

New York Transco LLC

ROCK TAVERN TO SUGARLOAF PROJECT

APPENDIX R HEALTH AND SAFETY PLAN

CASE NO. 20-T-0549

January 14, 2022

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Health & Safety Plan

NY Transco

Rock Tavern to Sugarloaf

June, 2020



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1 Health & Safety Policy

At Burns & McDonnell, safeguarding the safety and health of our employees, subcontractors and related personnel is of the utmost importance. Safety is a core value of our culture, and we are dedicated to protecting the safety and health of all those associated with our company.

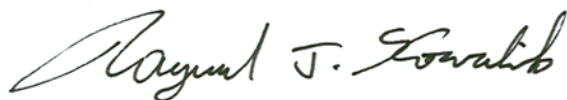
Our mission is “Make Our Clients Successful.” A safe and healthy work environment impacts every measure of a firm’s success, from quality of work life to productivity and profitability — our clients’ and our own. With many of our staff working full time in client facilities, our safety leadership not only affects the safety and health of our employee-owners, but that of many others influenced by their activities.

We understand that each of us plays a vital role in the completion of work in a safe manner. Employee recommendations to improve safety and health conditions are encouraged, and all will be given thorough consideration by our management team. The goal of our ongoing safety and health program is “zero incidents” on all job sites.

Our goal will be achieved by:

- Commitment to a belief that accidents are preventable.
- Top management’s commitment to providing a safe and healthy work environment for all employees by holding management personnel accountable for all aspects of employee safety and health.
- Employee involvement to improve the quality of workplace safety and health.
- This includes brainstorming, inspecting, detecting and correcting, from project startup to project completion.
- Committing auditing resources to detect hazards and ensure hazard correction.
- Ensuring that all employees and subcontractors have the knowledge and training to accomplish the task ahead.
- Providing all employees and all job sites with appropriate, state-of-the-art equipment to get the job done.
- Recognition that safety does not start at the job site, but with executive management.

Burns & McDonnell’s safety record puts us in the top 5% of all contractors nationwide. However, we are determined not to rest upon past successes, but to use those successes as a foundation for continual improvement in making us truly, “World Class”.



Chairman & CEO

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2 Roles and Responsibilities

Project Safety & Health Goals

[Introduction](#)

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[Project Safety & Health Program](#)

[Key Personnel and Responsibility Roles](#)

[Global Practice Manager](#)

[Director of Corporate Safety & Health](#)

[Project Manager](#)

[Site Manager \(Project Superintendent\)](#)

[Subcontract Site Manager \(Project Superintendent\)](#)

[Competent Person](#)

[Designated Safety Representative](#)

2.1 Project Safety & Health Goals

2.1.1 Introduction

The Burns & McDonnell Project Safety & Health Program is a framework designed to coordinate the safety & health efforts of Burns & McDonnell employee owners, all Subcontractors and lower tier Subcontractors to Burns & McDonnell on the project in a consistent manner. Each Subcontractor is required to develop and implement a Project Specific Safety & Health Program. The Burns & McDonnell Project Safety & Health Program in no way relieves Subcontractors and lower tier Subcontractors of legal obligations to any local, state or federal laws, regulations or requirements.

The following information provides the safety requirements that all Burns & McDonnell employee owners adhere to. These requirements are the minimum standards for Burns & McDonnell personnel and that Subcontractors to Burns & McDonnell shall implement in their Project Specific Safety & Health Program.

2.1.2 Project Safety & Health Goals

ZERO work-related injuries and illnesses is the highest priority of Burns & McDonnell. Burns & McDonnell is committed to safely constructing a project that is built on time and within budget. Success on this project, for the safety & health of the working individuals, will be achieved by reporting a zero (0) TRIR (Total Recordable Incident Rate) and a zero (0) DART (Days Away, Restricted, and Transferred) rate for work-related injuries and illness. As with all Burns & McDonnell projects, the avoidance of any occupationally related deaths or serious injuries is of the highest priority. [Refer to either the Burns & McDonnell Safety Form B-7 "Classification of Injury" or the Burns & McDonnell Safety Form C-2 "Incident/Accident Investigation Report" for information on what constitutes an OSHA recordable injury or illness,

By creating an atmosphere which minimizes hazards in the work environment, Burns & McDonnell feels a quality product can be easily produced allowing delivery of the finished product on time and within budget to **NY TRANSOCO**.

2.2 Project Safety & Health Program

Burns & McDonnell employee owners are responsible for knowing and following established safety procedures that are applicable to performing their jobs safely. All Burns & McDonnell employee owners attend a one-hour General Safety & Health Orientation class. At that time the employee owners are notified that individuals performing fieldwork are required to attend the 10-Hour OSHA Safety Course. No employee owner is to work in any area or under any circumstances where OSHA violations or other known hazards exist until the controlling Subcontractor has taken proper corrective action. Furthermore, **NY TRANSOCO** facilities are obligated by law to inform visitors of potential site hazards prior to working at the site. Initial Site Specific Safety & Health Orientation training is required prior to beginning work activities.

2.2.1 Project Site Safety & Health Program

The Project Safety & Health Program is tailored for this work site. The program is available to, and is to be followed by, all workers entering a work site where Burns and McDonnell is the general contractor. All Burns & McDonnell employee owners who will be working at the site are required to review and adhere to this program before beginning work. All Subcontractor workers shall be trained by the Subcontractor on the contents of their company's Project Specific Safety & Health Program that must include the requirements set forth in this program.

All work site personnel, including Burns & McDonnell employee owners and Subcontractors, will familiarize themselves with the contents of the Project Safety & Health Program and apply it during work activities. Furthermore, all project personnel are required to participate in the project's Project Site Specific Safety & Health Orientation Training and to sign the Project Orientation Training form, Burns & McDonnell Safety

Form C-8 “Orientation Training”, acknowledging participation in the training prior to performing any work on the project. This documentation is required with a time, date and signature of the individual to verify an understanding of the Project Safety & Health Program. Unless otherwise established, all Subcontractors to Burns & McDonnell are responsible for administering project orientation training for their workers. Safety is the responsibility of everyone on site, requiring everyone to work together to achieve a safe workplace.

Visitor(s) accessing the site for less than an eight (8) hour period will not be required to attend the Project Orientation Training. Visitor(s) shall be accompanied by an authorized person - one who has been trained on the project hazards and who is familiar with the project throughout the entirety of his/her visit. If the visitor(s) cannot be accompanied by an authorized individual throughout the entirety of the visit, the visitor(s) shall attend the Project Site Specific Orientation Training prior to accessing any work activity area.

2.2.2 General Liability Program

The Subcontractor and all lower tier contractors shall take all necessary precautions to protect the public, the facilities, the personnel and tenants of **NY TRANSCO** from any hazards involving safety & health arising from the scope of work. All work operations shall be isolated from the public and **NY TRANSCO**'s operations to the greatest extent possible. The owner's discretion and interpretation of abatement methods and procedures will be the defining opinion.

2.3 Key Personnel and Responsibility Roles

Purpose: The following information defines the obligations and requirements of key personnel for Burns & McDonnell and for Subcontractor personnel who play a vital role in the Project Safety & Health Program.

2.3.1 Burns & McDonnell

Global Practice Manager

The Global Practice Manager is responsible for making the decision on how to staff the project regarding the need for a full-time Safety & Health Professional. The Global Practice Manager along with the Project Manager is responsible for ensuring that the standard contract language is used and that safety & health requirements (Section 7.12) are met to assure Subcontractor safety & health submittals are in compliance with this Project Safety & Health Program.

The Global Practice Manager is responsible for assuring that the Project Manager, Site Manager and all site personnel adhere to this Project Safety & Health Program and all local, state and federal rules, regulations and procedures regarding safety and health. The Global Practice Manager will utilize the Director of Corporate Safety & Health to evaluate the Project Safety & Health Program and the performance of Project Management. The Global Practice Manager's responsibilities will also include the following:

- Provide the leadership, commitment and support necessary to achieve compliance with the Project Safety & Health Program.

- Sell the customer and Subcontractors on the value to all parties of a well-executed safety program.

- Require safety statistical reports to be submitted to Burns & McDonnell as required by contract.

- Communicate the customer's safety, health and loss control requirements to project management and the Director of Corporate Safety & Health.

- Provide leadership, authority and decisiveness in dealing with noncompliance with the program up to and including termination of Subcontractor and/or project management members for the project.

- Require project management to hold Subcontractors responsible and accountable for safety compliance on the project site with the Project Safety & Health Program.

Director of Corporate Safety & Health

The Director of Corporate Safety & Health is responsible for providing professional safety & health support and oversight to the project management team. The Director of Corporate Safety & Health will review and provide support in all concerns regarding the safety & health of field personnel assigned to this project. The Director of Corporate Safety & Health, or his designee, will conduct field audits of the project work site and programs to evaluate the adequacy of the Project Safety & Health Program. The Director of Corporate Safety & Health will implement necessary changes through the Site Manager.

The Director of Corporate Safety & Health, or his designee, will provide professional support by reviewing Safety & Health Programs of Subcontractors (when there is not a full-time Site Safety & Health) and will assist the project management in complying with the Project Safety & Health Program and all other rules, regulations and procedures which apply to the project. The Director of Corporate Safety & Health responsibilities shall also include the following:

- Along with the Global Practice Manager and the Project Manager, establish the correct contract language with regard to the requirements of the Project Safety & Health Program.

- Assist the Global Practice Manager and Project Manager in determining staffing and facility needs with regard to Project Safety & Health.

- Direct the distribution of safety regulations and safety material.

- Act as a safety resource advisory capacity for the organization and generate periodic improvements/revisions to the Project Safety & Health Program as needed.

- Include materials necessary for Subcontractors to properly bid the project during pre-bid meeting.

- Perform periodic project assessments to evaluate the Project Safety & Health Program and performance of the project management team as well as Subcontractors to Burns & McDonnell. The occurrence of these assessments will vary depending on the necessity for on site evaluation. At a minimum, the project will be assessed periodically.

- Communicate safety concerns and coordinate corporate safety requirements with the Corporate Safety & Health Department.

Project Manager

The Project Manager is responsible for communicating with the Director of Corporate Safety & Health in order to have a Project Safety & Health Program established. The Project Manager shall oversee the activities of the Site Safety Manager Management Team (The Burns & McDonnell employee owners who manage the project at the physical location of the site) in order to assure adherence of the Project Safety & Health Program. The Project Manager, along with the Director of Corporate Safety & Health, will be responsible for designating a Field Safety & Health Professional for the project. The Project Manager's responsibilities shall also include the following:

- Communicate customer safety, health, and loss control requirements to project team.

- Schedule and participate in pre-activity planning meeting for project.

- Assist in monitoring compliance with Project Safety & Health Program.

- Provide leadership, authority, and decisiveness in dealing with noncompliance of the Project Safety & Health Program up to, and including, termination of the Subcontractor from the project.

Evaluate and use withholding of payment to Subcontractor or other contract remedies, including termination of contract and removal of the Subcontractor from the site when this safety program is being violated.

Give on-going input into necessary changes to this safety program.

Hold Subcontractors accountable and responsible for compliance with the Burns & McDonnell Project Safety & Health Program.

Assure Burns & McDonnell employee owners have in their possession at the job site, the necessary safety equipment such as fall protection safety harnesses and lanyards, hard hats, safety glasses, safety shoes and other safety equipment and require their use as needed.

Plan ahead for safety so that appropriate safety equipment and safety systems are on hand and readily available when needed by Burns & McDonnell employee owners.

Site Manager (Project Superintendent)

The Site Manager is the on-site coordinator and overseer of operations. It is the duty of the Site Manager to see to the maintenance of site security, the coordination of activities by the Subcontractors, and to verify that all activities are performed in a safe manner. The Site Manager is responsible for the safety & health practices and conditions on site. Any Safety & Health Professionals or supervisors provided by Subcontractors shall be utilized as a resource by the Site Manager to optimize performance on site with regard to safety & health. The Site Manager's responsibilities shall also include the following:

The Site Manager shall ensure all personnel of Subcontractors to Burns & McDonnell are in compliance with safe work practices and attend all required safety & health training.

Give on-going input into necessary changes to this Project Safety & Health Program.

Hold Subcontractors responsible and accountable for compliance with the Burns & McDonnell Project Safety & Health Program as well as their own Project Specific Safety & Health Program.

Attend and provide input into the pre-construction safety planning meeting.

Schedule and attend weekly Safety & Health meetings presented by the Safety & Health Professional.

Require submittal of a written plan from all Subcontractors regarding how work processes will be safely performed, such as temporary bracing, (activity hazard analysis).

Obtain a master copy of the Burns & McDonnell material safety data sheets (SDS) compilation and start job specific files for SDS' for the project as submitted by Subcontractors.

Take prompt action up to and including termination of the Subcontractor from the project site to correct unsatisfactory conditions and work practices personally observed or brought to your attention which involve our Subcontractors or employee owners. Whenever a violation of the safety program occurs and requires correction, document the demand for correction utilizing the Burns & McDonnell Safety Form B-1 "Violation Notice" to the Subcontractor and Project Manager. Unsafe situations which involve Subcontractors not under Burns & McDonnell control should be brought to the attention of the responsible client party and documented. Immediately discontinue work around the unsafe area until concerns are properly addressed.

Assure that all injuries are reported and treated.

Require reports and investigations of all near misses, incidents and accidents.

Assure that OSHA recordkeeping requirements are maintained.

Various safety activities may be delegated to others, but the ultimate implementation and monitoring of safe work techniques are the responsibility of the Site Manager (Project Superintendent).

Assure Burns & McDonnell employee owners have in their possession the necessary protective and safety equipment such as fall protection safety harnesses and lanyards, hard hats, safety glasses, safety shoes, and other safety equipment, and require their use as needed.

Plan ahead for safety so that appropriate safety equipment and safety systems are on hand and readily available when needed by Burns & McDonnell employees.

Complete job safety walk-through assessments. Cover the findings of the walk-through with the accompanying Subcontractor. Follow up by documenting the items which require immediate correction.

Site Safety Professional

Provide full-time support in the field to assure operations are planned and conducted in a safe manner.

Provide advice, guidance, and assistance to personnel involved in our projects regarding safety and health issues and work practices. Identify unique safety & health issues by project, before the project begins, for resolution.

Interface with **NY TRANSCO** Safety & Health Department on site safety & health issues and coordinate proactive measures.

Coordinate and mentor project safety & health walk-through assessments. Cover the findings of the walk-through with the accompanying Subcontractor. Follow up by documenting the items which require immediate correction.

Periodically distribute information and updating memos relative to safety, including assisting with safety memorandums.

Conduct on-going training on safety & health subjects.

Review Incident/Accident Investigation reports (including Near Misses) and recommend corrective measures as appropriate.

