cold Stress			
	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but not hot—water. Have victim drink warm fluids, but not coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but not coffee or alcohol. Get medical attention.



10.4 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop—seek low areas) and ceasing intrusive work inside a building (i.e., direct-push technology), staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area;
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae and towers;
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding;
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward, and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous because the wet earth can conduct electricity. Do not touch the ground with your hands;
- Do not use telephones during electrical storms, except in the case of emergency;

Remember that lightning may strike several miles from the parent cloud, so work should be stopped/restarted accordingly. **Seek refuge when thunder sounds and do not resume activity until 30 minutes after the last thunder clap.**

- High winds can cause unsafe conditions, and activities should be halted until the wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.
- Heavy rains and mudslides are possible. Refer to the wildland fire site recon HIRA for additional post fire mitigation measures.

Please refer to Attachment 14 for information about lightning safety.

10.5 Fire Prevention During Vegetation Mowing

Refer to Attachment 17 for information about fire prevention during vegetation mowing.

11. Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. If you encounter a biological hazard that has not been identified in this plan, contact the HSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take exposures, bites, or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact WorkCare (see emergency contacts).

11.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. If you are stung, contact the WorkCare (see emergency contacts). If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

For long term site setups, the use of environmentally friendly wasp traps has been approved. See the HSM for specific models.

11.2 Bird Droppings

Large amounts of bird droppings may present a disease risk. The best way to prevent exposure to fungus spores in bird droppings is to avoid disturbing it. A brief inhalation exposure to highly contaminated dust may be all that is needed to cause infection and subsequent development of fungal disease.

If disturbing the droppings or if removal is necessary to perform work, follow these controls:

- Use dust control measures (wetting with water or HEPA vacuuming) for all activities that may generate dust from the accumulated droppings.
- Wear Tyvek with hoods, disposable gloves and booties, and air-purifying respirators with a minimum N95 rating.
- Put droppings into plastic/poly bags and preferably into a 55-gallon drum to prevent bag from ripping.

11.3 Cougars/Mountain Lions

Like bears, cougars will often retreat if given the opportunity. Walking in groups and making noise will give the cougar the chance to retreat and reduce the likelihood of a sudden encounter. Be especially cautious during dusk and dawn.

If you see a cougar—do not play dead, do not run. Running may trigger an attack. Face the cougar and retreat slowly maintaining eye contact. If the cougar continues advancing, raise your arms above your head to make yourself look larger than normal. This may help to intimidate the cougar. Sometimes aggressive yelling and rock throwing may scare it off.

If attacked, fight back with whatever is at hand (without turning your back)—people have utilized rocks, jackets, garden tools, tree branches, and even bare hands to turn away cougars.

11.4 Coyotes

While far from domesticated, coyotes show little fear of humans and have become comfortable living in close proximity to our communities. Although they tend to do most of their hunting after dusk, coyotes can be active at any time. Under normal circumstances, a coyote is not a danger to humans. They are, however, territorial and will respond aggressively if they or their family are threatened.

If you encounter a coyote that behaves aggressively, you have probably gotten too close to its prey or its family. Try to scare the coyote by yelling and waving your arms. Throw rocks, sticks or other objects. Do not turn away and run.

11.5 Feral Dogs

Avoid all dogs – both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears and a direct stare. If you are threatened by a dog, remain calm, do not scream and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run, try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g. vehicle). If attacked, retreat to vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the WorkCare (see emergency contacts). Report the incident to the local authorities.

11.6 Hantavirus

Hantavirus pulmonary syndrome (HPS) is a disease caused by a virus which can be transmitted from certain rodents to humans and is prevalent throughout the southwestern United States. Avoid disturbing rodent nests.

Nesting material and droppings must be removed if work is necessary in a rodent-infested area. PPE for removal shall include:

- Tyvek coveralls;
- Rubber boots or disposable shoe covers;
- Rubber, latex, or vinyl gloves;
- Respiratory protection such as a full face or half-mask air-purifying respirator with a high-efficiency particulate air (HEPA) filter; and
- Protective goggles if wearing a half-mask respirator.

Spray any urine, droppings, and nesting materials with either a bleach and water solution (1 parts bleach to 9 parts water) or a household disinfectant prepared according to the label instructions for dilution and disinfection time. Soak well and let stand for 15 minutes. Use a paper towel or rag to pick up the materials and dispose of them.

Mop floors after spraying them using bleach and water solution or a disinfectant. Dirt floors can be sprayed with either bleach and water solution or a disinfectant.

Personal protective gear shall be decontaminated upon removal at the end of the day. All potentially infective waste material (including respirator filters) from clean-up operations shall be double-bagged in plastic bags.

Symptoms of HPS

Symptoms develop between 14 and 31 days after exposure to infected rodents and include fatigue, fever, and muscle aches, especially the large muscle groups—thighs, hips, back and sometimes shoulders. About half of all HPS patients also experience headaches, dizziness, chills and/or abdominal pain. Four to 10 days after the initial phase of the illness, late symptoms of HPS may appear. These include coughing and shortness of breath. If you develop symptoms suggestive of HPS, call the WorkCare (see emergency contacts).

11.7 Mosquito Bites

Due to the recent detection of the West Nile Virus in the southwestern United States it is recommended that preventative measures be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent:

- Stay indoors at dawn, dusk, and in the early evening;
- Wear long-sleeved shirts and long pants whenever you are outdoors;
- Spray clothing with repellents containing permethrin or N,N-diethyl-meta-toluamide (DEET) since mosquitoes may bite through thin clothing;
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands; and
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3 to 15 days.

Contact the project HSM with questions, and immediately report any suspicious symptoms to your supervisor, PM, and contact the WorkCare (see emergency contacts).

11.8 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose its (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol, a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy



Poison Sumac



Poison Oak



Contamination with poison ivy, sumac or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed);
- Contact with clothing that has been contaminated with the oil;
- Contact from removing shoes that have been contaminated (shoes are coated with urushiol oil);
- Sitting in a vehicle that has become contaminated;
- Contact with any objects or tools that have become contaminated; and
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you work on a site with poison ivy, sumac or oak the following precautions are necessary:

- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac or oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site;
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated;
- PPE, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle;
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu or other product designed for removing urushiol. If you do not have Zanfel or Tecnu wash with cold water. Do not take a bath, as the oils can form an invisible film on top of the water and contaminate your entire body upon exiting the bath;
- Tecnu may also be used to decontaminate equipment; and
- Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest Jacobs warehouse to see if these products are available. Follow all directions for application.

If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and WorkCare (see emergency contacts).

See the attached fact sheet for additional poison oak photo identification, control measures, decon, first aid measures, and detail.

11.9 Scorpions



Scorpions usually hide during the day and are active at night. They may be hiding under rocks, wood, or anything else lying on the ground. Some species may also burrow into the ground. Most scorpions live in dry, desert areas; however, some species can be found in grasslands, forests, and inside caves.

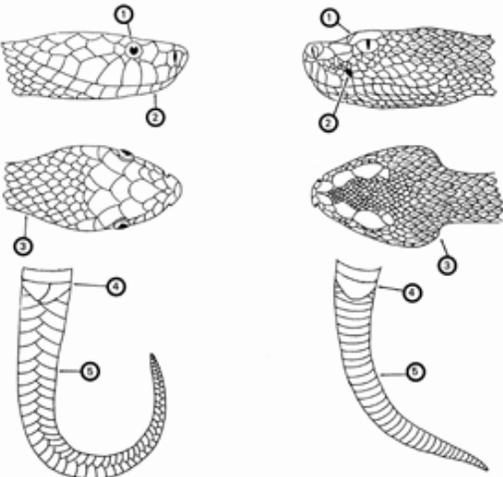
When entering an area that has the potential to contain scorpions, the following PPE is recommended: long pants, long sleeved shirts with collars, leather work gloves and leather work boots. Reaching into enclosures or recesses without prior visual inspection is not recommended. Thoroughly inspect each area before accessing. Shake out clothing, jackets, shoes or boots prior to putting them on.

If you are stung by a scorpion, call the WorkCare (see emergency contacts) and try to note the description of the scorpion. Cleanse the sting area and apply ice.

11.10 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call WorkCare (see emergency contacts) immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
<ol style="list-style-type: none"> 1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail 	<ol style="list-style-type: none"> 1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail
	

11.11 Spiders – Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

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If you think you have been bit by a poisonous spider, immediately call the WorkCare (see emergency contacts) and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood;
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite;
- Elevate the bitten area, if possible;
- Do not apply a tourniquet. Do not try to remove venom; and
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider—especially if you think it is a poisonous spider.

Black Widow



Red Widow



Brown Widow



Brown Recluse



11.12 Ticks

Every year, employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permethrin and spray skin with only DEET; and check yourself frequently for ticks. **Permethrin and use of an insect repellent are required when walking in vegetated areas.**

Where site conditions (vegetation above knee height, tick endemic area) or when tasks (e.g., having to sit or kneel in vegetation) diminish the effectiveness of the other controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting field work. Avoid habitats where possible, and reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellents, protective clothing and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this PHSEP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the WorkCare (see emergency contacts).

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear that looks like a bulls-eye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever,

headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the WorkCare (see emergency contacts).

Be sure to complete an Incident Report if you do come in contact with a tick.

12. Contaminants of Concern

The table below summarizes the potential contaminants of concern (COCs) and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and media that was sampled (groundwater, soil boring, surface soil). These concentrations were used to determine engineering and administrative controls described in the "Project-Specific Hazard Controls" section of this PHSEP, as well as PPE and site monitoring requirements.

