Health and Safety Plan for
HP-238

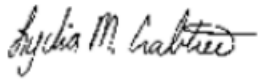
Prepared for
New York City Department of Environmental Protection
December 21, 2017

HP-238 Design Services and Design Services During Construction of the
New Anaerobic Digester Facilities at the Hunts Point WWTP
Ryawa Avenue
Bronx, New York 10474
BC Project Number 148525

Revision 9/17

Approval Page

This Health and Safety Plan (HASP) has been prepared and reviewed by the following Brown and Caldwell (BC) personnel for use at the Hunts Point WWTP, project number 148525

	Name	Signature	Title	Date
Prepared By:	Terri Reilly		Administrative Coordinator	9/27/2017
Reviewed By:	Jean-Pierre Hourani, P.E., BCEE		Site Safety Officer	9/27/2017
Reviewed By:	Gary Newman, P.E.		Project Manager	9/27/2017
Reviewed By:	Lydia Crabtree, CSP		Regional Safety Unit Manager	9/27/2017
Effective Dates:	September 27, 2017	through	September 26, 2018	

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Section 1

Critical Project Information

1.1 Health and Safety Policy

Brown and Caldwell Associates (BC) has long been committed to the health and safety of every employee by providing a safe work environment. BC and our project team will also comply with applicable DEP policies and procedures where applicable. As evidence of this commitment, our Health and Safety Program (HSP) meets or exceeds every federal or state Occupational Safety and Health (OSHA) requirement.

The goal of an effective HSP is simple: prevent incidents, injuries and illness. Brown and Caldwell Associates supports this goal by providing the resources necessary for an effective HSP. It is absolutely essential that every employee 1) comply with the policies and procedures described in the program manual, 2) follow specific operations procedures as required, and 3) most importantly, use common sense and safety precaution when conducting business operations.

With careful planning, good management and active employee participation, we can achieve our safety program goals.

BC has a long-standing commitment to maintain the highest standards for employee health and safety, and to prevent incidents and injuries resulting from the misuse of alcohol and controlled substances by employees. BC's Drug and Alcohol Policy enables BC to comply with federal law with respect to employees assigned to pipeline operations.

1.2 Introduction

Brown and Caldwell Associates (BC) has prepared this Health and Safety Plan (EHASP) for use during site visits, limited geotechnical drilling, and limited hazardous materials survey activities to be conducted at the Hunts Point Waste Water Treatment Plan (WWTP) located at Ryawa Avenue, Bronx, New York 10474 ("the Site"). Activities conducted under BC's direction at the Site will be in compliance with applicable New York City DEP policies and procedures, New York State Public Employee Safety and Health Bureau (PESH) regulations, Occupational Safety and Health Administration (OSHA) regulations, particularly those in Title 29 of the Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 29 CFR 1926), and other applicable federal, state, and local laws, regulations, and statutes. A copy of this EHASP will be kept on site during scheduled field activities.

This EHASP addresses the identified hazards associated with planned field activities at the Site. It presents the minimum health and safety requirements for establishing and maintaining a safe working environment during the course of work. In the event of conflicting requirements, the procedures or practices that provide the highest degree of personnel protection will be implemented. If scheduled activities change or if site conditions encountered during the course of the work are found to differ substantially from those anticipated, the Regional Safety Unit Manager and Project Manager will be informed immediately upon discovery, and appropriate changes will be made to this EHASP.

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CRITICAL PROJECT INFORMATION

Primary Known Compound(s) of Concern: Asbestos, Lead, Mercury, Polychlorinated Biphenyls (PCBs) - direct exposure is not anticipated with the exception of limited potential exposure during destructive testing occurring with the design phase. - this list is for awareness purposes.

Chlorine, hydrogen sulfide, methane, corrosive materials, and other chemicals associated with wastewater treatment are present at locations; however, direct contact by BC employees is not anticipated.

PPE Required: Hard Hat, safety glasses, steel/hard toe boots, high visibility vest, ear plugs when needing to elevate your voice to speak to someone 3' away, nitrile gloves if handling potentially contaminated equipment/materials, appropriate gloves for gathering information with regard to electrical panels, personal gas monitor as needed for monitoring atmospheric conditions, first aid kit, mobile phone, fluids/drinking water.

Respiratory Protection Required: None

SEE SECTION 10 FOR SITE EMERGENCY CONTINGENCY PROCEDURES

Do not endanger your own life. Survey the situation before taking any action.

BC Office Telephone	**646.367.0631**
Site Location Address	**Ryawa Avenue, Bronx, New York 10474**

EMERGENCY PHONE NUMBERS: In the event of emergency, contact the Project Manager and/or Regional Safety Unit Manager.

Emergency Services (Ambulance, Fire, Police)	**In Plant, call Watch Engineer #29**
Poison Control	**(800) 876-4766 or (800) 222-1222**
Hospital Name	**Bronx-Lebanon Hospital Center**
Hospital Phone Number	**718.590.1800**
BC Project Manager (PM; Gary Newman)	**Office: 602-567-3867** **Cell: 602-828-8982**
BC Site Safety Officer (Assistant Project Manager and SSO; Jean-Pierre Hourani)	**Office: 646.367.0583** **Cell: 516.325.8015**
BC Regional Safety Unit Manager (Lydia Crabtree)	**Office: 615.250.1236** **Cell: 615.202.1311**
Corporate Risk Management	**Property Loss** **Yolanda Harden 925.210.2494** **Maria Aguirre: 925.210.2488**
Subcontractor Contact (Refer to Separate Contact List, Appendix G)	**Office: ***-***-****** **Cell: ***-***-********
Client Contact (Steve Winrock)	**Office: 718.589.1300** **Cell: 347.461.6491**
BDEC AM (Nat Federici)	**Office: 718.595.6505**
OTHER CONTACT(s)	

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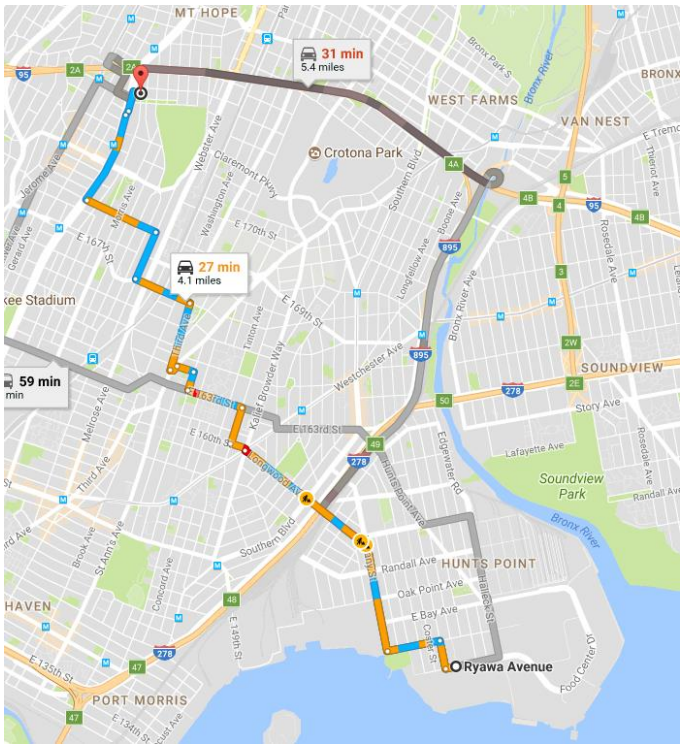
HOSPITAL LOCATION MAP



HOSPITAL DIRECTIONS:

Hunt's Point Wastewater Treatment Plant, Ryawa Ave, New York, NY

1. Head **east** on **Ryawa Ave** to **Tiffany Street** 0.4 mi
2. Take Longwood Ave. to 160th St. 1.2 mi
3. Continue on E 160th St. Take Cauldwell Ave. to Boston Rd./Edward A. Stevenson Blvd. 0.7 mi
4. Take Third Ave. to 167th Street 0.4 mi
5. Take 169th St. to Grand Concourse 0.9 mi
6. Turn right on Mt. Eden Parkway – Emergency Department is on left

HOSPITAL INFORMATION:

Bronx Lebanon Hospital
1650 Grand Concourse
Bronx, New York 10457

Phone: 718.518.5046

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EMERGENCY FIRST AID PROCEDURES

THE RESPONDER SHOULD HAVE APPROPRIATE TRAINING TO ADMINISTER FIRST AID OR CPR

1. Survey the situation. Do not endanger your own life. DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME. FOLLOW PROTOCOLS INCLUDING THAT A STANDBY PERSON IS PRESENT. IF APPLICABLE, REVIEW MSDSs TO EVALUATE RESPONSE ACTIONS FOR CHEMICAL EXPOSURES.
2. Call 911 (if available) or the fire department **IMMEDIATELY**. Explain the physical injury, chemical exposure, fire, or release.
3. Decontaminate the victim if it can be done without delaying life-saving procedures or causing further injury to the victim.
4. If the victim's condition appears to be non-critical, but seems to be more severe than minor cuts, he/she should be transported to the nearest hospital by the SSO or designated personnel: let the doctor assume the responsibility for determining the severity and extent of the injury. If the condition is obviously serious, contact emergency medical services (EMS) for transport or appropriate actions.

Notify the PM and Regional Safety Unit Manager immediately and complete the appropriate incident investigation reports as soon as possible.

STOP BLEEDING AND CPR GUIDELINES	
To Stop Bleeding	**CPR**
1. Give medical statement by indicating you are trained in First Aid. 2. Assure: airway, breathing and circulation. 3. Use **DIRECT PRESSURE** over the wound with clean dressing or your hand (use non-permeable gloves). Direct pressure will control most bleeding. 4. Bleeding from an artery or several injury sites may require **DIRECT PRESSURE** on a **PRESSURE POINT**. Use pressure points for 30 -60 seconds to help control severe bleeding. 5. Continue primary care and seek medical aid as needed.	1. Give medical statement by indicating you are trained in CPR. 2. Arousal: Check for consciousness. 3. Call out for help, either call 911 yourself or instruct someone else to do so. It is very important to call for emergency assistance prior to initiating CPR. 4. Open airway with chin-lift. 5. Look, listen and feel for breathing. 6. If breathing is absent, give 2 slow, full rescue breaths, 1 second per breath. 7. If breathing remains absent, initiate CPR; 30 compressions for each two breaths. Repeat for 5 cycles before re-analyzing patient or until help arrives. 8. If an automated external defibrillator (AED) is available, use it in accordance with the AED instructions.

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Section 2

Key BC Project Personnel and Responsibilities

Gary Newman is the BC Project Manager (PM). Lydia Crabtree is the BC Safety Manager (SM). Jean-Pierre Hourani has been designated as the BC Assistant Project Manager and Site Safety Officer (SSO) for this project. The BC project field staff has received health and safety training which meets applicable requirements of 29 CFR 1910 and 29 CFR 1926. Depending on project activities, specialized health and safety training may be required and will be provided as necessary.

The responsibilities of key BC project personnel are presented below.

2.1 BC Project Manager

The PM is responsible for evaluating hazards anticipated at the Site and working with designated field staff and the Health and Safety Program Manager to prepare this EHASP to address the identified hazards. The PM, or PM designee, is also responsible for the following.

- Coordinating with the Bureau of Wastewater Treatment Plant (BWT) prior to site visits.
- Informing project participants of safety and health hazards identified at the Site.
- Providing a copy of and requiring that each BC project team member, including subcontractors, reads or is briefed on the EHASP.
- Checking that the BC project team is adequately trained and perform safety briefings in accordance with this EHASP.
- Providing the resources necessary for maintaining a safe and healthy work environment for BC personnel.
- Communicating project safety concerns to the Health and Safety Program Manager for determining corrective actions.

2.2 BC Site Safety Officer

The SSO, or SSO's designee, has on-Site responsibility for verifying that BC team members, including subcontractors, comply with the provisions of this EHASP. The SSO, or SSO's designee, has the authority to monitor and correct health and safety issues as noted on-Site. The SSO will have completed the 4-hour BEDC Standards Manual Course Certification. The SSO, or SSO designee, is responsible for the following:

- Being on Site when work is actively occurring.
- Reporting unforeseen or unsafe conditions or work practices at the Site to the PM or SM.
- Stopping operations that threaten the health and safety of BC field team or members of the surrounding community.
- Monitoring the safety performance of Site personnel to evaluate the effectiveness of health and safety procedures.
- Performing air monitoring, as necessary, as prescribed in this EHASP.

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- Documenting field team compliance with this EHASP by completing the appropriate BC forms contained in the Appendices of this document.
- Conducting daily tailgate safety meetings and assuring that project personnel understand the requirements of this EHASP (as documented by each BC field team member's signature on the Signature Page).
- Limiting access to BC work areas on the Site to BC field team members and authorized personnel.
- Enforcing the "buddy system" or minimum 2-person teams as appropriate for Site activities.
- Performing periodic inspections to evaluate safety practices at the Site.
- Identifying the location and route to nearby medical facility and emergency contact information and coordinating appropriate responses in the event of emergency.

2.3 BC Safety Manager

The Health and Safety Program Manager is responsible for final review and modification of this EHASP. Modifications to this EHASP that result in less protective measures than those specified may not be employed by the PM or SSO without the approval of the Health and Safety Program Manager. In addition, the Health and Safety Program Manager has the following responsibilities.

- Developing and coordinating the overall BC health and safety program.
- Advising the PM and SSO on matters relating to health and safety on this project.
- Recommending appropriate safeguards and procedures.
- Modifying this EHASP, if necessary, and approving changes in health and safety procedures at the Site.

2.4 BC Team Members

BC employees and subcontractors are responsible for familiarizing themselves with health and safety aspects of the project and for conducting their activities in a safe manner. This includes attending site briefings, communicating health and safety observations and concerns to the SSO, maintaining current medical and training status and maintaining and using proper tools, equipment and PPE. Proper work practices are part of ensuring a safe and healthful working environment. Safe work practices are essential and it is the responsibility of BC employees and team members to follow safe work practices when conducting scheduled activities. Safe work practices to be employed during the entire duration of fieldwork include, but are not limited to, the following.

- Following the provisions of this EHASP, company health and safety procedures and regulatory requirements.
- Reviewing safety-related information from other parties (i.e., client or contractors) as it relates to BC's activities.
- Inspecting personal protective equipment (PPE) before on-site use, using only intact protective clothing and related gear, and changing suits, gloves, etc. if they are damaged or beyond their useful service life.
- Set up, assemble, and check out all equipment and tools for integrity and proper function before starting work activities.
- Assisting in and evaluating the effectiveness of Site procedures (including decontamination) for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.
- Practice the "buddy system" as appropriate for site activities.
- Do not use faulty or suspect equipment.

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- Do not use hands to wipe sweat away from face. Use a clean towel or paper towels.
- Practice contamination avoidance whenever possible.
- Do not smoke, eat, drink, or apply cosmetics while in chemically-affected areas of the site or before proper decontamination.
- Wash hands, face and arms before taking rest and lunch breaks and before leaving the site at the end of the workday.
- Check in and out with the SSO, or SSO's designee, upon arrival and departure from the site.
- Perform decontamination procedures as specified in this EHASP.
- Notify the SSO, or SSO's designee, immediately if there is an incident that causes an injury, illness or property loss. Incidents that could have resulted in injury, illness or property loss (close call) will also be reported to the SSO, or SSO's designee.
- Do not approach or enter an area where a hazardous environment (i.e., oxygen deficiency, toxic or explosive) may exist without employing necessary engineering controls, proper PPE and appropriate support personnel.
- Use respirators correctly and as required for the Site; check the fit of the respirator with a negative or positive pressure test; do not wear respirator with facial hair or other conditions that prevent a face-to-face piece seal.
- Confined spaces will not be entered without appropriate evaluation, equipment, training and support personnel.

2.5 BC Subcontractors

All subcontractors and subconsultants that will require visiting the Hunts Point WWTP site will be provided and required to sign the BC EHASP in advance so that they are familiar with its requirements prior to mobilization. Additionally, all subcontractors will receive site specific health and safety orientation from the plant operations staff and from BC. Specialty subcontractors such as drillers will be required to prepare an EHASP or JHA that is specific for their work to be incorporated into the BC EHASP. Subcontractor personnel are expected to comply fully with subcontractor's EHASP and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC EHASP. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

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Figure 2-1. Organizational Chart

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Section 3

Work Scope and Hazard Analysis

3.1 Site History

The Hunts Point Wastewater Pollution Control Plant (WPCP) is one of the largest of New York City's 14 water pollution control plants. The plant treats wastewater from a 16,000-acre area located in the northeast part of the Bronx. The Hunts Point WWTP has been operating since 1952 and has a design dry weather flow capacity of 200 million gallons per day (mgd), and a peak wet weather capacity of 400 mgd. In addition, Hunts Point serves as a dewatering facility accepting digested sludge from other facilities for dewatering and hauling.

3.2 Site Description

The initial plant design included four anaerobic digesters with an additional four added in 1969. Over time, a number of the existing digesters were converted into open top digested sludge storage/separation tanks, with three still providing digestion capacity today and the fourth being decommissioned due to a loss of structural integrity. Historically, the digester performance has been reliable, resulting in good dewatering performance and producing sufficient biogas to meet process and some auxiliary building heating requirements.

The digestion system, as currently configured, has reached capacity limits and when combined with the age of the infrastructure is in need of both expansion and replacement. A new anaerobic digester facility will therefore be constructed in a vacant area located immediately north of the Hunts Point WWTP between Ryawa, Marida and Barretto Avenues.

3.3 Scope of Work

BC employees and subcontractors will perform a series of site visits and investigations for the purpose of gathering data and observations consistent with design activities. Site visits will begin September 2017 to observe the existing layout and condition of the solids handling facilities, utility infrastructure and available areas for the new sludge digester facilities. The potentially risky tasks associated with initial site visits will include the following:

- Gathering information on electrical panels and equipment – (panels to be opened by DEP staff only) reference attached Job Hazard Analysis
- Gathering information on existing anaerobic sludge processing systems where inspection areas are poorly lighted, rodents and insects are present and the atmosphere has potential explosive gases and airborne pathogens.

Subsequent to the initial site visit, additional more detailed site visits and investigations will be performed. The potentially risky tasks associated with secondary site visits will include all of the same hazards as the initial site investigations plus the following:

- Performing geotechnical drilling– Note that drilling subcontractor will provide a separate EHASP covering their activities.
- Limited Hazardous Materials Survey – reference attached Job Hazard Analysis and note that survey will be visual observations with no sample collection, therefore no direct exposure to hazardous materials are anticipated in this design effort.

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- Laser scan survey of interior spaces will be performed. Some laser scanning devices use low grade nuclear material. Additionally, BC will confirm that the laser scanning instruments are compatible with hazard classification of the facilities. If not the JHA will require mobile gas detection during use of equipment.
- A subcontractor will perform ground penetrating radar investigations to locate buried utilities. Potential hazards include uneven surfaces, insects, rodents and potential weather related environmental hazards and exposure to sunlight.
- A subcontractor will perform vacuum excavation for shallow exploratory potholing to locate buried utilities. Potential hazards include the mechanical equipment used on the vacuum truck unit and risks of damaging existing buried infrastructure.