Report to Corporate Safety & Health periodically regarding the Project Safety & Health Program progress, problems, and objectives.

Organize and help conduct safety training as necessary.

Fully utilize the assistance of our insurance carrier, OSHA, safety organizations, and other resources.

Complete Burns & McDonnell Safety Form B-2 "Daily Field Safety & Health Report" and submit weekly to the Manager of Field Operations Safety & Health.

2.3.2 Subcontractor

Purpose:

Subcontractors are responsible for administering the Project Specific Safety & Health Program developed by the Subcontractor which incorporates the text of this document as a minimum standard. Subcontractors are responsible for the training of workers, safety inspections, necessary safety documentation and coordinating

of work for safe means through Burns & McDonnell and other Subcontractors on this project. For this reason, the following roles have been developed that each Subcontractor shall designate and comply with:

Subcontractor Site Manager (Project Superintendent)

The Subcontractor Site Manager shall have final authority and responsibility for the administering the Project Specific Safety & Health Program. The Site Manager may delegate these duties to persons qualified to administer the program. However, the Site Manager will still be responsible for assuring adherence of the Project Specific Safety & Health Program and for disciplining workers who violate the Project Specific Safety & Health Program requirements. The Subcontractor Site Manager is subject to dismissal from the project for the duration of the project for failing to properly administer the Project Safety & Health Program. This decision will be at the discretion of Burns & McDonnell and the owner.

All Subcontractor Site Supervision

Superintendents, General Foremen, Foremen, or other members of management (persons supervising workers) shall not operate equipment (e.g. material handling, monitoring, etc.) on Burns & McDonnell projects

Competent Person

OSHA requires a competent person be designated for particular activities who can recognize hazards or potential hazards and who has the authority to correct or abate the hazard. For this reason, the Competent Person should be identified on the Activity Hazard Analysis when applicable to the activity. The competent persons for all of the subcontractor project activities shall be submitted by each subcontractor prior to the start of project site activities, using Burns & McDonnell Safety & Health Form C-17 "Competent Person Designation".

OSHA defines a Competent Person as 'One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees *and* who has authorization to take prompt corrective measures to eliminate them'.

Designated Safety Representative

Subcontractors shall designate a qualified safety representative to be responsible for the administration of the Subcontractor's Safety Programs, the Project Specific Safety & Health Program and all **NY TRANSCO** requirements and procedures. This person shall be qualified to identify hazards and have the authority to correct them, coordinate safe work efforts and submit all required documentation to Burns & McDonnell. The Subcontractor shall inform Burns & McDonnell in writing who will be designated to fulfill these obligations utilizing the Burns & McDonnell Safety Form B-3 "Subcontractor Verification".

2.3.3 All Employees

Stop Work Authority

Worker's rights - Any person on site may shut down a work operation that poses imminent danger or a situation arises which is immediately dangerous to life or health on site. When such precautions must be immediately taken, the Site Manager (Project Superintendent) shall be immediately notified and actions to remedy the situation shall be implemented.

All employees have the authority and obligation to stop any work task or operation where concerns or questions regarding the control of a safety, health, or environmental risk exist. Employees are responsible to initiate a Stop Work Intervention when warranted and Management is responsible to create a culture where Stop Work Authority is exercised freely

Any worker onsite may submit an unsafe conditions memo to provide notification of an unsafe work condition that is a less than imminent situation. The Site management shall take appropriate action to mitigate and correct the unsafe condition within a reasonable time frame.

Stop Work Program

General Duty to provide a safe work environment

The employer shall furnish to each of his employees a place of employment which is free from recognized hazards that are likely to cause death or serious physical harm to his employees

All employees have the right and authority to stop any work activity where there are safety, health or environmental concerns

Workers have the right to refuse to do a job if they believe in good faith that they are exposed to an imminent danger.

"Good faith" means that even if an imminent danger is not found to exist, the worker had reasonable grounds to believe that it did exist.

Training

Employees must receive Stop Work Authority training before initial assignment.

The training must be documented including the following:

Employee name,

Dates of the training, and

The subject of the training.

Interventions

When an unsafe condition or unsafe behavior is identified a Stop Work Intervention will be initiated.

The Stop Work Intervention will:

Be initiated in a positive manner

Be coordinated through the supervisor

Notify all affected personnel and supervision of the stop work issue,

Initiate correction of the issue

No work will resume until all stop work issues and concerns have been adequately addressed.

All Stop Work Interventions shall be documented for

Lessons learned and

Corrective measures put into place.

Corrective Actions

The Stop Work Intervention will assure the identified safety concern(s) have been addressed to the satisfaction of all involved persons prior to the resumption of work.

Most issues can be adequately resolved in a timely manner at the job site,

Occasionally additional investigation and corrective actions may be required to identify and address root causes.

Lessons Learned

Stop Work reports shall be reviewed by supervision order to

Measure participation,

Determine quality of interventions and follow-up,

Trend common issues,

Identify opportunities for improvement, and

Facilitate the sharing of lesson learned

Non-Retaliation or discrimination

Workers may bring up safety and health concerns in the workplace to their employers without fear of discharge or discrimination, as long as the complaint is made in good faith.

Workers have a right to seek safety and health on the job without fear of punishment.

Workers have the right to be free from retaliation for exercising safety and health rights.

The worker has the right to refuse to do a task he/she considers unsafe, and is protected if ALL of the following conditions are met:

The worker asked the employer to eliminate the danger, and the employer failed to do so; and

The worker refused to work in "good faith."

The worker genuinely believes that an imminent danger exists.

The worker's refusal cannot be a disguised attempt to harass the employer or disrupt business; and

A reasonable person would agree that there is a real danger of death or serious injury; and

The urgency of the hazard is such that there isn't enough time to get it corrected through regular enforcement channels, such as requesting an OSHA inspection.

Any form of retribution or intimidation directed at any individual or company for exercising their right to issue a stop work authority will not be tolerated by the host facility.

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3.1 Program Administration

3.1.1 Purpose

Program administration is one of the key elements in communicating and coordinating site activities and Safety & Health obligations. For this reason, activities and procedures have been established to ensure all persons on site shall work in a safe and healthful environment where activity is coordinated and organized.

3.1.2 Project Safety & Health Program

Copies of the Project Safety & Health Program will be included in the Subcontractor bid packages. Each Subcontractor shall keep a copy of the Project Safety & Health Program in their company's on-site facilities. The Subcontractor is responsible with training and familiarization of their workers and their Subcontractor's workers with the minimum requirements set forth in this manual and any changes which are made to it.

3.1.3 Project Safety & Health Coordination Meetings

At the time of the Weekly Project Site Coordination Meeting, Project Safety & Health Coordination will also be discussed. At this weekly meeting up to date Subcontractor work hours shall be submitted as well as other safety & health statistics Burns & McDonnell Safety Form C-1 "Weekly Work Hour Report". Allotted time shall be, up to two hours attendance by the Subcontractor Safety & Health representative, for Burns & McDonnell to specifically address safety, health and coordination concerns with the Subcontractors. This time shall also serve as a forum for Subcontractors' to discuss safety & health concerns as related to each other and the project. Burns & McDonnell will facilitate any concerns between Subcontractors and will assist in finding adequate solutions.

3.1.4 Reporting Requirements

All incidents /accidents shall be immediately (within three minutes) communicated to Burns & McDonnell. Burns & McDonnell Safety Form C-2 "Incident/Accident Investigation Report" shall be submitted within twenty-four (24) hours of the incident. A copy of any supportive material utilized in the investigation shall also be submitted along with the report (i.e. photographs, drawings and witness statements).

All "recordable" accidents, deaths or incidents involving significant equipment damage, facility damage or **NY TRANSCO** property damage shall be immediately communicated to the Site Safety & Health Professional and the Site Manager. If the Site Safety & Health Professional or the Site Manager is not available, notify any Burns & McDonnell employee.

An executive management member, of the Subcontractor will arrive on site within 48 hours of an incident to attend an incident review meeting if an OSHA recordable accident occurs. If an OSHA DART, or a near miss incident that may have produced injury takes place or a property damaging incident occurs which results in a loss of \$5,000 or more, the president of the company shall attend this meeting as well.

At the time of this meeting the executive management member and/or president of the company shall submit a plan of action to prevent such occurrences in the future.

In the event of a work-related fatality, work-related inpatient hospitalizations of one or more employees, work-related amputations, or work-related losses of an eye Burns & McDonnell shall immediately be notified. Failure to comply with this procedure will result in disciplinary action at the discretion of Burns & McDonnell.

A summary of the safety & health statistics for each Subcontract company Burns & McDonnell "Monthly Work Hour Report" Safety Form C-3 shall be submitted by the fifth working day of each month for the previous month's total man/hours and review of incidents from that month.

3.1.5 Project OSHA Procedure

OSHA Notifications

When is Burns & McDonnell required to notify OSHA?

It is the responsibility of the Director of Corporate Safety & Health to notify OSHA:

Of work-related fatalities within 8 hours of finding out about them. Employers only have to report fatalities that occurred within 30 days of a work-related incident.

Of any inpatient hospitalization, amputation, or eye loss within 24 hours of learning about it. Employers only have to report an inpatient hospitalization, amputation or loss of an eye that occurs within 24 hours of a work-related incident.

The location and time of the accident, along with the number of fatalities or hospitalized employees, the name and phone number of a contact person, and a brief description of the accident will be required in the notification.

You may contact OSHA through your area office which can be located using the following hyper-link: <http://www.osha.gov/html/RAmap.html>. After hours you should contact OSHA via: 1(800) 321-OSHA

Arrival of the CSHO

Upon Arrival of the OSHA Compliance Safety & Health Officer, CSHO: Immediately notify Burns & McDonnell Corporate Safety & Health (816) 333-9400.

Before the CSHO arrives at the facility, security, receptionists, or anyone responsible for letting people enter the facility must know to immediately contact the Site Manager in the event of an OSHA inspection.

The Site Manager or his/her designee must accompany the CSHO throughout the entire inspection process.

The CSHO's credentials must be checked before inspection begins. If there are doubts about the validity of the credentials, contact the nearest area OSHA office.

Ask the CSHO the reason for the visit. Reasons for an OSHA inspection may include a fatality or serious injury, Imminent danger, A complaint, A general scheduled inspection, or Special emphasis inspection

Opening Conference:

During the opening conference, the CSHO will inform the designated representatives that the official purpose of the visit is to ascertain if the facility is in compliance with the requirements of the OSH Act. Other topics that should be discussed are:

- the scope of the inspection

- records that need to be reviewed

- a physical inspection

- obligation to privately interview employees

The CSHO must also show a copy of the complaint if one was made.

The following information must be readily available for the CSHO's review

OSHA 300, 300A forms (current and past years). The blank 300 forms may be acquired via the following hyper-link: <http://www.osha.gov/pls/publications/pubindex.list#300>

Company safety programs (including but not limited to):

Lockout/Tagout

Confined Spaces

Fall Protection

Emergency Procedures

Hazard Communication Program

The OSHA poster must be posted in a conspicuous location. The OSHA poster can be printed using the following hyper-link: <http://www.osha.gov/Publications/osh3165.pdf>

Walk around Inspection:

During the walk-around inspection, it is required that a Burns & McDonnell representative accompany the CSHO at all times. Those accompanying the CSHO are to make sure that the inspection stays within the intended scope of the investigation that was discussed in the opening conference. The inspection should not expand outside of this scope.

The CSHO may also have instruments for taking measurements such as air samples, noise samples, or illumination surveys. The Burns & McDonnell representative should perform side by side sampling with the CSHO whenever possible and take notes of the locations and conditions discovered during sampling by the CSHO.

All violations will be documented by the CSHO. Once documented, the CSHO will bring the violations to the attention of the Burns & McDonnell representative. The Burns & McDonnell representative should also make identical notes of the violations that the CSHO cites.

The Burns & McDonnell representative should also correct any violations that he/she comes across during the inspection.

Never admit to a violation or bring a violation to the attention of the CSHO.

When the CSHO takes any photographs or videos of the facility, the Burns & McDonnell representative should take the identical picture for their records.

The CSHO may also conduct private employee interviews. The employee may ask for another representative to accompany them with the interview, but it is the discretion of the CSHO whether it is to be allowed.

After the inspection, the Burns & McDonnell representative should ask the interviewed employee about the content of the interview, and how the questions were answered.

Closing Conference:

All personnel who attended the Opening Conference shall attend the Closing Conference.

The CSHO will describe the suspected violations discovered during the inspection.

The CSHO will also inform that citations may be issued for suspected violations and that penalties may be proposed for each.

The CSHO will then attempt to gather an estimate on how long it will take for the alleged violations to be abated. This estimate will be taken into consideration when the CSHO decides on recommended time for abatement.

Follow-up Inspections:

OSHA may conduct a follow-up inspection if the citations involve imminent danger, a serious offense, or a repeated offense. The follow-up inspection will usually just involve the areas that were cited. All of the same rules for the original inspection apply in the follow-up inspection.

After the Inspection: When the CSHO leaves the facility, the following items must be accomplished:

Update Corporate Safety & Health to discuss further actions.

Fill out Burns & McDonnell Safety Form C-4 “Regulatory Contact Report” and forward it to Corporate Safety & Health.

Debrief employees that may have been interviewed by the CSHO.

Correct any deficiencies and document the corrections.

OSHA recordkeeping

Each employer is required to keep records of fatalities, injuries, and illnesses must record each fatality, injury and illness that is work-related; and is a new case; and meets one or more of the general recording criteria.

Each recordable injury or illness must be entered on an OSHA 300 Log and 301 Incident Report, or other equivalent form, within seven (7) calendar days of receiving information that a recordable injury or illness has occurred.

A company executive must certify that he or she has examined the OSHA 300 Log and when found to be correct will sign the OSHA 300A Summary.

A copy of the annual summary (OSHA 300A) must be posted in each establishment in a conspicuous place (or places) where notices to workers are customarily posted.

The posted annual summary shall not be altered, defaced or covered by other material.

The summary must be posted from February 1 through April 30.

The OSHA 300 Log, the privacy case list (if one exists), the annual summary, and the OSHA 301 Incident Report forms must be retained for five (5) years following the end of the calendar year that these records cover.

3.1.6 Project Safety Assessments**Scope**

This process contains requirements for inspection, self-assessment, and Executive assessment for all project sites where Burns & McDonnell is actively fulfilling the role of Owner's Representative, Construction Manager, General Contractor, or as determined necessary by the Director, Corporate Safety and Health or his / her designee.

Purpose

The purpose of this process is to identify and correct safety and health hazards encountered in the workplace, to provide uniform guidance with respect to these hazards, and satisfy rules or standards promulgated by federal, state, or local authority.

General

Inspections and assessments have been identified as primary management tools for continually improving the Safety and Health Program. These on-site evaluations, when executed effectively, can lead to enhanced safety and health performance.