12.1 Contaminants of Concern

(Refer to Project Files and Workplan/SAP for more detailed contaminant information)

Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Arsenic	SB: 350 mg/kg (SWMU 7.9) SB: 21 mg/kg (A1BP, Group 1B) GW: 98 µg/L (R1 Pond, Group 1B)	0.01 mg/m ³	5 mg/m ³ Ca	Ulceration of nasal septum, respiratory irritation; dermatitis; gastrointestinal disturbances; peripheral neuropathy, hyperpigmentation	NA
Acetone	SB: 300 mg/kg (A1BP, Group 1B) GW : 36 mg/L (STL IV, Group 5) SV: 190 mg/m ³ (SWMU 4.3/4/AOC – Instr./Equip. Lab)	250 ppm	2500 ppm	Irritation eyes, nose, and throat; headache; dizziness; CNS depressant; dermatitis	9.69
Aluminum	SB: 43000 mg/kg (PDU, Group 5) SB: 38700 mg/kg (A1BP, Group 1B)	5 mg/m ³	unk	Aluminum dust is an eye and respiratory tract irritant in humans	NA
Antimony	SB: 1170 mg/kg (Northern Drainage) SB: 29 mg/kg (A1BP, Group 1B) GW: 16 µg/L (PDU, Group 5)	.5 mg/m ³	50 mg/m ³	Eye, nose, skin, and respiratory irritation; headache; nausea; vomiting	
Barium	SB: 6880 mg/kg (Bldg 359 sump, Area 1 AOC) SB: 372 mg/kg (A1BP, Group 1B) GW: 340 µg/L (ECL, Group 5)	.5 mg/m ³	50 mg/m ³	Irritation to eyes, skin, upper resp; skin burns; gastroenteritis; slow pulse	UK

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Benzene	GW: 15 µg/L (ECL, Group 5) SB: 8.2 mg/kg (SWMU 4.1, B-1 area) SG: 510 mg/m ³ (SWMU 4.1, B-1 area)	0.5 ppm	500 ppm Ca	Eye, nose, skin, and respiratory irritation; headache; nausea; dermatitis; fatigue; giddiness; staggered gait; bone marrow depression	9.24
Beryllium	SB: 77 mg/kg (Outfall 8 catchment basin, Group 1A) SB: 1.95 mg/kg (A1BP, Group 1B)	0.2 ug/m ³	4 mg/m ³ Ca	Weakness; anorexia; low weight; cough; eye irritation; dermatitis	NA
Boron	SB: 120 mg/kg (A1BP, Group 1B) GW: 1840 µg/L (HMSA Bldg 457, Group 5)	15 mg/m ³	N.D.	Irritant to eyes, skin, upper respiratory	NA
Cadmium	SB: 463 mg/kg (A1BP, Group 1B)	0.005 mg/m ³	9 mg/m ³ Ca	Pulmonary edema, coughing, chest tightness/pain, headache; chills, muscle aches, nausea, vomiting, diarrhea; difficulty breathing; loss of sense of smell; emphysema; mild anemia	NA
Carbon tetrachloride*	SB: 1.2 mg/kg (A1BP, Group 1B) GW: 29 mg/L (ECL, Group 5)	2 ppm	200 ppm Ca	Central nervous system depression, nausea, liver damage	11.5
Chromium (Total)	SB: 924 mg/kg (SWMU 4.12 – LETE/CTL-1) SB: 860 mg/kg (A1BP, Group 1B)	0.5 mg/m ³	25 mg/m ³	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Cobalt	SB: 152 mg/kg SB: 57 mg/kg (A1BP, Group 1B)	0.05 mg/m ³	20 mg/m ³	Coughing; difficulty breathing; wheezing; decreased pulmonary function; diffuse nodule fibrosis; dermatitis; respiratory hypersensitivity; asthma	NA

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Copper	SB: 10,000 mg/kg (A1BP, Group 1B)	1 mg/m ³	100 mg/m ³	Irritation to eyes, skin, nose, and pharynx; metallic taste; dermatitis	NA
Cyanides	SB: 14 mg/kg (A1BP, Group 1B)	5 mg/m ³	25 mg/m ³	Irritation eyes and respiratory system; cough; delayed pulmonary edema; weakness; headache; dizziness; confusion; nausea; vomiting; irregular heartbeat.	
Dibenzofuran	SB: 2.8 mg/kg (A1BP, Group 1B)	NL	NL	See Dioxin/Furan	
1,1-Dichloroethane*	SB: 10 mg/kg (A1BP, Group 1B) GW: 520 µg/L (Compound A, Group 5) SV: 76 mg/m³ (A1BP, Group 1B)	100 ppm	3,000 ppm	CNS depression, skin irritation, liver, kidney, and lung damage	11.06
1,2-Dichloroethane (Ethylene Dichloride)*	SB: 0.2 mg/kg (A1BP, Group 1B) GW: 250 mg/L (ECL, Group 5) SV: 87 mg/m³ (ECL, Group 5)	1 ppm	50 ppm Ca	CNS depression, nausea, vomiting, dermatitis, eye irritation, liver, kidney, and CNS damage; corneal opacity	11.05
Dioxins/Furans (TEQ) 2,3,7,8 – TCDD	SB: 0.005 mg/kg (TEQ) (A1BP, Group 1B)	Not determined	Ca IDLH- Not determined	Irritation to eyes; allergic dermatitis; chloracne; GI disturbance; possible repro terato effects; liver/kidney damage; carcinogen	UK
1,1-Dichloroethylene (1,1-DCE)*	SB: 2.1 mg/kg (A1BP, Group 1B) GW: 590 µg/L (STL IV, Group 5) SG: 50000 mg/m³ (SWMU 4.5/6 – LOX Area)	1 ppm	500 ppm	Irritation of eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis.	10.0

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
1,2-Dichloroethylene*	SB: 17 mg/kg (SWMU 4.5/6 – LOX Area) GW: 2.9 mg/L (Bowl area, Group 1B), 2.04 mg/L cis-1,2-DCE (IEL, Group 1A) SV: 438 mg/m ³ (CTL III, Group 1B)	200 ppm	1000 ppm	Eye irritation, respiratory system irritation, CNS depressant	10.0
1,4-Dioxane*	SB: 3 mg/kg (A1BP, Group 1B) GW: 2,800 µg/L (FSDf, Group 1A); 35 µg/L (IEL, Group 1A)	20 ppm	500 ppm	Eye irritation, headache, nausea, drowsiness	9.13
Ethylbenzene	SB: 33 mg/kg (SWMU 4.1 B-1 area) SB: 0.21 mg/kg (A1BP, Group 1B) SV: 140 mg/m ³ (SWMU 4.1 B-1 area)	100 ppm	800 ppm	Eye, skin, and mucous membrane irritation; headache; dermatitis; narcotic; coma	8.76
Formaldehyde	SB: 10 mg/kg (A1BP, Group 1B) GW: 2,000 µg/L (Canyon and LETF/CTL-1, Group 1A)	C-0.3 ppm	20 ppm	Irritated eyes, weeping, vomiting, bronchial spasms	10.88
Hydrazine	SB: 0.00589 mg/kg (A1BP, Group 1B)	1 ppm	50 ppm Ca	Irritant eyes, skin, nose, throat; temporary blindness; dizziness, nausea; eye, skin burns; liver and kidney damage	8.93
Kerosene	SB: 15000 mg/kg (SWMU 5.13/14/15 – Bravo Area) GW: 11 mg/L (STL IV, Group 5)	PEL none REL 100 mg/m ³	N.D.	Irritated eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude, restlessness, drowsiness; vomiting, diarrhea.	NA

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Lead	SB: 44800 mg/kg (Northern Drainage) SB: 320 mg/kg (A1BP, Group 1B)	0.05 mg/m ³	100 mg/m ³	Weakness, lassitude; facial pallor; pal eye; weight loss, malnutrition; abdominal pain, constipation, anemia; gingival lead line; tremors; paralysis of wrist and ankles; encephalopathy; kidney disease; irritated eyes; hypotension	NA
MTBE*	GW: 27.6 µg/L (IEL, Group 1A)	40 ppm	NE	Drowsiness, eye irritation, lack of coordination, rapid breathing	< 9.40
Manganese	SB: 2370 mg/kg (Compound A, Group 5) SB: 1600 mg/kg (A1BP, Group 1B)	1 mg/m ³	500 mg/m ³	Insomnia; mental confusion; meta fume fever; dry throat; cough; flu-like fever; vomit; malaise	NA
Magnesium	SB: 53700 mg/kg (A1BP, Group 1B)	5 mg/m ³	500 mg/m ³	Parkinson's; asthenia, insomnia, mental confusion; metal fume fever; dry throat; cough, chest tightness, low back pain; vomiting, kidney damage	NA
Mercaptans	SB: 27 mg/kg (A1BP, Group 1B)	0.5 ppm, 1 mg/m ³ TWA	150 ppm	Irritation of eyes, skin, respiratory tract; cough, sore throat; headache; nausea; shortness of breath; unconsciousness; pulmonary edema (delayed); CNS effects (narcois, cyanosis, seizures); respiratory failure	NA
Mercury	SB: 110 mg/kg (A1BP, Group 1B)	0.05 mg/m ³	10 mg/m ³	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumonitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	NA
Methylene Chloride	SB: 120 mg/kg (A1BP, Group 1B) GW: 440 mg/L (ECL, Group 5) SV: 35000 mg/m³ (ECL, Group 5)	1 ppm	2300 ppm	Eye and skin irritation; fatigue; weakness; numbness and tingling to limbs	11.32
Molybdenum	SB: 1000 mg/kg (A1BP, Group 1B)	15 mg/m ³	5000 mg/m ³	Irritant eyes, nose, throat. Diarrhea, liver and kidney damage	NA