3.4 Hazard Analysis

Hazards at the Site may include physical hazards, chemical hazards or biological hazards. Each type of identified hazard is addressed in the following sections. Hazards that are the specialty of a subcontractor (i.e., operation of a drill rig or excavator) are not addressed in this EHASP. Subcontractors are responsible for identifying potential hazards associated with their activities and implementing proper controls.

3.5 Job Hazard Analyses (JHAs)

The following JHAs should be reviewed each time prior to performing the task, and modified as needed based on existing site conditions and/or information available at the time. Subcontractors may review these JHAs. However subcontractors will be responsible for preparing submitting to BC and DEP JHAs covering their scopes of work. Subcontractor JHAs will minimally cover geotechnical drilling where appropriate, and sampling of hazardous materials where appropriate.

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BEDC JOB HAZARD ANALYSIS (JHA)

Version No.: 1
Revision Date: 11/7/12

Project:	148526	**Contract:**	HP-238	**Contractor:**	Brown and Caldwell Associates
Activity:	Site Visits and Pre-Construction Activities	**Activity Location:**	Hunt's Point WWTP		
JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/19/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Site Setup	Lack of familiarity with site requirements, PPE & work activities		Review project personnel roles and responsibilities. Minimum standard PPE for design personnel for all tasks shall include hard hat, safety glasses or goggles, sturdy work boots with non-skid soles, Class 2 high visibility safety vest, nitrile (or equivalent) gloves as necessary, and leather (or equivalent) work gloves as necessary. Hearing protection with a minimum NRR of 30 shall be used when working in high noise areas. An area shall be considered "high noise" if you need to raise your voice or have difficulty understanding a normal tone of voice at a distance of approximately three feet.	Minimum standard PPE for all tasks: Hard hat Safety glasses Safety toed work boots Class 2 Hi-vis safety vest Nitrile gloves, as necessary Work gloves, as necessary Hearing protection, as necessary	Orientation, including BEDC EHS Standards
Egress & Emergency Response	Delayed response		Review safety procedures and emergency egress routes Follow illuminated directional exit signs, if present Do not work alone in unoccupied or remote locations Verify working cell phone service or land line is provided.	• Cell phone/ land line	• EAP Review
General Field Work	Working on wet and uneven surfaces		Face the direction you are moving & look ahead. Where possible, avoid working in wet or slippery (oily) areas. Adjust your stride to a pace that is suitable for the walking surface and the tasks at hand. Walk with the feet pointed slightly outward.		

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Project:	148526	**Contract:**	HP-238	**Contractor:**	Brown and Caldwell Associates
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JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Working on wet and uneven surfaces (cont'd)		Make wide turns at corners. Do not approach any unguarded floor or wall openings. Do not walk with hands in pockets.		
	Poor House-keeping		All garbage/debris will be collected and containerized. Garbage/debris shall be removed at the end of each day. Work areas will be inspected daily for housekeeping.		
	Working near low overhead obstructions		Look ahead - face the direction you are moving. Observe the area you are entering. Take a moment to look around & identify potential hazards. Be aware of moving parts, equipment and loads that could shift or move and become overhead hazards.		
	Overhead Hazards		Be alert - face the direction you are walking. Observe the area you are entering. Take a moment to look around & identify potential hazards. Check for overhead hazards and operational equipment when entering buildings and other work areas. Do not stand under or pass under suspended loads.		
	Onsite Construc-tion		Note Construction activities that may be present. Avoid construction areas whenever possible. Look ahead - face the direction you are moving and be aware of your surround-ings. Observe the area you are entering. Take a moment to look around & identify potential hazards. Stay clear when a hoist is being used. Do not stand under a load or a boom with a suspended load. At no time should any body part be allowed to be placed under a raised load.		

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JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Onsite Construc-tion (cont'd)		Obey flagman or signal person(s). Be alert when hearing back-up alarms. Remain a safe distance away to avoid being struck by machinery. Controlled access zones-observe and obey designated swing radius and/or operating areas (roped off, barricades, etc.).		
	Fire		• Smoking is prohibited on site.		Fire prevention (TBT)
	Working at Elevations		Do not enter an elevated platform or any other locations > 4 ft. above a lower level unless it is equipped with a standard guardrail. Do not approach unprotected edges or other locations where a fall of 4 feet or greater may occur. If necessary personal fall arrest systems (PFAS) shall be utilized and training required. Do not approach any unguarded floor or wall openings	• PFAS • Guardrail	• Fall Protection

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JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Heavy Lifting		Use two people to lift heavy loads. Maximum lifting weight is 50 pounds, or less if load is awkward or individual is otherwise uncomfortable. Wear gloves to secure grip. Attach handles to loads that are bulky or difficult to grasp or obtain assistance in lifting the load.	• Work Gloves	Review proper lifting techniques
	Cuts/Abrasions		• Wear work gloves. • Avoid handling objects with rough or sharp edges.	• Work Gloves	
	Pinch points/ crushing		Avoid handling objects with rough or sharp edges. Ensure proper hand clearance when setting down or carrying loads through doors or other areas with limited clearance. Wear work gloves. Avoid handling objects with rough or sharp edges. Keep clear of equipment's moving parts	• Work Gloves	
	Heat Stress		• Training – Know signs of heat stress • Monitor body temperatures • Rest/cooling regime • Water/non-caffeinated beverages	Temperature specific clothing Water or other appro-	Heat stress (TBT)
	Cold Stress		• Training – Know signs of cold stress • Monitor body temperatures • Layered clothing • Rest/warming regime	Temperature specific clothing	Cold stress (TBT)
	Inclement Weather		• Stop work/travel during snowstorms, hurricanes, lightning strikes, hazardous icy conditions, electrical storms, high winds or low visibility conditions		

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Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Insects and Ticks		Consider using insect repellant with DEET, or keep skin well covered (i.e., long sleeve shirt secured at wrists & neck, shirt ticked into pants, pants tucked into socks, head covering under hard hat). Complete tick inspection after leaving vegetated area. Notify Project Manager of known insect allergies and keep Epi-Pen onsite.	Insect repellant with DEET	
	Poisonous Plants		Wash hands and face as soon as possible upon leaving vegetated area. Use barrier cream if poisonous plants are identified in the area. If direct contact with poison ivy, oak or sumac, use a cleanser such as Technu® after contact.	• Barrier cream • Cleanser	
	Snakes and Animals		Keep out of vegetated areas, when possible Proceed with caution when moving branches or through vegetation. Do not approach snakes or animals - walk around them. If bitten, seek medical attention promptly.		
	Vehicular Traffic		All project personnel shall wear ANSI Class 2 reflective vests as standard PPE. Obey any Temporary Traffic Controls (TTC) in effect onsite. Look both ways before crossing active roadways.	ANSI Class 2 Reflective Vest	

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Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Biological Contaminants		Use Universal Precautions including nitrile (or equivalent) gloves. Use disposal outer garments as necessary to prevent contamination of clothing (i.e., Tyvek). Use protective "booties" as necessary to prevent contamination of work shoes. Use outer work gloves as necessary to prevent punctures and cuts, etc. Wash hands and face after exiting the work site and prior to eating, drinking, contact with eyes and mouth. Use a face shield with safety glasses, chemical protective suit (i.e., poly coated Tyvek), nitrile gloves and rubber boots if there is a potential to be splashed with raw or partially treated sewage.	Disposable coveralls, as necessary Nitrile (or equivalent) gloves Leather work gloves, as necessary	Bloodborne Pathogen Awareness
	Confined Space Entry – not anticipated in this phase of work, but is here for awareness		Entrants shall sign in on entry permit; Entrants shall be secured via full body harness to a rescue tripod and winch assembly, as appropriate. Portable ladder shall be placed into channel for entry and secured prior to use. Air monitoring with 4-gas meter to continuously measure air quality. Air monitoring results shall be recorded on the confined space permit. Fresh air blower as needed to meet acceptable entry conditions/provide ventilation. Acceptable entry conditions are defined as: ◦ O2: 19.5 - 23.5% ◦ LEL: < 10% ◦ H2S: < 10 ppm ◦ CO: < 35 ppm	Tripod & winch assembly, as necessary Full body harness Portable ladder • 4-gas meter • Air blower	Confined Space Entry Facility specific Confined Space Entry procedures Knowledge of air monitoring equipment (for personnel required to perform monitoring)

BEDC JOB HAZARD ANALYSIS (JHA)

Version No.: 1
Revision Date: 11/7/12

Project:	148526	**Contract:**	HP-238	**Contractor:**	Brown and Caldwell Associates
Activity:	Site Visits and Pre-Construction Activities	**Activity Location:**	Hunt's Point WWTP		
JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Chemicals Used and Stored at the Site		Project personnel must not handle any chemicals stored at the site. Storage locations and access restrictions should be discussed with the Plant. Determine where facility SDSs are kept and review as necessary.		• HazCom
	All "Hazardous Locations" by the Facility as Containing Potentially Explosive and Oxygen Deficient Atmospheres		Do not enter without DEP authorization and coordination. Coordinate access with DEP facility personnel and determine roles and responsi-bilities for carrying out procedures and control requirements. Including but not limited to precautions and procedures and any exiting engineering controls in place that DEP uses to protect its employees when in these spaces. Be prepared to perform pre-entry and continuous air monitoring using direct read air sampling equipment. Direct read air sampling equipment shall be capable of detecting, at a minimum, the following: Hydrogen Sulfide Combustible Gases VOCs Oxygen Carbon Monoxide	Direct read air sampling equipment that at minimum can detect hydrogen sulfide, combustible gases, VOCs, oxygen and carbon monoxide	Knowledge of air monitoring equip-ment (for personnel required to perform monitoring)
	Electrical Hazards - Wiring & Equipment		Assume that all wiring and equipment are energized. Report "suspicious" or damaged wiring and/equipment. All live wiring or equipment shall be guarded to protect all persons or objects from harm. No work permitted during electrical storms.		Arc Flash Awareness

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JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
General Field Work (cont'd)	Electrical Hazards - Wiring & Equipment (cont'd)		Maintain safe distances in accordance with recognized and applicable arc boundaries for a given piece of equipment or system. At a minimum default Flash Protection Boundaries listed in NFPA 70E should be maintained.		
	Working Near Active Machinery, Pumps and/or Rotating Shafts		Know your surroundings. Be aware of where there are rotating shafts and moving parts on the equipment. Do not approach unguarded rotating equipment/shafts. Stay clear from any moving machine part. Do not wear loose fitting clothing, loose jewelry, neck ties, scarfs or any clothing accessory that may get caught in machinery. Note posted signage such as High Voltage warnings, etc.		
Bulk Sample Collection	Uncontrolled Hazardous Energy		Coordination with DEP as necessary. BC will not open any electrical panels. Internal electrical panel investigations will be performed only when DEP staff open panels. Review of equipment specific Hunts Point WWTP Energy Control Plan (ECP).	• Locks & Tags	LOTO Equipment-specific ECP review

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JHA Prepared By:	Lydia Crabtree, CSP and BC Project Team			**Est. Start Date:**	9/27/2017

Table 5-1
Job Hazard Analysis

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
Bulk Sample Collection (cont'd)	Inhalation of Potentially Contaminated Material	Release of potentially contaminated material	Due to nature of the task, the amount of airborne dust generated is expected to be below concentrations where respiratory protection is required. Placement of poly below sample collection point to catch any debris generated. Wetting down area (when applicable).	• Poly sheeting	
	Direct Contact With Potentially Contaminated Material		Use nitrile (or equivalent) gloves. Contact with materials being inspected will be kept to a minimum when possible	Nitrile (or equivalent) gloves	Hazardous Materials (Lead, PCB, Mercu-ry) Awareness
	Inhalation of asbestos containing dusts	Release of asbestos fibers	Materials potentially containing asbestos will be wet down with amended water prior to disturbance. Use half face APR with P-100 cartridges.	Spray bottle with amend-ed water Half face	Asbestos Awareness NYS Licensed Asbestos Investiga-tor
	Direct contact with asbestos containing		Use nitrile (or equivalent) gloves and disposable coveralls.	Nitrile (or equivalent) gloves	Asbestos Awareness NYS Licensed Asbestos Investiga-
	Cuts/Abrasions from sample collection tools		• Use cut resistant gloves.	Leather/cut resistant work gloves	

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Table 5-2
Screening Channel Confined Space Entry Job Hazard Analysis

Task/ Activity	Hazards	Environmental Considerations	Controls	Equipment	Training Requirements
Access Setup	Slips/Trips/Falls		Railings around channel access shall not be removed. BWT shall place extension ladder into channel upstream of screens using overhead crane. Secure extension ladder, with top extending 3 ft beyond opening. Ladder to be inspected by Competent Person prior to use. Personnel ascending and descending ladder must maintain 3 points of contact at all times. No equipment or materials shall be staged within a 6 ft radius of the opening.	• Extension ladder	• Fall Protection
	Poor air quality above Channels		Direct read air monitoring equipment shall be capable of detecting, at a minimum, the following: Hydrogen Sulfide Combustible Gases CO Oxygen VOCs Air monitoring equipment shall be factory calibrated, bump tested and maintained in accordance with the manufacturer's recommendations and documented. Air monitoring equipment shall be operated by qualified personnel/technicians.	Direct read air monitoring equipment that can detect hydrogen sulfide, combustible gases, carbon monoxide, oxygen & VOCs	Knowledge of air monitoring equipment (for personnel required to perform monitoring)
LOTO	Uncontrolled hazardous energy/ improper LOTO/ personnel not included in LOTO		Coordinate LOTO with BWT and obtain copies of applicable energy control plans (ECPs) prior to the start of work activities. Prior to entry/work, Authorized personnel will participate in LOTO as described in the BWT LOTO procedure. Keys shall be placed in lock box, with key to lock box retained by the Authorized individual for duration of confined space entry and LOTO.	Locks as required for participation in BWT LOTO procedure	LOTO for authorized and affected individuals, as applicable Review of BWT ECPs

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Laser scanning equipment	Laser scanning equipment may contain low grade nuclear material.	Use of equipment in areas that are classified as hazardous	Confirm area classifications of areas to be surveyed and laser scanning equipment enclosure classification prior to mobilization. Use equipment classification that is compatible with area classification	Laser scanning equipment.	Knowledge of air monitoring equip-ment (for personnel required to perform monitoring)
Vacuum excavation	Disrupting existing buried utilities		Perform ground penetrating radar investigation in areas proposed to have vacuum excavation to preliminarily locate buried utilities	Vacuum excavation rig	Excavation rig

3.6 Chemical Hazards

Based on the scope of work to be performed, the potential for BC and subcontractor personnel to be exposed to chemical contaminants is considered unlikely. However, personnel should be aware that chemical exposure pathways include: inhalation of airborne contaminants; direct skin contact with chemicals or impacted materials; and incidental ingestion of chemicals or affected materials (i.e., hand-to-mouth transfer).

If necessary, implementation of engineering controls (i.e., ventilation or dust suppression), administrative controls (i.e., limiting access to areas of concern), and proper use of PPE can minimize hazards to personnel. The SSO, or SSO's designee, must assess site conditions and verify that appropriate controls are employed where necessary. Unless specifically required by the work, BC personnel should remain a safe distance from potential chemical hazards.

Common chemical hazards associated with sewers, wastewater treatment facilities, and landfill operations include hydrogen sulfide, methane (explosive), corrosive materials and chlorine. If exposure to these, or other compounds of concern, is identified as a potential hazard, air monitoring will be conducted as specified in Section 5 of this EHASP. Chemical exposure information for the above chemicals is provided in the paragraphs below. Also provided are federal OSHA (OSHA) permissible exposure limits (PELs; located in 29 CFR 1910.1000); New York Public Employees Safety and Health Bureau (PESH) PELs (located in the PESH Field Operation Manual, Subsection 800.5); and the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs).

Asbestos

Asbestos may be solid, crystals or crystalline, or fibrous in appearance, and comprises hydrated, fibrous silicates. It is light or pale gray in color and odorless.

There are two groups of asbestos mineral. The first is the serpentine group, commonly referred to as chrysotile. Chrysotile, which comprises approximately 93% of all asbestos in use in the United States, is characterized by long, soft and flexible strands that can be woven into a cloth. The second category occurs as a group of minerals called amphiboles. Amphibole fibers are characterized as being strong, brittle, and needle-like. The common names of the forms of the minerals within this group are crocidolite, amosite, tremolite, anthophyllite, and actinolite. Asbestos was formerly very popular for use in building materials and industry.

Dust from this material can be hazardous when inhaled. Exposure to asbestos dust can cause irritation of eyes and mucous membranes, upper respiratory irritation, delayed and often serious breathing problems, and stomach upsets. Asbestos can produce a lung fibrosis called asbestosis. The onset of asbestosis is usually gradual, developing over a period of 10 to 30 years of exposure to significant concentrations of asbestos. It is characterized by development of a thickening of the lung pleura (lining).

Asbestos is also a cancer-producing agent (lung cancer and mesothelioma, among others). Heavy exposure to dust containing asbestos can also cause skin irritation. Epidemiological studies have shown that lung cancer appears to be related to the degree of exposure, the type of asbestos and whether or not the individuals smoke cigarettes. It is significant that cigarette smoking greatly increases the risk of lung cancer in those who are exposed to asbestos. However, mesothelioma (a rare tumor of the chest cavity lining) appears to develop without regard to the amount of asbestos inhaled.

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- The OSHA PEL is listed as 0.1 fibers per cubic centimeter (f/cc).
- The PESH PEL is listed as 0.1 f/cc as referenced by OSHA.
- The TLV is listed as 0.1 f/cc.

Lead

Lead (inorganic) is a bluish-white, silver or gray odorless solid. Short-term exposure to lead can cause decreased appetite, insomnia, headache, muscle and joint pain, colic, and constipation. Considerable data exist on the effects of lead exposure in humans. It is a poison by ingestion and a suspected human carcinogen of the lungs and kidneys. There are data to suggest that lead is a mutagen and can cause reproductive effects. Human systemic effects by ingestion and inhalation (the two routes of absorption) include loss of appetite, anemia, malaise, insomnia, headache, irritability, muscle and joint pains, tremors, flaccid paralysis without anesthesia, hallucinations and distorted perceptions, muscle weakness, gastritis, and liver changes. Recent experimental evidence suggests that blood levels of lead below 10 µg/dl (micrograms per deciliter) can have the effect of diminishing the IQ scores of children.

- The OSHA PEL is listed as 0.05 mg/m3 and the OSHA PEL for tetraethyl lead and tetramethyl lead is listed as 0.075 mg/m3.
- The PESH PEL for elemental lead is listed as 0.05 mg/m3 as referenced by OSHA.
- The TLV for elemental lead is listed as 0.05 mg/m3, the TLV for tetraethyl lead is 0.1 mg/m3 and the TLV for tetramethyl lead is 0.15 mg/m3.

Note: Published exposure limits designate a skin notation indicating that dermal contact (to organic forms) can contribute to the overall exposure.