Safety inspection and assessment should be considered as a tool to be utilized by the Global Practice Leader(s), Director, Corporate Safety and Health, Corporate Safety and Health Manager, Global Practice Safety Segment Leader(s), Project Manager, and the Site Manager to assess site safety and health conditions, insure compliance with the Site Specific Safety and Health Program, and identify methodology for establishing and maintaining continuous improvement of safety and health performance.

The following types of inspection and assessment may be utilized to aid in the continuous improvement of safety and health performance:

Weekly Work Area Assessment

Daily Field Safety and Health Report

Project Safety Assessment

Executive Safety Assessment

Other Inspection

Weekly Work Area Assessment

Weekly Work Area Assessments should be conducted by the Site Manager and/or his/her designee, Site Safety Manager (if applicable), and a minimum of 1 representative from each subcontractor / client contractor.

Scheduling and selection of the assessment team should be coordinated by the Site Manager and / or his / her designee.

The assessment team should conduct a comprehensive review of the Site Safety and Health Program's implementation on the project site.

Burns & McDonnell's "Weekly Work Area Assessment" should be utilized to document compliance, deficiencies, and corrective action(s) taken to be taken.

Completed reports should be submitted to the Burns & McDonnell Site Manager / designee, the Section Manager – Construction Operations, Safety and Health, and submitted via the Intelex System (when application becomes available).

Daily Field Safety and Health Report

Safety observations / interface / concerns should be documented daily by the Site Manager or the Site Safety Manager / Specialist, when applicable.

Burns & McDonnell's "Daily Field Safety and Health Report" (Form B-2) should be utilized to document compliance, deficiencies, corrective action(s) taken / to be taken, and other safety related interface and concerns.

Content should be quantifiable / observation-based with no personal supposition.

Reports completed by the Site Safety Manager / Specialist should be submitted to the Site Manager for review, comment, and recommendation.

Completed reports should be retained for project archiving purposes.

Completed reports should be submitted to the Director, Corporate Safety and Health, Corporate Safety and Health Manager, and Global Practice Safety Segment Leader for review.

Project Safety Assessment

Project Safety Assessments should be conducted by the Global Practice Safety Segment Leader when Burns & McDonnell is contractually responsible for project safety.

Scheduling and project selection should be coordinated by the Project Manager and their respective Global Practice Safety Segment Leader.

An assessment team, comprised of the Site Manager, Site Superintendent (if applicable), Global Practice Safety Segment Leader, and Site Safety Manager / Specialist (if applicable), should conduct a comprehensive review of the Site Safety and Health Program's implementation on the project site.

The comprehensive review should include:

Opening conference – The assessment team will meet with the senior project personnel and review the purpose, scope, and methodology of the assessment and identify site personnel participation.

Site observation and evaluation – The assessment team should conduct a jobsite physical evaluation noting compliance, deficiencies, and corrective actions to be taken with immediate, positive, and certain feedback.

Review of documentation, statistics, and metrics – The assessment team should review documentation required by the Site Safety and Health Program, as well as TRIR and DART Rates.

Closing conference – The assessment team should meet with the senior project personnel and review the findings of the jobsite physical assessment and documentation, statistics, and metrics.

The assessment team should provide immediate, positive, and certain feedback at the management level.

Burns & McDonnell's "Project Safety Assessment" worksheets should be utilized to document compliance, deficiencies, and corrective action(s) taken / to be taken.

Completed worksheets should be submitted to the Site Manager and retained for project archiving purposes.

The Site Manager has the responsibility to ensure implementation of any corrective action(s) to be taken.

Completed worksheets should be submitted to the Global Practice Leader(s), Director, Corporate Safety and Health, Corporate Safety and Health Manager, and Project Manager for review and distribution.

Executive Safety Assessment

Executive Safety Assessments may be conducted by Executive / Senior Management at their sole discretion, when Burns & McDonnell is contractually responsible for project safety.

Executive / Senior Management should conduct at least one cross-global practice safety assessment annually.

Scheduling and project selection should be coordinated by the respective Executive / Senior Manager and their respective Global Practice Safety Segment Leader

A Notification of Assessment should be forwarded to the respective Project Manager, Site Manager, and Global Practice Safety Segment Leader in advance of the assessment.

An assessment team, comprised of the Executive / Senior Manager, Site Manager, Site Superintendent (if applicable), Global Practice Safety Segment Leader, and Site Safety Manager / Specialist (if applicable), should conduct a comprehensive review of the Site Safety and Health Program's implementation on the project site.

The comprehensive review should include:

Opening conference – The assessment team should meet with the senior project personnel and review the purpose, scope, and methodology of the assessment and identify site personnel participation.

Site observation and evaluation – The assessment team should conduct a jobsite physical evaluation noting compliance, deficiencies, and corrective actions to be taken with immediate, positive, and certain feedback.

Review of documentation, statistics, and metrics – The assessment team should review documentation required by the Site Safety and Health Program, as well as TRIR and DART Rates.

Closing conference – The assessment team should meet with the senior project personnel and review the findings of the jobsite physical assessment and documentation, statistics, and metrics.

The assessment team should provide immediate, positive, and certain feedback at the management level.

Burns & McDonnell's "Executive Safety Assessment" worksheets should be utilized to document compliance, deficiencies, and corrective action(s) taken / to be taken.

Completed worksheets should be submitted to the Site Manager and retained for project archiving purposes.

The Site Manager has the responsibility to ensure implementation of any corrective action(s) to be taken.

Completed worksheets should be submitted to the Director, Corporate Safety and Health, Corporate Safety and Health Manager, and Project Manager for review and distribution.

Other Inspection(s)

Other safety and health inspection and assessments may be conducted by federal and state agencies, worker's compensation and general liability insurance carriers, including the Owner / client insurance carrier, and by the Owner's / client safety department. These inspections / assessments should be conducted as follows:

OSHA / State OSHA inspections may be conducted at any company office, project, or other location without appointment or advance notice.

Prescribed requirements for these inspections are detailed in Chapter 3 of the Safety and Health Program.

Company insurance carriers may conduct periodic project inspections, and may also inspect company owned property / premises.

Insurance carrier inspections will typically be pre-scheduled with the Director, Corporate Safety and Health or Insurance Manager.

Insurance carrier inspections will be coordinated by the Director, Corporate Safety and Health or Insurance Manager.

Owner / client inspection of a project site may be conducted at any time.

The Site Manager routinely receives reports of inspections conducted by the Owner / client.

Copies, with comments regarding the inspection recommendations and compliance shall be sent to the Project Manager and the Global Practice Safety Segment Leader.

If response is warranted, the Project Manager shall coordinate with the Corporate Manager of Safety and Health, the Global Practice Safety Segment Leader, the Site Manager, and site personnel.

3.1.7 Project Safety & Health Procedure Issuances

Burns & McDonnell reserves the right to issue Project Safety & Health Procedures which affect all Subcontractors on site. These procedures will be issued to all persons who have received a copy of the Project Safety & Health Program. An effective date and expiration date will be included to indicate the start and duration of the procedure.

3.2 Safety & Health Monitoring and Enforcement

3.2.1 Procedure

Each Subcontractor is responsible for managing its own Project Specific Safety & Health Program and related programs.

Subcontractors are also responsible for monitoring and enforcing the project disciplinary procedures, or disciplinary procedures which are more stringent, for workers performing non-conformance work in relation to Safety & Health.

Subcontractors shall monitor the work of their workers to assure the worker's actions do not create an unsafe condition which may result in harm to themselves, other persons on site or result in property damage.

Failure of Subcontractor management to enforce the disciplinary procedures established in this manual may result in disciplinary action taken against Subcontractor management by Burns & McDonnell.

3.2.2 Monitoring

The enforcement of the Burns & McDonnell Project Safety & Health Program (an outline of Subcontractor minimum requirements) and all related local, state, federal or otherwise stated safety & health rules, regulations and procedures is a vital aspect to achieving a safe and healthful work environment. For this reason, Burns & McDonnell will monitor the activities of the Subcontractors on site and enforce all aspects of the Burns & McDonnell Project Safety & Health Program.

Project Safety & Health assessments shall be performed periodically (refer to Burns & McDonnell Safety Form QSA Physical and QSA Documentation). All findings shall be immediately corrected with written verification (Safety Form QSA Action Items) of the corrections submitted to the Burns & McDonnell Site Manager within the abatement date.

3.2.3 Enforcement

Subcontractors are responsible for enforcing all Safety & Health procedures adopted on this project. Burns & McDonnell will take disciplinary action against Subcontractor management for failing to enforce such procedures. The following actions may be taken against Subcontractor management and personnel for non-compliance issues:

Verbal instruction may be used at the discretion of the designated Safety Manager for conditions or practices which are less than serious and are not likely to cause an accident or incident. Violations may fit into four classes defined as follows:

Non-serious

Any condition or practice which is not likely to cause death or serious physical harm to any person.

Serious

Any condition or practice which is causing or likely to cause death or serious physical harm to any person.

Stop Work/Imminent Danger

The existence of any condition or practice which would reasonably be expected to cause death or serious physical harm before such condition or practice can be corrected. This is a “stop work” situation. All persons shall be withdrawn from the affected area, and no one is allowed into the area except those people deemed necessary to correct the unsafe condition or practice and who are using the necessary controls to safeguard themselves from the hazard.

Repeat

Violations which have been verbally stated or written to an employee or Subcontractor more than once.

Violation Abatement

Abatement of Safety & Health violation notices Burns & McDonnell Safety Form B-1 “Violation Notice” shall take place within the allotted time given to abate the unsafe condition. If the Subcontractor fails to comply with the abatement procedure within the allotted time period, without submittal of an alternate solution, Burns & McDonnell may take corrective action procedures and back charge expense to the Subcontractor who created the unsafe condition.

All Subcontractors on site shall have a violation policy and procedures that shall meet, at a minimum, the following standards:

3.2.4 Violation Procedure (Individuals)

Violations issued are subject to the OSHA regulations which regulate work sites, the Subcontractor Safety & Health Program and the Burns & McDonnell Project Safety & Health Program. The possible consequences subjective to the violation are as follows:

Non-Serious Violations

First Offense is verbal warning. With log book documentation for future reference.

Second Offense is written warning.

Third Offense is time off project or dismissal.

Serious Violations and Repeat Violations

First Offense is subject to time off project or dismissal at the discretion of the Site Manager and/or the Site Safety Manager.

Burns & McDonnell reserves the right to request the dismissal of project personnel who commit serious or repeat safety or health violations.

3.2.5 Violation Procedure (Company)

Violations issued are subject to the OSHA regulations which regulate work sites, the Subcontractor Safety & Health Program and the Burns & McDonnell Project Safety & Health Program. Notice of violation will occur via Burns & McDonnell Safety Form B-1 "Violation Notice". Violation Notices will be logged in Burns & McDonnell Safety Form C-15 "Violation Log".

3.3 Subcontractor Project Safety & Health Coordination and Submittal Requirements

3.3.1 Purpose

Burns & McDonnell has implemented coordination measures and submittal requirements in order to assure the protection of all persons on site and to communicate activities which are being performed on the project. For this reason, those requirements are outlined in the following section so that all Subcontractors are keenly aware of the Project Safety & Health Program Minimum Requirements. These requirements are to be adhered to by Burns & McDonnell employee owners. For help in meeting these requirements refer to Burns & McDonnell Safety Form C-20 "Safety Submittals". The following procedures shall be developed and implemented into the Subcontractor Safety & Health Program for this project.

The Subcontractor shall be responsible for coordination of its work and that of its Subcontractors so that safe work practice is achieved. The Subcontractor shall coordinate all work provided under this agreement with all contiguous contracts and work activities whether provided by facility staff or Subcontractors. Subcontractor shall arrange and schedule the operation of its own work and the work of all Subcontractors so that delays will be avoided when safe work measures are implemented. No extra payment shall be made for any delays incurred from improper coordination of this work with other trade work and compensation for any such delays and all extra work related thereto is considered as having been included in the contract price.

3.3.2 Pre-Mobilization Submittals - Prior to Subcontractor Mobilizing on Site

Purpose:

The following requirements shall be submitted to Burns & McDonnell prior to the start of activities on the project. Program submittals are necessary to coordinate the requirements established in the Subcontractor's Project Specific Safety Program along with the Project Safety & Health Program. It is also necessary for Burns & McDonnell to know who will carry out the functions required by the Project Safety & Health Program and the designated competent persons Burns & McDonnell Safety Form C-17 "Competent Person Designation" for each of the activities.

Safety & Health Program

Submittal of Subcontractor's written Project Specific Safety & Health program to Burns & McDonnell shall be done prior to the start of work. The Project Specific Safety & Health program shall include the requirements outlined in this program as minimum standards. In addition to the written Project Specific Safety & Health program, the following program's shall also be established, submitted and implemented on the project by the Subcontractor, when applicable, if not already included in the Subcontractor's Project Specific Safety & Health program:

Hazardous Energy Control - Lockout/Tagout Procedures

Confined Space Entry Procedures

Hazard Communication Program

Fall Protection Plan

Subcontractors that do not have a written Project Specific Safety & Health Plan may adopt the verbiage located in the Project Safety & Health Rules as Subcontractor's Project Specific Safety & Health Plan for the exclusive use of this project. Burns & McDonnell is in no way responsible for use and/or interpretation of the Burns & McDonnell Project Safety & Health Program when utilized by Subcontractor. Subcontractor must submit in writing to Burns & McDonnell of the intent for Subcontractor to utilize the Burns & McDonnell Project Safety & Health Program as own for the project. The Burns & McDonnell Safety Form B-3 "Subcontractor Verification" can be utilized to fulfill this obligation.

Burns & McDonnell is not responsible for administering the Subcontractor Project Safety & Health Program or safety training any Subcontractor personnel after adoption for the project.

3.3.3 Pre/Post-Activity Coordination & Submittal Requirements

Purpose:

Certain activities pose hazards that require safe work considerations prior to the activity being conducted. For this reason, Burns & McDonnell has established pre/post-activity requirements to assure Burns & McDonnell personnel and/or the Subcontractor consider hazards prior to the start of the activity. These requirements are outlined below:

Permit Required Confined Space Entry

Confined Space entry procedures shall be established by the Subcontractor for entry of their personnel. Burns & McDonnell Safety Form C-6 "Confined Space Request" shall be completed and submitted to Burns & McDonnell prior to entry. It is pertinent for Burns & McDonnell to know this information so that coordination efforts may be properly conducted for any other Subcontractor personnel to enter the confined space. Confined Space procedures for entry of Burns & McDonnell personnel can be found in [Chapter 7](#).

Crane Inspection and Lift Plan Submittal:

An annual third party crane inspection shall be conducted and shall be submitted to Burns & McDonnell prior to the use of any crane on site. This inspection shall be performed by a qualified crane inspector or by a certified inspection service.