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Naphthalene	SB: 200 mg/kg (A1BP, Group 1B)	0.1 ppm	250 ppm	Eye irritation, headache, confusion, excitement, nausea, vomiting, abdominal pain, bladder irritation, profuse sweating, dermatitis, corneal damage, optical neuritis	8-12
Nickel	SB: 2,310 mg/kg (A1BP, Group 1B)	.015 mg/m ³	10 mg/m ³ Ca	Dermatitis; allergic asthma	NA
n-nitrosodimethylamine (NDMA)	SB: 0.016 mg/kg (A1BP, Group 1B) GW: 110 µg/L (ECL, Group 5)	Established under 1910.1016, part of 13 chemicals	ND Ca	Nausea, vomiting, diarrhea, abdominal cramps, headache, fever, enlarged liver....	8-69
PCBs	SB: 2.6 mg/kg (A1BP, Group 1B)	0.05 mg/m ³	5 mg/m ³ Ca	Eye and skin irritation, acne-form dermatitis, liver damage, reproductive effects	UK
Pentachlorophenol	SB: 4000 mg/kg (A1BP, Group 1B)	.5 mg/m ³	2.5 mg/m ³	Irritation to eyes, nose, and throat; sneezing; coughing; weakness; sweating; headaches; dizziness; nausea; vomiting; chest pain; high fever	NA
Perchlorate	SB: 71.3 mg/kg (Area 1AOC – Bldg 359 Sump) SB: 1.13 mg/kg (A1BP, Group 1B) GW: 280 µg/L (Outfall 8 Catchment Basin, Group 1A)	UK	UK	Causes serious eye irritation. May cause damage to the thyroid through prolonged or repeated oral exposure.	UK
Phosphorus	SB: 1080 mg/kg (A1BP, Group 1B)	0.1 mg/m ³	5 mg/m ³	Irritant to eyes, resp. tract; eye, skin burns; abdominal pain, nausea, jaundice, anemia	NA
Radiological	See Attachment 11	See Attachment 11	See Attachment 11	See Attachment 11	NA
Selenium	SB: 34 mg/kg (A1BP, Group 1B)	0.2 mg/m ³	1 mg/m ³	Irritation to eyes, skin, nose, and pharynx; metallic taste; dermatitis; garlic breath; skin burns	NA
Silver	SB: 1100 mg/kg (A1BP, Group 1B)	0.1 mg/m ³	10 mg/m ³	Blue-gray eyes; irritation to eyes, nasal septum, throat; dermatitis	NA

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Tetrachloroethylene (PCE)*	SB: 30 mg/kg (A1BP, Group 1B) GW: 2,100 µg/L (ECL, Group 5) SV: 3,400 mg/m ³ (SWMU 4.1 – B-1 Area)	25 ppm	150 ppm	Irritant to eyes, skin, nose, throat, respiratory system. Nausea, flush face and neck, dizziness.	9.32
Thallium	SB: 50 mg/kg (A1BP, Group 1B)	0.1 mg/m ³	15 mg/m ³	Nausea; diarrhea; abdominal pain; vomit; chest pain; tremors; pulmonary edema	NA
Toluene	SB: 30 mg/kg (A1BP, Group 1B) GW: 1900 µg/L (ECL, Group 5) SV: 320 mg/m ³ (SWMU 4.5/6 – LOX Area)	10 ppm	500 ppm	Eye and nose irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, excessive tearing, nervousness, muscle fatigue, paresthesia, dermatitis, liver and kidney damage	8.82
Trichloroethylene (TCE)*	SB: 1820 mg/kg (SWMU 5.9/10/11 – Alfa Area) SB: 190 mg/kg (A1BP, Group 1B) GW: 29 mg/L (IEL, Group 1A), 28 mg/L (STL IV, Group 5) SG: 500,000 mg/m ³ (SWMU 4.5/6 – LOX Area)	10 ppm	1,000 ppm Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
1,2,3-Trichloropropane*	GW: 0.04 µg/L (Building 204, Group 1A); 0.013 µg/L (IEL, Group 1A)	10 ppm	100 ppm	Irritated eyes, throat, central nervous system depression	NA
Diesel Range Organics	SB: 108000 mg/kg (SWMU 4.3/4/AOC – Inst./Equip. Lab) SB: 5100 mg/kg (A1BP, Group 1B) GW: 0.58 mg/L (RD-37)	100 mg/m ³ (REL)	NL	Primary system effect is CNS depression. Inhalation of vapors may cause nausea, confusion, drowsiness, convulsions, and coma. Liquid may cause skin and eye irritation.	NA

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Contaminant	Location and Maximum ^a Concentration	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Gasoline Range Organics	SB: 2 1000 mg/kg (Area 1 AOC, Happy Valley North) SB: 1900 mg/kg (A1BP, Group 1B) GW: 0.26 mg/L (RD-73)	300 ppm	ND Ca	Eye, skin and mucous membrane irritation; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, chemical pneumonia on aspiration, possible liver and kidney damage	NA
Vanadium	SB: 140 mg/kg (A1BP, Group 1B)	.05 mg/m ³	35 mg/m ³	Irritation to eyes, skin, and throat; green tongue; metallic taste; coughing; wheezing	NA
Vinyl Chloride*	SV: 1,200,000 mg/m³ (SWMU 4.5/6 – LOX Area) GW: 970 µg/L (Well C-2)	1 ppm 0.5 ppm action level	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	9.99
Xylenes	SB: 99 mg/kg (A1BP, Group 1B)	100 ppm	900 ppm	Irritated eyes, skin, nose, throat; dizziness; excitement; drowsiness; incoherence; staggering gait; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; dermatitis	8.56
Zinc	SB: 48,000 mg/kg (SWMU 4.2 – Area 1 Landfill) SB: 1420 mg/kg (A1BP, Group 1B)	5 mg/m ³	500 mg/m ³	Metal fume fever: muscle ache, nausea, fever, dry throat, cough	NA

Footnotes:

^a Specify sample-designation and media: SB (Soil Boring), GW (Groundwater), SV (Soil Vapor)

^b Appropriate value of PEL, REL, or TLV listed.

^c IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

^d PIP = photolionization potential; NA = Not applicable; UK = Unknown.

* Compounds denoted by an asterisk (*) are the primary COCs at the IEL_RFI site, where the LSCO project drilling program will be conducted.

13. Site Monitoring

(Reference Jacobs SOP HSE-207, Exposure Monitoring for Airborne Chemical Hazards)

This section presents the site monitoring requirements based on the hazard information presented in earlier sections of this PHSEP. When performing site monitoring, record all the information in a suitable location, such as in a field logbook or electronic and paper form (for radiological predominantly). Note date and time, describe monitoring location (for example, in breathing zone, at source and site location), and what the reading is. If any action levels are reached, note it in the field logbook and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment plus thirty years. Ensure that copies of the field log book or electronic forms are maintained in the project file.

Copies of all project exposure records (e.g., copies of field logbook pages, electronic forms, where air monitoring readings are recorded and associated calibration) shall be sent to the regional SPA for retention and maintained in the project files.

13.1 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels ^a	Requirements	Frequency ^b	Calibration
General VOC Monitoring					
PID: RAE PID with 11.7 eV lamp (VOCs)	<ul style="list-style-type: none"> Drilling/Coring/Geoprobe boring Surface and shallow soil sampling (in areas of known COCs) Soil gas sampling Investigation-derived waste management and disposal Hand Augering Groundwater well gauging and sampling 	<p>* All Action Levels are based on sustained breathing-zone measurements above background for 10 minutes.</p> <p><0.5 ppm → Level D</p> <p>≥0.5 ppm → Collect colorimetric tubes; if Benzene, Formaldehyde or Vinyl Chloride ARE NOT detected, then:</p> <p>1-5 ppm → Level D >5 ppm → Level C</p> <p>>25 ppm → Level B; Stop work; contact HSM for guidance</p> <p>If either Benzene or Vinyl Chloride ARE detected, then: Stop work; See below; contact HSM for guidance</p>	Level B, stop work and contact HSM for guidance	Initially and periodically during task (i.e. every 20 minutes) all readings must be logged in the field log book.	Daily
Benzene Monitoring					
Benzene colorimetric tube	If PID reading is > 0.5 ppm and Benzene is identified	>0.5 ppm (on colorimetric tube)	Level B, stop work and contact HSM for guidance	Initially and every 2 hours when PID > 1 ppm	Not applicable
Vinyl Chloride and Formaldehyde Monitoring					
VC colorimetric tube	If PID reading is > .5 ppm and Vinyl Chloride is identified	>0.3 ppm (on colorimetric tube)	Level B, stop work and contact HSM for guidance	Initially and every hour when PID > 1 ppm	Not applicable
Other Required Monitoring					
Combustible Gas Indicator (CGI) for LEL: MutiRAE Plus or equivalent	<ul style="list-style-type: none"> Drilling/coring/direct push boring Hand Augering Soil sampling Groundwater well gauging and sampling 	0-5%: 5-25% LEL: >25% LEL:	No explosion hazard Potential explosion hazard Explosion hazard; evacuate or vent	Continuous during advancement of boring or trench	Daily

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Instrument	Tasks	Action Levels ^a	Requirements	Frequency ^b	Calibration
O₂ Meter: MuttrAE Plus or equivalent	<ul style="list-style-type: none"> ▪ Drilling/coring/direct push boring ▪ Soil sampling ▪ Hand Augering 	<p>>25%^c O₂; 20.9%^c O₂; <19.5%^c O₂;</p>	Explosion hazard; evac. & vent Normal O ₂ O ₂ deficient; vent or use SCBA	Initial and continuously during task	Daily
Carbon monoxide: MuttrAE Plus or equivalent	<ul style="list-style-type: none"> ▪ Drilling/coring/direct push boring ▪ Soil sampling ▪ Hand Augering 	0-25 ppm >25 ppm	Level D Stop work; Notify HSM	Initial and continuously during task	Daily
Hydrogen sulfide: MuttrAE Plus or equivalent	<ul style="list-style-type: none"> ▪ Drilling/coring/direct push boring ▪ Soil sampling ▪ Hand Augering 	<1 ppm >1 ppm	Level D Stop work; Notify HSM	Initially and periodically during tasks	Zero Daily
Dust Monitor: Miniram model PDM-3, DataRAM, TSI Dust Track II, or equivalent	All soil disturbance tasks at greater than 1 foot bgs in areas of known COC's or potentially elevated silica levels (i.e., rock coring with significant dust generation).	<0.08 mg/m ³ > 0.09 mg/m ³	Level D, use soil wetting Level C	Initially and periodically during tasks	Zero daily
Radiological Instrumentation	See Attachment 11	See Attachment 11	See Attachment 11	See Attachment 11	See Attachment 11

^a Action levels apply to **sustained** breathing-zone measurements above background for **10 minutes**.