Mercury

Mercury is a silver-colored, heavy, mobile liquid element. Mercury is a poison by inhalation, and is corrosive to skin, eyes, and mucous membranes. It may be absorbed into the body through the skin. Human systemic effects by inhalation include wakefulness, muscle weakness, anorexia, headache, diarrhea, liver changes, dermatitis, and fever. It is an experimental teratogen with experimental reproductive effects and tumorigenic data. When heated to decomposition it emits toxic fumes of mercury.

- The OSHA PEL is listed as 0.1 mg/m3 as a Ceiling Value for elemental mercury, inorganic compounds and aryl compounds. The OSHA PEL is listed as 0.04 mg/m3 as a Ceiling Value for Alkyl compounds.
- The PESH PEL is listed as 0.05 mg/m3 for mercury.
- The TLV is listed as 0.01 mg/m3 for mercury alkyls, 0.1 mg/m3 for mercury aryl compounds, and 0.025 mg/m3 for inorganic forms including metallic mercury

Note: Published exposure limits designate a skin notation indicating that dermal contact can contribute to the overall exposure.

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Polychlorinated Biphenyls (PCBs)

PCBs are a series of technical mixtures consisting of many isomers and compounds that vary from mobile oil liquids to white crystalline solids and hard non-crystalline resins. Technical products vary in composition, in the degree of chlorination, and possibly according to batch. Generally, they are moderately toxic by ingestion, and some are poisons by other routes. Most are suspect human carcinogens and experimental tumorigens, and exhibit experimental reproductive effects. They have two distinct actions on the body: a skin effect (chloracne) and a toxic action on the liver. The higher the chlorine content, the more toxic the PCBs tend to be.

- The OSHA PEL is listed as 0.5 mg/m3 for 54% chlorine content (as a PCB) and 1.0 mg/m3 for 42% chlorine content (as a PCB).
- There are no PESH PELs referenced for PCBs.
- The TLV is listed as 0.5 mg/m3 for 54% chlorine content (as a PCB) and 1.0 mg/m3 for 42% chlorine content (as a PCB).

Note: Published exposure limits designate a skin notation indicating that dermal contact can contribute to the overall exposure.

Chlorine

Chlorine is a common air contaminant and can be a greenish-yellow gas, liquid, or rhombic-shaped crystals. It is moderately toxic and irritating by inhalation and is a strong irritant to eyes and mucous membranes. Because of its intensely irritating properties, severe industrial exposure seldom occurs as workers are forced to leave the exposure area before they can become seriously affected. In cases where escape is not possible, the initial irritation of the eyes and mucous membranes is followed by coughing, a feeling of suffocation, and later, pain or feeling constriction in the chest. Severe exposures may result in pulmonary edema.

- The OSHA PEL is listed as 1 ppm as a ceiling limit.
- The TLV is listed as 0.5 ppm.
- The NY PESH PEL is listed as 0.5 ppm with a 15-min. STEL of 1 ppm.

Corrosives (Acids, Bases, and Oxidizers)

Corrosives are strong irritants of the eyes, mucous membranes, and skin. Inhalation may cause upper respiratory irritation, and exposure to skin and mucous membranes may cause chemical burns. Repeated exposure of skin may cause dermatitis. Examples of common corrosives are hydrochloric acid (acid), sodium hydroxide (base), and hydrogen peroxide (oxidizer). Appropriate gloves should be worn whenever corrosives are handled. Exposed skin or mucous membranes should be immediately rinsed with water for at least 15 minutes. Oxidizers react strongly with combustible materials and may cause fires.

The above information is provided for a class of compounds. OSHA PELs, NY PESH PELs, and TLVs (if listed) vary by specific compound.

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Hydrogen Sulfide

Hydrogen sulfide, a by-product of many industrial processes, is found around oil wells and in areas where petroleum products are processed, stored, or used; and in the digestion of sewage sludge, decomposition of organic material in domestic wastewater, or decaying organic matter. It is an extreme irritant of the eyes and respiratory tract at low concentrations; at higher levels, it causes respiratory paralysis with consequent asphyxia, and is rapidly fatal. The odor is offensive and characteristic as "rotten eggs"; however, it is unreliable as a warning signal because olfactory fatigue occurs.

- The OSHA PEL is listed as 20 ppm as a ceiling concentration.
- The NY PESH PEL is listed as 10 ppm with a 15-min. STEL of 15 ppm.
- The TLV is listed as 1 ppm with a 15-min. STEL of 5 ppm.

Methane

Methane is a colorless, odorless, tasteless gas. The lower explosive limit (LEL) is 5.0 percent. Methane is non-toxic, but it can act as a simple asphyxiant by displacing oxygen. Workers exposed to an oxygen deficient atmosphere become cyanotic, and experience diminished mental alertness and impaired muscular coordination. Generally, methane can only displace oxygen to a significant degree in a confined area.

Published exposure limits are based on maintaining adequate oxygen levels in the atmosphere (generally, between 19.5 % and 23.5% oxygen).

The TLV is listed as 1,000 ppm (as aliphatic hydrocarbon gases, alkane [C1-C4]) Hazard Communication

In accordance with the Hazard Communication standard, material safety data sheets (MSDSs)/Safety Data Sheets (SDSs) will be maintained on site for chemical products used by BC personnel at the Site (i.e., spray paint, PVC cement, etc.). Subcontractors will be responsible for maintaining MSDSs/SDSs for chemical products they bring on Site. In addition, containers will be clearly labeled in English to indicate their contents and appropriate hazard warnings. Please note that labeling containers includes, but is not limited to, any waste, used PPE, and/or decontamination materials collected.

3.7 Opening Wells and Well Vaults

Direct-reading instrumentation specified in Section 5 will be used to monitor any work in a well vault at the site where VOCs are a concern. The well vault will be opened carefully with the BC employee staying upwind as much as possible and then left open for a minimum of three minutes to allow the vault to vent. If the well cap is then removed, allow another three minutes for the well head to vent before proceeding. Please note that if there are other established protocols that differ from 3 minutes; the more protective time increment will be followed. Personnel should stay upwind as much as possible while working in and around the vault.

When removing a well cap, personnel will remain upwind as much as possible and will carefully remove the cap by opening it away from them in order to minimize the likelihood of exposure to vapors. Personnel will wait a minimum of three minutes to allow the well to vent before proceeding.

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3.8 Physical Hazards

The following physical hazards, as marked below, have been identified and may be encountered during scheduled field activities.

- ☒ Slips, Trips and Falls
- ☐ Heavy Equipment
- ☐ Excavations
- ☒ Noise
- ☐ Overhead Utilities
- ☐ Electrical Hazards
- ☐ Confined Spaces - BC employee will not enter
- ☐ Sharp Objects/Cutting Utensils
- ☒ Elevated Platforms/Working Surfaces
- ☒ Traffic
- ☐ Arc Flash Protection
- ☐ Water Hazards (non-boating)
- ☐ Removing Manhole Covers
- ☐ Housekeeping
- ☐ Materials and Equipment Handling - Lifting
- ☒ Drilling - for sample collection - covered under subcontractors EHASP
- ☐ Underground Utilities
- ☐ Equipment Refueling
- ☐ Lockout/Tagout
- ☒ Fire/Explosion
- ☐ Cutting Acetate Sleeves
- ☒ Ladder Use
- ☒ Driving
- ☐ Boating Safety
- ☐ Building Collapse
- ☒ Personal Safety – Urban Setting - Note that BC Personnel will not be alone on site at any point during this effort. The site itself is not considered a personal security risk.

Actions to be taken to protect against the hazards identified are provided in the sections below.

3.8.1 Slip, Trips and Falls

Slipping hazards may exist due to uneven terrain, wet or slick surfaces, leaks or spills. Tripping hazards may be present from elevation changes, debris, poor housekeeping or tools and equipment. Some specific hazards may include: climbing/descending ladders, scaffolding, berms or curbing. Collectively, these types of injuries account for nearly 50 percent of all occupational injuries and accepted disabling claims. Prevention requires attention and alertness on the part of each worker, following and enforcing proper procedures, including good housekeeping practices, and wearing appropriate protective equipment.

3.8.2 Housekeeping

Personnel shall maintain a clean and orderly work environment. Make sure that all materials stored in tiers are stacked, racked, blocked, interlocked, or secured to prevent sliding, falling, collapse, or overturning. Keep aisles and passageways clear and in good repair to provide for free and safe movement of employees and material-handling equipment. Do not allow materials to accumulate to a degree that it creates a safety or fire hazard.

During construction activities, scrap and form lumber with protruding nails and other items shall be kept clear from work areas, passageways, and stairs. Combustible scrap and debris shall be removed at regular intervals. Safe means must be provided to facilitate removal of debris.

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Containers must be provided for collecting and separating waste, used rags and other debris. Containers used for garbage and other oily flammable or hazardous waste such as caustics, acids, harmless dusts, etc., must be separated and equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

3.8.3 Heavy Equipment

Equipment, including earth-moving equipment, drill rigs, or other heavy machinery, will be operated in compliance with the manufacturer's instructions, specifications, and limitations, as well as any applicable regulations. The operator is responsible for inspecting the equipment prior to use each work shift to verify that it is functioning properly and safely.

The following precautions should be observed whenever heavy equipment is in use:

- PPE, including steel-toed boots, safety glasses, high visibility vests, and hard hats must be worn.
- Personnel must be aware of the location and operation of heavy equipment and take precautions to avoid getting in the way of its operation. Workers must never assume that the equipment operator sees them; eye contact and hand signals should be used to inform the operator of the worker's intent.
- Personnel should not walk directly in back of, or to the side of, heavy equipment without the operator's knowledge. Workers should avoid entering the swing radius of equipment and be aware of potential pinch points.
- Nonessential personnel will be kept out of the work area.

3.8.4 Materials and Equipment Handling - Lifting

The movement and handling of equipment and materials on the Site pose a risk to workers in the form of muscle strains and minor injuries. These injuries can be avoided by using safe handling practices, proper lifting techniques, and proper personal safety equipment such as steel-toed boots and sturdy work gloves. Where practical, mechanical devices will be utilized to assist in the movement of equipment and materials. Workers will not attempt to move heavy objects by themselves without using appropriate mechanical aids such as drum dollies or hydraulic lift gates.

Proper lifting techniques include the following:

- Lift with the strength of your knees, not your back.
- Firmly plant your feet approximately shoulder-width apart.
- Turn your whole body, don't bend or twist at the waist.
- Be sure that the path is clear of obstructions or tripping hazards; avoid carrying objects that will obstruct your vision.
- Use caution when holding an object from the bottom to prevent crushing of the hands or fingers when lowering.

3.8.5 Excavations

A competent person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them, will be present during excavation activities.

The atmosphere will be tested in excavations, before employees are permitted to enter and begin work, greater than 4 feet in depth or where oxygen deficiency or toxic or flammable gases are likely to be present. The atmosphere shall be ventilated and re-tested until flammable gas concentrations less than 5 percent of the lower explosive limit (LEL) and site-specific action levels are obtained. Worker entry will

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not be allowed if the oxygen concentration is less than 20 percent. In addition, a safe means of access and egress (i.e., a ladder, stairs or ramp) must be provided so that no more than 25 feet of lateral travel is required by employees.

Workers will not enter unstable excavations or excavations greater than 5 feet in depth without appropriate protective systems such as benching, sloping, or shoring. If shoring or shielding systems are not used, side slopes will not be steeper than 1½:1 without written confirmation from the competent person that the slope is safe for the soil conditions. Excavations will be constructed in accordance with the OSHA Excavation Safety Standard (29CFR1926 Subpart P).

The competent person will inspect excavations daily. If there is evidence that a cave-in or slide is possible, work will cease until the necessary safeguards have been taken. Excavated material will be placed far enough from the edge of the excavation (a minimum of 2 feet) so that it does not fall back into the opening or affect the integrity of the sidewall. At the end of each day's activities, open excavations will be clearly marked and secured to prevent nearby workers or unauthorized personnel from entering them. Remote sampling techniques will be the preferred method of sample collection in excavations.

3.8.6 Drilling

Prior to drilling activities, the driller must complete the Driller's Checklist in the Driller's EHASP, submit it, and receive authorization to proceed. During all drilling activities, the operator must verify that the appropriate level of protection and appropriate safety procedures are utilized. The operator will verify that equipment "kill switches" are functioning properly at the start of each day's use. Hard hats, steel-toed boots, and ear and eye protection will be required at all times when working around drill rigs. The proximity of underground and overhead utilities must be identified through 811 and other means where appropriate before any drilling is attempted. The rig may not be moved with the mast in the upright position. The Driller will maintain a spill kit on Site per the Driller's EHASP.

Workers can effectively manage hazards associated with working around heavy equipment if a constant awareness of these hazards is maintained. These hazards include the risk of becoming physically entangled in rotating machinery, slipping and falling, impact injury to eyes, head and body, and injury from machinery operations. Never work or walk on piles of well casings. Make sure all high-pressure lines and hoses have whip checks attached. Constant visual or verbal contact with the equipment operator will facilitate such awareness.

3.8.7 Noise

Noise may result primarily from the operation of heavy equipment, process machinery or other mechanical equipment. Hearing protection with the appropriate noise reduction rating (NRR) shall be worn in areas with high noise levels. A good rule of thumb to determine if hearing protection is needed is the inability to have a conversation at arms length without raising voice levels. If loud noise is present or normal conversation becomes difficult, hearing protection in the form of ear plugs, or equivalent, will be required.

3.8.8 Underground Utilities

Reasonable efforts will be made to identify the location(s) of underground utilities (e.g., pipes, electrical conductors, fuel lines, and water and sewer lines) before intrusive soil work is performed. The state underground utility notification authority (e.g., USA, Dig Alert, Blue Stake, etc.) will be contacted prior to the start of intrusive field activities in accordance with local notification requirements. In areas not evaluated or serviced by the underground utility notification authority, and a reasonable potential for underground utilities exists, one or more of the following techniques will be employed to determine the location of subsurface structures.

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- Contracting the services of a qualified private utility locator.
- Having a survey of the subject area conducted by staff trained in the use of subsurface utility locating equipment.
- Subsurface testing (i.e., hand digging or potholing) to the expected depth of probable utilities (not less than 5 feet).

If utilities cannot be located or if unlocated utilities are suspected to be present, subsurface activities (i.e., borings, excavation) should not be conducted before the location(s) or absence of underground utilities is confirmed.

Typical subsurface location marks are as follows:

- Red – electrical,
- Yellow – gas/oil/steam,
- Blue – water,
- Green – sanitary/storm drains/culverts,
- Orange – communications, and
- White – proposed excavation or boring.

Intrusive work should be limited to the area 3.3 feet (1 meter) on either side of the location marks. In some special cases such as fiber optics and high-pressure pipelines this area should be expanded to 16.5 feet (5 meters) on either side of the utility.

3.8.9 Overhead Utilities

If work is to be conducted in the vicinity of overhead electrical utilities, the owner of the overhead line will be contacted to determine the maximum voltage. Any overhead utility will be considered to be energized unless and until the person owning or operating such line verifies that the line is not energized, and the line is visibly grounded at the work site.

Workers will not perform work in proximity to energized high-voltage lines (including scaffolding, well drilling, pile driving, or hoisting equipment) until danger from accidental contact with high-voltage lines has been effectively guarded against.

Equipment with articulated upright booms or masts are not permitted to operate within 15 feet of an overhead utility line (less than 50kV) while the boom is in the upright position. For transmission lines in excess of 50kV, an additional distance of 4 inches for each 10 kV over 50kV will be used.

3.8.10 Equipment Refueling

Care shall be exercised while refueling generators, pumps, vehicles, and other equipment to prevent fire and spills. Personnel shall eliminate static electricity by grounding themselves (touching metal) prior to using refueling hoses and or containers of petroleum liquids. Items being refueled shall be grounded or be located on the ground and not on a trailer, work bench or inside a truck bed. Equipment that is hot must be allowed to cool prior to refueling. Spill response materials shall be available when conducting refueling operations.

3.8.11 Electrical Hazards

Electrical equipment to be used during field activities will be suitably grounded and insulated. Ground-fault circuit interrupters (GFCI), or equivalent, will be used with electrical equipment to reduce the potential for serious electrical shock. Electrical equipment including batteries, generators, panels and extension cords shall be kept dry during use. Extension cords may not be used as a perma-

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nent means of providing power and will be removed from service if they are worn, frayed, or if the grounding prong is missing.

Extension cord precautions include the following:

- Be aware of exposed or bare wires, especially on metal grating. Warning: Electrical contact with metal can cause fatal electrocution.
- Prior to use, inspect cords for exposed or bare wires, worn or frayed cords, and incorrect splices. Splices are permitted, but there must be insulation equal to the cable, including flexibility.
- Cables and extension cords in passageways, steps or any area where there may be foot traffic should be secured so as to not create a tripping hazard. Overhead cables and extension cords shall be rigged to a height greater than 6 feet.
- Shield extension cords that must run across driveways or areas where vehicle traffic is present.
- Do not run cords across doorways or windows where they can be frayed or cut by a closed door or window.
- Do not run wires through wet or puddled areas.
- Flexible cord sets that are used on construction sites or in damp locations shall be of hard usage or extra hard usage type.

Observation of energized machinery will take place from a safe distance. Only qualified personnel will remove guards, hatch covers, or other security devices if necessary. Equipment lockout procedures and the appropriate facility work permit requirements will be followed. Lockout/tagout procedures will be conducted before activities begin on or near energized or mechanical equipment that may pose a hazard to site personnel. Workers conducting the operation will positively isolate the piece of equipment, lock/tag the energy source, and verify effectiveness of the isolation. Only employees who perform the lockout/tagout procedure may remove their own tags/locks. Employees shall complete lockout/tagout training before initiating this procedure.

Only qualified personnel will remove covers of electrical equipment to expose energized electrical parts. Entering electrical rooms/vaults or areas with live exposed electrical part by BC employees shall be permitted only when accompanied by a qualified personnel after notification and approval of the appropriate facility personnel.

3.8.12 Lockout/Tagout

Lockout/tagout (LO/TO) procedures in accordance with 29 CFR 1910.147 will be performed before activities begin on or near energized or mechanical equipment that may pose a hazard to site personnel. The purpose of the lockout/tagout (LO/TO) system is to safeguard exposure from machinery, energized electrical circuits, piping under pressure, or any type of energy source from unexpected energization or start up that could cause harm to an individual. Workers conducting the operation will positively isolate the piece of equipment, lock/tag the energy source, and verify effectiveness of the isolation. Only employees who perform the lockout/tagout procedure may remove their own tags/locks. Employees must be thoroughly trained before initiating this procedure.

Whenever multiple personnel (or multiple employers are working on the same worksite) are to be engaged in activities requiring LO/TO, employees/employers shall inform each other of their activities and coordinate their respective LO/TO procedures. When applicable, BC shall request an owner's representative to initiate the LO/TO procedure and apply the first lock. When initiated by others, BC will remove their locks prior to leaving a facility. Whenever a group lockout/tagout procedure must be performed, they shall utilize a procedure that affords the same level of protection as that provided by the implementation of a personal lockout or tagout device. Group LO/TO devices shall meet the requirements of 29 CFR 1910.145(f)(3).