This procedure shall in no way eliminate any requirements set forth for crane inspections in the [OSHA Standard 1926.1412](#).

Lift plans shall be completed for all lifts that are over 20 tons, lifts that involve more than one crane, piece of equipment or the load to be lifted exceeds 75% of the manufacturer's load rating chart for configuration of the crane/equipment. Burns & McDonnell Safety Form N-2 "Critical Lift Plan" shall be used to document this information.

Excavations and Trenching

Burns & McDonnell Safety Form J-1 "Site Specific Excavation Plan" shall be completed by the Subcontractor and submitted to Burns & McDonnell prior to the start of the operation. For trenches and excavations over twenty (20) feet in depth, the Subcontractor shall have a Professional Engineer, who is registered in the state of the project, design the sloping, shoring or shielding method used.

Soil shall be treated as Class C with regards to the dimensions for sloping, shoring and benching unless Burns & McDonnell Safety Form J-3 "Soil Classification" has been completed by a competent person and transmitted to Burns & McDonnell.

Work Notice – Permit to Work

Work permits shall be issued by **NY TRANSOCO** Representative before commencing any work activity and must be posted in the immediate area where the work is being done.

The Permit to Work shall apply to hazardous work activities, such as

Excavations

Confined Space Entry

Hot Work (welding, cutting, brazing, spark producing, etc.)

Lockout / Tagout work activities (electrical, mechanical, etc.)

Permit to Work shall

Be requested by the subcontractor/crew foreman/superintendent that will perform the work.

Be discussed during the daily PTA meeting

Remain on the job site until completion of the work or the permit expires, whichever occurs first.

Be legibly written / completed.

Require a new permit at the beginning of each new work shift for the work crew.

Be returned to the approver when the permit has expired or the work that has been completed

The Burns & McDonnell Safety Form C-7 "Work Permit" shall be utilized.

Lockout/Tagout Procedures

Subcontractors are responsible for administering their own lockout/tagout procedures and program while equipment is under the control of the Subcontractor.

The Subcontractors shall coordinate any work that involves existing or permanent site equipment and all start-up processes involving Burns & McDonnell. The project lockout/tagout program shall be utilized in these circumstances along with any requirements set forth by the **NY TRANSOCO** Training documentation of all employees affected in the Lockout/Tagout process may be required to be submitted to Burns & McDonnell prior to the beginning of the activity. Burns & McDonnell personnel utilizing lockout on systems will follow [Chapter 7 Lockout/Tagout](#). All authorized locking/tagging authorities of Burns & McDonnell and Subcontractors will be documented in Burns & McDonnell Safety Form G-11 "Tagging Authority List".

Training Requirements

Burns & McDonnell shall conduct project orientations and the subcontractor is responsible for all required worker training. All project employees shall receive an orientation prior to starting to work on the project. Project orientations will be conducted by Burns & McDonnell or designee as needed by the project. This project orientation may not be restricted to the items listed on the Burns & McDonnell Safety Form C-8 "Project Orientation", but shall at a minimum, include all applicable items listed.

Subcontractor employees involved in the following areas shall be trained by the subcontractor. All training shall be documented on the Burns & McDonnell Safety Form C-9 "Certification of Training" and submitted to Burns & McDonnell prior to the activity by the subcontractor for all of, but not limited to, the following:

Fall Protection

Scaffolds

Hazardous Energy Control - Lockout/Tagout

Confined Space

Respiratory Protection

Powered Industrial Truck Operators

Crane Operators (Per Type of Equipment)

High Voltage

Additional information regarding OSHA required training may be found in Burns & McDonnell Safety and Health Form C-21 “OSHA required Training Requirements and Training Guidelines”, or at <https://www.osha.gov/Publications/osh2254.pdf>

Pre-Task Analysis (PTA)

A Pre-Task Analysis (PTA) shall be documented daily (specific to the task being performed) for all subcontractor employees Burns & McDonnell Safety Form C-10 “Pre-Task Analysis (PTA)”. A copy of all PTA reports must be submitted to Burns & McDonnell weekly.

Weekly Work Area Assessment

Weekly Work Area Assessments should be conducted by the Site Manager and/or his/her designee, Site Safety Manager (if applicable), and a minimum of 1 representative from each subcontractor / client contractor forming the Assessment Team.

Scheduling and selection of the assessment team should be coordinated by the Site Manager and / or his / her designee.

The assessment team should use the Burns & McDonnell Safety Form C11 “Weekly Work Area Assessment” as a tool to conduct a comprehensive review of the Site Safety and Health Program’s implementation on the project site.

Burns & McDonnell’s Safety Form C11A “Weekly Work Area Assessment Action Items” should be utilized to document the following:

Client Contractor / Subcontractor being observed,

Enter the name of the respective contractor / subcontractor.

Sub-tier contractors should be identified by their prime contractor / subcontractor name.

Observations / comments regarding compliance and/or deficiencies,

Document observation (see example below).

“...employee observed working at elevation in excess of 6 feet without utilizing fall protection.”

Recommended Corrective Actions (CA),

Recommendations for elimination / mitigation of observed unsafe behaviors / conditions.

The date and time the CA is opened and closed, and

Open / Date & Time

Document date and time of observation.

Closed / Date & Time

Document date and time corrective action(s) completed and verified.

The Responsible person/party for implementing or performing the CA.

Document responsible party for the implementation of corrective action(s).

Completed reports should be submitted weekly to the Burns & McDonnell Site Manager / designee, and the Section Manager – Construction Operations, Safety and Health.

Task Safety Observations (TSO)

Subcontractor supervisors and front-line managers shall be required to perform a minimum of one formal Task Safety Observation per day providing immediate, certain, and positive feedback. The completed Task Safety Observations should be submitted to the Site Manager or his / her designee at the end of each workday.

Incident/Accident Review & Reporting

An executive management member, of the Subcontractor Company whose employee suffered an OSHA Recordable injury, will arrive onsite within 48 hours of the incident to attend an incident review meeting to discuss the incident and shall submit a plan of action / proposed corrective actions to prevent recurrence of similar future events. If the incident results in an OSHA DART injury, or a property damaging incident occurs resulting in a loss of \$5,000 or more, the president of the Subcontractor Company shall also attend this incident review meeting.

At the time of this meeting the executive management member and/or president of the company such occurrences in the future.

In the event of a work-related fatality, work-related inpatient hospitalizations of one or more employees, work-related amputations, or work-related losses of an eye Burns & McDonnell shall immediately be notified. Failure to comply with this procedure will result in disciplinary action at the discretion of Burns & McDonnell.

Activity Hazard Analysis (AHA)

Major work operations, such as those with a hazardous nature or that require special planning shall use a Burns & McDonnell Safety Form C-12 "Activity Hazard Analysis" completed prior to the work operation. At a minimum, the following details shall be included on the activity hazard analysis:

Define Activity

Describe Sequence of Operation

Specific Hazards Related to Operation

Hazard Control Measures

Training for all Involved Employees

Competent Person

For work associated with:

Fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall arrest systems.

Materials handling equipment, address safeguarding measures related to materials handling equipment.

Excavations including excavation safeguarding requirements.

The appropriate activity hazard analysis shall be reviewed and attendance documented by the Subcontractor at the preparatory, initial and follow-up phases of the operation.

Prior to the start of the work operation, the appropriate people shall be assembled by the Subcontractor to complete the activity hazard analysis. All employees involved in the operation shall be trained in all of the details described on the activity hazard analysis. The activity hazard analysis Burns & McDonnell Safety Form C-12 “Activity Hazard Analysis” and verification of training Burns & McDonnell Safety Form C-9 “Certification of Training” for all employees involved in the operation shall be submitted to Burns & McDonnell prior to commencing the work operation.

At a minimum, all of the following work operations and activities require an activity hazard analysis along with any other operations determined necessary by Burns & McDonnell:

Chemical Cleaning Activities	Metal Wall Panel Installation
Concrete Work	Painting, Coating and Lining Operations
Confined Space Work	Pile Driving and Drill Pier Installation
Electrical Equipment Installation	Pre-Cast Concrete Panel Installation
Excavations & Trenching	Pressure Testing
Foundation Work	Roofing & Decking Work
Hazardous Waste Remediation	Startup and Commissioning Activities
Heavy Rigging & Lifting Operations	Structural Steel Erection
Insulation Work	Tower Construction
Mechanical Equipment Installation	

3.3.4 Monthly Submittal Requirements

Monthly Crane Inspection Reports

A monthly crane inspection shall be conducted by the designated competent person for cranes and shall be submitted to Burns & McDonnell by the first working day of each month.

The crane / lift type specific inspection form from the Burns & McDonnell Safety Forms (refer to Chapter 14 or Chapter 18) shall be used.

3.3.5 Weekly Submittal Requirements

Weekly Toolbox Safety Meetings

All Subcontractors on site shall hold weekly toolbox Safety & Health meetings with their employees which shall be documented on the Burns & McDonnell Safety Form C-13 “Weekly Safety Toolbox Meeting” and

submitted to Burns & McDonnell within 24 hours of the meeting. Subcontractors shall inform their personnel of any coordination efforts discussed in the Project Safety & Health Coordination Meeting which will affect their work with regard to Safety & Health. In addition, these meetings shall be utilized to inform their personnel of a select topic to educate employees of hazards incurred on the project and in related activities.

3.3.6 One-time Submittals

Competent Person Designation

A list of competent persons per activity (as required by OSHA) shall be submitted prior to beginning work on any activity that requires a competent person use Burns & McDonnell Safety Form C-17 “Competent Person Designation”.

Chemical Inventory List (CIL)

A list of hazardous materials and chemicals which are used in the course of the company's normal business activities must be maintained and continually updated. This list is to include all substances which require a Safety Data Sheet (SDS). The Chemical Inventory List shall include as a minimum the following information:

- The Product Name (as noted on the SDS)
- The Manufacturer's Name
- Emergency Contact Information
- HMIS Information for Health, Fire, Reactivity, and PPE

A complete chemical inventory for all hazardous chemicals kept on site shall be submitted via Burns & McDonnell L Safety Form Z-1 “Chemical Inventory List”. This list shall be updated as necessary.

Safety Data Sheets (SDS)

A SDS for all chemicals in the chemical inventory list must be provided. Chemicals shall not be brought onsite without the prior submittal of its SDS for inclusion in the SDS inventory and listing on the CIL.

3.3.7 Other Submittals

Other submittals will be required as needed. For help in meeting these requirements refer to the Burns & McDonnell Safety Form C-20 “Safety Submittals”.

3.4 Project Procedures

Subcontractors shall adhere to the following Project Procedures and Requirements:

3.4.1 All Subcontractor Site Supervision

Superintendents, General Foremen, Foremen, or other members of management (persons supervising workers) shall not operate equipment (e.g. material handling, monitoring, etc.) on Burns & McDonnell projects

3.4.2 Substance and Alcohol Abuse Prevention Program

Pre-Site Access/Annual Testing

Post Incident

Reasonable Cause

Random

3.4.3 Safety Recognition Programs

Recognition programs are one of the Five High-Impact Zero Injury Techniques as defined by the Construction Industry Institute. Establishment of these programs is considered of high importance for employee recognition and ownership of the Project Safety & Health Program. The Safety Recognition Program will be designed when the project begins and after a formal budget has been established. Subcontractor participation is encouraged to show a commitment of safety/health on all levels for the project

3.4.4 Task Safety Observations

The purpose of Task Safety Observation is to identify and correct project safety and health hazards and “at risk” behaviors encountered in the workplace, to provide uniform guidance, requirements to identify and correct these hazards and “at risk” behaviors, and satisfy OSHA standards.

General

Inspections and self-assessments are one of the primary management tools for continually improving the Program. These on-site activities are one of the best methods for evaluating individual and group behavior regarding safety. They serve two primary needs: first they evaluate the existing safety and health system which is in place on the project. Second, and more importantly if performed properly, they can evaluate safety behavioral aspects of the individuals and the workforce.

Since 85% of jobsite injuries stem from individual unsafe or “at-risk” behavior, identification of “at risk” behavior is critical to achieving environment free of injury. Safe behavior, plus a continuously improving safety system equals zero injuries.

Procedure

The Site Manager is responsible for the implementation of this procedure when Burns & McDonnell is contractually responsible for safety.

Burns & McDonnell Executive / Senior Management may conduct Task Safety Observation's at their sole discretion, when Burns & McDonnell is contractually responsible for safety.

Burns & McDonnell Site Management shall be required to perform a minimum of one formal Task Safety Observation per day, when Burns & McDonnell is contractually responsible for safety, providing immediate, certain, and positive feedback.

Site Management includes the following:

- Site Manager / Construction Manager
- Assistant Project Manager (when applicable)
- Project Superintendent(s)
- Discipline Superintendent(s)
- Quality Assurance Manager (when applicable)
- Site Safety Manager / Specialist (when applicable)
- Field Engineer (when applicable)

Subcontractor supervisors and front-line managers shall be required to perform a minimum of one formal Task Safety Observation per day providing immediate, certain, and positive feedback.

Contractor supervisors and front-line managers include the following:

Project / Site Manager

Assistant Project / Site Manager (when applicable)

Project / General Superintendent(s)

Discipline Superintendents(s)

General Foremen

Foremen

A formal Task Safety Observation should consist of the following:

Observe crew at work, noting the safe and “at risk” behaviors.

Review safe and “at risk” behaviors with crew after observation is complete (immediate)

Safe behaviors should be commended (positive / certain)

Corrective coaching if necessary (certain), crew should be involved to make the condition or task safe (positive)

Continued improvement should be encouraged (certain)

Completion of the Task Safety Observation Card / Form

Workers being observed should remain anonymous

Completed Task Safety Observations should be submitted to the Site Manager or his / her designee.

Task Safety Observation results should be recorded / tracked at a project level by utilizing the Task Safety Observation tracking spreadsheet and submitted to the Manager of Operations, Safety and Health, by the 5th of the each month

Negative trends or issues identified should be targeted for improvement

Project Task Safety Observation results should be communicated to the workforce

Improvements made by the workforce should be recognized and / or rewarded, at the discretion of Burns & McDonnell Project Management

Task Safety Observation results should be reviewed by Executive / Senior Management

Negative trends or issues identified should be targeted for improvement

Improvements made by individual projects should be recognized and rewarded, at the sole discretion of Executive / Senior Management

Training

Personnel required, by this program, to perform Task Safety Observations should be trained in the requirements set forth by this program.

Training may be delivered electronically or via an instructor-led class

3.4.5 Amendment Form

On special occasion(s), circumstances on site will necessitate a change in a safety procedure or procedures. In this event, the Project Manager shall be notified, as well as the Director of Corporate Safety & Health and the Global Practice Manager. The Burns & McDonnell Safety Form C-14 “Program Amendment” shall be completely filled out and signed prior to implementing any new procedure.