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

13.2 Calibration Specifications

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name;
- Serial Number;
- Owner of instrument (for example, Jacobs, HAZCO);
- Calibration gas (including type and lot number);
- Type of regulator (for example, 1.5 l pm);
- Type of tubing (for example, direct or T-tubing);
- Ambient weather condition (for example, temperature and wind direction);
- Calibration/instrument readings;
- Operator's name and signature; and
- Date and time.

13.3 Integrated Personal Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants, such as soil sampling at AIBP. Integrated personal air sampling typically is required when site contaminants include metals, asbestos, and certain volatile organic compounds. Personal air sample will occur with personnel utilize respiratory protection.

Integrated personal sampling for non-radiological contaminants may be conducted by an industrial hygiene subcontractor to Jacobs/Jacobs if required. Radiological air monitoring may be performed by Jacobs radiological staff if required.

Results must be sent immediately to the HSM (the Jacobs RSO for radiological only). Regulations may require reporting to monitored personnel. Results reported to:

HSM: Loren Kaehn/BOI

14. Personal Protective Equipment

(See P&PS Work Instruction, IB-HS-WI-0310-IB, Personal Protective Equipment Minimum Standards and IB-HS-WI-0310-US, PPE Guidance – USA)

14.1 Required Personal Protective Equipment

(See P&PS Work Instruction, IB-HS-WI-0310-IB, Personal Protective Equipment Minimum Standards and IB-HS-WI-0310-US, PPE Guidance – USA)

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.

A PPE assessment has been conducted by the HSM and the Jacobs RSO or designee (for radiological only), based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the HSM that approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE;
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area;
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner;
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage;
- PPE must be maintained in a clean and reliable condition;
- Damaged PPE shall not be used and must either be repaired or discarded; and
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the HSM so this table can be updated. *Note: for nearly all Boeing SSFL work, a high visibility safety vest is recommended and in some location required.*

Ensure that all PPE is inspected prior to use and that you have been trained in its use. Ensure the PPE used fits properly. Contact the HSM and the Jacobs RSO (for radiological only) if there are deficiencies or you haven't been trained on care, use, and limitations of PPE.

In addition to the PPE requirements below, confirm in advance in additional COVID-19 protection (e.g., face masks) may be required, per Section 8.9.

Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
Surveying and Surface Geophysics, GET System Oversight	D	Work clothes; safety toed leather work boots and gloves	Hardhat ^c Safety glasses with side shields Ear protection ^d Snake chaps (if working in vegetated areas)	None required

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Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
<ul style="list-style-type: none"> ▪ Drilling/Coring/ Geoprobe boring ▪ Vegetation clearance ▪ Concrete pad installation ▪ BAM sampling ▪ Surface and shallow soil sampling ▪ Soil gas sampling ▪ Groundwater well gauging ▪ Groundwater sampling ▪ Investigation-derived waste management and disposal ▪ Third-party contractor oversight 	Modified D	<p>Work clothes, including long sleeve shirts or cotton coveralls</p> <p>Boots: Safety-toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers</p> <p>Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.</p>	<p>Hardhat ^c</p> <p>Safety glasses with side shields</p> <p>Faceshield (vegetation clearance)</p> <p>Ear protection ^d</p>	None required
Work near vehicular traffic ways or earth moving equipment, or working in remote areas.	All	Appropriate level of ANSI/ISEA 107-2004 high-visibility safety vests.	<p>Hardhat ^c</p> <p>Safety glasses with side shields</p> <p>Ear protection ^d</p>	
Equipment decontamination if using pressure washer (DeCon for radiological purposes shall be performed under the direct supervision of the Jacobs RSO or designee.	Modified D with splash protection	<p>Coveralls: Polycoated Tyvek®</p> <p>Boots: 16-inch-high steel-toed rubber boots</p> <p>Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.</p>	<p>Hardhat ^c</p> <p>Splash shield ^c over safety glasses with side shields or splash goggles</p> <p>Ear protection ^d</p>	None required.
<p>Tasks requiring upgrade</p> <ul style="list-style-type: none"> ▪ When real time air monitoring shows action levels exceeded for sustained times of 5 minutes. ▪ Area 1 Burn Pit subsurface work ▪ Radiological monitoring per the Jacobs RSO or designee ▪ Chemical injections if dusts and fumes are not controlled by engineered ventilation. 	C	<p>Coveralls: Polycoated Tyvek®</p> <p>Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers</p> <p>Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.</p>	<p>Hardhat ^c</p> <p>Splash shield ^c</p> <p>Ear protection ^d</p> <p>Spectacle inserts</p>	APR, full face, MSA Ultratwin or equivalent; GME-H cartridges or equivalent ^e

Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
<i>Unless Air or Radiological Sampling data allows for downgrade to Level D.</i>				
Tasks requiring upgrade, not authorized or anticipated	B	Coveralls: Polycoated Tyvek® Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection (with approval of the HSM)

Upgrade ^f	Downgrade
<ul style="list-style-type: none"> ▪ Request from individual performing tasks. ▪ Change in work tasks that will increase contact or potential contact with hazardous materials. ▪ Occurrence or likely occurrence of gas or vapor emission. ▪ Known or suspected presence of dermal hazards. ▪ Instrument action levels in the "Site Monitoring" section exceeded. ▪ Directed by the Jacobs RSO or designee 	<ul style="list-style-type: none"> ▪ New information indicating that situation is less hazardous than originally thought. ▪ Change in site conditions that decreases the hazard. ▪ Change in work task that will reduce contact with hazardous materials.

^a Modifications are as indicated. Jacobs will provide PPE only to Jacobs employees.

^b No facial hair that would interfere with respirator fit is permitted.

^c Hardhat and splash-shield areas are to be determined by the SL.

^d Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

^e See cartridge change-out schedule.

^f Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SL qualified at that level is present.

14.2 Respiratory Protection

(See P&PS Work Instruction, IB-HS-WI-0310-IB, Personal Protective Equipment Minimum Standards and IB-HS-WI-0310-US, PPE Guidance – USA)

Implement the following when using respiratory protection:

- Respirator users must have completed appropriate respirator training within the past 12 months. Level C training is required for air-purifying respirators (APR) use and Level B training is required for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) use. Specific training is required for the use of powered air-purifying respirators (PAPR);
- Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used;

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- Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months;
- Respirator use shall be limited to those activities identified in this plan. If site conditions change that alters the effectiveness of the specified respiratory protection, the HSM and Jacobs RSO (for radiological only) shall be notified to amend the written plan;
- Tight-fitting facepiece respirator users shall be clean-shaven and shall perform a user seal check before each use;
- Canisters/cartridges shall be replaced according to the change-out schedule specified in this plan. Respirator users shall notify the SL or HSM of any detection of vapor or gas breakthrough. The SL shall report any breakthrough events to the HSM for schedule upgrade;
- Respirators in regular use shall be inspected before each use and during cleaning;
- Respirators in regular use shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition;
- Respirators shall be properly stored to protect against contamination and deformation;
- Field repair of respirators shall be limited to routine maintenance. Defective respirators shall be removed from service;
- When breathing air is supplied by cylinder or compressor, the SL or HSM shall verify the air meets Grade D air specifications; and
- The SL or designee shall complete the H&S Self-Assessment Checklist – Respiratory Protection included in as attachment to this plan to verify compliance with Jacobs' respiratory protection program.
- All respiratory protection requirements and selection, to include additional training and restrictions shall be approved by the Jacobs RSO or designee.

15. Worker Training and Qualification

15.1 Jacobs Worker Training

(See P&PS Work Instruction, IB-HS-WI-0200-IB; HSE Training and Competency)

15.1.1 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

15.1.1.1 Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

15.1.1.2 Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

15.1.1.3 Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

15.1.1.4 Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as Safety Lead (SL) – Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor trained.

15.1.2 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR training. Bloodborne pathogen training located on Jacobs' E3 Learning is also required for those designated as first aid/CPR trained.

15.1.3 Safety Liaison Training

SLs are trained to implement the HSE program on Jacobs field projects. A qualified SL is required to be identified in the site-specific PHSEP for Jacobs field projects. SLs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SLs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

15.1.4 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable PHSEPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

15.1.5 Project-Specific Training Requirements

Project-specific training for this project includes:

- PHSEPs/HIRAs
- Arsenic Awareness (online)
- Benzene (online)
- Cadmium (online)
- Chromium (online)
- ADT Driver Training/Jacobs Permit to Drive (ADT, online)
- Electrical Safety (online)
- NFPA 70e Arc Flash
- Lock Out Tag Out (online)
- Excavation Awareness
- Excavation Competent Person (third party subcontractor)
- Qualified Equipment Operator (third party subcontractor)
- Formaldehyde (online)
- Hearing protection/Noise (online)
- Heat Illness Prevention (online)
- Intro to Beyond Zero
- Ionizing Radiation (online)
- General Employee Radiological Worker Training
- Lead (online)
- Manual Lifting (online)
- Methylene Chloride (online)
- UTV Qualification
- Vinyl Chloride (online)

- Wildland Fire Smoke (online)
- Waste handling and shipping
- Radioactive material transportation training (commensurate with the type, activity, and method of transportation)

16. Medical Surveillance and Qualification

All site workers participating in hazardous waste operations or emergency response will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (e.g., physician's written opinion) will be maintained in the project files and made available for inspection.

16.1 Hazardous Waste Operations and Emergency Response

Jacobs personnel expected to participate in on site hazardous waste operations or emergency response are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

16.2 Job or Site-Specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

- Lead
- Formaldehyde
- Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

16.3 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85dBA time-weighted average shall be included in a hearing conservation program that includes annual audiometric testing.

17. Site-Control Plan

17.1 Site-Control Procedures

(Reference Jacobs SOP HSE-218, *Hazardous Waste Operations*)

- The SL will implement site control procedures.
- The Jacobs radiological staff will implement site radiological controls.
- The SL will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of PHSEP, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SL records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with Jacobs Core Standard, *OSHA Postings*.
- Establish support, contamination reduction, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
 - Line-of-sight and hand signals
 - Air horn
 - Two-way radio or cellular telephone required at SSFL
- Establish offsite communication.
- Establish and maintain the “buddy system.”
- Initial air monitoring is conducted by the SL in appropriate level of protection.
- The SL is to conduct periodic inspections of work practices to determine the effectiveness of this plan. Deficiencies are to be noted, reported to the HSM, and corrected.