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Basic Lockout/Tagout Procedures

1. Each person will maintain their own lock, key, and lockout device so that no one else can remove the lock.
2. Always notify the operator when work is to be done.
3. Use your own lock to lock out electrical power. Attach a tag or sign to the power disconnect to indicate that maintenance work is in progress. Use the wording "Do Not Operate."
4. Bleed all pressure from pneumatic, hydraulic, or other fluid lines, or safely isolate them from the area where work is being done.
5. Drain contents of lines or tanks as needed. Lock valves open or closed to prevent buildup of pressure.
6. Ground electrical systems as needed.
7. Secure any device under tension or compression so as to prevent accidental movement. Move suspended parts that could drop or cycle to a safe position and block, clamp, or chain them in place.
8. Verify (test) that the mechanism has been isolated from the source of energy.
9. Ensure that all workers remove their individual locks after work is completed. The last worker should remove the locking devices.
10. Ensure that the last person double-checks that all is clear and safe before start-up.

Portable Equipment

Portable electrical equipment such as hand drills, computers, and power saws that use plug type connectors must be unplugged prior to any task that may expose the employee to energized portions of the equipment. Removal of the plug from the power source, such as the generator or wall socket, may be combined with a tagout system, particularly if the plug is at a distance from the equipment being repaired

3.8.13 Fire/Explosion

Site workers should have an increased awareness concerning fire and explosion hazards whenever working with or near flammable/explosive materials, especially when performing any activity that may generate sparks, flame, or other source of ignition. Intrinsically safe equipment is required when working in or near environments with the potential for an explosive or flammable atmosphere. The SSO will verify facility requirements for a "hot work" permit before activities that may serve as a source of ignition are conducted.

Flammable materials will be kept away from sources of ignition. In the event of fire, work will cease, the area will be evacuated, and the local fire response team will be notified immediately. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so. A fully charged ABC dry chemical fire extinguisher will be readily available for use during all scheduled activities at the Site.

3.8.14 Sharp Objects/Cutting Utensils

Frequently field tasks require the cutting of items such as rope, packaging or containers. Care should be exercised in using knives and/or cutting implements while performing such cutting tasks. Personnel should cut down and away from their body and other personnel. The item being cut should be braced or secured from movement while cutting. When slicing open acetate liners, such as those utilized in direct push drilling, personnel should use a hook blade cutting implement designed for this task versus a straight blade knife.

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3.8.15 Cutting Acetate Sample Sleeves

The cutting of acetate sleeves presents a potential hazard to sampling personnel. By following proper procedures, the risk associated with this activity can be effectively minimized. To remove the soil sample the acetate liner must be cut with a bladed tool or knife. Knives are more frequently the source of disabling injuries than any other hand tool. The principal hazard in the use of knives is the hand slipping from the handle onto the blade or the blade strikes another part of the body. To prevent this, the following safety procedures should be followed:

- Provide a safety blade holder with a retraction spring on a track where blade mounts. Use a hook type linoleum blade which has a reduced cutting edge. When the hook of the blade is cutting the acetate liner it keeps the blade extended. If the blade breaks or the operator's hand slips the blade automatically retracts into the handle of the safety blade holder.
- Replace blades when they become dull. If material becomes hard to cut then the blade is dull.
- Wear leather cut-resistant (such as Kevlar) gloves.
- Wear safety glasses.
- The cutting stroke should be away from the body. If that is not possible, then the hands and body should be in the clear.
- Provide an angle iron device to place the liner in when cutting. This gives a holder for the liner.
- If you drop the knife, just let it fall to the ground and DO NOT try to catch it.
- If you lay the knife down, make sure the blade is retracted into the holder or the knife is placed in a protective holder.

3.8.16 Elevated Platforms / Working Surfaces

When working at heights that expose employees to falls greater than 6 feet, especially on sloping roofs and elevated platforms, the requirements of 29 CFR 1926.502 shall be observed. In such instances, a safety harness shall be worn and the lanyard secured at a level not lower than the employee's waist, limiting the free-fall distance to a maximum of 6 feet.

Elevated work platforms shall be constructed, used, and maintained in accordance with Subpart L of the OSHA Construction Safety Orders. Scaffolds and hoisting lines shall be inspected daily by a competent person to verify the integrity of the components. If a material is determined to be defective, it may not be used for any purpose and will be replaced immediately.

A standard railing shall consist of top rail, intermediate rail, toe board, and post. It shall have a vertical height of approximately 42 inches (±3 inches) from the top surface of the top rail to the floor, platform, runway, or ramp. The top rail shall have a smooth surface throughout. The intermediate rail shall be set half way between the top rail and the floor, platform, runway, or ramp.

A cover of standard strength and construction that is secured against accidental displacement shall guard floor holes, hatchways, or any other openings into which a person can walk. When the cover is not in place, the openings shall be guarded with a standard railing (equipped with a toe board) on all exposed sides. Any cover on floor openings shall be properly labeled or stenciled with letters at least one inch high or greater stating "OPENING – DO NOT REMOVE".

<u>Personal Fall Protection Equipment</u>

Full body harness is the only acceptable means of fall arrest for personnel working over surfaces greater than six feet in height. A Fall Arrest System consisting of safety harness and anchor lanyard must be worn by anyone working on elevated surfaces that lack "general" fall protection such as railings, etc.

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Lanyards must be tied off at a point above the worker's head and to a firm structure or a portion thereof designed to hold a weight of 5,000 lbs. Only hooks with locking snaps that operate in "as new" condition will be used. These hooks are also referred to as "double action lanyard hooks".

When other possible means of fall protection (railings, etc.) are not available, individuals working at heights of less than 6 feet must tie-off if there is danger of impalement, especially if the impalement hazard cannot be mitigated in accordance with OSHA standards.

All workers must perform routine inspection of belts/harnesses and lanyards prior to their use. The employer shall conduct regular inspections (every three months) of all fall protection equipment. In addition, there shall be an inspection of all workers' personal tools and equipment prior to the employees using them on the job.

Lanyards are to be used for tie-off purposes only, and damaged belts, harnesses, and lanyards must be retired and discarded.

3.8.17 Ladder Use

Ladders are to be maintained in good condition at all times, with tight joints, hardware, and fittings securely attached, and moveable parts freely operating without binding or undo play. Defective ladders must be "tagged" out of service. Safety "feet" shall be kept in good condition. Ladders are to be visually inspected for possible signs of damage or defects daily, before each use.

Where possible, portable straight rung ladders shall be set up so that the horizontal distance from the top support to the foot of the ladder is ¼ of the working length of the ladder. The ladder shall be secured by tying it off to a firm point, or held in place by another worker while in use. If the ladder is used to gain access to a roof or platform, the side rails shall extend at least 3 feet beyond the point of support at the edge of the roof or platform.

Step ladders shall always be set up properly, so that they are in the "A" frame position, level and with all four feet on firm ground, and fully opened with the spreaders locked in place. Personnel are forbidden to stand on the top cap or on the last step of a step ladder, or to stand on the hinged back of a step ladder. A step ladder shall never be used at a straight ladder.

3.8.18 Traffic

Vehicular traffic presents opportunities for serious injury to persons or property. Traffic may consist of street traffic or motor vehicles operated by facility employees or visitors to the Site. Workers and other pedestrians are clearly at risk during periods of heavy traffic. Risk from motor vehicle operations may be minimized by good operating practices and alertness, and care on the part of workers and pedestrians.

Site personnel will wear high-visibility traffic safety vests whenever activities are conducted in areas of heavy traffic. Work vehicles will be arranged to be used as a barrier between site workers and nearby traffic. If required by local ordinances or site location, a traffic control plan will be developed and implemented. Consider using amber/yellow warning lights to alert traffic to the work zone. Note that amber/yellow warning lights may be required by specific clients or ordinances.

It is important to be conscious of all vehicular traffic that may be present during conduct of field operations. Use caution tape, barricades, or safety cones to denote the boundaries of the work area and to alert vehicle operators to the presence of operations which are non-routine to them. Be careful when exiting the work area and especially when walking out from between parked vehicles to avoid vehicular traffic.

Never turn your Back on Traffic. When working in or near a roadway, walk and work with your face to the oncoming traffic. If you must turn your back to traffic, have a coworker watch oncoming traffic for you.

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Vehicle and Worksite Position. Whenever possible, place a vehicle between your worksite and oncoming traffic. Not only is the vehicle a large, visible warning sign, but if an oncoming car should fail to yield or deviate, the parked vehicle, rather than your body, would absorb the first impact of a crash. Turn the wheels so that if the vehicle were struck, it would swing away from the worksite. Even though the vehicle would protect you in a crash, it might be knocked several feet backward. Always leave some room between the rear of the vehicle and the work area.

Use of Signs and Cones to Direct Traffic. Traffic signs and cones are used to inform drivers and direct traffic away from and around you. Cones and signs are only effective if they give oncoming drivers enough time to react and make it clear how traffic should react.

Cone Positioning. The most common coning situation is setting a taper of cones that creates a visual barrier for oncoming motorists and gradually closes a lane.

The position of the taper depends on the road width, position and size of the work area, and also on the characteristics of the traffic.

3.8.19 Driving

A lot of driving is required to get to, from, and between project Sites. Safe vehicle maintenance and operation must be a priority. It requires knowledge of directions to (and conditions of) the Site in advance, careful exiting and merging into traffic, anticipating the unexpected, remaining alert to one's physical and mental condition, resisting distractions such as cell phone use, other car activities and contacting assistance when needed. Report all vehicle collisions/incidents to BC's Risk Manager.

3.8.20 Arc Flash Protection

An arc flash is a short circuit through the air when insulation or isolation between electrified conductors is breached or can no longer withstand the applied voltage. Statistics show that there are 5 to 10 arc flash explosions a day near electrical equipment that result in hospitalization of a burn victim. An arc flash can be caused by common occurrences such as dropping tools, accidental contact with electrical systems, and build up of dirt or corrosion.

The temperature of an arc can reach more than 35,000 F as it creates a brilliant flash of light and a loud noise. Concentrated energy explodes outward from the electrical equipment, spreading hot gases, molten metal, causing death or severe burns, and creating pressure waves that can damage hearing or brain function and a flash that can damage eyesight. The fast-moving pressure wave also can send loose material such as pieces of equipment, metal tools, and other objects flying, injuring anyone standing nearby.

Regulations require the calculation of the "flash protection boundary" inside which qualified workers must be protected when working. This boundary is an imaginary sphere surrounding the potential arc point, "within which a person could receive a second-degree burn if an electrical arc flash were to occur," according to the National Fire Protection Association (NFPA) 70E standard. Brown and Caldwell Associates' Health and Safety Manual gives direction of when and where to establish this boundary.

BC's Electrical Safety/Arc Flash Policy provides information and instruction for BC employees who work on or near energized power circuits, electrical distribution equipment, electrical utilization equipment and those who inspect energized equipment, where a phase-to-ground or phase-to-phase short or fault occurrence may cause an Arc Flash event.

BC employees must comply with BC's Electrical Safety and Lock-Out/Tag-Out Policy in the Health and Safety Manual and treat electrical equipment and circuits as energized until:

1. Lock-Out/Tag-Out protection is in place and the equipment or circuit has been tested to verify "no voltage" present, by a trained and qualified electrical worker, or

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2. The equipment or circuit has been physically isolated from every power source, tested, and clearly labeled.

For those BC employees involved with energized electrical work (i.e. design verification, equipment check-out, or start-up adjustments), the following ordered approach must be used:

1. BC employees will seek to have a trained and qualified electrical worker perform all energized electrical hands-on work (i.e. switching, metering, testing, etc.) while BC employees remain outside the flash protection boundary, with the exception of those BC employees who have completed NFPA 70 E and have appropriately planned, including appropriate PPE, for the task.
2. BC employees that closely supervise work within the flash protection boundary should document the possible electrical hazards, appropriate PPE, and mitigation techniques to be implemented during the project with a detailed project work plan attached to this plan's appendices. The Electrical Safety Officer (ESO) or similarly qualified person must approve all project work plans with identified shock or arc flash hazards.
3. Prior to performing this work, the Project Manager (PM) will verify that the above-mentioned project work plan is prepared and approved and reviewed by the PM, the project field team, the SSO, and cognizant Health and Safety Manager.
4. Only BC employees with NFPA 70E Qualified Person training shall enter the flash protection boundary wearing the proper Personal Protective Equipment (PPE) and only for Hazard/Risk Categories 0-2 – see the 'Warning' section below.

WARNING

Qualified BC personnel are limited to work in Hazard/Risk Categories 0-2, and therefore only require PPE meeting the requirements of Hazard/Risk Categories 0-2.

Only qualified electricians may conduct work categorized as a Hazard/Risk Category of 3 or 4.

Qualified BC personnel are NOT to cross a flash protection boundary which involves a Hazard/Risk Category 3 or 4 situation.

BC employees and management shall review the Arc Flash policy in BC's Health and Safety Manual for detailed requirements.

Questions concerning this policy should be directed to the BC Electrical Safety Officer Health and Safety Program Manager.

Definitions

Energized Electrical Work. Work performed on or near energized electrical systems or equipment with exposed components operating at 50 volts or greater. Electrical system testing, thought to be de-energized, but not yet proven to be (for example, a LO/TO effectiveness check).

Flash Protection Boundary. The distance from energized exposed electrical equipment at which an unprotected person will receive a curable burn: 2nd degree burn or blistering. Work performed inside this boundary requires that the person be a "qualified person" and the use of appropriate personal protective equipment (PPE) to protect against arc flash burns.

Newly installed/serviced electrical equipment may contain an Arc Flash Label that will identify the energy, hazard category and PPE requirements associated with the equipment. For all other unlabeled equipment, where the specific flash protection boundary (energy, hazard category, and applicable PPE) is not established or cannot be established first (prior to live electrical exposure), BC personnel must maintain a 4-foot minimum observation distance (10 feet is preferred) from the exposed (i.e. doors open, covers off) live electrical equipment rated 600V and below. In the event that the flash protection boundary must be crossed, qualified BC personnel will don PPE appropriate for Hazard/Risk Category 2.

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For equipment rated above 600V, BC personnel must maintain a 10-foot minimum observation distance and not enter the flash protection boundary unless qualified and approved to do so.

Qualified BC Employee. A person with the training and experience having knowledge of energized electrical equipment hazards from an operational standpoint and from the safety training standpoint.

Educational credentials alone do not make a person qualified. Determination of qualification must be established by the employee's supervisor or other designated knowledgeable management representative.

3.8.21 Building Collapse

Buildings collapse for a variety of reasons. Natural phenomena such as earthquakes, hurricanes, floods, mudslides, avalanches, and storms are the usual cause for building collapses. Vacant buildings may be at risk for collapse since maintenance-related activities have been often neglected thus resulting in structural damage.

Project personnel should attempt to answer the following questions whenever working near suspect building structures:

- Are there any vacant buildings present on site?
- Will it be necessary to enter or work next to the vacant building(s)?
- Are there any apparent hazards including external damage, falling objects, sticky doors, structural instability, or possible asbestos and/or lead paint?
    - External damage may include, but not necessarily be limited to, foundation cracks, damaged or missing porch roofs and overhangs, supports, gaps between steps and the structure, missing supports or portions of walls, and "washed away" ground.
    - Falling objects may include, but not necessarily be limited to, building cornices, gutters, bricks, and roofs/roofing materials.
- Be aware that when entering a building, if the door sticks at the top it could mean the ceiling is ready to fall. If you force the door open, stand outside the doorway clear of falling debris.
- Has the building(s) been inspected by a qualified professional and deemed safe for entry?
- Are there any viable alternatives for conducting work that preclude the need to enter or work next to the suspect building(s)?

If you have any concerns about entering the building after answering the above questions, speak with the PM immediately. The client will need to be informed that a proper building inspection or engineering controls may be needed before work can be performed.

If you don't feel safe entering a building, notify the PM and Health and Safety Program Manager and stay outside the building at an appropriate distance to avoid falling debris.

3.8.22 Removing/Replacing Manhole Covers

Manhole structures are the principal means of access into wastewater collection systems and into other underground utilities and facilities. In general, manhole entries are conducted to determine the physical conditions of manholes and pipelines, collect data, and for maintenance activities.

Removing and replacing manhole covers can present potential hazards (overexertion, struck by, caught between, contaminated air, traffic, etc.) to personnel. Therefore, personnel should always first seek to have client or contractor personnel remove and install the manhole cover whenever possible. If this is not possible, then BC personnel need to plan and carefully consider all the potential hazards and controls associated with the removal and installation. Hard hat, safety glasses, safety boots, and leather/cut-resistant gloves must be used when attempting to remove manhole covers.

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When working in the vicinity of an open sewer manhole, air monitoring must be performed to verify that the atmosphere is safe for work activities. At no time are personnel to break the plane of the manhole with any part of their body. Where entry must be made, the requirements of the Confined Spaces section of this EHASP must be complied with at all times (i.e. training, air monitoring, ventilation, permitting, rescue, etc.).

General Procedures for Removing/Replacing Manhole Covers

The following are general guidelines for the removal and replacement of manhole covers. Use procedures as they apply to the specific covers to be removed. Additional tools or different procedures may be necessary for a particular location.

Freeing the Manhole Cover

When the cover is stuck in its frame, remove any encrustation with a cold chisel. Next, place a block of wood on the cover near the rim and hit the block of wood with a heavy hammer. Do this at different points around the rim until the cover has loosened.

Unseating the Manhole Cover

Lift the cover with the Hook and Lifter tool. Next, attach the hook and lifter tool to the outer edge/rib before trying to move the cover. Unseat the cover, about four inches, by pulling and lifting with a fluid motion.

Removing the Manhole Cover

Evaluate the area surrounding the manhole cover to be removed and verify conditions that could present a hazard during removal have been properly mitigated. Use proper body mechanics – using the leg and arm muscles to lift and pull the cover – don't use your back.

With your feet properly positioned evenly apart and footing secure, pull the cover clear of the frame. Once clear of the frame keep pulling the cover with a steady motion and remove it from the work area. Potential pinch points exist to the hands, fingers, and feet. Never place your hands, fingers, or feet under the manhole cover. Whenever possible, have someone assist with the removal and replacement of the manhole cover.

Replacing the Manhole Cover

Stand parallel to the desired direction of travel for moving the manhole and check the cover frame of the manhole to make sure it is free of any obstructions or debris.

Place the point of the Hook and Lifter tool under the edge of the cover, lift slightly, and drag the cover toward its frame.

Move to the opposite side of the cover and repeat the lifting and dragging motion.

Continue alternating the lifting and dragging until the cover is partially over the manhole frame.

With the hook, lift the edge that is farthest from the opening until the cover slides into the frame of the manhole.

Check the cover for proper seating in the manhole cover frame.

3.8.23 Personal Safety - Urban Setting

Working in a distressed neighborhood may present hazards associated with street violence or other crime. In these situations, mental preparation before going to the Site and awareness while on Site are of key importance. If in doubt, always ask Site or client personnel about the safety of a neighborhood.