3.4.6 Postings




Posting of all federally required notices which includes, but is not limited to the following, shall be posted upon arrival of Subcontractor on site.

Notice to Workers Concerning Unemployment Benefits,
Employee Polygraph Protection Act,
Equal Employment Opportunity,
Discrimination in Employment,
Family and Medical Leave Act of 1993,
Federal Minimum Wage,
OSHA – Job Safety & Health,

Emergency Procedures and Contacts
OSHA 300A Summary (February 1 – April 30).
The appropriate State postings:
Worker’s Compensation
Minimum Wage
Discrimination, etc.

3.4.7 Scaffold Tagging

All scaffolding shall be required to be tagged by the Subcontractor’s designated competent person for scaffolds indicating its suitability for use. Burns & McDonnell shall be notified each time a scaffold is tagged prior to employee use. Tags shall be affixed to the scaffold so they are easily noticeable at each access point. The color coding is as follows:

Table 3 - 1 Scaffold Tagging Color Codes		
Scaffold Tag Color		Project Definition
Red		UNSAFE – Do Not Use
Yellow		Warning – Hazard Exists
Green		Ready to Use

The scaffold erector’s competent person(s) shall make daily inspections of the scaffolding prior to its use. The inspection shall be documented on the scaffold tag with the inspector’s name/initials and date.

Only the erector of the scaffold shall make modifications to the structure. Access ladders are required. Climbing up the side of scaffolding is not permitted unless the scaffold is designed for such use.

Subcontractors are responsible for obtaining all permits; licenses and having a registered engineer approve the scaffold when applicable.

3.4.8 Signage and Barricading Work

The Subcontractor shall barricade and mark (tag/sign) all hazardous areas. Signs, Tags, and Labels shall be provided to give adequate warning and caution of hazards. They are provided to instruct and direct workers and public. This shall include, but is not limited to open ditches, trenches, and other excavations; overhead work; and temporarily suspended loads.

Red barricades shall denote that enclosed area is off limits to any person(s) not performing work in the area.

Yellow barricades shall denote that a hazard exists and should be identified in the barricaded area prior to entering.

Other colors may be used as specified by NY TRANSOCO requirements as follows:

3.4.9 Safety Color Coding

Placement of Signs

Hazard alerting signs must be placed to alert and inform viewers from a safe viewing distance, according to ANSI Z535.2-2011, Sections 11 and 12. They must be legible, and must not be a distraction or create a hazard themselves. They must not be placed on or adjacent to moveable objects like doors, windows, etc. Safety and fire equipment signs must be clearly visible in the immediate vicinity of the equipment. Safety signs must be protected from damage caused by fading and other potential environmental conditions. Signs must be displayed with illumination or retro-reflectiveness as needed for adequate legibility under normal operating conditions.

Where illumination is inadequate or colors are not recognizable, supplemental illumination must be used.

Where illumination may be interrupted, the sign should be made with photo luminescent

The following chart represents the color codes of both ANSI/NEMA Z535.1-2006 (R2011) and OSHA:

Table 3 - 2 Standard Color Coding for Safety		
COLOR	MEANING	APPLICATION
Red	Danger	Safety cans and signs.
	Stop	Emergency stop bar or button on machinery. Identification of fire equipment.
Fluorescent Orange, Orange- Red	Biosafety	Labels and containers for blood and infectious waste. (Warning labels must be fluorescent orange or orange-red with the biosafety symbol in a contrasting color.)
Yellow	Caution	Tripping, falling and striking hazards. "Flammable, Keep Fire Away" labels on cabinets. Safety cans and containers for explosives, corrosives or unstable materials.
Orange	Warning	Parts of machinery or energized equipment that may cut, crush or otherwise injure. Inside of transmission guards for pulleys, gears, etc.
Green	Safety	Location of first aid equipment. Location of safety equipment, respirators, safety showers, etc.
Blue	Information	Signs and bulletin boards. Specific railroad warnings against starting, using or moving equipment being repaired.
Black, White, Yellow or Combination of Black with White or Yellow	Boundaries	Traffic or housekeeping markings. Stairways, directions and borders.
Magenta or Purple on Yellow	Radiation Caution	X-ray, alpha, beta, gamma, neutron and proton radiation.

3.4.10 Evacuation/Emergency Procedures

Evacuation/Emergency Procedures shall be implemented for the following circumstances by the Subcontractor for their employees as applicable:

Medical emergencies,

Fire,

Hazardous material spills and

Varying weather circumstances.

Subcontractor shall have person(s) trained in providing First Aid and CPR or have a Designated Medical Facility within approximately fifteen (15) minutes of the job site.

The Burns & McDonnell Safety Form E-1 "Emergency Action Plan" may be developed in the field in coordination with any existing **NY TRANSCO** Emergency Action Plans / Emergency Response Plans.

3.4.11 Minimum Personal Protective Equipment

The following minimum personal protective equipment is required 100% of the time on the project:

[Hard Hat](#) (ANSI Z89.1-1986, Class E/G)

[Leather work boots](#) steel or composite toe with defined heel

[Safety Glasses](#) (ANSI Z87.1-1989)

Full length work pants, coveralls, jeans, etc.

Work shirt with a minimum 4" sleeve length

Hand protection appropriate for task and in accordance with Hand Protection Reference Guide

See [Chapter 9 – Personal Protective Equipment](#) for specific requirements of the PPE. Tank tops and halter tops are prohibited! Any articles of clothing or outerwear that display profane or offensive materials are prohibited. Subcontractors are responsible for supplying all personal protective equipment necessary for employees to safely perform duties required.

3.4.12 Cumulative Trauma Prevention

Work activities that require workers to conduct lifting, handling, or carrying; rapid and frequent application of high grasping forces; repetitive hand/arm manipulations; tasks that include continuous, intermittent, impulsive, or impact hand-arm vibration or whole body vibration; and other physical activities that stress the body's capabilities shall be evaluated by a competent person to ensure the activities are designed to match the capabilities of the workers.

When work activities that stress the body's capabilities are identified, the employer shall establish a cumulative trauma disorders prevention plan and incorporate it in the Plan. The plan shall incorporate processes that recognize cumulative trauma hazards, isolate causative factors, inform and train workers, and implement controls.

Control measures to minimize hand-arm vibration shall include: adherence to the TLV guidelines as specified in the ACGIH in "Threshold Limit Values and Biological Exposure

Indices"; the use of anti-vibration tools and/or gloves; implementation of work practices that keep the worker's hands and body warm and minimize the vibration coupling between the worker and the vibration tool; and application of specialized medical surveillance to identify personnel susceptible to vibration.

Additional information is found in Chapter 7 - Project Site Ergonomics and Manual Material Handling

3.4.13 Housekeeping

Subcontractors are responsible for housekeeping of their work areas and cleaning of the debris and/or surplus materials accumulated as a result of the work process.

Subcontractors shall monitor craft activities to assure housekeeping cleanup is performed throughout the work process.

Accumulation of debris and waste materials slow the work process, create disorganization and contribute to unsafe work conditions. For this reason, all contracts have been structured to require Subcontractors to remedy such problems as assigned on the notification within the allotted abatement period. Failure to meet such conditions may result in charges to the Subcontractor for removal of trash or waste material by others from the work area or for clearing or moving tools, materials or equipment from aisles, walkways or work areas.

3.4.14 Fire Prevention Program

Each Subcontractor shall be responsible for fire protection throughout all phases of work as required by the National Fire Protection Code and the Chapter 12 of this program.

Only work procedures which minimize fire hazards to the extent practical shall be used. A fire extinguisher shall be present in the immediate vicinity of any hot work. Verification shall be made to assure no fire hazards exist for at least 30 minutes following the conclusion of the hot work activity. In addition the following outline summarizes when fire extinguishers are required:

Table 3 - 3 Fire Extinguisher Requirements			
Standard	Location	Type	Distance
150(c)(1)(i)	Building Area	2A	100 Foot Radius
150(c)(1)(iv)	Each Floor	2A	100 Foot Radius
150(c)(1)(iv)	Multi-Story Building	2A or Suitable for Hazard	Next to Stairway
150(c)(1)(vi)	5 Gal. of Flamm. or Comb. Liquids or 5 Gal. of Flammable Gas	10B	Within 50 Feet
150(c)(6)	Open Yard Storage	2A or Suitable for Hazard	100 Foot Radius
152(d)(1)	Flammable Liquid Storage Room	20B	10 Feet Outside
152(d)(2)	Outside Flammable Liquid Storage Area	20B	25-75 Feet
152(d)(4)	Vehicles Used for Dispensing or Transporting Flamm. or Comb. Liquids	20B:C	On Vehicle
152(g)(11)	Service or Fuel Area	20B:C	Within 75 Feet
153(l)	LP-Gas Storage Area	20B:C	In Location
352(d)	Welding, Cutting or Heating Areas	Suitable for Hazard	In Area
550(a)(14)(i)	Crane Cabs	5B:C	On Crane
Subcontractors shall provide, as a minimum, a 20-pound ABC fire extinguisher (charged and ready for use) at each hot work site for fire watch purposes.			

3.4.15 Site Sanitation/Waste Plan

All Wastes Shall Be Disposed Of Properly.

Controls and Disposal Of Solid Waste

Solid waste will be picked up and placed in containers as generated. All waste containers shall be emptied by the contractor on a regular basis, as to prevent over-flowing conditions. All handling and disposal will be conducted in such a fashion as to minimize secondary contamination by overflow or spillage during waste transfer.

Disposal of Demolition and Other Construction Debris

Disposition of construction debris shall be conducted as follows: All wastes generated by demolition activities shall be segregated as much as practicable, and placed in dumpster. Upon completion of all demolition activities, the area shall be clean, absent of signs of demolition, construction, temporary construction barriers or demolished structures. Exceptions to this requirement shall be specifically defined within the scope of work for this task order.

Sewage

All sewage will be disposed of through connections to established sanitary systems. Where such systems are not available, chemical toilets or comparable effective units will be used with collected wastes periodically emptied by means of a sanitary pumping service. No conditions shall be allowed to exist where noticeable odors are present.

Table 3 - 4 Requirements For Toilets Facilities	
Ratio Of # workers to # of Toilets	
Number of Workers	Number of Toilets
10 or less	1 toilet seat and 1 urinal
20 or less	2 toilet seats and 2 urinals
More than 20	2 toilet seats and 2 urinals per additional 15 workers

Additionally, the above ratio of toilet facilities shall be used for female workers independent of male employees on site. Women's facilities shall be clearly indicated as such and be equipped with a lock. Use of these facilities by males shall be prohibited at any time.

Dust Control:

Positive dust control shall be exercised at all times during this project. Dust generation during (saw-cutting or chipping) activities shall be minimized by a constant water stream wetting the concrete. All efforts to minimize dust generation with water spray shall be expended.

Chemicals and Chemical Waste

In the event that a chemical is put into use in some form (after submittals and approvals are obtained if required), the following procedure shall be followed:

All chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action.

All activities and inspection shall be documented.

Chemical waste shall be collected in corrosive resistant containers.

All chemical containers shall be investigated to assure chemical compatibility with the medium to be collected.

Collection drums shall be monitored and removed to a storage or staging area when contents are within 6-inches of the top.

Wastes shall be classified, managed, stored and disposed of in accordance with Federal, State, and local laws and regulations.

Hazardous Waste Management and Disposal

Hazardous waste generated during the course of this project will be appropriately classified by the responsible party (as determined by contract) and removed for appropriate disposal by a licensed disposal company.

Fuels and Lubrication

Any fuels brought on-site by the contractor shall be in approved, self-closing, leak-proof, steel containers. These containers (if any) shall not be stored in a designated area and provide secondary containment as required.

Wastewater Disposal

Wastewater generated during the course of these construction activities, such as spray-waters used during trenching, shall not be allowed to enter any waterways or to enter any storm drain system. Any generated wastewater shall be treated to remove any contaminants prior to discharge, or shall be captured, stored and removed from the facility as potentially contaminated wastewater. No wastewater shall be disposed of without compliance with all Federal, State, or local laws and regulations.

Garbage Disposal

The contractor will place all generated garbage in an appropriate container and arrange for disposal by means of contracted vendor, which can provide a timely pick-up.

3.4.16 Cell Phones

Personal cell phone use is prohibited on the project site, with exception given in designated break areas. Cell phones or any other non-intrinsically safe devices are prohibited in process areas.

3.4.17 Breaks and Lunches

Break Areas

All break areas shall be approved by Burns & McDonnell (or client as required). Break area shall be indicated by a clearly defined border on at least 3 sides. Food and drink other than water shall be confined to designated break areas. There shall be no storage of materials in break areas.

Smoking Areas

Smoking shall be confined to designated smoking areas only. Smoking areas shall have a dedicated fire extinguisher and appropriate receptacles for disposal of cigarettes (butt cans, etc.). There shall be no disposal of other trash in these receptacles.

Drinking Water

An adequate supply of fresh, potable drinking water should be provided in an easily accessible location. Portable water containers used to dispense drinking water shall be cleaned daily, must be capable of being tightly closed, and shall be equipped with a tap. Any container used to distribute drinking water should be clearly marked with the nature of its contents and not used for any other purpose. Containers shall be sealed (duct taped) and dated for fill date.

Where paper cups are supplied, a disposal receptacle should be provided immediately nearby.

The use of pails and dippers or a common drinking cup for dispensing drinking water is prohibited.

If for any reason water that is unfit for human consumption is used at the job site, it must be identified and labeled to clearly indicate that the water is unsafe for drinking, washing or cooking.

3.4.18 Washing and Hygiene Facilities –

Adequate washing facilities for employee-owners shall be provided where hazardous substances may be handled or come into contact with the skin. Such facilities or means, e.g. disposable wet wipes for hand/face washing shall be in near proximity to the worksite.

3.4.19 Machinery, Tools, Material, or Equipment –

The use of any machinery, tool, material, or equipment which is not in compliance with any applicable requirement of this part is prohibited. Such machine, tool, material, or equipment shall either be identified as unsafe by tagging or locking the controls to render them inoperable or shall be physically removed from its place of operation.

3.4.20 Visitor Access

Visitors/vendors to the site must sign in using the Burns & McDonnell Safety Form C-16 “Visitor Sign-in”.

Visitor(s) accessing the site for less than an eight (8) hour period will not be required to attend the Project Orientation Training. Visitor(s) shall be accompanied by an authorized person - one who has been trained on the project hazards and who is familiar with the project throughout the entirety of his/her visit. If the visitor(s) cannot be accompanied by an authorized individual throughout the entirety of the visit, the visitor(s) shall attend the Project Site Specific Orientation Training prior to accessing any work activity area.

If an emergency should arise the designated person shall take the Visitor Sign-in sheets to the designated assembly area to be used for accountability of personnel.