17.2 HAZWOPER Compliance Plan

(Reference Jacobs SOP HSE-218 *Hazardous Waste Operations*)

Certain parts of the site work are covered by state or federal HAZWOPER standards and therefore require training and medical monitoring. Anticipated HAZWOPER tasks listed in the “General Project Information” section of this PHSEP might occur consecutively or concurrently with respect to non- HAZWOPER tasks (also specified in the “General Project Information” section).

This section outlines procedures to be followed when approved the approved non- HAZWOPER activities do not require 24- or 40-hour training. Non- HAZWOPER -trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non- HAZWOPER trained personnel are allowed on the site, or while non- HAZWOPER trained staff is working in proximity to HAZWOPER activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data.

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- When non- HAZWOPER trained personnel are at risk of exposure, the SL must post the exclusion zone and inform non- HAZWOPER trained personnel of the:
 - nature of the existing contamination and its locations
 - limitations of their access
 - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-HAZWOPER trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-HAZWOPER trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to extract/pump and treat contaminated media only HAZWOPER trained personnel (minimum of 24 hour of training) will be permitted to enter the site. All non- HAZWOPER trained personnel must not enter the TSDF area of the site.

18. Decontamination

(Reference Jacobs SOP HSE-218, *Hazardous Waste Operations*)

The SL and the Jacobs RSO (for radiological only) must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SL and the Jacobs RSO (for radiological only). The SL and the Jacobs RSO (for radiological only) must ensure that procedures are established for disposing of materials generated on the site.

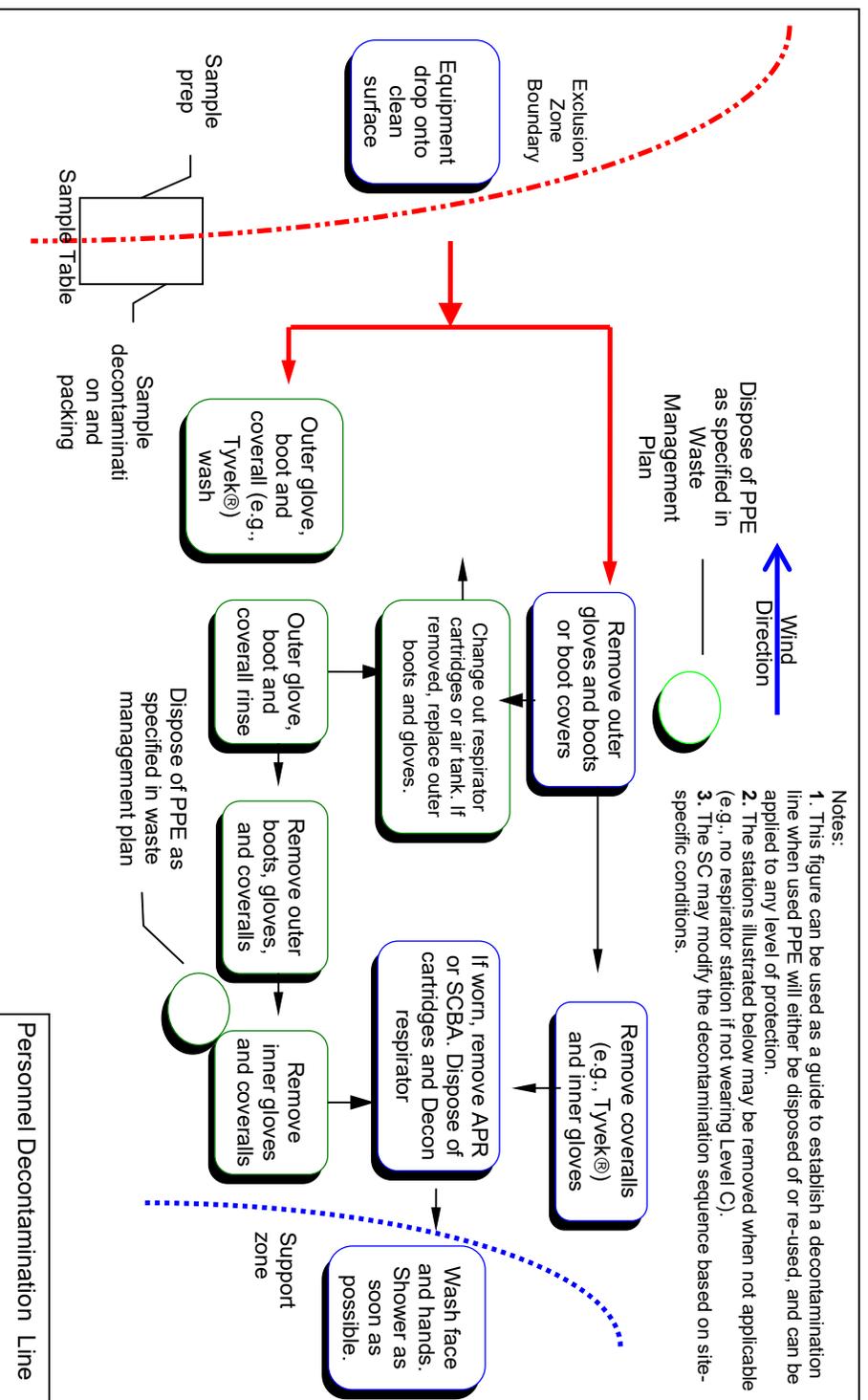
18.1 Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
Boot wash/rinse Glove wash/rinse Outer-glove removal Body-suit removal Inner-glove removal Respirator removal Hand wash/rinse Face wash/rinse Shower ASAP Contain PPE for disposal Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal	Wash/rinse equipment Solvent-rinse equipment (if required in sampling plan or SOP) Contain solvent waste for offsite disposal	Power wash Steam clean Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

18.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SL should establish designated areas for eating and drinking. Smoking and any use of tobacco is not allowed at SSFL.

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SL to accommodate task-specific requirements.



19. Emergency Response Plan

(Reference Jacobs SOP HSE-106, *Emergency Planning*)

19.1 Pre-Emergency Planning

- The Emergency Response Coordinator (ERC), typically the SL or designee, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with Jacobs onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the ERC include:
 - Review the facility emergency and contingency plans where applicable;
 - Determine what onsite communication equipment is available (e.g., two-way radio, air horn);
 - Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
 - Confirm and post the "Emergency Contacts" page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated;
 - Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear;
 - Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures;
 - Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
 - Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities;
 - Inventory and check site emergency equipment, supplies, and potable water;
 - Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases;
 - Rehearse the emergency response plan before site activities begin, including driving route to hospital. Drills should take place periodically but no less than once a year;
 - Brief new workers on the emergency response plan; and
 - The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

19.2 Emergency Equipment and Supplies

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

Emergency Equipment and Supplies	Location
20 (or two 10) class A,B,C fire extinguisher	Variable – field vehicle and/or designated building onsite. Must be available for immediate use.
First aid kit	
Eye Wash	
Emergency Shower	
Potable water	
Bloodborne-pathogen kit	
Additional equipment (specify): water truck/trailer	

19.3 Incident Response

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

- Notify appropriate response personnel.
- Shut down Jacobs operations and evacuate the immediate work area.

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

- Shut down Jacobs operations and evacuate the immediate work area.
- Notify appropriate response personnel by calling Boeing's emergency line from an on-site phone by dialing 2-2222.

When using a cell phone: 562-797-2222*
Spill Reporting Call: 818-466-8888.

*Cell phone coverage onsite is limited, therefore always use the Boeing 2-way radio (Channel 1 or 2) to notify Boeing (Mark Spenard) of an emergency and the facility will report the emergency to the correct emergency personnel.

- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Once Boeing's emergency line is called, the initial sequence of events during emergency response is as follows:

- On site security notifies the responding agency of a problem.
- The highest-ranking Fire Services officer arriving with the first engine onsite becomes the "Incident Commander."
- The Incident Commander provides an initial scene assessment (wind direction, chemicals involved, special hazards, etc.), secures the area, rescues victims if rescue can be done safely, denies entry to the public, and determines if any additional resources are needed.
- The Hazardous Materials Response Team is also dispatched to the scene. The Response Team identifies the hazardous materials, assesses risks, and implements appropriate controls.
- The Response Team Coordinator works with the Incident Commander to determine if any other resources are needed.
- Once confirmation of an actual or potential hazardous materials release is made by the Incident Commander, he/she will notify other emergency responders from other departments, outside support agencies, and the California Office of Emergency Services. The Office of Emergency Services will make other notifications to state and federal agencies as required. Agencies that may be contacted include EPA, Poison Control Center, California Department of Toxic Substances Control, Air Quality Management District, and California Water Quality Control Board.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this PHSEP.

19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing/heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify Boeing's emergency line, Boeing's contract coordinator, or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a Jacobs employee, the supervisor will call the WorkCare (see emergency contacts) and make other notifications as required by HSE Handbook.
- Make certain that the injured person is accompanied to the emergency room. For radiological impacted events, the Jacobs radiological staff will accompany the injured person to the hospital.
- Follow the Serious Incident Reporting process in HSE Handbook and complete incident report using the hard copy forms provided as an attachment to this PHSEP.
- Notify and submit reports to client as required in contract.
- Radiological controls are always secondary to emergency medical treatment.

19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the SSFL Evacuation Area Map (Attachment 13).
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The ERC will follow the incident reporting procedures in the "Incident Notification, Reporting and Investigation" section of this PHSEP.
- See Attachment 13 (Evacuation Areas) for other Boeing-specific evacuation information.

19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

19.7 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop—seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area;
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae and towers;
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding;
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands;
- Do not use telephones during electrical storms, except in the case of emergency;

Remember that lightning may strike several miles from the parent cloud, so work should be stopped/restarted accordingly. The lightning safety recommendation is When Thunder Roars, Go Indoors. Do not resume activity until 30 minutes after the last thunder. See Attachment 14 (Lightning Safety) for other Boeing-specific evacuation information.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

19.8 SSFL Wildfire Smoke Conditions

See Attachment 12 (Personal Protection during Wildfire Smoke Conditions) for SSFL site-specific wildfire smoke conditions.