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Forethought should be given to arranging to work during daylight hours if possible. Take advantage of any Site security measures (monitoring cameras, security guards) and investigate such measures prior to the field work. Once in the field, work in parties of two or more and stay within view of the general public. Keep a charged cell phone nearby or on your person at all times. Become familiar with your location so you can effectively communicate it over the phone.

In addition to these basic principles, the following is a list of common personal safety rules that apply not only to work at the Site, but to general safety practices while in the field and also between work shifts:

- If at all possible, work/travel in groups. Do not venture out alone.
- Be alert. Notice who passes you and who's behind you. Maintain distance between yourself and strangers. Know where you are, and note potential exit paths.
- If work has paused, do not appear slack or distracted. Do not sit in a vehicle with the doors unlocked.
- Walk in well-lighted areas. Don't walk close to bushes, alleys, and so on. In dark or deserted neighborhoods, walk down the middle of the street (be alert to vehicle traffic).
- If a car pulls up slowly, or the occupants of the vehicle bother you, cross the street and walk or run in the other direction. If you are pursued, dial 911.
- If you feel someone is following you, turn around and check. Proceed to the nearest lighted house or place of business.
- Don't overburden yourself with bags or packages, which might impede running or taking care of yourself.
- Be aware of loose clothing, packs/purses and hair. These give an assailant an easier method of grabbing and controlling you. Wear unrestrictive clothing for ease of movement (but not overly loose).
- Carry a non-weapon personal safety device (such as a whistle, panic button, or key light) - anything that could visually or audibly draw attention to your location.
- What you carry in your hand(s) is important. Valuables make you a potential target. Items such as a hand auger or tool may help you be perceived as a less-than-inviting victim.
- Carry as little cash as possible.
- Hold your purse tightly, close to your body. Keep your wallet in a front or in a buttoned, hip pocket. When at a fixed location, lock your valuable items away and out of site (i.e., in a trunk).
- Be careful when people stop you for directions or information. Always reply from a distance; never get too close to a stranger's car.
- If you feel that you are in danger, don't be afraid to scream and run.
- Toss wallet/keys away from direction of escape.
- Don't attach car keys to house keys.
- Leave large valuables (purse, laptop) locked and hidden in the vehicle.

3.8.24 Laser Scanning Devices

Equipment used to [perform laser scanning often includes low grade nuclear materials. Equipment will only be handled by trained individuals that are familiar with the specific model and unit being used and will employ all of the laser scanning equipment manufacturer's safety and use instructions and recommendations. The laser scanning equipment's enclosure type will be confirmed for compatibility with the areas hazard classification according to NFPA 820 prior to mobilization. If the equipment enclosure is not compatible with the area classification, gas monitoring for lower explosive limit will be continuously conducted during use of the equipment.

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3.9 Natural Phenomena

Natural phenomena such as weather-related emergencies and acts of nature can affect employees' safety. Natural phenomena can occur with little or no warning. If an emergency situation arises as a result of natural phenomena, adhere to the contingency procedures outlined in Section 10. The following natural phenomena have been identified and may be encountered during scheduled field activities.

- ☐ Sunburn
- ☒ Cold Stress
- ☐ Hurricanes/Nor' Easters
- ☐ Earthquakes
- ☒ Heat Stress
- ☒ Lightning/Electrical Storms
- ☐ Tornados and Strong/Straight Line Winds
- ☒ Flooding

3.9.1 Heat Stress

Climate conditions, particularly heat, are important considerations in planning and conducting site operations. Heat-related illnesses range from heat fatigue to heat stroke, with heat stroke being the most serious condition. Workers should be trained and aware of signs and symptoms of heat-related illnesses, as well as first aid for these conditions. These are summarized in the table below. The SSO, or SSO's designee, and site workers will monitor each other for signs of heat stress. If an employee exhibits signs or symptoms of heat-related illness, the SSO, or designee, must be notified and the appropriate response procedures initiated.

Heat Related Illness			
Condition	**Signs**	**Symptoms**	**Response**
Heat Rash or Prickly Heat	Red rash on skin.	Intense itching and inflammation.	Increase fluid intake and observe affected worker.
Heat Cramps	Heavy sweating, lack of muscle coordination.	Muscle spasms, and pain in hands, feet, or abdomen.	Increase fluid uptake and rest periods. Closely observe affected worker for more serious symptoms.
Heat Exhaustion	Heavy sweating; pale, cool, moist skin; lack of coordination; fainting.	Weakness, headache, dizziness, nausea.	Remove worker to a cool, shady area. Administer fluids and allow worker to rest until fully recovered. Increase rest periods and closely observe worker for additional signs of heat exhaustion. If symptoms of heat exhaustion recur, treat as above and release worker from the day's activities after he/she has fully recovered.
Heat Stroke	Red, hot, dry skin; disorientation; unconsciousness	Lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse.	Immediately contact emergency medical services by dialing emergency medical services. Remove the victim to a cool, shady location and observe for signs of shock. Attempt to comfort and cool the victim by administering small amounts of cool water (if conscious), loosening clothing, and placing cool compresses at locations where major arteries occur close to the body's surface (neck, underarms, and groin areas). Carefully follow instructions given by emergency medical services until help arrives.

The effects of ambient temperature can cause physical discomfort, loss of efficiency, and personal injury, and can increase the probability of mishaps. In particular, protective clothing that decreases the body's ventilation can be an important factor leading to heat-related illnesses.

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To reduce the potential for heat-related illness, workers are encouraged to drink plenty of water/fluids to stay properly hydrated. in addition, a work schedule will be established that will provide sufficient rest periods for cooling down (at least five minutes when workers feel the need to do so) and have access to shade from the sun (which, in addition to natural shade or canopies, includes resting inside a vehicle with the air conditioner running). Personnel must maintain an adequate supply of non-caffeinated drinking fluids on site for personal hydration – a minimum of one quart of water per employee per hour.

3.9.2 Cold Stress

Workers performing activities during winter and spring months may encounter extremely cold temperatures, as well as conditions of snow and ice, making activities in the field difficult. Adequate cold weather gear, especially head and foot wear, is required under these conditions. Workers should be aware of signs and symptoms of hypothermia and frostbite, as well as first aid for these conditions. These are summarized in the table below.

Cold Stress Symptoms and Response

Condition	Signs	Symptoms	Response
Hypothermia	Confusion, slurred speech, slow movement.	Sleepiness, confusion, warm feeling.	Remove subject to a non-exposed, warm area, such as truck cab; give warm fluids; warm body core; remove outer and wet clothing and wrap torso in blankets with hot water bottle or other heat source. Get medical attention immediately.
Frostbite	Reddish area on skin, frozen skin.	Numbness or lack of feeling on exposed skin.	Place affected extremity in warm, not hot, water, or wrap in warm towels. Get medical attention.
Trench Foot	Swelling and/or blisters of the feet	Tingling/itching sensation; burning; pain in the feet	Remove wet/constrictive clothing and shoes. Gently dry and warm feet with slight elevation. Seek medical attention.

3.9.3 Lightning/Electrical Storms

Lightning can be unpredictable and may strike many miles in front of, or behind, a thunderstorm. Workers will therefore cease field operations at the first sign of a thunderstorm and suspend activities until at least 30 minutes after the last observed occurrence of lightning or thunder. For purposes of this EHASP, signs of a thunderstorm will include any visible lightning or audible thunder.

In the event of a thunderstorm, field personnel will take the following actions:

- Get inside a permanent building structure (not a shed or canopy) or fully enclosed metal vehicle (not a convertible or camper shell) with the windows fully up.
- If in a house or building, do not use the telephone or any electrical appliance that's connected to the building's electrical wiring.
- Stay away from tall isolated objects, such as trees, drill rigs, telephone poles, or flag poles.
- Avoid large open areas, such as fields or parking lots, where a person is the relatively highest object.
- Stay away from lakes, ponds, railroad tracks, fences, and other objects that could transmit current from a distant lightning strike.
- If caught out in the open without time to escape or find shelter, seek a low area (if time permits), crouch down, and bend forward holding the ankles. Tuck the head so that it's not the highest part of the body, without letting it touch the ground. Under no circumstances lay down.

If a person is struck by lightning contact emergency medical services, even if he/she appears only stunned or otherwise unhurt as medical attention may still be needed. Check for burns, especially at fingers and toes, and areas next to buckles and jewelry.

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3.9.4 Flooding

Flooding may occur at or en-route to and from the Site and may be the result of weather conditions or due to thawing of ice and snow (especially in the Spring).

In the event flooding starts to occur:

- Stay tuned to NOAA Weather Radio All Hazards, your local radio and TV stations (i.e., The Weather Channel) for updates, watches, warnings or emergency instructions.
- Know the Coastal Evacuation Route for coastal area or an inland area with chronic flooding
- If the waters start to rise inside before you have evacuated, retreat to higher ground, including the roof. Use cell phone or land line to call for help. Take a flashlight and a portable radio. Then, wait for help. Don't try to swim to safety; wait for rescuers to come to you.
- Avoid flooded areas. Do not attempt to cross any flooded areas in a vehicle or on foot. Flood waters may be deeper than they look.
- Avoid low-lying areas like ditches, creeks, and rivers.
- Before entering or re-entering a building, check for any signs of structural damage.
- When entering a building, do not use matches, lighters, or open flame. Use a flashlight only.
- After a flood, steps and floors are often slippery with mud and covered with debris, including nails and broken glass. Be careful walking around.

3.10 Biological Hazards

The following biological hazards have been identified and may be encountered during scheduled field activities.

☒ Bloodborne Pathogens/Sanitary Waste
☒ Rodents and Mammals
☐ Reptiles/Snakes
☐ Venomous Insects
☒ Mosquitoes
☐ Fire Ants
☐ Spiders/Scorpions
☐ Ticks
☐ Poisonous Plants

If any biological hazards are identified at the Site, workers in the area will immediately notify the SSO, or SSO's designee, and nearby personnel.

3.10.1 Bloodborne Pathogens/Sanitary Waste

Potential exposure to bloodborne pathogens may occur during some work activities (e.g., sewer video surveys or source sampling), rendering first aid or CPR. Direct contact is an important route of exposure for bloodborne pathogens due to puncture injuries, contact with abraded skin, or contact with areas such as the eyes, without appropriate protection. While very few organisms can enter the body through normal intact skin, direct contact with sewage, blood and body fluids is to be avoided. Site personnel should thoroughly wash their hands and face before eating, drinking or smoking and before leaving the work site.

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Exposure controls and Universal Precautions are required at suspect locations, in order to prevent contact with blood or other potentially infectious materials as specified in Brown and Caldwell Associates' Bloodborne Pathogens Program. All blood or other potentially infectious material will be considered infectious regardless of the perceived status of the source individual. A Hepatitis B vaccination will be offered to BC personnel before the person participates in a task where direct exposure to potentially infectious materials is a possibility (i.e., first aid or CPR). For personnel who have potential exposure to sanitary wastes, a current tetanus/diphtheria inoculation or booster is recommended.

3.10.2 Rodents/Mammals

Animals may potentially carry the rabies virus or disease causing agents. Do not attempt to feed or touch animals. Feces from some small mammals may contain diseases such as Hanta Virus. Avoid generating dust in the vicinity of rodent feces. In addition, animals such as dogs or wild predators (i.e., cougars or coyotes) may pose an attack hazard. Persons should slowly back away in a non-threatening manner if an encounter with a threatening animal occurs. In order to avoid such encounters, use the buddy system and make noise when working in areas where such animals may be present.

3.10.3 Mosquitoes

Mosquitoes may transmit diseases such as West Nile Virus. Symptoms of West Nile Virus include: fever, headache, tiredness, body aches, and occasional rash. Avoid mosquito bites by wearing long sleeved shirt and long pants. Apply insect repellent to clothes and/or skin (if FDA approved for topical use). Report any dead birds in the area to local health officials. Mosquitoes are most active from dusk to dawn.

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Section 4

Quality Assurance/Site Control

The SSO, or SSO's designee, will conduct a safety inspection of the BC work site before each day's activities begin to verify compliance with the requirements of the EHASP. Results of the first day's inspection will be documented on the Site Safety Checklist. A copy of the checklist is included in Appendix B. Thereafter, the SSO, or SSO's designee, should document unsafe conditions or acts, along with corrective action, in the project field log book.

Procedures must be followed to maintain site control so that persons who may be unaware of site conditions are not exposed to hazards. The work area may be barricaded by tape, warning signs, or other appropriate means. Site equipment or machinery will be secured and stored safely.
Access to the specified work area will be limited to authorized personnel. Only BC employees and designated BC subcontracted personnel, as well as designated employees of the client, will be admitted to the work site. Personnel entering the work area on BC business are required to sign the signature page of this EHASP, indicating they have read and accepted the health and safety practices outlined in this plan.

4.1 Training Requirements

BC Site personnel, including subcontractors and visitors conducting work in controlled areas of the Site, must have completed the appropriate training as required by applicable sections of 29 CFR 1910 and 1926. BC personnel involved in the performance of field work receive BC 4-hour Fieldwork Safety Awareness training every two years. In addition, the SSO, or designee, will have current training in first aid and CPR, and any additional training appropriate to the level of site hazards.

Further site-specific orientation training for the BC field team and other personnel will be conducted by the SSO or appropriate designee prior to the initiation of project activities. This training will include, but will not necessarily be limited to, Site-specific orientation as required by DEP, emergency procedures, site control, personnel responsibilities, and the provisions of this EHASP. Each employee will document that the have been briefed on the hazards identified at the site and that they have read and understand the requirements of this EHASP by signing the H&S Plan Acknowledgement Form attached as Appendix C. Employees completing the site-specific orientation training will receive the appropriate BEDC sticker.

4.2 Safety Meetings

A daily morning briefing to cover safety procedures and contingency plans in the event of an emergency is to be included with a discussion of the day's activities. These daily meetings will be recorded on the Daily Tailgate Safety Meeting Form. A copy of the Daily Tailgate Safety Meeting Form is included in Appendix D.

Exception: When there is only one employee performing field activities for the project, a formal and documented daily tailgate safety meeting (or completion of the form) is not required. However, personnel are still expected to plan their work activities and attend any site specific safety meetings or training so that tasks are performed safely.

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4.3 Personal Protective Equipment

The purpose of PPE is to protect employees from hazards and potential hazards they are likely to encounter during site activities. The amount and type of PPE used will be based on the nature of the hazard encountered of anticipated. It is not anticipated that respiratory protection will be required by BC personnel for this project.

Dermal protection, primarily in the form of chemical-resistant gloves and coveralls, will be worn whenever contact with potentially chemically-affected materials (e.g., sewage, sludge or wastewater) is anticipated.

On the basis of the hazards identified for this project, the following personal protective equipment (PPE) will be required and used. Changes to the specified levels of PPE will not be made without the approval of the SSO after consultation with the Health and Safety Program Manager.

The following equipment is specified as the minimum PPE required to conduct activities at the Site.

- Work shirt and long pants,
- ANSI- or ASTM-approved hard-toed boots or safety shoes,
- ANSI-approved safety glasses, and
- ANSI-approved hard hat.

Other personal protection readily available for use, if necessary, includes the following items.

- Nitrile gloves when direct contact with chemically affected materials or wastewater/sewage is anticipated (latex gloves may be worn in lieu of nitrile for wastewater/sewage contact).
- Chemical-resistant clothing (e.g., Tyvek or polycoated Tyvek coveralls) when contact with chemically affected materials or wastewater/sewage is anticipated.
- Knee-high PVC polyblend boots when direct contact with chemically affected materials or wastewater/sewage is anticipated.
- Hearing protection.
- Sturdy work gloves (i.e., leather, Kevlar, others as appropriate).
- High-visibility traffic safety vest.

Work will cease if unanticipated conditions or materials are encountered or if an imminent danger is identified. The SSO will immediately contact the Health and Safety Program Manager for consultation.

4.3.1 Stop Work Conditions

If air monitoring indicates that the site-specific action levels defined in Section 5 (Air Monitoring) are exceeded, activities will cease, and personnel must evacuate the work area. The PM and Health and Safety Program Manager will be contacted immediately.

Work will also cease if unanticipated conditions or materials are encountered or if an imminent danger is identified. The SSO will immediately contact the Health and Safety Program Manager for consultation.

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Section 5

Air Monitoring Plan

It is not anticipated that air monitoring will be required for this project. However, in some instances, such as entering into a confined space or subsurface work at a landfill, air monitoring is necessary and essential for protecting personnel. The Health and Safety Program Manager will determine what air monitoring is necessary based on the hazards identified.

Often a multi-gas monitoring device will be used to verify that atmospheric conditions in a suspect area is acceptable for entering or performing work. Common situations would include monitoring for hydrogen sulfide, oxygen levels and lower explosive limit (LEL; often due to a potential presence of methane). For purposes of this EHASP, acceptable atmospheric concentrations for these compounds is as follows:

- hydrogen sulfide less than 5 parts per million (ppm);
- LEL less than 5%; and
- oxygen between 20% and 22%

If acceptable atmospheric conditions are not met, personnel will immediately evacuate the area and the Health and Safety Program Manager will be contacted for consultation. It is important to note that if other compounds of concern can reasonably be expected, the Health and Safety Program Manager will be contacted for appropriate air monitoring instrumentation and acceptable atmospheric concentrations.

Air monitoring will be performed prior to entering into an area of concern. This can be accomplished by using an extended probe or tubing, or by lowering the instrument into the subject space. Air monitoring will then be performed continuously during activities in the suspect area. Data collected will be recorded at approximately 15 minute intervals. In some instances, air monitoring may be discontinued after consultation with the Health and Safety Program Manager.

The equipment will be calibrated in accordance with manufacturer's specifications. The results of air monitoring will be recorded in the field notebook or an appropriate BC form. For reference, a copy of the Air Monitoring Form is located in Appendix A. If applicable, BC's Confined Space Permit and confined space entry procedures will be included in Appendix F.

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Section 6

Contractor Management

BC's EHASP has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's EHASP may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's EHASP does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's EHASP to identify all hazards that may be present at the Site.

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their Job Hazard Analyses (JHAs) for this project or other health and safety program documents for review.

Subcontractor personnel are expected to comply fully with subcontractor's EHASP and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC EHASP. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Subcontractors are prequalified by BC prior to being contracted to perform intrusive or otherwise risky activities. Potential subcontractors are evaluated through a cursory review of the subcontractor's:

- insurance coverage,
- EMR and other Injury/Illness statistics for 3 years,
- a limited check of the subcontractors H&S program, and
- if the subcontractor has received any OSHA citations in the past 3 years

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Section 7

Decontamination Procedures

Decontamination is not anticipated for this project. However, scrupulous personal hygiene should be observed to prevent transmission of infectious disease. An antiseptic waterless hand cleaner or soap and water should be readily available in the absence of proper hygiene facilities. Personnel should thoroughly wash their hands and face as soon as practicable and always prior to eating, drinking, or other activities that would facilitate hand-to-mouth transfer of materials of concern.