3.5 Substance and Alcohol Abuse Prevention Program

3.5.1 Purpose

Burns & McDonnell has the right and obligation to maintain a safe, healthy, and efficient working environment. Being under the influence of a drug or alcohol on the job poses serious safety and health risks to the user and to all those who work with the user.

The use, sale, purchase, transfer, or possession of an illegal drug in the workplace, and the use, possession, or being under the influence of alcohol also poses unacceptable risks for safe, healthy, and efficient operations.

The unlawful manufacture, distribution, consumption, possession, or use of a controlled substance and alcohol is prohibited at the worksites under the scope of work for the Project.

The Subcontractor shall comply with these requirements for a Drug and Alcohol Free Workplace, unless a more stringent program is defined for the Project. By signing a contract agreement with Burns & McDonnell or owner, the Subcontractor certifies that their employees will comply with this written substance abuse testing program.

The Subcontractor shall assist Burns & McDonnell in administering the Project requirements for a substance abuse detection and prevention program as part of its responsibilities and scope of work.

All costs for substance abuse/alcohol testing shall be included in the Subcontractor's contract price.

Personnel entering, working on, or leaving the Project worksite shall be subject to search in support of the substance and alcohol abuse prevention program.

Supplier representatives, home office employees, and field technical representatives who visit the Project worksite on a short-term basis (three-calendar-day period) are not subject to drug and alcohol testing,

although such persons are subject to search and/or inspection procedures in support of the substance and alcohol abuse prevention program.

3.5.2 Testing

Burns & McDonnell employee owners and Subcontractor workers working on Project worksites, including workers, new hires, replacements, and supervisory personnel, are subject to the following Drug and Alcohol testing:

Pre-Site Access/Annual testing,

Random testing as a condition of contract.

Subcontractors are required to send evidence that a worker's drug and/or alcohol test was negative, regardless of the reason for testing, to Burns & McDonnell within three days of completion of the test utilizing Burns & McDonnell Safety Form C-18 "Substance Abuse Site Access Verification".

The following is a listing of the types of testing, and required time frames for such testing, as required under this program.

3.5.3 Pre-Site Access/Annual Testing

Initial site access of any worker shall be conditional upon successfully meeting the requirements of the pre-site access substance and alcohol test.

The pre-site access test must be taken by the worker within 5 days prior to reporting to the Project site.

Only workers who are certified as drug- and alcohol-free, in accordance with the requirements of this program, shall be permitted by the Subcontractor to work at the Project worksites.

In addition, each worker shall participate in annual testing.

The pre-site access test date will become their new annual testing date for the substance and alcohol abuse prevention program.

This program prohibits the Subcontractor from giving any more than 7 days' notice to a worker of pre-site access/annual testing.

3.5.4 Collections

A pre-screening (e.g. Insta-Check) program may be used along with a urinalysis test only if approved by Burns & McDonnell.

If for any reason the pre-screening is inconclusive the specimen shall be sent to the appropriate facility for testing.

Access to the site shall be prohibited until confirmation of a negative test has been received by Burns & McDonnell.

Specimen collection and pre-screenings will be conducted in accordance with the Department of Health and Human Services (DHHS), Substance Abuse and Mental Health Services Administration (SAMHSA), "Mandatory Guidelines for Federal Workplace Drug Testing Programs".

Specimen collection(s) can be conducted at the project worksite or a local clinic approved by Burns & McDonnell.

The employee should always be escorted to the collection facility by an accompanying supervisor

All substance analysis in specimens shall only be performed by SAMHSA laboratories certified by DHHS, as outlined in the federal guidelines.

In addition, specimen collection shall be conducted in accordance with state and federal law.

The procedure shall be designed to ensure the security and integrity of the specimen provided by each worker by following accepted chain-of-custody guidelines.

Every reasonable effort will be made to maintain the dignity of anyone submitting a specimen for this program.

3.5.5 Methodology

The only methodology for substance abuse testing approved by DHHS is urinalysis.

Urinalysis involves screening for the presence of drug metabolites in a two-step process.

The initial test is an immunoassay, a screening test based on antibodies directed against each major drug class.

Specimens containing the drug at less than the initial test cutoff concentration are reported as “Negative”.

Specimens that are not negative at the initial test are taken to a second, confirmation test using gas chromatography-mass spectrometry (GC/MS). GC/MS is a quantitative test that unequivocally determines presence or absence of the drug.

If a drug is determined to be present at greater than or equal to the confirmation cutoff concentration, it is reported as “Positive”.

No adverse personnel action should ever be taken before completing the two-step procedure.

3.5.6 Refusal to Test

Refusal to test, or failure to remain and complete the testing procedure, shall carry the same sanctions as a positive test result.

Personnel selected for a drug/alcohol test are required to remain under the supervision of their supervisor, collection site personnel, or representative from their company or Burns & McDonnell from the time of test notification until released.

If personnel are unable to supply a sample at the time of testing, they shall be required to wait up to two hours, without leaving the testing facility.

Failure to remain and complete the testing procedure shall be considered a refusal to test, which carries the same sanctions as a positive test.

To accommodate this probability, notification of random testing shall be given in ample time before the end of a shift.

3.5.7 Testing Parameters

Substance Abuse

The substance abuse testing parameters will consist of a 12-panel drug screen using the substances and the cut-off levels listed in TABLE C-4 “Cut-Off Levels for Substance Abuse Testing”. The cut-off levels are equivalent or more stringent than the DHHS Guidelines for Federal and Department of Transportation (DOT) workplaces listed in the DHHS – SAMHSA guidelines, as well as in 49 CFR Part 40.87 for the DOT.

In addition to these substances and cut-off levels, the creatinine level and specific gravity of the specimen shall be measured.

If the creatinine level is less than 20 milliliter per deciliter and the specific gravity is less than 1.003, the sample shall be considered dilute and another collection will be required.

The second sample shall be requested to be collected the following morning from the time of notification of a diluted sample.

Those samples containing adulterants or considered substituted as determined by the laboratory will be considered as a positive test.

New drugs and preliminary cutoff and confirmation levels may be added and modified periodically in order to parallel the DHHS – SAMHSA and DOT guideline requirements.

More stringent limits of sensitivity and specificity for each drug of abuse may be defined by the Project owner and shall be followed.

Alcohol Abuse

The alcohol abuse testing parameters will consist of an alcohol test using the breath or blood to determine blood alcohol content (BAC). If possible, a breathalyzer-type instrument conforming to the DOT guidelines should be used. If that is not available, then a blood draw may be used.

Breath and/or blood collection shall be conducted at the project worksite clinic or a local clinic approved by Burns & McDonnell.

Failure to provide a sufficient breath sample to complete a breath test or refusing to provide a blood sample will be considered a refusal to test and have the same consequences as a positive test.

The minimum requirement for a positive test result for alcohol will be a BAC of 0.02 % or 0.02 grams of alcohol per 100 milliliters of blood.

Any initial breath test that indicates a BAC of 0.02% or greater will be confirmed by an Evidential Breath Testing device operated by a Breath Alcohol Technician.

The confirmation test will be performed no sooner than 15 minutes and no later than 30 minutes following the completion of the initial test.

Two blood samples will be drawn if the blood is used to determine BAC.

An alcohol concentration of 0.02% or greater from the confirmation breath test or concentration of 0.02 grams of alcohol per 100 milliliters of blood or greater from the blood samples will be considered a positive alcohol test.

Supervision, Confirmation and Control

All drug testing shall come under the control and supervision of a physician with confidentiality protected in accordance with state law and the “American Medical Association’s Code of Ethical Conduct for Physicians Providing Occupational Medical Services” or the Medical Review Officer Manual, as developed by the National Institute on Drug Abuse (NIDA).

The laboratory or testing facility shall report all results to the Medical Review Officer (MRO) for verification and medical review.

The MRO shall be a licensed physician responsible for receiving laboratory results generated by a substance abuse testing program, who has knowledge of substance abuse disorders, and who has received appropriate medical training to interpret and evaluate an individual's medical history, and any other relevant biomedical information, as certified by either the American Medical Association or the American College of Occupational and Environmental Medicine.

3.5.8 Sanctions/Consequences Imposed for Failing Drug and/or Alcohol Test

Immediate removal from the project site shall occur when:

Any worker is found to possess, distribute, sell, attempt to sell, or transfer of an illegal drug while on project worksites or while performing project business;

Any worker is found to be in possession of or under the influence of alcohol while on project worksites or while performing project business;

Any worker is found to be in possession of contraband or other controlled substances;

Any worker is found through drug and alcohol testing to have in their body a concentration of a substance abuse drug or of alcohol that is equal to or exceeds the confirmatory test cutoff limits; or

Any worker refuses to cooperate in providing a specimen or participating in the testing.

Anyone failing to comply with this program shall be permanently prohibited project worksite access.

3.5.9 Training

All workers shall be educated in all provisions of this program through classes and/or other methods as appropriate.

All supervisory personnel (site superintendents, site supervisors, foremen) should receive additional training relative to the detection of signs and symptoms of drug and alcohol use.

Table 3 - 5 Cut-Off Levels for Substance Abuse Testing			
Drug Class	Drugs Confirmed	Cut-Off Level (ng/mL) Initial Test (Immunoassay)	Cut-Off Level (ng/mL) Confirmation Test (GC-MS)
Amphetamines Methamphetamine	Amphetamine (Dexedrine, Benzedrine) Methamphetamine (Desoxyn, Methedrine)	1,000	500
Barbiturates	Amobarbital (Amytal), Butalbital (Fiorinal), Pentobarbital (Nembutal), Phenobarbital (Donnatal), Secobarbital (Seconal)	300	200
Benzodiazepines	Most benzodiazepines used in U.S., and metabolites Diazepam (Valium), Oxazepam (Serax), Chlordiazepoxide (Librium), Alprazolam (Xanax), Chlorazepate (Tranxene),	300	200, except alpha-hydroxyalprazolam

	Temazepam (Restoril)		
Buprenorphine	BUPRENORPHINE METAB	10	5
Cannabinoids	Carboxy-THC (THCA)	50	15
Cocaine metabolite	Benzoyllecgonine	300	150
Methadone	Amidone, Dolophine EDDP (Methadone metabolite)	300	300
Opiates	Codeine Hydromorphone Hydrocodone	2000	2000
	Morphine	2000	2000
Oxycodone	OxyContin®, OxyIR®, OxyFast®, Percodan®, Percocet®, Tylox, and Vicodin, Endocet, Roxicet, Endodan, Roxicprin	100	100
Phencyclidine, (PCP)	Phencyclidine	25	25
Propoxyphene	Norpropoxyphene (Darvon, Darvocet, Novopropoxyn)	300	200

Table 3 - 6 DOT Rule (49 CFR Part 40 Section 40.87) - Cutoff Levels for Drug Tests			
Initial test analyte	Initial test cutoff concentration	Confirmatory test analyte	Confirmatory test cutoff concentration
Marijuana metabolites	50 ng/mL	THCA ¹	15 ng/mL
Cocaine metabolites	150 ng/mL	Benzoyllecgonine	100 ng/mL
Opiate metabolites			
Codeine/Morphine ²	2000 ng/mL	Codeine	2000 ng/mL
		Morphine	2000 ng/mL
6-Acetylmorphine	10 ng/mL	6-Acetylmorphine	10 ng/mL
Phencyclidine	25 ng/mL	Phencyclidine	25 ng/mL
Amphetamines ³			
AMP/MAMP ⁴	500 ng/mL	Amphetamine	250 ng/mL
		Methamphetamine ⁵	250 ng/mL
MDMA ⁶	500 ng/mL	MDMA	250 ng/mL
		MDA ⁷	250 ng/mL
		MDEA ⁸	250 ng/mL

TABLE NOTES:

Note: All DOT-required collections are conducted using split specimen procedures. There are no exceptions to this requirement.

Note: If an alcohol test is also required, the alcohol test should be conducted first, if practicable.

- Delta-9-tetrahydrocannabinol-9-carboxylic acid (THCA).
- Morphine is the target analyte for codeine/morphine testing.
- Either a single initial test kit or multiple initial test kits may be used provided the single test kit detects each target analyte independently at the specified cutoff.
- Methamphetamine is the target analyte for amphetamine/methamphetamine testing.
- To be reported positive for methamphetamine, a specimen must also contain amphetamine at a concentration equal to or greater than 100 ng/mL.
- Methylenedioxymethamphetamine (MDMA).
- Methylenedioxyamphetamine (MDA).
- Methylenedioxyethylamphetamine (MDEA).

[65 FR 79526, Dec. 19, 2000, as amended at 75 FR 49862, August 16, 2010; 77 FR 26473, May 4, 2012]

Drug Testing Laboratory Reporting Requirements:

(a) The laboratory must use the cutoff concentrations displayed in the above table for initial and confirmatory drug tests. All cutoff concentrations are expressed in nanograms per milliliter (ng/mL).

Table 3 - 6 DOT Rule (49 CFR Part 40 Section 40.87) - Cutoff Levels for Drug Tests

- (b) On an initial drug test, The Laboratory must report a result below the cutoff concentration as negative. If the result is at or above the cutoff concentration, the laboratory must conduct a confirmation test.
- (c) On a confirmation drug test, the laboratory must report a result below the cutoff concentration as negative and a result at or above the cutoff concentration as confirmed positive.
- (d) The laboratory must report quantitative values for morphine or codeine at 15,000 ng/mL or above.

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4 Walking and Working Surfaces

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4.1 Protection for Floor Openings

4.1.1 Floor Grating

When floor grating must be removed, Burns & McDonnell “Floor Grating and Handrail Removal Permit” Safety Form D-1 shall first be obtained. This form must be posted at the worksite until the grate is back in place and secure.

4.1.2 Hole Covers

Hole covers shall be secured in place and shall be clearly marked as holes by affixing Burns & McDonnell Safety Form D-6 “Hole Cover” Safety Label.

4.2 Protection of Open-Sided Floors, Platforms, and Runways

4.3 Guardrails

Burns & McDonnell “Perimeter Guardrail Inspection” Safety Form D-2 shall be submitted whenever a guardrail is erected.

Whenever a guardrail must be removed Burns & McDonnell “Floor Grating and Guardrail Removal Permit” Safety Form D-1 shall first be obtained.

Upon completion of their work Subcontractors must either: remove their guardrail system, accept continued responsibility for it, or shall submit Burns & McDonnell “Perimeter Guardrail Inspection” Safety Form D-2 with the next controlling contractor.

4.4 Ladders

4.4.1 Care and Use

Ladders shall be inspected monthly and those with defects shall be withdrawn from service for destruction and tagged or marked as Dangerous, Do Not Use. Inspections shall be documented using Burns & McDonnell “Ladder Inspection” Safety Form D-4.