Wildfire Smoke and Particulate Hazards

For field projects in the state of California, an emergency regulation (Wildfire Smoke Emergency Order 2019-0719-04E) set forth by state-run Cal/OSHA has been enacted to protect workers from the dangers of wildfire smoke (our offices and vehicles are exempt). For all projects located in California, Jacobs must take the following steps to protect workers:

- Identify harmful exposure to airborne particulate matter from wildfire smoke before each shift and periodically thereafter by checking the Air Quality Index (AQI) for Particulate Matter (PM) 2.5 in regions where workers are located. One way to check the AQI in your specific region is with the Environmental Protection Agency's [Air Now tool](#).
- Talk to the Project Manager and HSM to identify all required controls and actions.
- Reduce harmful exposure to wildfire smoke if feasible, for example, by relocating work to an enclosed building with filtered air or to an outdoor location where the AQI for PM 2.5 is 150 or lower.
 - Employees who are exposed to an AQI greater than 150 “for a total of one hour or less during a shift,” are exempt from this regulation.
 - Accordingly, employees who are outside only briefly during a work shift are likely exempt.
- If employers cannot reduce workers’ harmful exposure to wildfire smoke so that the AQI for PM 2.5 is 150 or lower, they must provide:
 - Respirators such as N95 masks to all employees for voluntary use if they chose to, if the AQI for PM 2.5 is between 150 to 500. This must be performed in accordance with Jacobs Respiratory Protection Plan, Appendix D of 29 CFR 1910.134 and Appendix B to Section 5141.1 of the California Wildfire Smoke Emergency Order 2019-0719-04E
 - Training on the new regulation, the right to obtain medical treatment without fear of reprisal, the health effects of wildfire smoke, and the safe use and maintenance of respirators shall be performed for all affected employees
- If employers cannot reduce workers’ harmful exposure to wildfire smoke and the AQI for PM 2.5 is greater than 500, they must provide:
 - Respirators such as N95 masks to all employees for Mandatory use. This must be performed in accordance with Jacobs Respiratory Protection Plan and 29 CFR 1910.134
 - The preferred action in this scenario is to remove the workers from the area.

Particulate Hazards outside of the state of California must also be evaluated. If a Jacobs field project is being affected by smoke from fires or other local particulate levels, follow the steps below:

- Evaluate the Air Quality Index (AQI) for Particulate Matter (PM) 2.5 in your region. One way to check the AQI in your specific region is with the Environmental Protection Agency's [Air Now tool](#).
- Reduce harmful exposure to wildfire smoke and other harmful particulates if feasible, for example, by relocating work to an enclosed building with filtered air or to an outdoor location where the AQI for PM 2.5 is 150 or lower.
- Contact your HSM to identify other control measures that may be needed.

19.9 Emergency Contacts

24-hour WorkCare Injury Reporting – 1-888-449-7787 Global Assistance and Response & ISOS – (480) 333 3595	
Medical Emergency – 562-797-2222 or 2-2222 on a SSFL landline Facility Medical Response #: 562-797-2222 or 2-2222 on a SSFL landline Local Ambulance #: 911, Boeing to notify	Non-Emergency Medical Injuries WorkCare: 1-888-449-7787 Call no matter how minor the injury as soon as possible
Fire/Spill Emergency – 562-797-2222 or 2-2222 on a SSFL landline Facility Fire Response #: 562-797-2222 or 2-2222 on a SSFL landline Local Fire Dept #: 911 and Boeing on-site fire dept.	Jacobs Health, Safety, Security & Environment Lead Name: Stephanie Dewitt Phone: (720) 346-4851
Security & Police – 562-797-2222 or 2-2222 on a SSFL landline Facility Fire Response #: 562-797-2222 or 2-2222 on a SSFL landline Spill Line #: 818-466-8888	Jacobs Project Health and Safety Manager (HSM) Name: Loren Kaehn, MS, CSP Phone: (208) 871-5787
Jacobs Radiation Safety Officer (RSO) Name: Dustin Miller, CHP, RRPT Phone: (314)240-0507	Jacobs Radiological Operations Manager and LLRW/Radioactive material Shipping SME Name: Kevin Smallwood, RRPT Phone: (970) 250-5441
Utilities Emergency Phone Numbers Water: Boeing to notify Gas: Boeing to notify Electric: Boeing to notify	Jacobs Human Resources Department Human Resources Service Desk toll-free number Phone: 1-877-586-4411 (United States and Canada)
Jacobs Project Managers Name: Liz Bryant (PM) Phone: (714) 697-9028 (cell) Name: Abe Northup/DET (GW Monitoring Project) Phone: (269) 358-2165 (cell) Name: Kevin Murdock/COS (GETS Project) Phone: (805) 358-5260 (cell) Name: Mark Strong/CLT (BVE/SVE Pilot Study Project) Phone: (704) 340-4378 (cell) Name: Tom Wallis (AIBP Removal Action Project) Phone: (510) 501-0551 (cell)	Jacobs Worker's Compensation: Contact Market Human Resources Department to have form completed Workman's Compensation Claims: WCClaims@CH2M.com
Jacobs Safety Liaison (SL) Name: Andrew Dunavent/SDO Phone: (619) 272-7223	Jacobs Safety Liaison (SL) Name: Sam Sundahl/RDD Phone: (530) 693-2269

Name: Caroline Carter/SCO (BAM Project)

Phone: (310) 930-2187 (cell)

Name: Roger Lucich/BAO

Phone: (925) 250-4441

Name: Charlie Royko/SDO

Phone: (773) 793-5941

Name: Steven Sanchez/SCO

Phone: (323) 717-7087

Name: Bobby Horan/SCO

Phone: (714) 801-5778

Media Inquiries Corporate Strategic Communications

Name: Lorrie Paul Crum

Phone: 469-941-8845

Jacobs US Security Officer:

Name: Keith Waddell

Phone: (214) 920-8327

Jacobs Project Environmental Manager

Name: Jenny Lindquist

Phone: (530) 209-2234

Automobile Accidents

Rental: Vehicle Accident Form required to be sent to AutoClaims@CH2M.com (see Vehicle Accident Guidance attached to this plan)

Fleet Vehicle: Karyna Zarate (281) 721-8634

Federal Express Dangerous Goods Shipping

Phone: (800) 238-5355

CHEMTEL (hazardous material spills)

Phone: (800) 255-3924

Facility Alarms: Use verbal notification or vehicle horn. Boeing radio to be monitored for site alarms.

Evacuation Assembly Area(s): Vehicle parking area.

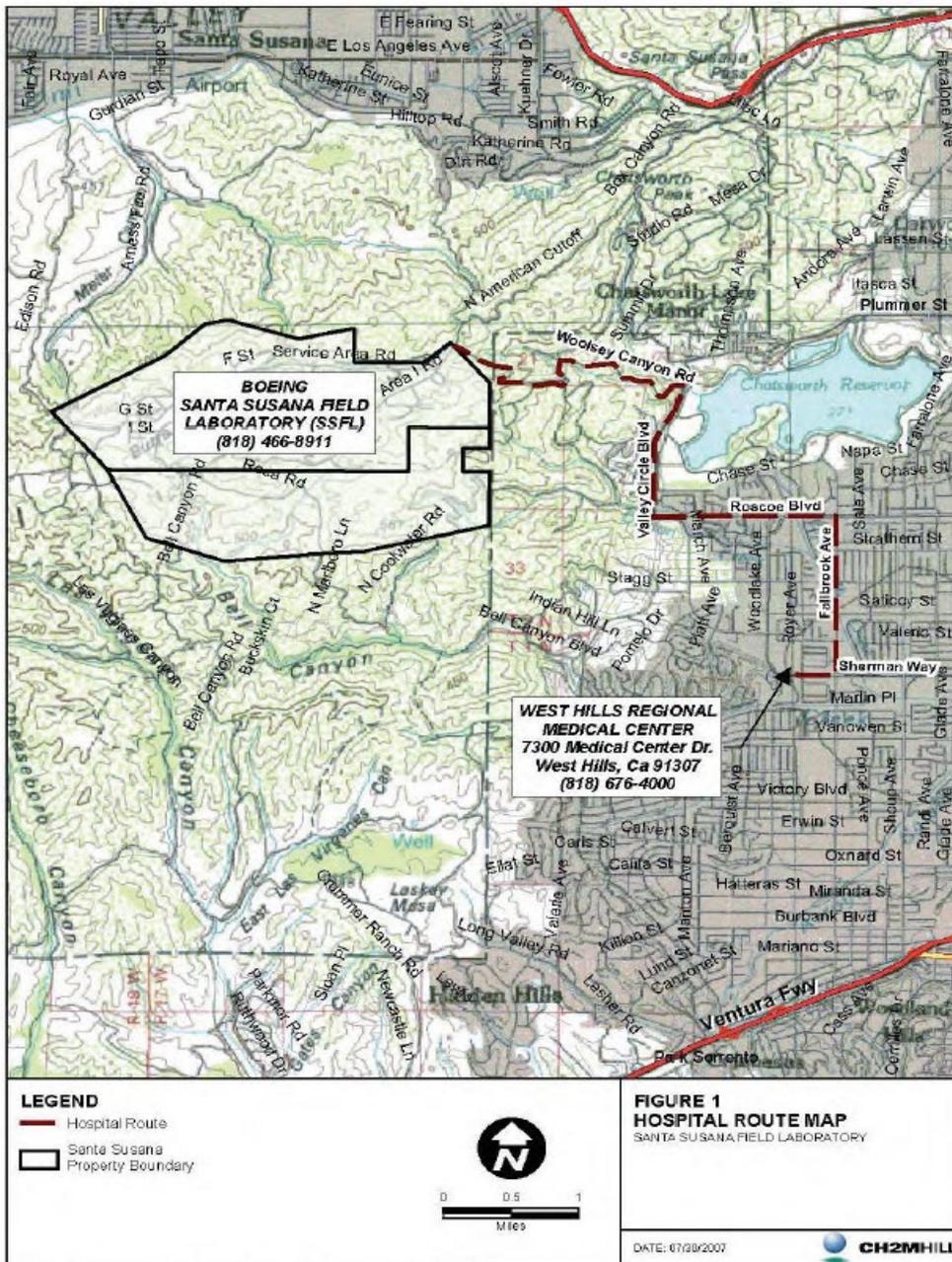
Facility/Site Evacuation Route(s): See Attachment 13 for the SSFL evacuation areas. Please contact Mark Spenard to determine which evacuation area to use.