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Section 8

Medical Surveillance Requirements

Formal medical surveillance, such as that required by 29 CFR 1910.120, is not required for this project. However, personnel should be physically fit and able to perform their assigned activities and are not to perform any activity for which they have a medical limitation.

A Hepatitis B vaccination will be offered to BC personnel before the person participates in a task where direct exposure to potentially infectious materials is a possibility (i.e., first aid or CPR). For personnel who have potential exposure to sanitary wastes, a current tetanus/diphtheria inoculation or booster is recommended.

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Section 9

Incident Investigations and Contingency Procedures

9.1 Injury or Illness

If an exposure or injury occurs, work will be temporarily halted until an assessment can be made to determine it is safe to continue work. The SSO, in consultation with the Health and Safety Program Manager, will make the decision regarding the safety of continuing work. The SSO will conduct an investigation to determine the cause of the incident and steps to be taken to prevent recurrence.

In the event of an injury, the extent and nature of the victim's injuries will be assessed and first aid/CPR will be rendered as appropriate. If necessary, the Plant's Watch Engineer at #29 will be contacted, who will coordinate emergency services for further care or transport to the nearby medical center. The mode of transportation and the eventual destination will be based on the nature and extent of the injury. A hospital route map is presented at the front of this EHASP.

In the event of a life-threatening emergency, the injured person will be given immediate first aid and emergency medical services will be contacted by dialing the number listed in the Critical Project Information section at the beginning of this plan. The individual rendering first aid will follow directions given by emergency medical personnel via telephone.

Incidents (injury, illness, near misses, property damage) will be reported to the SSO and Health and Safety Program Manager. The SSO and Health and Safety Program Manager will immediately report to the BEDC AM identified in the Critical Information Section of this EHASP.

9.2 Contingency Procedures

Minimum emergency equipment maintained on site will include a fully charged ABC dry chemical fire extinguisher, an adequately stocked first aid kit, and an emergency eyewash station (when corrosive chemicals are present). In addition, employees will consider maintaining the personal emergency supply items listed in Section 3: Natural Phenomena, as appropriate.

In the event of an emergency, site personnel will signal distress with three blasts of a horn (a vehicle horn will be sufficient), or other predetermined signal. Communication signals, such as hand signals, must be established where communication equipment is not feasible or in areas of loud noise.

It is the SSO's duty to evaluate the seriousness of the situation and to notify appropriate authorities. The first part of this plan contains emergency telephone numbers as well as directions to the hospital. Nearby telephone access must be identified and available to communicate with local authorities. If a nearby telephone is not available, a cellular telephone will be maintained on site during work activities. The operation of the cellular phone will be verified to confirm that a signal can be achieved at the work location.

The SSO, or designee, should contact local emergency services in the event of an emergency. After emergency services are notified, the PM and Health and Safety Program Manager will be notified of the situation as soon as possible. If personal injury, property damage or equipment damage occurs, the PM

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and BC Risk Manager will be contacted as soon as practicable. An Incident Investigation Report will be completed within 24 hours by the SSO, or other designated person. A copy of the Incident Investigation Report is included in Appendix E.

9.3 Vehicle Collision or Property Damage

If a vehicle collision or property damage event occurs, the SSO, or designee, will contact the BC Risk Manager for appropriate action.

9.4 Fire

In the event of fire, the alarm will be sounded and Site personnel will evacuate to a safe location (preferably upwind). The SSO, or designee, should contact the local fire department immediately by dialing 911. When the fire department arrives, the SSO, or designated representative, will advise the commanding officer of the location and nature of the fire, and identification of hazardous materials on site. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so. Site personnel should not attempt to fight a fire if it poses a risk to their personal safety.

Note that smoking is not permitted in controlled areas (i.e., exclusion or contamination reduction zones), near flammable or combustible materials, or in areas designated by the facility as non-smoking areas.

9.5 Underground Utilities

In the event that an underground conduit is damaged during subsurface work, mechanized equipment will immediately be shut off and personnel will evacuate the area until the nature of the piping can be determined. Depending on the nature of the broken conduit (e.g., natural gas, water, or electricity), the appropriate local utility will be contacted.

9.6 Site Evacuation

The SSO will designate evacuation routes and refuge areas to be used in the event of a Site emergency. Site personnel will stay upwind from vapors or smoke and upgradient from spills. If workers are in an Exclusion or Contamination Reduction Zone at the start of an emergency, they should exit through the established decontamination corridors, if possible. If evacuation cannot be done through an established decontamination area, site personnel will go to the nearest safe location and remove chemically-affected clothing there or, if possible, leave it near the Exclusion Zone. Personnel will assemble at the predetermined refuge following evacuation and decontamination. The SSO, or designated representative, will count and identify site personnel to verify that all have been evacuated safely.

9.7 Spill of Hazardous Materials

If a hazardous material spill occurs, site personnel should locate the source of the spill and determine the hazard to the health and safety of site workers and the public. Attempts to stop or reduce the flow should only be performed if it can be done without risk to personnel.

Isolate the spill area and do not allow entry by unauthorized personnel. De-energize sources of ignition within 100 feet of the spill, including vehicle engines. Should a spill be of the nature or extent that it cannot be safely contained, or poses an imminent threat to human health or the environment, an emergency cleanup contractor will be called out as soon as possible. Spill containment measures listed below are examples of responses to spills.

- Right or rotate containers to stop the flow of liquids. This step may be accomplished as soon as the spill or leak occurs, providing it is safe to do so.

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- Sorbent pads, booms, or adjacent soil may be used to dike or berm materials, subject to flow, and to solidify liquids.
- Sorbent pads, soil, or booms, if used, must be placed in appropriate containers after use, pending disposal.
- Contaminated tools and equipment shall be collected for subsequent cleaning or disposal.

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Section 10

Documentation and Discipline Guidelines

10.1 Documentation

The implementation of the EHASP must be documented on the appropriate forms (see appendices) to verify employee participation and protection. In addition, the regulatory requirements must be met for recordkeeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information, and respirator fit-tests. Documentation of each BC employee's health and safety records is maintained by the Health and Safety Data Manager in Walnut Creek, California.

Health and safety documentation and forms completed, as specified by this plan, are to be retained in the project file.

Other relevant project-specific health and safety documents, such as MSDSs/SDSs or client-specified procedures, will be attached to this EHASP in Appendix F.

10.2 Disciplinary Guidelines

Employees are expected to comply with BC's H&S Program, including rules, policies, and procedures concerning health and safety in the workplace. Positive reinforcement and recognition is an integral part of the strategy to promote participation and compliance with BC's H&S Program. BC management will periodically distribute discretionary awards to employees who display exemplary safety attitudes or contribute to BC's health and safety efforts. Failure to comply with BC's HSPs, project H&S Plans, regulatory requirements, or attached Codes of Safe Practices may result in reprimand, suspension, or termination. The response to a health and safety infraction will depend on the nature and severity of the violation and will be considered on a case-by-case basis. Where appropriate, re-training of subject individuals may be part of a remedial action program.

Health and safety participation will be reviewed as part of each employee's performance evaluation.

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Appendix A:

Air Monitoring Form

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Brown AND Caldwell

Air Monitoring Form

Instructions: Complete this form immediately prior to project start.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Performing Air Monitoring: (Print and Sign):	Date:

Instrument(s)

Manufacturer/Model:	Manufacturer/Model:
Manufacturer/Model:	Manufacturer/Model:

Does the instrument(s) have a current calibration per the manufacturer's instructions? ☐ Yes ☐ No

Was the instrument(s) field checked (i.e bump tested or field calibrated) per the manufacturer's instructions? ☐ Yes ☐ No

Remarks:

Monitoring Data

TIME	LOCATION AND ACTIVITY	P/FID (PPM)	COLORIMETRIC TUBES (PPM)	RAM (mg/m^3)	MULTI-GAS DETECTION %LEL	H2S	O2	OTHER

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Appendix B:

Site Safety Checklist

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Brown AND Caldwell

Site Safety Checklist

Instructions: Complete this form immediately prior to project start.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Completing Checklist: (Print and Sign):	Date:

Yes	No	N/A		Yes	No	N/A	
☐	☐	☐	Written Health and Safety (H&S) Plan is on site?	☐	☐	☐	Respirators are available, properly cleaned, and stored?
☐	☐	☐	Addenda to the H&S Plan are documented on site?	☐	☐	☐	Overhead utilities do not present a hazard to equip./personnel?
☐	☐	☐	H&S Plan information matches conditions/activities at the site?	☐	☐	☐	Traffic control measures have been implemented?
☐	☐	☐	H&S Plan read/signed by all site personnel, including visitors?	☐	☐	☐	Trenches and excavations are safe for entry?
☐	☐	☐	Daily tailgate H&S meetings have been held/documented?	☐	☐	☐	Soil Spoils are at least 2 feet from the edge of the excavation?
☐	☐	☐	Site personnel have required training and medical?	☐	☐	☐	Emergency/FA equip. is on site as described in the H&S Plan?
☐	☐	☐	Air monitoring is performed/documented per the H&S Plan?	☐	☐	☐	Drinking water is readily available?
☐	☐	☐	Air monitoring equipment has been calibrated daily?	☐	☐	☐	Phone is readily available for emergency use?
☐	☐	☐	Site zones are set up and observed where appropriate?	☐	☐	☐	Utility locator has cleared subject locations?
☐	☐	☐	Access to the work area limited to authorized personnel?	☐	☐	☐	Proper drum and material handling techniques are used?
☐	☐	☐	Decontamination procedures followed/match the H&S Plan?	☐	☐	☐	Waste containers/drums are labeled appropriately?
☐	☐	☐	Decontamination stations (incl. hand/face wash) are set up and used?	☐	☐	☐	Ext. cords are grounded/protected from water/vehicle traffic?
☐	☐	☐	PPE used matches H&S Plan requirements?	☐	☐	☐	Tools and equipment are in good working order?
☐	☐	☐	Hearing protection used where appropriate?	☐	☐	☐	GFCIs used for portable electrical tools and equipment?

Notes

(All "no" answers must be addressed and corrected immediately. Note additional health and safety observations here):

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Appendix C:

H&S Plan Acknowledgement Form

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Brown AND Caldwell

H&S Plan Acknowledgement Form

Instructions: Complete this form immediately prior to project start or as new personnel join the project.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Performing Briefing: (Print and Sign):	Date:

Employee Acknowledgement:

The following signatures indicate that these personnel have read and/or been briefed on this Health and Safety (H&S) Plan and understand the potential hazards/controls for the work to be performed.

Important Notice to Subcontractor(s):

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their own H&S Plan for this project or other health and safety program documents for review.

BC's Health and Safety Plan has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's H&S Plan may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's H&S Plan does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities. (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's H&S Plan to identify all hazards that may be present at the Site. Subcontractor personnel are expected to comply fully with subcontractor's Health and Safety Plan and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC H&S Plan. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Print	Sign	Date	Print	Sign	Date

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Appendix D:

Daily Tailgate Meeting Form

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DAILY TAILGATE MEETING FORM

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Completing Form (*print and sign*):	**Date:**

Employee Acknowledgement:

The following signatures indicate that these personnel have read and/or been briefed on this Health and Safety (H&S) Plan and understand the potential hazards/controls for the work to be performed.

Important Notice to Subcontractor(s):

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their own H&S Plan for this project or other health and safety program documents for review.

BC's Fieldwork Safety Plan has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's H&S Plan may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's H&S Plan does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities. (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's H&S Plan to identify all hazards that may be present at the Site. Subcontractor personnel are expected to comply fully with subcontractor's Fieldwork Safety Plan and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC H&S Plan. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Print	Sign	Date	Print	Sign	Date

Plan of the Day

(Describe the activities that are planned to be performed today)

Potential Hazards and Topics Discussed

(Describe the potential hazards and controls that may be associated with planned activities)

☐ Physical ☐ Natural Phenomena ☐ Chemical ☐ Electrical ☐ Biological ☐ Radiological

☐ Other (specify):

Place a copy in the project file.

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Appendix E:

Incident Investigation Report

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Preliminary Incident Investigation Report Form

Privileged and Confidential
Do Not Distribute

Instructions:
If an incident occurs, complete all applicable information in this form, make a copy for your records, and immediately forward the original to the office Health and Safety Coordinator (HSC). If fields are not applicable, indicate with "N/A". Use separate sheet(s) if necessary and attach sketches, photographs, witness statements, or other information that may be helpful in understanding how the incident occurred. For assistance in completing this form, contact your office H&S Coordinator/Specialist or your Health and Safety Program Manager.

HSC – Review and enter report into the BC Online Incident Reporting System within 3 workdays of receipt. File original in appropriate office health and safety file.

NOTE:
This report is important – please take the time necessary to properly complete it. Incomplete reports will be forwarded to appropriate management for review and action.

General Information

Date of Incident	**Time of Incident:**	**Date Incident Reported:**	**To Whom:**
Exact Location of Incident (Street, City, State)**:**			**BC Office:**
Name Project:			**Project Number:**
Employee Completing the Investigation (Print and Sign)**:**			**Date:**

Injured/Ill Employee/Property Damage Information

Employee Name:	**Employee No.**	**Department:**	**Phone Number:**
Job Title:		**Manager's Name and Phone Number:**	
Nature of Injury/Illness (laceration, contusion, strain, etc.)**:**		**Body Part Affected** (arm, leg, head, hand, etc.)**:**	
Describe Property Damage and Estimate Loss :			

Description of Incident

Describe the incident sequentially, beginning with the initiating event, and followed by secondary and tertiary events. End with the nature and extent of injury/damage. Name any object or substance and tell how they were included. Examples: 1) Employee was pulling utility cart that was loaded with wastepaper from office area to hallway. Wheel of utility cart caught against door casing. Bags of heavy wastepaper that were in cart fell to end of cart. Cart tipped over onto foot of employee. Right foot was crushed between utility cart and door casing, resulting in severe contusion to right foot of employee. 2) Employee was driving rental car from office to project site. Car struck icy section of road. Employee lost control of vehicle, which skidded across road into concrete abutment on side of road. Incident resulted in damage to right fender, tire, headlight, and grill.

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Brown AND Caldwell

Preliminary Incident Investigation Report Form

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Do Not Distribute

Analysis of Incident Causes

Immediate Causes - Substandard Actions

What substandard actions caused or could have caused the incident? State the actions on the part of the employee or others that contributed to the occurrence of the incident. Examples: 1) Employee overloaded the utility cart with wastepaper. 2) Employee exceeded safe speed on icy road, and was inattentive to hazard.

Codes (check all that apply)

- ☐ Failure to recognize hazard(s)
- ☐ Failure to use equipment or use it properly
- ☐ Failure to use PPE or use it properly
- ☐ Failure to warn, secure, or barricade
- ☐ Horseplay
- ☐ Improper lifting
- ☐ Improper loading, placement, or position for task
- ☐ Performing excessive repetitive activities
- ☐ Operating equipment without authority
- ☐ Removing or making safety devices inoperable
- ☐ Servicing equipment in operation
- ☐ Using defective equipment
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Immediate Causes - Substandard Conditions

What substandard conditions caused or could have caused the incident? State the conditions that existed at the time of the incident (the specific control factors that were or may have been the direct or immediate cause or causes of the incident). Examples: 1) Wheel of utility cart was worn and would not roll properly; utility cart was overloaded with wastepaper. 2) Road was covered with icy spots; weather was foggy.

Codes (check all that apply)

- ☐ Congested or restricted area
- ☐ Defective tools, equipment, or materials
- ☐ Fire or explosion hazards
- ☐ Hazardous environmental conditions (vapors, dusts, etc.)
- ☐ High or low temperature exposures
- ☐ Inadequate guards or barriers
- ☐ Inadequate or excessive illumination
- ☐ Inadequate ventilation
- ☐ Inadequate walking/working surfaces
- ☐ Noise Exposures
- ☐ Poor housekeeping
- ☐ Radiation exposures
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Basic Causes - Personal and Job Factors

What personal and/or job factors caused or could have caused the incident? State the influencing factors or underlying causes, either conditions or actions or both, that contributed to the incident. Examples: 1) Employee had not been instructed in overloading hazards. 2) Employee had not been trained in driving under winter conditions; company has no driver training program.

Codes (check all that apply)

Personal Factor Codes

- ☐ Alcohol or drug influence (possible)
- ☐ Fatigue
- ☐ Inadequate skill, capability, knowledge, or training
- ☐ Inattention
- ☐ Rushing to complete work
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Job Factor Codes

- ☐ Inadequate engineering
- ☐ Inadequate leadership/supervision
- ☐ Inadequate maintenance, wear, abuse, or misuse
- ☐ Inadequate planning or accelerated schedule
- ☐ Inadequate tools/equipment
- ☐ Inadequate work standards/procedures
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Remedial Actions

Describe the actions taken or planned to prevent recurrence of incident - provide the implementation date and person responsible for any planned corrective action. Examples: 1) Wheels of utility cart were replaced with larger size wheels; all carts were inspected for safe operation; employees were instructed in overloading hazards. 2) All project personnel were instructed at the safety training meeting on driving under hazardous conditions; driver training program will be implemented.

Codes (check all that apply)

- ☐ Equipment repair or replacement
- ☐ Improve design or construction
- ☐ Improve housekeeping
- ☐ Improve PPE
- ☐ Install safety guard or device
- ☐ Reinstruction or reprimand of personnel involved
- ☐ Temporary/permanent reassignment of personnel
- ☐ Work method change
- ☐ Use safer materials or equipment
- ☐ Develop and publish lessons learned
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

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Appendix F: DEP Documents and Forms

SOP 025 Design Phase Health and Safety Plan

DEP BEDC EHS EHASP Standard

DEP Arc Flash PPE Guidance

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NYC Environmental Protection **SOP 025**	**PROJECT DELIVERY SOPS** **FACILITY PLANNING AND DESIGN PHASE ENVIRONMENTAL, HEALTH, AND SAFETY PLAN**	SOP applicable in: ☒ Facility Planning ☒ Design ☐ Construction	Revision: 1 Issued: 3/17/14 Approved By: HB

PART I - OBJECTIVE / OVERVIEW

The purpose of this document is to identify the procedures required for the development, submittal, review and approval of Environmental, Health and Safety Plans (EHASPs) during the facility planning and design phases. An EHASP is often required to identify hazards related to the activities performed during the facility planning and design phases of the project (e.g., ground water sampling, soil sampling, structural inspections, integrity diving operations, etc.). The purpose of the EHASP is to provide written procedures to control or mitigate these hazards.