Directions to Local Hospital

Local Hospital (approximately 5.5 miles – 15 minutes from the front gate of the site; see Hospital Route Map provided below)

- 1) Travel downhill on Woolsey Canyon Road
- 2) Turn right on Valley Circle Blvd.
- 3) Turn left on Roscoe Blvd.
- 4) Turn right on Fallbrook Ave.
- 5) Turn right on Sherman Way/Medical Center Drive to reach West Hills Regional Medical Center.

See attached map for hospital route illustration.



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20. Spill Containment Procedures

Jacobs and subcontractor personnel working at the project site shall be knowledgeable of the potential health, safety and environmental concerns associated with petroleum and other hazardous or radioactive substances that could potentially be released at the project site.

The following is a list of criteria that must be addressed in Jacobs' or the subcontractor's plans in the event of a spill or release. In the event of a large quantity spill notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop the spill immediately (if possible and properly trained) or note source. If unsafe conditions exist, then leave the area, call onsite emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. The SL and Boeing shall be notified immediately;
- Extinguish sources of ignition (e.g., flames, sparks, hot surfaces, cigarettes, etc.);
- Clear personnel from the spill location and barricade the area;
- Utilize available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread;
- Boeing will perform clean-up of the spill;
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate reporting and cleanup procedures (if needed) can be identified;
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion; and
- A Spill Report shall be completed, including a description of the event, root causes, and corrective actions.

21. Inspections

21.1 Inspections and Audits

Various types of inspections may be conducted, including Leadership HSE site visits, project activity self-assessments, Beyond Zero Observations, Agency inspections, and operational project reviews which are described below.

Additional environmental inspections may be required based on the scope of the project. These can include weekly hazardous waste container inspections, daily hazardous waste tank inspections, monthly oil Spill Prevention Control and Countermeasures (SPCC) inspections, and routine stormwater inspections. Contact your Environmental Manager to determine what environmental inspections may be needed. A separate plan (e.g., waste management, environmental, spill plan) may be appropriate and may include environmental inspection checklists; such a plan can be referenced in this section.

HSE project audits will be determined and scheduled based on the risk profile of the project and input from the LOB or Regional BU HSE Lead. The F&ES HSE Project Audit Plan will be populated with the audit schedule and kept on the F&ES HSE SharePoint Site.

21.2 Leadership HSE Site Visit Form

The project PM and Managers of Project (or their designees) will conduct periodic Leadership Engagement sessions or Site Walks to the project every year. The PM may delegate completion to the task manager if the project is of short duration and a visit is not planned for.

The Leadership Engagement session or Site Walk will be documented using the Leadership Engagement tool in the [Intelix Beyond Zero Observation Module](#). Contact your HSM if you need directions for completing the form and copy your HSM on your submittal. Examples of Leadership Engagement include leading the subcontractor chartering call, engaging with project team on matters of HSE, performing a site visit/walk to observe HSE at the project, completing a HSE Site Inspection Report, holding an HSE Stand-Down, etc.

21.3 Project Activity Self-Assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-Assessment Checklists are contained as an attachment to this PHSEP. The Project-Activity Self-Assessment Checklists are based upon minimum regulatory compliance and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SL.

The self-assessment checklists will also be used by the SL in evaluating the subcontractors and any client contractors' compliance on site.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SL or other Jacobs representative and maintained in project files.

- Drilling
- Hand and Power Tools
- Electrical Safety

- Earthmoving Equipment
- Groundwater Monitoring
- Respiratory Protection
- Traffic Control
- PPE
- Underground Utility Verification

21.4 Beyond Zero Observations

(Reference Jacobs Business Management System Work Instruction, JJ-HS-WI-0306-JJ, BeyondZero Observations)

BZOs are a required element of our BeyondZero Culture of Caring and can be performed for project observations as well as away from work. The minimum frequency on this project is to submit a BZO is once per week, using the BZO mobile app of Intellex platform on JacobsConnect.

Reach out to your HSM/EM if you need help entering a BZO. Be sure to add the HSM (or EM if an environmental observation) to the “additional notifications” field of the BZO form so they are notified. Attach photos whenever possible.

* Note: Entering the correct Worst Potential Severity (WPS) code is important! The WPS code is a way of rating an event based on the likelihood of what could have happened versus what actually happened. When a WPS of 3, 4, or 5 is indicated, the BZO form will require close-out by the PM. **Ensure your HSM, Supervisor, and/or PM are notified of the event prior to submitting an SOR with a WPS of 3 or greater.** Likewise, if any follow-up action is needed, regardless of WPS, notify the HSM and/or PM and supervisor.

Worst Potential Severity Table			
WPS	Injury -Illness	Environment	Property Damage
5	Fatality or total permanent disability	Serious offsite impact, significant remediation required	USD\$> 3 million
4	Partial disability; life changing; intensive care	Significant offsite impact, some remediation required	USD\$ 300K-3 million
3	Urgent treatment, surgery	Release significantly above reportable limit of some local impact	USD\$ 30K-300K
2	Medical treatment to prevent deterioration	Release above reportable limit or minor impact	USD\$ 3K-30k
1	Simple, immediate treatment	Small release contained onsite and no impact	USD\$ less than 3K

How to complete a SOR:

- Go to JacobsConnect and use the [electronic BZO tool](#);
- Download the SOR app from the Jacobs Appstore: <https://appstore.Jacobs.com>; or
- Use the hard copy form attached to this plan.

BZOs can be chosen by the Center of Excellence (COE) as a winner of the BZO of the month. StepBack Process

(Reference BIAF Global Guide, BIAF-350-G-01, HSE StepBack Process)

The StepBack process applies to all Jacobs employees and subcontractors that are performing tasks in an office or at a site location. It is a critical thinking process to supplement HSE planning tools such as the

Project Health, Safety and Environment Plan

Pre-Task Safety Plan, HIIRAs, and PHSEPs and should be applied at the start of shift, after a break, when the task or location change, when adjacent work may present additional hazards, or any other hazard or change to task is identified. Training for initial roll-out will be provided via 8-hour HAZWOPER refreshers or a briefing from the HSM.

The process is comprised of three key steps:

Identify: Prior to and while executing the task, “StepBack” and identify any new hazards or changes to the environment, including reviewing personal physical and mental preparedness. Ask the questions on the card (see wallet card or use the form attached to this plan); if “yes” is the answer to all questions, the task may proceed. If you answer “no” to any of the questions, STOP work and contact your HSM/EM. Together you will work through the following steps to identify corrective actions.

Evaluate: Assess the risk associated with the new hazard or change to the environment to understand the level of risk.

Act: Take appropriate action. Engage with project management or supervisors as necessary to identify the risk mitigation measures. Mitigation measures (changes to means/methods, use of different PPE than specified in the HIIRA, or similar) would require HSM involvement and potentially revision to the HIIRA and or PHSEP.

Completion: After the job has finished ask:

- Did you feel safe doing the job?
- Were others nearby working safely?
- Can any improvements be made next time?

If any of these questions yield a “no” response, follow up with feedback to the PM, HSM, or your supervisor.

21.5 Agency Inspections

If a Federal or local agency (e.g., OSHA, local water board, EPA, Department of Environmental Quality) announces it will be performing inspection, either announced or unannounced, refer to the attachment, Agency Inspections, in this plan. Contact the PM, HSM, the Jacobs RSO (for radiological only), and EM as soon as you receive notice.

22. Incident Notification, Reporting, and Investigation

(See P&PS Work Instruction IB-HS-WI-0400-IB, P&PS Incident Reporting and Investigation)

22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public;
- Damage to property or equipment;
- Interruptions to work or public service (e.g., hitting a utility);
- Incidents which attract negative media coverage;
- Near misses;
- Spills, leaks, or regulatory violations; and
- Motor vehicle accidents.

Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SL and maintained onsite for the duration of the project.

22.2 Section Definitions

Incident: an undesired event which results or could have resulted in loss through injury, damage to assets or environmental harm. This includes all of the definitions below.

Accident: an incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: an unsafe act or incident which, in other circumstances, could have resulted in loss through injury, damage to assets, or environmental harm.

Serious Incident:

- All fatalities including contractors, subcontractors, third parties, or members of the public;
- Kidnap/Missing Person;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage;
- Acts or threats of terrorism; and
- Spill or release of hazardous or radioactive materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor and Boeing.

The Jacobs or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the Jacobs SL.

The SL shall immediately report the following information to the HSM, the Jacobs RSO (for radiological only), and PM by phone and e-mail:

- Project Name/Site Manager;
- Date and time of incident;
- Description of incident;
- Extent of known injuries/damage;
- Level of medical attention; and
- Preliminary root cause/corrective actions.

The SL shall complete an Incident Report Form and forward it to the HSM and the Jacobs RSO (for radiological only), within 24 hours and finalize those forms within 3 calendar days.

The Jacobs team shall comply with all applicable statutory incident reporting requirements such as those to OSHA and the police.

22.4 Incident Report Form (IRF)

It is the policy of Jacobs to maintain Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A incident report entry will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative. Intelix, and incident reporting entry will be completed by the HSM.

22.5 Injury Management/Return-to-Work (for Jacobs Staff Only)

(Reference Jacobs, SOP HSSE-124, *Injury Management/Return-to-Work*)

22.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SL should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program;
- Become familiar with the Notification Process (detailed below); and
- Post the Workcare Notification Poster.

22.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their Supervisor.
- Employee calls WorkCare number immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment) with the supervisor

or SL accompany the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.

- Supervisor/SL completes the Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and HSM.
- Nurse notifies appropriate Jacobs staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured/ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

22.6 Determine the Actual Severity and Worst Potential Severity

Work with your HSM or EM and use the severity table below to determine the Actual Severity (AS) and the Worst Potential Severity (WPS) of the incident. WPS is a way of rating the incident based on what harm may have realistically been experienced considering the controls in place at the time had the incident realized its full potential. Once the AS and WPS are determined, ensure the verbal reporting take place at the time period specified. Ensure that both operations and HSE chains are notified. AS and WPS with increasing severity requires a higher level of notifications. See table and incident notification flowchart.

AS or WPS (specific Operations reporting requirements)	Injury/Illness	Environment	Reputation	Economic / Material Production	Motor Vehicle Incident (MVI)
5 (Report up to LoB President and CEO within 2 hours)	Fatality or total permanent disability or kidnapping	Serious off-site impact, significant remediation required	International media coverage; regulatory sanction	USD\$ > 3 million	Collision with another vehicle or object with at least one vehicle moving at high speed; >50mph (80kph) or an incident involving vehicle roll-over or striking a pedestrian, bicycle or motorcycle
4 (Report up to LoB SVP within 2 hours)	Partial disability; life changing; intensive care or aggravated assault	Significant off-site impact, some remediation required	National media coverage; regulatory action	USD\$ 300k-3mill	Collision with another vehicle or object with at least one vehicle moving at medium speed; >40 and 65kph and < 80kph)
3 (Up to VP/GM within 2 hours)	Urgent treatment; surgery or assault	Release significantly above reportable limit or some local impact	State media coverage; Prohibition Notice	USD\$ 30k-300k	Collision with another vehicle or object with at least one vehicle moving at medium speed; >30 and < 40mph (>48kph and < 65kph)
2 (Up to Regional Ops within 1-2 hours)	Medical treatment to prevent deterioration (i.e., more than first aid) or harassment	Release above reportable limit or minor impact	Local media coverage; citations/ fines	USD\$ 3k-30 k	Low speed collision (< 30mph or 48kph) with another vehicle or object

AS or WPS (specific Operations reporting requirements)	Injury/Illness	Environment	Reputation	Economic / Material Production	Motor Vehicle Incident (MVI)
1 (up to PM by end of the day)	Simple, immediate treatment or simple threat	Small release contained onsite and no impact	No media coverage	USD\$ < 3 k	Minor collision while stationary or moving at slow speed while parking, backing, or maneuvering

22.7 Serious Incident Reporting Requirements

(Reference Jacobs SOP HSE-111, Incident Reporting, Notification and Investigation)

The Serious Incident Reporting Requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security and Environment (HSSE) requirements for the consistent reporting of and managing of serious events throughout our operations.

22.7.1 Serious Incident Determination

The following are general criteria for determining whether an incident on Jacobs owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

- Work related death, or life threatening injury or illness of a Jacobs employee, subcontractor, or member of the public;
- Kidnap/missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage; and
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.7.2 Serious Incident Reporting

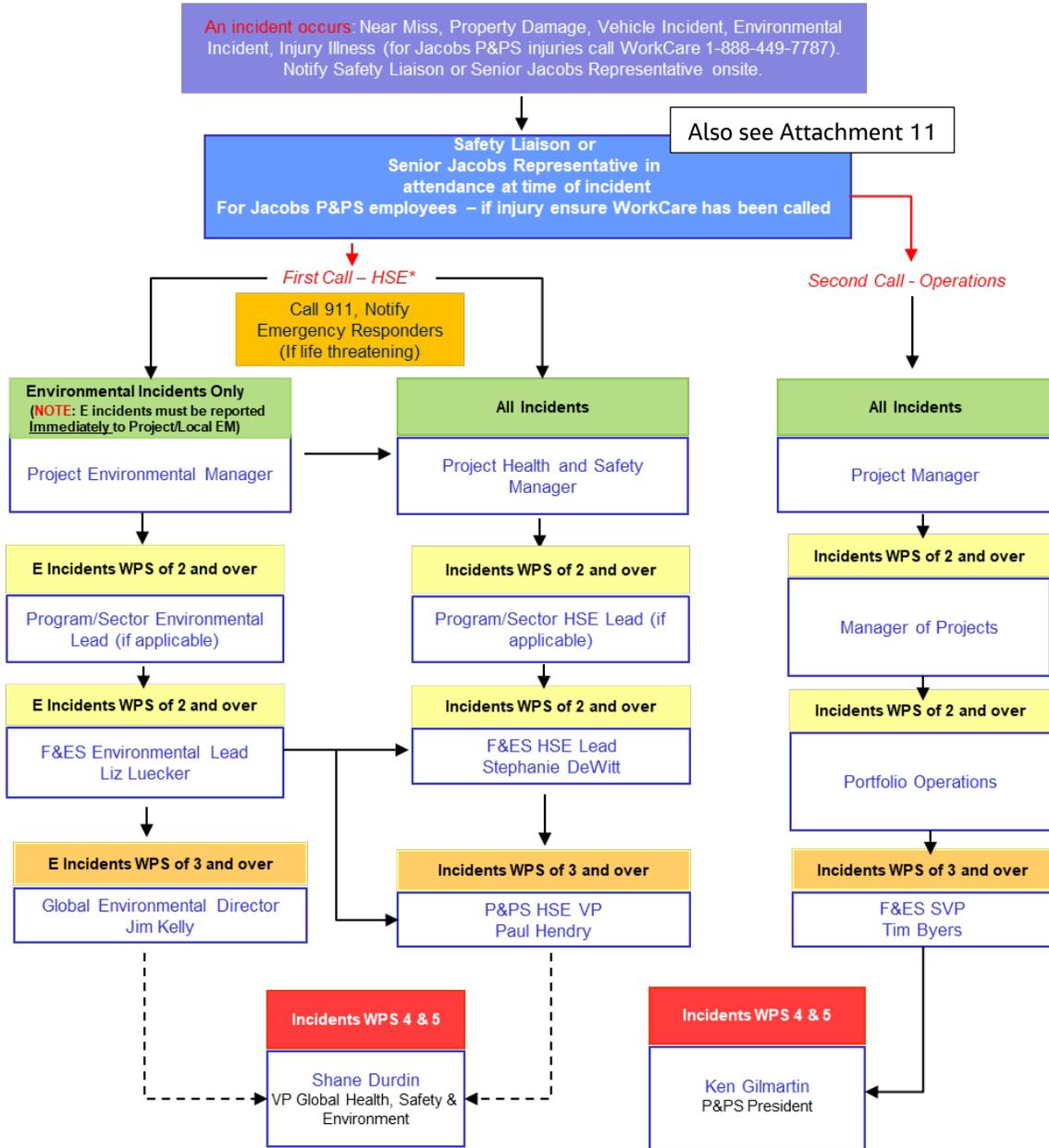
If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Global Assistance and Recovery, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Jacobs Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

Verbal Incident Notification – to be implemented as soon as possible after an incident.

Verbal incident notification is made to both the HSE and the Operations chains to the indicated group depending on the severity, and any project, geographic, or client specific notification and reporting requirements as shown in the flowchart below (Also refer to P&PS Work Instruction IB-HS-WI-0400-IB, Incident Reporting and Investigation). The HSM will complete an Intellex report.

F&ES Verbal Chain for Reporting all Field Incidents



* First call HSE – If the incident is an environmental incident, immediately (within 15 minutes) call the EM to ensure timely reporting to external agencies, if necessary. If any other type of incident, call the HSM as the first call.

Notes:

1. Worst Potential Severity (WPS) definitions are to be found in Global Work Instruction JJ-HS-WI-0400-JJ, HSE&S Incident Mngm.
2. Actual 4 and 5 must be communicated to Legal and Communications by the HSE VP or GVP
3. All incidents involving Jacobs employees or a subcontractor under Jacobs control (including motor vehicle accidents, injuries, environmental incidents and near-misses) shall be reported as soon as possible **in person or by telephone**.
4. If your Project Manager is not your Line Manager it is essential that a call is made to both.
5. Calls must be made to both the relevant HSE and operations chains. These are not alternatives.
6. Security and Sustainability Directors / VP's will be notified where appropriate by HSE&S VP / HSE VP
7. Where required by legislation, a Jacobs HSE&S Manger will make the necessary report to the enforcing authorities.

22.8 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. The investigation team will consist of the SL (with support from HSM), appropriate subcontractor personnel as necessary, the PM, and the responsible supervisor. More participants may be involved as needed to complete the investigation.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must use the Root Cause Analysis Flow Chart to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

For "Serious Incidents" call the Security Contact in Emergency Contacts
(e.g., work related death, kidnapping terrorism, property damage in excess of \$500,000, spill with significant threat, etc. Refer to SOP HSE-111 for additional information.)

22.8.1 Personal Factors

- Lack of skill or knowledge.
- Correct way takes more time and/or requires more effort.
- Short-cutting standard procedures is positively reinforced or tolerated.
- Person thinks there is no personal benefit to always doing the job according to standards.

22.8.2 Job Factors

- Lack of or inadequate operational procedures or work standards.
- Inadequate communication of expectations regarding procedures or standards.
- Inadequate tools or equipment.

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

22.8.3 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SL upon successful implementation of all recommended actions.

- The HSM will inform the Responsible Environmental Manager (REM) of any environmental incidents.
- Evaluation and follow-up of the IRF will be completed by the type of incident by the HSM and EM. The FES HSE Lead will review all FES incidents and modify as required.
- Incident Investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

22.9 Drug and Alcohol Free Workplace

(See Jacobs Human Resource Policy PL-EB-PL-6830-PL, Drug and Alcohol-Free Workplace)

All employees, subcontractors, and other employed individuals are expected to arrive at work fit to carry out their jobs and to be able to perform duties safely without any limitations due to the use or after effects of alcohol or drugs (whether prescribed, over the counter, or illegal).

It is forbidden to be present at the workplace after consuming alcohol or drugs and/or possess and/or consume alcohol or drugs at the workplace. Any employee or subcontractor who violates these rules will not be permitted to work. Immediate supervisors are responsible for monitoring adherence to the policy.

When an employee, subcontractor or employed individual arrives at work or during the workday and a supervisor reasonably believes that they are under the influence of alcohol or drugs, the supervisor must immediately contact Human Resources in order that the person can be provided with assistance and an investigation can be undertaken.