PART II - PROCEDURES

1. The BEDC Accountable Manager (AM), in consultation with the appropriate BEDC EHS Regional Manager (RM) for the project, evaluates whether an EHASP is required:
   - AN EHASP will be developed if the scope of work requires field work involving significant occupational and environmental hazards (i.e., death or serious injuries/illnesses or detrimental impact to land, water and air), including but not limited to analyses/inspections/investigation of structures and geology, environmental sampling of groundwater and soil, and surveying.
   - Where an EHASP is required, the AM and RM will determine the extent of EHASP to be provided. A sample EHASP criteria is provided in the **Planning and Design Phase EHASP Guidance Document**
   - Where an EHASP is not required, the AM and RM may determine that the use of Job Hazard Analysis (JHA) or Site-Specific Safe Work Plans (SSSWP) is adequate and acceptable.
2. As soon as the Order to Commence is announced the Engineer of Record (EOR) will begin development of the EHASP.
   - The EHASP will be prepared by a Qualified Person (i.e., an individual who by training, experience, or education is capable of recognizing and identifying hazards associated with the work and ability to develop control measures to mitigate the hazards presented) or as otherwise required by the contract documents.
3. The AM is responsible for ensuring that the EOR coordinates with the Operating Facility Representative and Operating Bureau EHS to discuss site conditions and potential hazards associated with the prescribed scope of work and obtain a copy of the facility's emergency action plan.
4. The EOR will submit the EHASP to the AM and RM. The AM will then provide the EHASP to the Operating Bureau representative. The EHASP will contain:
   - A cover page indicating the contract number, a current date, unique revision number, signature of the Qualified Person, and the EOR's letterhead with a listing of all consultants/sub-consultants.
5. The EOR will require that all consultants/sub-consultants comply with the EOR EHASP or have consultants/sub-consultants develop a separate EHASP, which is reviewed and accepted by the EOR, prior to submittal to BEDC for review (see Section 2.4). No work will start until the EHASP for that activity is approved by BEDC EHS.
6. The AM and RM will perform simultaneous reviews of the EHASP and provide written comments.
   - The AM will focus on the verification that the scope described in the EHASP is accurate with regards to the project scope and as determined above (see Section 2.1).
   - The RM will focus on the identification of hazards, proposed controls and mitigation measures, and compliance with all applicable Federal, State and Local EHS rules and regulations, DEP's EHS Policies and Procedures, and BEDC's EHS Standards.

7. The AM is to submit all comments, including any from the Operating Bureau to the EOR. If comments are extensive (e.g., significant hazards are not identified, sufficient controls are not incorporated, etc.), a request may be made by the AM to the EOR and RM for a meeting to discuss comments.
8. The EOR will address each set of comments and update the EHASP accordingly.
    - All EHASP responses are to be documented on the reviewers' comment sheets with references to locations where updates were made in the EHASP.
9. The EOR will submit the revised EHASP to the AM.
10. The review and revision process repeats until an acceptable EHASP is submitted. The AM will ensure that no site work is performed until the EHASP is accepted.
11. The AM and RM will verify their respective comments have been addressed and/or incorporated into the EHASP.
12. Upon acceptance by both the AM and RM, the AM will issue to the EOR acceptance of the EHASP in the form of an e-mail or memorandum.
13. The EOR is to provide one electronic copy of the EHASP to the AM and RM.
14. The EOR will provide at least one hard copy of the EHASP for usage at the site, when work is being performed. For Consultant-lead projects, the Consultant will provide the number of copies indicted in the Consultant scope of work.
15. Where a SSSWP, JHA, or something other than an EHASP is used, the AM and RM should consider and utilize the review process above as they deem necessary.

PART III - TOOLS AND FORMS

- **Planning and Design Phase EHASP Guidance Document**

PART IV - RELATED PROCEDURES

- **None**

Version No. 1
Last Updated: 04/04/11

BEDC EHS DESIGN PHASE HASP REVIEW CHECKLIST

DEP Contract ID No.		Accountable Mgr:	
Project Title:		Portfolio Mgr:	
EOR:		HASP Submitted:	(Date HASP Submitted)
Checklist Completed by:		Date Completed:	(Date Checklist Completed)

Item	Conforms with Standards?		
	Yes	No	Comments
1. Cover page with: a. DEP project name b. Contract number, c. Name address and telephone number of the primary EHS contact	D	D	
2. Table of Contents	D	D	
3. Policy	D	D	
4. Staff Organization Chart (e.g. Roles and Responsibilities) a. Competent Persons b. Subcontractor Oversight c. Subcontractor HASP	D	D	
5. Description of Scope of Work activities	D	D	
6. Description of Project hazards and corresponding control measures (i.e. Project JHAs)	D	D	
7. Quality Assurance	D	D	
8. Training Requirements a. New to the job orientation b. OSHA 10 Specialized training	D	D	
9. Safety Meetings	D	D	
10. PPE Requirements	D	D	
11. Contractor & Subcontractor Management	D	D	
12. Incident Investigation Process	D	D	
13. Safe Work Rules and Regulations	D	D	
14. Occupational Health	D	D	
15. Emergency Action & Fire Prevention Plans	D	D	
16. Access Control Procedures	D	D	
17. Discipline	D	D	

18. **Appendix:** a. Forms b. Approved Sub-HASPs	D	D

1. Environmental Health and Safety Plan

PLAN DEVELOPMENT

Each BEDC Contractor shall have a site-specific Environmental Health and Safety Plan (EHASP) that describes the means and methods they will employ on a BEDC project to comply with the EHS requirements of BEDC standards, OSHA standards, environmental standards and local codes, rules and regulations.

The narrative EHASP shall be prepared by the Contractor's EHS Professional who is familiar with construction methods, regulatory requirements, and hazard recognition and control.

The EHS Professional shall have experience with the identification, evaluation and control of the hazards associated with the work to be performed and meet all requirements defined by the contract.

Information contained in the EHASP shall be auditable.

EHASPs shall be submitted to BEDC for review and approval. EHASPs shall be submitted within 30 business days following the issuance of Notice to Proceed (NTP). In no case shall work be allowed to commence without a BEDC approved EHASP.

PLAN MODIFICATION

As necessary the EHASP shall be modified as conditions, personnel or means and methods change.

Any deviation from the EHASP shall be incorporated into the EHASP and communicated to BEDC.

Whenever the changes are made to the EHASP the change shall be communicated to affected personnel. A printed copy of the EHASP shall be readily available on the job site during all shifts.

EHASP OUTLINE

The EHASP shall be project-specific and address any unusual or unique aspects of the project or activity. The EHASP shall interface with the Contractor's overall EHS program. Any portions of a Contractor's EHS program that are referenced in the EHASP shall be included as an attachment.

The following areas shall be addressed in each EHASP:

PART I – ADMINISTRATION

1. **Signature sheet –** Title, signature, date, and phone number of the following:
   - Plan preparer
   - A principal or senior manager authorized to obligate the company
   - Project management staff
     - For Construction contracts this shall include
       - Project Manager
       - Project Superintendent

- Construction management contracts
  - Resident Engineer
- Engineering and design contracts
  - Engineer of Record
- Other
  - As dictated by contract

2. **Background information –** List the following:
   - Contractor
   - Contract number
   - Project name
   - Brief project description, description and locations of work to be performed
3. **Statement of EHS policy –** Provide a copy of current company EHS Policy Statement, detailing commitment to providing a safe and healthful workplace for all personnel. This policy shall also demonstrate a commitment to minimizing impacts to the environment.
4. **Responsibilities and lines of authorities –** Provide the following:
   - Identification and accountability of personnel responsible for safety at both the company and project level
   - Project specific organizational chart
   - The names of Competent and/or Qualified Person(s) and verification of qualifications (if the individuals are not yet identified at the time of EHASP submission, the EHASP will be updated as soon as the individuals are identified)
   - Requirements that no work shall be performed unless a designated Competent Person is present on the job site
   - A progressive disciplinary policy that includes termination for willful disregard of EHS requirements
5. **Subcontractors and suppliers –** Provide procedures for coordinating EHS activities with other employers on the job site:
   - Process used to select and qualify subcontractors and suppliers
   - Identification of subcontractors and suppliers (if known);
   - EHS responsibilities of subcontractors and suppliers;
   - Procedures for assuring compliance by subcontractors, suppliers, and authorized visitors.
6. **Scope of Work –** The EHASP shall provide an outline of the scope of work to be performed. This outline shall include a detailed sequence of steps for how the project is going to be executed.
7. **Job Hazard Analysis (JHA) –** Contractors shall provide programs for planning for the risks of their work activities and how this planning will involve and be communicated to affected personnel. JHAs must be performed for all major scope of work activities and where defined by BEDC's EHS Standards. JHAs are required to be performed prior to the start of associated work activities. Each JHA shall identify the following:
   - Hazards of the work activity being performed
   - Means and methods necessary to control the hazards of the work activity (simply referencing regulatory citations as control programs is not acceptable)

- Competent Person performing the JHA
- Environmental considerations (e.g., secondary containment, soil and erosion controls)
- Equipment to be used for the work activity
- Training requirements for personnel

8. **Pre-Shift "Toolbox Talks" –** Contractors shall identify programs for conducting a toolbox talk prior to the start of each daily work shift. Toolbox talks shall be relevant to the potential hazards of the activities being performed that shift. BEDC strongly encourages that toolbox talks include the participation of all affected personnel.

9. **Training**
   - Requirements for project specific safety orientation (on-site)
   - Requirements for mandatory training, certifications and licenses that apply to the project (e.g., confined space entry, crane operator, scaffolding, fall protection, HAZWOPER, etc.) and any requirements for periodic retraining/recertification
   - Procedures for EHS training for supervisors and employees
   - Requirements for emergency response training in accordance with the project's Emergency Action Plan (EAP)

10. **EHS Inspections**
    - Specific assignment of responsibilities for a minimum daily site EHS inspections
      - Identify who will be performing (e.g., EHS Representative, project manager, superintendent, etc.)
      - Identify any external inspections/certifications that may be required (e.g., NYCDOB).

11. **Reporting –** The Contractor shall identify individuals responsible to report the following (reporting shall be in accordance with applicable BEDC EHS Standards):
    - Exposure data (man-hours worked);
    - Near miss events
    - Incident investigation reports
    - Regulatory violations
    - Inspection data
    - Training information
    - Environmental reports

12. **Substance Abuse Program**
    - Frequency, type and reason for testing
    - Measures that will be taken in cases where workers are suspected of drug or alcohol impairment
    - Mandatory testing following any crane or mobile equipment related serious or significant incident.

PART II – PLANS AND PROGRAMS

When preparing an EHASP, Contractors shall perform an assessment of work activities to identify risks to be addressed and compliance plans needing to be prepared. Examples of plans needing to be included in a Contractor's EHASP may include the following:

1. **Layout and Site Mobilization Plan**
2. **Site Sanitation Plan**
3. **Access and haul road plan**
4. **Respiratory Protection Plan**
5. **Hazard Communication Program**
6. **Lead Abatement Plan**
7. **Asbestos Abatement Plan**
8. **Hazardous Energy Control Plan**
9. **Crane Erection and Critical Lift Plan**
10. **Site-Specific Fall Protection & Prevention Plan**
11. **Demolition Plan (to include engineering survey)**
12. **Personal Protective Equipment program**
13. **Traffic Control Plan (in accordance with DOT's MUTCD)**
14. **Hazardous Waste Operations**
15. **Confined Space Entry Program**
16. **Spill Prevention Program**

PLAN DEVELOPMENT TOOLS

When developing the WMS the author must be cognizant of the basic four safety hazards found and health hazards in construction and the hierarchy of control.

TOOLS AND FORMS

BEDC EHS Field Guide

BEDC EHS Job Hazard Analysis Form

RELATED PROCEDURES

BEDC EHS Job Hazard Analysis Standard

BEDC EHS Emergency Action Plan Standard

BEDC EHS Incident and Near Miss Reporting and Investigation Standard

SOP 207 Construction Environmental, Health and Safety Plan

1. Background

This guidance document provides guidelines on selection of Personal Protective Equipment (PPE) for protection from electric arc flash from equipment for which detailed arc hazard analysis has not been performed. This guidance applies to situations in which staff may be exposed to arc flash from high voltage switches or live unguarded electrical wires, parts or equipment with voltages above 50 Volts. PPE is not required when in proximity to electrical equipment in enclosed panels with no exposed connectors, where electrical work is not being performed and where no high voltage switch is being operated.

An arc flash may occur when electrical current "short circuits," that is, flows from energized wires or equipment to ground, or between energized wires or equipment with different phases or potential. An arc flash may also occur during movement of energized electrical contractors, such as switches. The arc flash creates electrically conductive superheated plasma that can reach temperatures of 5000° F and above. Occurring in a fraction of a second, it produces a brilliant flash, intense heat, and a shock wave. The magnitude of the energy and other factors will determine the severity of the arc flash. With sufficient energy, an arc flash may become an arc blast producing a dangerous shock wave.

This guidance is derived from the National Fire Protection Association's (NFPA) recommended standard NFPA 70E, *Standard for Electrical Safety in the Workplace.* This document will summarize key provisions of NFPA 70E as they apply to work conducted by DEP employees. Refer to NFPA 70E for additional information.

This guidance should be used unless there is a detailed arc hazard analysis and Hazard Mitigation Plan that has calculated arc flash energy and established PPE requirements for the specific equipment being worked on.

2. Definitions

Arc Rating [NFPA 70E] – The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to break open or: at the onset of a second-degree skin burn. Arc rating is normally expressed in cal/cm^2.

Circuit Breaker [NFPA 70E] – A device designed to open and close a circuit by non-automatic means and to open the circuit automatically when a predetermined over current occurs without damage to itself when properly applied within its rating.

Dead Front [NFPA 70E] – Without live parts exposed to a person on the operating side of the equipment.

Disconnecting Means [NFPA 70E] – A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Electrical Hazard [NFPA 70E] – A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn or blast.

Exposed (as applied to live parts) [NFPA 70E] – Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated.

Exposed (to arc flash hazard) **– Within the flash protection boundary during work activities on or close to unguarded energized electric wires or equipment, or activation of unguarded energized electrical switches. This includes opening of electrical enclosures.**

Flash Hazard [NFPA 70E] – A dangerous condition associated with the release of energy caused by an electric arc.

Flash Protection Boundary [NFPA 70E] – An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur. *Entry into the Flash Protection Boundary* occurs *when the face, head or trunk of the person* crosses *the boundary. Within this boundary workers are required to wear appropriate PPE.* [Note: if hands cross the boundary, PPE is required on the hands and arms]

Flash Suit **[NFPA 70E] – A complete system of fire retardant clothing and equipment that covers the entire body, except for the hands and feet including pants, jacket, and bee-keeper type hood fitted with a face shield.**

Opening Door - To move (as a breaker box door) from a closed position by making available for entry, by turning back (as a barrier) or by removing (as a panel cover or obstruction).

Qualified Person [NFPA 70E] – One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved.

Working On (live parts) [NFPA 70E] – Coming into contact with live parts greater than 50 Volts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the PPE a person is wearing.

3. Responsibilities

Only Qualified Person(s) are allowed to work on electrical equipment.

Responsible Individuals shall ensure that employees comply with the requirements set forth in this guidance, including that required PPE is available and used appropriately by employees, that employees are assigned work for which they are qualified, and that appropriate training has been conducted for staff to perform their jobs safely.

Individuals opening or exposing energized electrical wires or equipment are responsible for assessing the requirements of this guideline and taking appropriate measures to protect themselves and others from potential arc flash hazards.

Employees will perform only those tasks for which they are qualified, shall understand the basic principles of high voltage electricity, hazardous energy control and electrical safety procedures. Employees shall use the proper tools and required PPE, and shall request supplemental training and information whenever necessary.

See the DEP Personal Protective Equipment procedure for a complete listing of responsibilities associated with any PPE.

4. Safeguarding Electrical Parts and Equipment

Whenever possible, live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them. This may be done by de-energizing and locking out, insulating or enclosing.

When safeguarding is not feasible, precautions for protection from arc flash and electric shock are required.

5. "Dead Front" Equipment

Dead front equipment is equipment within enclosures or panels without live parts exposed to a person on the operating side of the equipment. This includes disconnects, control panels, switches, breakers, and motor controls within enclosures with the doors closed and secured.

Arc flash PPE is not required when operating this equipment. It is a recommended practice for electricians and other employees who commonly operate this equipment to wear non-melting clothes and safety glasses.

It is also a good practice when an employee is switching disconnect switches for him/her to stand to the hinge side of door, so that he/she is out of the direct line of fire if a catastrophic fault occurs when the switch is operated. Further protection would be afforded by taking a deep breath and facing away from the switch, before throwing the switch.

6. Exposure to Arc Flash

The potential for arc flash exists when there is a potential for an electrical current to short circuit. A short circuit occurs when current flows from energized wires or equipment to ground, or between energized wires or equipment with different phases or potential. An arc flash may also occur during movement of energized electrical contractors.

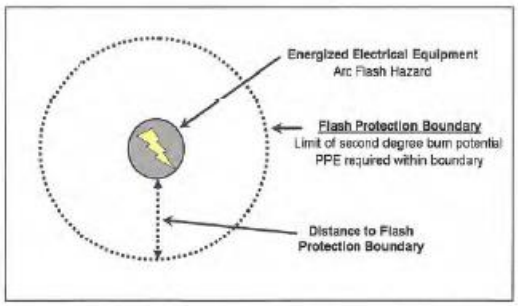
Exposure to an arc flash hazard occurs when a person is close enough to a potential source of arc flash that he/she may be injured if there is no protection such as an electrical enclosure or barrier.

Tasks such as opening electrical panels can result in an exposure to an arc flash hazard and may require protection. Servicing, maintenance and testing of energized circuits, or within equipment with energized circuits, creates an additional risk for arc flash through accidental contact of tools or equipment with un-insulated energized wires or parts.

Hazard distance requiring the use of PPE is defined by the Flash Protection Boundary.

7. Flash Protection Boundary

The Flash Protection Boundary is the distance from a potential source of arc flash within which arc flash PPE is required. Inside this boundary, it is estimated that a person could receive a second degree burn if an electrical arc flash were to occur. Entry into the Flash Protection Boundary occurs when the face, head or trunk of the person crosses the boundary.

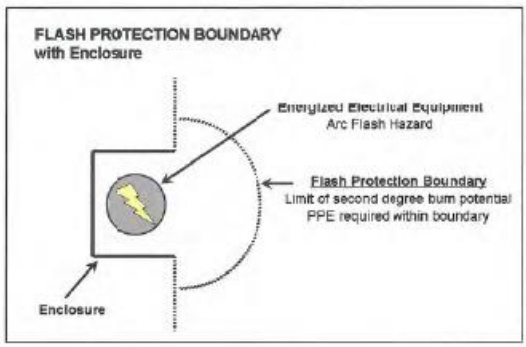


Equipment-specific arc flash boundaries may depend upon numerous factors such as available fault level and trip characteristics of the upstream protective device, as determined in an arc hazard analysis. Default Flash Protection Boundaries are provided in this table based on the most conservative assumptions in NFPA ?OE and may be used if there are no detailed arc hazard analyses and equipment-specific Hazard Mitigation Plan.

Arc Location	System Voltage	Flash Protection Boundarv (Feet)
Arc in air	200–600V	**4**
Arc in enclosure	200–600V	10
Arc in enclosure	600V and up	20

Arc in air means unenclosed, so that flash energy is dispersed in all directions. This type of exposure may occur when an employee is testing live wiring outside of an enclosure.

Most exposures will occur with equipment in enclosures. The enclosure will direct the arc flash energy in the direction of the opening. This protects people away from the opening but increases the energy directed towards anyone in front of the opening.



8. Personal Protective Equipment (PPE) Classifications

For all work involving potential exposure to energized unguarded or un-insulated electrical equipment, non-melting clothing must be worn. Non-melting clothes are natural fibers such as cotton and wool. Synthetic clothing can melt and burn rapidly when exposed to heat or flame and can increase burn injuries. Electrical safety programs will also generally prohibit employees from wearing metallic jewelry and clothing with metal closures (e.g., zippers, snaps).

In addition to non-melting clothing, the appropriate level of PPE must be worn for tasks in which exposure to an arc flash hazard within the flash protection boundary is possible.

Flame resistant clothing may be a treated fabric or a flame resistant fabric such as Nomex. PPE is designated according to Arc Rating. The higher the energy exposure, the higher the Arc Rating expressed in cal/cm . Typically, Flash Suits and Flash Hoods are rated on the inside tag, expressing what the Arc Rating is for that garment. Khaki Flash Hoods and Flash Suits are rated at 40 cal/cm^2.

The following levels of protective clothing are specified in NFPA ?OE Table 130.7(C)(10) for protection from arc flash.

Level O

- Non-Melting Long Sleeve Shirt; Non-Melting Long Pants.
- Safety Glasses.

Level 1

- Minimum Arc Rating 4 callcm^2.
- Flame Resistant (FR) Long Sleeve Shirt; FR or Denim Long Pants; *FR Coveralls may be used instead of FR Shirt and Pants.*
- Hard Hat (Class E), Arc Rated Faceshield, Leather Gloves and Leather Work Shoes.

Level 2

- Minimum Arc Rating 8 callcm^2
- Cotton Underwear **plus** FR Long Sleeved Shirt; FR or Denim Long Pants; FR Coveralls may be used instead. Hard Hat (Class E), Safety Glasses or Goggles, Arc Rated Flash Hood (20 cal/cm^2 or equivalent) or Arc
- Rated Face Shield, Hearing Protection, Leather Gloves and Leather Work Shoes.

Level 3

- Minimum Arc Rating 25 callcm^2.
- Cotton Underwear **plus** FR Long Sleeved Shirt; FR or Denim Long Pants; **plus** FR Coveralls.
- Hard Hat (Class E), Safety Glasses or Goggles, Arc Rated Flash Suit w/ Hood (40 cal/cm^2 or equivalent), Hearing Protection, Leather Gloves, Leather Work Shoes.

Level 4

- Minimum Arc Rating 40 callcm^2.
- Cotton Underwear **plus** FR Long Sleeved Shirt; FR or Denim Long Pants; **plus** Multi-Layer Arc Rated Flash Suit (100 cal/cm^2 or equivalent).
- Hard Hat (Class E), Safety Glasses or Goggles, Arc Rated Flash Suit Hood (100 cal/cm^2 or equivalent),
- Hearing Protection, Leather Gloves, Leather Work Shoes.

See Appendix A for additional information on selection of arc flash PPE.

Selection of PPE

PPE for protection from arc flash must be selected, as described in Sections 10 and 11, by trained and qualified employees.

Training and authorization must be appropriate for the level of energy and type of PPE being used. As an example, a person trained and authorized for 480 volt work may not be sufficiently trained or authorized for 4160 volt work.

9. Inspection, Maintenance, Cleaning and Storage of PPE

PPE may be individually assigned or available to a group.

For individually assigned PPE, the person to whom the equipment is assigned is responsible for inspection, maintenance and storage of the PPE.

For group equipment, such as 100 cal/cm^2 suits, a person shall be assigned responsibility for inspection, maintenance and storage of the equipment.

The user must inspect all PPE prior to and after each use for damage and defects. Any damage, defects, or problems with the equipment must be reported to the Responsible Individual.

DEP will follow manufacturer's recommendations for laundering protective clothing and will provide for special care of treated fabrics, when required.

DEP will follow manufacturer's recommendations for cleaning and storing of other protective equipment. Storage bags and designated, secure, readily accessible storage areas are recommended.

10. Low Voltage Tasks (less than 600 Volts)

The flash protection boundary (before equipment-specific assessment) for exposed equipment less than 600 Volts is 10 feet. Arc Flash PPE is for exposure within this boundary.

PPE may be selected based on the attached Low Voltage Hazard/Risk Classifications Table (Appendix B) and the PPE levels specified in Section 8, or the following standard clothing may be used.

Standard clothing for all Level 1 and Level 2 tasks (see Low Voltage Hazard/Risk Classifications) is:

- Minimum Arc Rating 8 cal/cm^2.
- Cotton Underwear plus FR Long Sleeved Shirt and FR or Denim Long Pants; FR Coveralls may be used instead of shirt and pants.
- Hard Hat (Class E), Safety Glasses or Goggles, Arc Rated Flash Hood (20 cal/cm^2 or equivalent) or Arc Rated Face Shield, Hearing Protection, Leather Gloves and Leather Work Shoes.

The following low voltage tasks require Level 3 clothing:

Insertion or removal of starter buckets from MCC.
Insertion or removal (racking) of circuit breakers, with doors open.
Removal of bolted covers to expose bare, energized parts in switchgear (<600V).

11. High Voltage Tasks (greater than 600 Volts)

The interim flash protection boundary (i.e., before equipment-specific assessment) for high voltage tasks is 20 feet. Arc Flash PPE must be worn within this boundary.

PPE may be selected based on the attached High Voltage Hazard/Risk Classifications Table (Appendix C) and the PPE levels specified in Section 8, or the following standard clothing may be used.

Standard clothing for all Level 3 and Level 4 tasks (see High Voltage Hazard/Risk Classifications) is:

- Minimum Arc Rating 40 ca//cm^2.
- Cotton Underwear plus FR Long Sleeved Shirt and FR or Denim Long Pants; Plus Multi- layer Arc Rated Flash Suit (100 cal/cm^2 or equivalent).
- Hard Hat (Class E), Safety Glasses or Goggles, Arc Rated Flash Suit Hood (100 cal/cm^2
- or equivalent), Hearing Protection, Leather Gloves, Leather Work Shoes.

NFPA 70E 130.7(C)(10)

Protective Clothing and Equipment	Protective Systems for Hazard/Risk Category					
Hazard/Risk Category Number	**–1 (Note 3)**	**0**	**1**	**2**	**3**	**4**
Non-melting (according to ASTM F 1506-00) or Untreated Natural Fiber						
a. T-shirt (short-sleeve)	X			X	X	X
b. Shirt (long-sleeve)		X				
c. Pants (long)	X	X	X (Note 4)	X (Note 6)	X	X
FR Clothing (Note 1)						
a. Long-sleeve shirt			X	X	X (Note 9)	X
b. Pants			X (Note 4)	X (Note 6)	X (Note 9)	X
c. Coverall			(Note 5)	(Note 7)	X (Note 9)	(Note 5)
d. Jacket, parka, or rainwear			AN	AN	AN	AN
FR Protective Equipment						
a. Flash suit jacket (multilayer)						X
b. Flash suit pants (multilayer)						X
c. Head protection						
1. Hard hat			X	X	X	X
2. FR hard hat liner					AR	AR
d. Eye protection		—	—	—	—	—
1. Safety glasses	X	X	X	AL	AL	AL
2. Safety goggles				AL	AL	AL
e. Face and head area protection		—	—	—	—	—
1. Arc-rated face shield, or flash suit hood				X (Note 8)		
2. Flash suit hood					X	X
3. Hearing protection (ear canal inserts)				X (Note 8)	X	X
f. Hand protection			—	—	—	—
Leather gloves (Note 2)			AN	X	X	X
g. Foot protection						
Leather work shoes			AN	X	X	X

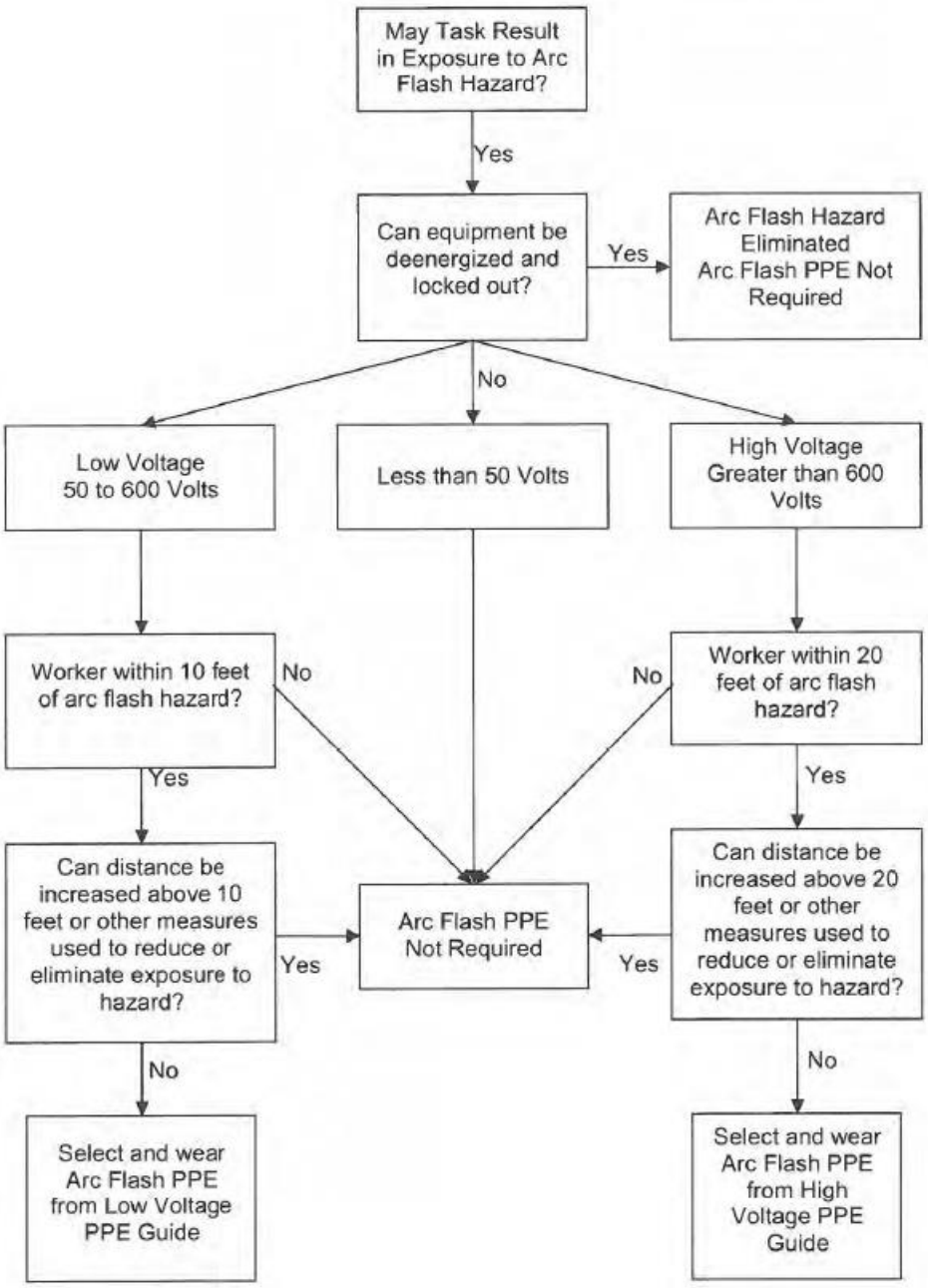
Color Codes for Arc Flash PPE Salisbu

NFPA 70E 2004 Edition

Table 130.7(C)(11) Protective Clothing Characteristics Typical Protective Clothing Systems

Salisbury Clothing Color Code	Hazard Risk Category (HRC)	Clothing Description (Typical Number of clothing layers given in parentheses)	Minimum Arc Thermal Performance Exposure Value (ATPV)** or Breakopen Threshold Energy (E_{BT})* Rating of PPE
Navy Blue	0	Untreated cotton (1)	n/a
	1	FR shirt & FR pants (1)	4 cal/cm² (16.74 J/cm²)
	2	Cotton underwear plus FR shirt and FR pants (1 or 2)	8 cal/cm² (33.47 J/cm²)
Royal Blue	3	Cotton underwear plus FR shirt and FR pants plus FR coverall (2 or 3)	25 cal/cm² (104.6 J/cm²)
Gray Khaki	4	Cotton underwear plus FR shirt and FR pants plus double layer switching coat and pants (3 or more)	40 cal/cm² (167.36 J/cm²)

Appendix A – Quick Reference for Selecting Arc Flash PPE



Appendixx B Low Voltage (Less Than 600 Volts)

Hazard/Risk Category Classifications

Assumes Equipment Is Energized, and Work Is Done within the Flash Protection Boundary Source NFPA ?OE Table 130.7(C)(9)(a).

EQUIPMENT	TASK	PPE
Panelboards Rated 240 V and Below Notes 1and 3	Circuit breaker (CB) or fused switch operation with covers on	0
	CB or fused switch operation with covers off	0
	Work on energized parts, including voltage testing	1
	Remove/install CBs or fused switches	1
	Removal of bolted covers (to expose bare, energized parts)	1
	Opening hinged covers (to expose bare, energized parts)	0
Panelboards or Switchboards Rated >240 V to 600 V (molded case or insulated case circuit breakers) Notes 1 and 3	CB or fused switch operation with covers on	0
	CB or fused switch operation with covers off	1
	Work on energized parts, including voltage testing	2*
600 V Class Motor Control Centers (MCCs) Notes 2 (except as indicated) and 3	CB or fused switch or starter operation with enclosure doors closed	0
	Reading a panel meter while operating a meter switch	0
	CB or fused switch or starter operation with enclosure doors open	1
	Work on energized parts, including voltage testing	2*
	Work on control circuits with energized parts 120 V or below, exposed	0
	Work on control circuits with energized parts >120 V, exposed	2*
	Insertion or removal of individual starter "buckets" from MCC — Note 4	3
	Application of safety grounds, after voltage test Removal of bolted covers (to expose bare, energized parts)	2*
	Opening hinged covers to expose bare, energized parts	1

EQUIPMENT	TASK	PPE
600 V Class Switchgear (with power circuit breakers or fused switches) Notes 5 and 6	CB or fused switch operation with enclosure doors closed	**0**
	Reading a panel meter while operating a meter switch	**0**
	CB or fused switch operation with enclosure doors open	**1**
	Work on energized parts, including voltage testing	**2***
	Work on control circuits with energized parts 120 V or below, exposed	**0**
	Work on control circuits with energized parts >120 V, exposed	**2***
	Insertion or removal (racking) of CBs from cubicles, doors open	3
	Insertion or removal (racking) of CBs from cubicles, doors closed	**2**
	Application of safety grounds, after voltage test	**2***
	Removal of bolted covers (to expose bare, energized parts)	**3**
	Opening hinged covers (to expose bare, energized parts)	**2**
Other 600 V Class (277 V through 600 V, nominal) Equipment Note 3	Lighting or small power transformers (600 V, maximum) - Removal of bolted covers (to expose bare, energized parts)	**2***
	Lighting or small power transformers (600 V, maximum) - Opening hinged covers (to expose bare, energized parts)	**1**
	Lighting or small power transformers (600 V, maximum) - Work on energized parts, including voltage testing	**2***
	Lighting or small power transformers (600 V, maximum) - Application of safety grounds, after voltage test	**2***
	Revenue meters (kW-hour, at primary voltage and current) - Insertion or removal	**2***
	Revenue meters (kW-hour, at primary voltage and current) - Cable trough or tray cover removal or installation	**1**
	Revenue meters (kW-hour, at primary voltage and current) - Miscellaneous equipment cover removal or installation	**1**
	Revenue meters (kW-hour, at primary voltage and current) - Work on energized parts, including voltage testing	**2***
	Revenue meters (kW-hour, at primary voltage and current) - Application of safety grounds, after voltage test	**2***

Notes:
2* *means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard/Risk Category 2 requirements*

1. *Maximum of 25/<A short circuit current available, 0.03 second (2 cycle) fault clearing time.*
2. *Maximum of 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.*
3. *For <10 kA short circuit current available, the hazard/risk category required may be reduced by one number.*
4. *Maximum of 42 kA short circuit current available, 0.33 second (20 cycle) fault clearing time.*
5. *Maximum of 35 kA short circuit current available, up to 0.5 second (30 cycle) fault clearing time.*

Appendix C - High Voltage (Greater Than 600 Volts)

Hazard/Risk Category Classifications

Assumes Equipment Is Energized, and Work Is Done within the Flash Protection Boundary Source NFPA 70E Table 130.7(C)(9)(a)

EQUIPMENT	TASK	PPE
NEMA E2 (fused contactor) Motor Starters 2.3 kV - 7.2 kV	Contactor operation with enclosure doors closed	**0**
	Reading a panel meter while operating a meter switch	**0**
	Contactor operation with enclosure doors open	2*
	Work on energized parts, including voltage testing	3
	Work on control circuits with energized parts 120 V or below, exposed	**0**
	Work on control circuits with energized parts >120 V, exposed	**3**
	Insertion or removal (racking) of starters from cubicles, doors open	**3**
	Insertion or removal (racking) of starters from cubicles, doors closed	**2**
	Application of safety grounds, after voltage test	**3**
	Removal of bolted covers (to expose bare, energized parts)	**4**
	Opening hinged covers (to expose bare, energized parts)	**3**
Metal Clad Switchgear 1 kV and Above	CB or fused switch operation with enclosure doors closed	**2**
	Reading a panel meter while operating a meter switch	**0**
	CB or fused switch operation with enclosure doors open	**4**
	Work on energized parts, including voltage testing	**4**
	Work on control circuits with energized parts 120 V or below, exposed	**2**
	Work on control circuits with energized parts >120 V, exposed	**4**
	Insertion or removal (racking) of CBs from cubicles, doors open	**4**
	Insertion or removal (racking) of CBs from cubicles, doors closed	**2**
	Application of safety grounds, after voltage test	**4**
	Removal of bolted covers (to expose bare, energized parts)	**4**
	Opening hinged covers (to expose bare, energized parts)	**3**
	Opening voltage transformer or control power transformer compartments	**4**

EQUIPMENT	TASK	PPE
Other Equipment 1 kV and Above Metal clad load interrupter switches, fused or unfused	Switch operation, doors closed	2
	Work on enerQized parts, includinQ voltaQe testinQ	4
	Removal of bolted covers (to expose bare. energized parts)	4
	Opening hinged covers (to expose bare, energized parts)	3
	Outdoor disconnect switch operation (hookstick operated)	3
	Outdoor disconnect switch operation (gang-operated, from grade}	2
	Insulated cable examination, in manhole or other confined space	4
	Insulated cable examination, in open area	2

Notes:
2* *means that* a *double-layer switching hood and hearing protection are required for this task in addition to the other Hazard/Risk Category 2 requirements*

Appendix G: Subcontractor Contact List

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Appendix H: Hunts Point Waste Water Treatment Plant EAP

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