Wooden or metal ladders shall not be used on Burns & McDonnell projects, except job made wooden ladders shall be permitted provided Burns & McDonnell “Job Made Ladder Checklist” Safety Form D-5 is submitted.

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5.1 Emergency Action Plans

Written emergency action plans shall be documented using Burns & McDonnell Health & Safety Form E-1 “EAP and Fire Prevention Plan”, or equivalent. The plans must be completed, kept in the workplace, and made available to all workers for review.

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6 Powered Platforms

Powered Platforms/Aerial Lifts

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6.1 Powered Platforms/Aerial Lifts/Scissor Lifts

6.1.1 General Requirements

Aerial lifts may not be field modified for uses other than those intended by the manufacturer, unless the modification has been certified in writing by the manufacturer to be at least as safe as the equipment was before modification.

Equipment can only be operated by trained workers and within equipment rating and design limitations.

6.1.2 Specific Requirements

Lifts shall be tested each day prior to use. Burns & McDonnell Aerial Lift Inspection Safety Form F-1, or equivalent, shall document these inspections.

The lift controls of bucket, derrick, and pole setting trucks, etc. must be tested before use each day to be sure they are in safe working condition.

Critical safety components that affect raising, lowering, or rotating of lifts must be visually inspected before use on each shift for indications of any possible defects.

When other workers are present, vehicles must not be backed up unless (1) the driver has a clear rear view and the vehicle has a back-up alarm or (2) another Worker serves as a guide.

If a vehicle has outriggers, they must be used unless the work area or terrain prevents their use.

Vehicles may only be used within their maximum load limits and without outriggers if the manufacturer's design and instructions indicate that it is safe to operate without the outriggers.

Before outriggers are set, the operator must have a clear view of the outriggers or otherwise ascertain that all workers are clear of outrigger motion.

When a load is suspended from a boom, operators must remain at the controls unless it can be shown that there is no hazard to personnel, such as those created by a falling load, wind, or unstable soil.

6.1.3 Ground Control and Spotter

A ground-man (spotter) trained in the operation of the aerial lift shall remain with the aerial lift when in use at all times.

A given spotter may serve as ground-man for more than one aerial lift only when they are able to view the lifts in the same line of sight and remain capable of; spotting for the lifts, and advise any parties in the vicinity of the overhead hazard.

A ground-man shall wear a high visibility vest while performing their duties.

6.1.4 Fall Restraint

Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

An approved fall restraint system shall be worn when working from an aerial lift and attached to the manufacturer's designated restraint point.

An approved fall restraint system shall be attached to the boom or basket when working from an aerial lift and is not permitted to be attached to adjacent poles or structures.

Electrical Clearances

When operating near energized lines or equipment, aerial lift equipment must maintain the minimum approach distance unless the insulated portion of the aerial lift is operated by a 269-qualified employee. If necessary, another worker must be a spotter for the operator to ensure the minimum approach distance is maintained.

Alternative Minimum Approach Distances for Voltages of 72.5 kV and Less ¹				
Nominal voltage (kV) phase-to-phase	Distance			
	Phase-to-ground exposure		Phase-to-phase exposure	
	m	ft	m	ft
0.050 to 0.300 ²	Avoid Contact		Avoid Contact	
0.301 to 0.750 ²	0.33	1.09	0.33	1.09
0.751 to 5.0	0.63	2.07	0.63	2.07
5.1 to 15.0	0.65	2.14	0.68	2.24
15.1 to 36.0	0.77	2.53	0.89	2.92
36.1 to 46.0	0.84	2.76	0.98	3.22
46.1 to 72.5	1.00	3.29	1.20	3.94
¹ Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work. ² For single-phase systems, use voltage-to-ground.				

Alternative Minimum Approach Distances for Voltages of More Than 72.5 kV ^{1 2 3}				
Voltage range phase to phase (kV)	Phase-to-ground exposure		Phase-to-phase exposure	
	m	ft	m	ft
72.6 to 121.0	1.13	3.71	1.42	4.66
121.1 to 145.0	1.30	4.27	1.64	5.38
145.1 to 169.0	1.46	4.79	1.94	6.36
169.1 to 242.0	2.01	6.59	3.08	10.10
242.1 to 362.0	3.41	11.19	5.52	18.11
362.1 to 420.0	4.25	13.94	6.81	22.34
420.1 to 550.0	5.07	16.63	8.24	27.03
550.1 to 800.0	6.88	22.57	11.38	37.34
¹ Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work. ² Employers may use the phase-to-phase minimum approach distances in this table provided that no insulated tool spans the gap and no large conductive object is in the gap. ³ The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges				

If the aerial lift could contact energized lines, then at least one of the following must be done:

The energized lines exposed to contact must be covered with insulating protective material that will withstand the type of contact that might be made during the operation; or

The aerial lift must be insulated, and uninsulated portions of the lifts must maintain the minimum approach distance from live parts.

The aerial lift must also be positioned so that uninsulated portions of the lift cannot come within the minimum approach distance from the live parts.

Note: *insulated booms require electrical testing at voltages and intervals specified in ANSI A92.2. An untested boom or one that fails a test is considered non-insulating*

or

Workers must be protected by implementing all of the following:

Each piece of equipment (trucks, trailers, etc.) must be grounded.

All pieces of equipment must be bonded together.

Ground mats must be used around equipment to extend the equipotential zone.

Insulating protective equipment or barricades must be used around the equipotential zone.

6.1.5 Training Workers

Employers must provide workers training on hazards, including how to work safely with or near scissor lifts. (29 CFR 1926.454). Training must, at a minimum, include:

Manufacturer's instructions for operating the scissor lift vertically and while in transit.

How to handle materials on the scissor lift, including weight limits.

Other worksite hazards workers may encounter when working on a scissor lift (e.g., contact with electrical wires).

Reporting any equipment defects or maintenance needs

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7.1 Confined Space Entry in Construction

7.1.1 Scope

This procedure sets forth requirements for practices to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

Examples of locations where confined spaces may occur include, but are not limited to, the following:

Table 7 - 1 Examples of Confined Spaces in Construction Activities					
heating, ventilation, and air-conditioning (HVAC) ducts	pits (such as elevator, escalator, pump, valve or other equipment)	manholes (such as sewer, storm drain, electrical, communication, or other utility);	tanks (such as fuel, chemical, water, or other liquid, solid or gas);	concrete pier columns	precast concrete and other pre-formed manhole units
bins	boilers	sewers	storm drains	water mains	silos
enclosed beams	scrubbers	transformer vaults	step up transformers	lift stations	cesspools
reactors	vessels	air receivers	sludge gates	air preheaters	bag houses
digesters	incinerators	turbines	chillers	mixers	drilled shafts

Exceptions. This procedure does not apply to:

Construction work regulated by Chapter 10 of this plan (Excavations).

Where this procedure applies and there is a more stringent provision that addresses a confined space hazard in another applicable OSHA plan or client program, the subcontractor must comply with both that requirement and the applicable provisions of this procedure.

All confined spaces shall be considered permit required unless they have been declassified using Burns & McDonnell "Work Permit" Safety Form C-07.

Permit-required confined space entry shall not be allowed prior to the completion of Burns & McDonnell "Work Permit" and a pre-entry review has been conducted with the entire authorized crew; Safety Form C-07.

7.1.2 Definitions

Acceptable entry conditions means the conditions that must exist in a permit space, before an employee may enter that space, to ensure that employees can safely enter into, and safely work within, the space.

Attendant means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in this section.

Authorized entrant means an employee who is authorized by the entry supervisor to enter a permit space, who has been trained in accordance with and who must perform the duties specified in this section.

Barrier means a physical obstruction that blocks or limits access.

Blanking or blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

Confined space means a space that:

Is large enough and so configured that an employee can bodily enter it;

Has limited or restricted means for entry and exit; and

Is not designed for continuous employee occupancy.

Control means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

Controlling Contractor is the contractor that has overall responsibility for construction at the worksite. Under most conditions within this plan Burns & McDonnell shall be considered as the Controlling Contractor unless otherwise indicated.

Note to the definition of “Controlling Contractor”. If the Controlling Contractor owns or manages the property, then it is both a Controlling Contractor and a Host Employer.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Early-warning system means the method used to alert authorized entrants and attendants that an imminent hazard may be developing. Examples of early-warning systems include, but are not limited to:

Alarms activated by remote sensors; and

Lookouts with equipment for immediately communicating with the authorized entrants and attendants.

Emergency means any occurrence (including any failure of power, hazard control or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.

Employee means any project personnel (including Controlling Contractor, Host Employer or Entry Subcontractor personnel regardless of their affiliation or assigned duties.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, crushing, or suffocation.

Entry means the action by which any part of a person passes through the plane of the opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

Entry Subcontractor means any subcontractor who decides that an employee it directs will enter a permit space.

Note to the definition of “Entry Employer”. A subcontractor cannot avoid the duties of the plan merely by refusing to decide whether its employees will enter a permit space, and Burns & McDonnell as well as OSHA will consider the failure to so decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.

Entry permit (permit) means the written or printed document that is provided by the subcontractor who designated the space a permit space to allow and control entry into a permit space and that contains the information specified in this section.

Entry rescue occurs when a rescue service enters a permit space to rescue one or more employees.

Entry supervisor means the qualified person (such as the Entry Subcontractor's foreman, or Competent Person) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this plan.

Note to the definition of "Entry supervisor" An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by Sections 7-10 of this plan for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazard means a physical hazard or hazardous atmosphere. See definitions below.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

Airborne combustible dust at a concentration that meets or exceeds its LFL;

Note to the definition of "Hazardous atmosphere". This concentration may be approximated as a condition in which the combustible dust obscures vision at a distance of 5 feet (1.52 meters) or less.

Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in OSHA 29CFR1926 Subpart D ([Occupational Health and Environmental Control](#)), or in OSHA 29CFR1910 Subpart Z ([Toxic and Hazardous Substances](#)), and which could result in employee exposure in excess of its dose or permissible exposure limit;

Note to the definition of "Hazardous atmosphere". An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effect not covered by this definition.

Any other atmospheric condition that is immediately dangerous to life or health.

Note to the definition of "Hazardous atmosphere". For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Safety Data Sheets that comply with the Hazard Communication Plan, [§1926.59](#), published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Host Employer means the entity that owns or manages the property where the construction work is taking place.

Note to the definition of "Host Employer". If the owner of the property on which the construction activity occurs has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in Section 3(h)(1), OSHA will treat the contracted management entity as the Host Employer for as long as that entity manages the property. Otherwise, OSHA will treat the owner of the property as the Host Employer. In no case will there be more than one Host Employer.

Hot work means operations capable of providing a source of ignition (for example, riveting, welding, cutting, burning, and heating).

Immediately dangerous to life or health (IDLH) means any condition that would interfere with an individual's ability to escape unaided from a permit space and that poses a threat to life or that would cause irreversible adverse health effects.

Note to the definition of “Immediately dangerous to life or health”. Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim “feels normal” after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “immediately” dangerous to life or health.

Inerting means displacing the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note to the definition of “Inerting”. This procedure produces an IDLH oxygen-deficient atmosphere.

Isolate or isolation means the process by which employees in a confined space are completely protected against the release of energy and material into the space, and contact with a physical hazard, by such means as:

Blanking or blinding;

Misaligning or removing sections of lines, pipes, or ducts;

A double block and bleed system;

Lockout or tagout of all sources of energy; blocking or disconnecting all mechanical linkages; or

Placement of barriers to eliminate the potential for employee contact with a physical hazard.

Limited or restricted means for entry or exit means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Lockout means the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lower flammable limit or lower explosive limit means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

Monitor or monitoring means the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that is performed in a periodic or continuous manner after the completion of the initial testing or evaluation of that space.

Non-entry rescue occurs when a rescue service, usually the attendant, retrieves employees in a permit space without entering the permit space.

Non-permit confined space means a confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space, as defined below.

Oxygen deficient atmosphere means an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space (permit space) means a confined space that has one or more of the following characteristics:

Contains or has a potential to contain a hazardous atmosphere;

Contains a material that has the potential for engulfing an entrant;

Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

Contains any other recognized serious safety or health hazard.

Permit-required confined space program (permit space program) means the contractor's or subcontractor's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Physical hazard means an existing or potential hazard that can cause death or serious physical damage. Examples include, but are not limited to:

Explosives (as defined by paragraph (n) of [§1926.914](#), definition of "explosive");

Mechanical, electrical, hydraulic and pneumatic energy;

Radiation;

Temperature extremes;

Engulfment;

Noise;

Inwardly converging surfaces

Physical hazard also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation).

Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized. A hazardous atmosphere is a prohibited condition unless the subcontractor can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee.

Qualified person means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

Representative permit space means a mock-up of a confined space that has entrance openings that are similar to, and is of similar size, configuration, and accessibility to, the permit space that authorized entrants enter.

Rescue means retrieving, and providing medical assistance to, one or more employees who are in a permit space.

Rescue service means the personnel designated to rescue employees from permit spaces.

Retrieval system means the equipment (including a retrieval line, chest or full body harness, wristlets or anklets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Serious physical damage means an impairment or illness in which a body part is made functionally useless or is substantially reduced in efficiency. Such impairment or illness may be permanent or temporary and includes, but is not limited to, loss of consciousness, disorientation, or other immediate and substantial reduction in mental efficiency. Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.

Tagout means:

Placement of a tagout device on a circuit or equipment that has been de-energized, in accordance with an established procedure, to indicate that the circuit or equipment being controlled may not be operated until the tagout device is removed; and

The subcontractor ensures that:

Tagout provides equivalent protection to lockout; or

That lockout is infeasible and the subcontractor has relieved, disconnected, restrained and otherwise rendered safe all stored (residual) energy.

Test or testing means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Note: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

Ventilate or ventilation means controlling a hazardous atmosphere using continuous forced-air mechanical systems that meet the requirements of [1926.57 \(Ventilation\)](#).

The permit required space atmosphere shall be tested to determine whether dangerous air contamination or oxygen deficiency exists.

The minimum parameters to be monitored are oxygen deficiency, Lower Flammable Level (LFL), and hydrogen sulfide concentration.

A written record of the pre-entry test results is made and kept at the worksite for the duration of the job.

Affected workers are able to review the testing results.

The most hazardous conditions will determine when work is being performed in two adjoining, connected spaces

A direct reading gas monitor shall be used.

Portable gas monitors shall be bump tested prior to use.

Testing shall be documented using Burns & McDonnell “Portable Gas Monitor Bump Test Log” Safety Form G-08.

7.1.3 General Requirements

Before beginning work at a worksite, each subcontractor must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of that space, including testing as necessary.

If the workplace contains one or more permit spaces, the Controlling Contractor, Host Employer or Entry Subcontractor who identifies, or who receives notice of, a permit space must:

Inform exposed employees by posting danger signs or by any other equally effective means, of the existence and location of, and the danger posed by, each permit space; and

A sign reading:

“DANGER—PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER”

or using other similar language would satisfy the requirement for a sign.

Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the Controlling Contractor of the existence and location of, and the danger posed by, each permit space.

Each subcontractor who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space, in addition to complying with all other applicable requirements of this plan.

If any subcontractor decides that employees it directs will enter a permit space, that subcontractor must have a written permit confined space program that complies with this section and is implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized/competent representatives.

A subcontractor may use the alternate procedures specified in this section for entering a permit space only under the conditions set forth in this section provided that all of the following conditions are met:

The subcontractor can demonstrate that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

The subcontractor can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry, and that, in the event the ventilation system stops working, entrants can exit the space safely;

The subcontractor develops monitoring and inspection data that supports the demonstrations required by this section;

If an initial entry of the permit space is necessary to obtain the data required by this section, the entry is performed in compliance with the permit required entry sections.

The determinations and supporting data required by this section are documented by the subcontractor and are made available to each employee who enters the permit space under the terms of this section or to that employee's authorized representative; and

The entry into the permit space under the above conditions and terms of this section is performed in accordance with the requirements of the following paragraph of this section.

Note: See paragraph (g) of this section for reclassification of a permit space after all hazards within the space have been eliminated.

The following requirements apply to entry into permit spaces that meet the conditions set forth in the above paragraph of this section:

Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.

When entrance covers are removed, the opening must be immediately guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

Before an employee enters the space, the internal atmosphere must be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee, who enters the space, or that employee's authorized/competent representative, must be provided an opportunity to observe the pre-entry testing required by this paragraph.

No hazardous atmosphere is permitted within the space whenever any employee is inside the space.

Continuous forced air ventilation must be used, as follows:

An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;

The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be present within the space and must continue until all employees have left the space;

The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space.

The atmosphere within the space must be continuously monitored unless the Entry Subcontractor can demonstrate that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient.

If continuous monitoring is used, the subcontractor must ensure that the monitoring equipment has an alarm that will notify all entrants if a specified atmospheric threshold is achieved, or that an employee will check the monitor with sufficient frequency to ensure that entrants have adequate time to escape.

If continuous monitoring is not used, periodic monitoring is required. All monitoring must ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that employee's authorized/competent representative, must be provided with an opportunity to observe the testing required by this paragraph.

If a hazard is detected during entry:

Each employee must leave the space immediately;

The space must be evaluated to determine how the hazard developed; and

The subcontractor must implement measures to protect employees from the hazard before any subsequent entry takes place.

The subcontractor must ensure a safe method of entering and exiting the space. If a hoisting system is used, it must be designed and manufactured for personnel hoisting; however, a job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.

The subcontractor must verify that the space is safe for entry and that the pre-entry precautions required by his section have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification must be made before entry and must be made available to each employee entering the space or to that employee's authorized/competent representative.

When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, or some indication that the initial evaluation of the space may not have been adequate,

each Entry Subcontractor must have a competent person reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

A space classified by a subcontractor as a permit-required confined space may only be reclassified as a non-permit confined space when a competent person determines that all of the applicable requirements of this section have been met:

If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated or isolated without entry into the space (unless the subcontractor can demonstrate that doing so without entry is infeasible), the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated or isolated;

The Entry Subcontractor must eliminate or isolate the hazards without entering the space, unless it can demonstrate that this is infeasible. If it is necessary to enter the permit space to eliminate or isolate hazards, such entry must be performed as a permit required entry. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated or isolated in accordance with the C-07 permit, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated or isolated;

Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination or isolation of the hazards. This paragraph covers permit confined space entry where the subcontractor can demonstrate that forced air ventilation alone will control all hazards in the confined space.

The Entry Subcontractor must document the basis for determining that all hazards in a permit space have been eliminated or isolated, through a certification on the C-07 permit form that contains the date, the location of the space, and the signature of the competent person making the determination. The certification must be made available to each employee entering the space or to that employee's authorized/competent representative; and

If hazards arise within a permit space that has been reclassified as a non-permit space each employee in the space must exit the space. The Entry Subcontractor must then reevaluate the space and reclassify it as a permit space as appropriate in accordance with all other applicable provisions of this plan and associated documentation.

Permit space entry communication and coordination.

Information sharing, pre-entry and post-entry debrief shall be documented using the Burns & McDonnell Safety Form C-6A "Confined Space Host – Contractor Information Transfer". The confined space hazard evaluation / assessment may be performed using the Burns & McDonnell Safety Form C-6B "Confined Space Hazard Assessment"

Before entry operations begin, the Host Employer must provide the following information, if it has it, to the Controlling Contractor:

The location of each known permit space;

The hazards or potential hazards in each space or the reason it is a permit space; and

Any precautions that the Host Employer or any previous Controlling Contractor or Entry Subcontractor implemented for the protection of employees in the permit space.

Before entry operations begin, the Controlling Contractor must:

Obtain the Host Employer's information about the permit space hazards and previous entry operations; and

Provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space:

The information received from the Host Employer;

Any additional information the Controlling Contractor has about the subjects listed in this section; and

The precautions that the Host Employer, Controlling Contractor, or other Entry Subcontractor has implemented for the protection of employees in the permit spaces.

Before entry operations begin, each Entry Subcontractor must:

Obtain all of the Controlling Contractor's information regarding permit space hazards and entry operations; and

Inform the Controlling Contractor of the permit space program that the Entry Subcontractor will follow, including any hazards likely to be confronted or created in each permit space.

The Controlling Contractor and Entry Subcontractor(s) must coordinate entry operations when:

More than one entity performs permit space entry at the same time; or

Permit space entry is performed at the same time that any activities that could foreseeably result in a hazard in the permit space are performed.

After entry operations:

The Controlling Contractor must debrief each entity that entered a permit space regarding the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations;

The Entry Subcontractor must inform the Controlling Contractor in a timely manner of the permit space program followed and of any hazards confronted or created in the permit space(s) during entry operations; and

The Controlling Contractor must apprise the Host Employer of the information exchanged with the entry entities pursuant to this subparagraph.

Note: Unless a Host Employer or Controlling Contractor has or will have employees in a confined space, it is not required to enter any confined space to collect the information specified in this section.

If there is no Controlling Contractor present at the worksite, the requirements for, and role of, Controlling Contractors in this section must be fulfilled by the Host Employer or other subcontractor who arranges to have employees of another subcontractor perform work

7.1.4 Permit-Required Confined Space Program

Each Entry Subcontractor must:

Implement the measures necessary to prevent unauthorized entry;

Identify and evaluate the hazards of permit spaces before employees enter them;

Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

Specifying acceptable entry conditions;

Providing each authorized entrant or that employee's authorized/competent representative with the opportunity to observe any monitoring or testing of permit spaces;

Isolating the permit space and physical hazard(s) within the space;

Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

Note: When a subcontractor is unable to reduce the atmosphere below 10 percent LFL, the subcontractor may only enter if the subcontractor inertes the space so as to render the entire atmosphere in the space non-combustible, and the employees use PPE to address any other atmospheric hazards (such as oxygen deficiency), and the subcontractor eliminates or isolates all physical hazards in the space.

Determining that, in the event the ventilation system stops working, the monitoring procedures will detect an increase in atmospheric hazard levels in sufficient time for the entrants to safely exit the permit space;

Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards;

Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry, and ensuring that employees are not allowed to enter into, or remain in, a permit space with a hazardous atmosphere unless the subcontractor can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee; and

Eliminating any conditions (for example, high pressure) that could make it unsafe to remove an entrance cover.

Provide the following equipment specified in this section at no cost to each employee, maintain that equipment properly, and ensure that each employee uses that equipment properly:

Testing and monitoring equipment needed to comply with the paragraphs of this section;

Ventilating equipment needed to obtain acceptable entry conditions;

Communications equipment necessary for compliance with this section, including any necessary electronic communication equipment for attendants assessing entrants' status in multiple spaces;

Personal protective equipment insofar as feasible engineering and work-practice controls do not adequately protect employees;

Note: The requirements of this section and other PPE requirements continue to apply to the use of PPE in a permit space. For example, if employees use respirators, then the respirator requirements in [§1926.103 \(Respiratory protection\)](#) must be met

Lighting equipment that meets the minimum illumination requirements in §1926.56, that is approved for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber that will be present, and that is sufficient to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

Barriers and shields as required by this section;

Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

Rescue and emergency equipment needed to comply with this section, except to the extent that the equipment is provided by rescue services; and

Any other equipment necessary for safe entry into, safe exit from, and rescue from, permit spaces.

Evaluate permit space conditions in accordance with the following paragraphs of this section when entry operations are conducted:

Test conditions in the permit space to determine if acceptable entry conditions exist before changes to the space's natural ventilation are made, and before entry is authorized to begin, except that, if a subcontractor demonstrates that isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), the subcontractor must:

Perform pre-entry testing to the extent feasible before entry is authorized; and,

If entry is authorized, continuously monitor entry conditions in the areas where authorized entrants are working, except that employers may use periodic monitoring in accordance with paragraph (e)(2) of this section for monitoring an atmospheric hazard if they can demonstrate that equipment for continuously monitoring that hazard is not commercially available;

Provide an early-warning system that continuously monitors for non-isolated engulfment hazards. The system must alert authorized entrants and attendants in sufficient time for the authorized entrants to safely exit the space.

Continuously monitor atmospheric hazards unless the subcontractor can demonstrate that the equipment for continuously monitoring a hazard is not commercially available or that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard is being controlled at safe levels.

If continuous monitoring is not used, periodic monitoring is required with sufficient frequency to ensure that acceptable entry conditions are being maintained during the course of entry operations;

When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors;

Provide each authorized entrant or that employee's authorized/competent representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;

Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized/competent representative who requests that the subcontractor conduct such reevaluation because there is some indication that the evaluation of that space may not have been adequate; and

Immediately provide each authorized entrant or that employee's authorized/competent representative with the results of any testing conducted in accordance with this section.

Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations:

Attendants may be assigned to more than one permit space provided their duties can be effectively performed for each permit space.

Attendants may be stationed at any location outside the permit space as long as their duties can be effectively performed for each permit space to which the attendant is assigned.

If multiple spaces are to be assigned to a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of those permit spaces without distraction from the attendant's responsibilities.

Designate each person who is to have an active role (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by this section

Develop and implement procedures for summoning rescue and emergency services (including procedures for summoning emergency assistance in the event of a failed non-entry rescue), for rescuing entrants from permit

spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this plan, including the safe termination of entry operations under both planned and emergency conditions;

Develop and implement procedures to coordinate entry operations, in consultation with the controlling contractor, when employees of more than one subcontractor are working simultaneously in a permit space or elsewhere on the worksite where their activities could, either alone or in conjunction with the activities within a permit space, foreseeably result in a hazard within the confined space, so that employees of one subcontractor do not endanger the employees of any other employer;

Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

Review entry operations when the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

Note: Examples of circumstances requiring the review of the permit space program include, but are not limited to: Any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

Review the permit space program, using the cancelled permits retained under Section (5)(f), within 1 year after each entry and revise the program as necessary to ensure that employees participating in entry operations are protected from permit space hazards.

Note: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

Table 7 - 2 Entry Procedures for Confined Space Conditions	
If you have any of the following conditions	Then follow these procedures
Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels	<p>All workers are trained</p> <p>A self-contained breathing apparatus is worn by any person entering the permit required space.</p> <p>At least one worker stands by the outside of the permit required space ready to give assistance in case of emergency.</p> <p>The rescue workers have a self-contained breathing apparatus available for immediate use.</p> <p>There is at least one additional worker within sight or call of the standby worker.</p> <p>Continuous powered communications is maintained between the worker within the permit required space and standby personnel.</p>
The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop	
It is not feasible to provide for immediate exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems	
An emergency exists and it is not feasible to wait for pre-entry procedures to take effect	

7.1.5 Permitting Process

Before entry is authorized, each Entry Subcontractor must document the completion of measures required by this section by preparing an entry permit. All permit-required confined spaces require the completion of the Burns & McDonnell "Work Permit" Safety Form C-07 which shall serve as the determination of permitting requirements.

Before entry begins, the entry supervisor identified on the permit must sign the entry permit to authorize entry.

The completed permit must be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means; so that the entrants can confirm that pre-entry preparations have been completed.

The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit.

The entry supervisor must terminate entry and take the following action when any of the following apply:

- Cancel the entry permit when the entry operations covered by the entry permit have been completed; or

- Suspend or cancel the entry permit and fully reassess the space before allowing reentry when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is temporary in nature and does not change the configuration of the space or create any new hazards within it; and

- Cancel the entry permit when a condition that is not allowed under the entry permit arises in or near the permit space.

The Entry Subcontractor must retain each cancelled entry permit for at least 1 year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation must be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

7.1.6 Entry Permit

The entry permit that documents compliance with this section and authorizes entry to a permit space must identify:

- The permit space to be entered;

- The purpose of the entry;

- The date and the authorized duration of the entry permit;

- The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

Note: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

- Means of detecting an increase in atmospheric hazard levels in the event the ventilation system stops working;

- Each person, by name, currently serving as an attendant;

- The individual, by name, currently serving as entry supervisor, and the signature or initials of each entry supervisor who authorizes entry;

- The hazards of the permit space to be entered;

- The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

Note: Those measures can include, but are not limited to, the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

The acceptable entry conditions;

The results of tests and monitoring performed, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this plan;

Any other information necessary, given the circumstances of the particular confined space, to ensure employee safety; and

Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

7.1.7 Training

The subcontractor must provide training to each employee whose work is regulated by this plan, at no cost to the employee, and ensure that the employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this plan. This training must result in an understanding of the hazards in the permit space and the methods used to isolate, control or in other ways protect employees from these hazards, and for those employees not authorized to perform entry rescues, in the dangers of attempting such rescues.

Training required by this section must be provided to each affected employee:

In both a language and vocabulary that the employee can understand;

Before the employee is first assigned any duties under this plan;

Before there is a change in assigned duties;

Whenever there is a change in permit space entry operations that presents a hazard about which an employee has not previously been trained; and

Whenever there is any evidence of a deviation from the permit space entry procedures or there are inadequacies in the employee's knowledge or use of these procedures.

The training must establish employee proficiency in the duties required by this procedure and must introduce new or revised procedures, as necessary, for compliance with this plan.

Prior to entering Confined Spaces, employees are to be trained in:

Confined Space Program Roles and Responsibilities;

Basic knowledge of atmospheric monitoring criteria;

Permitting methods (Permit/Non-Permit);

Communication methods;

Respirator use, if required;

Fire prevention and the use of selected fire suppression equipment;

The hazards and safe work practices specific to each Confined Space Entry;

Emergency procedures for Non-Entry Rescue and requirements for emergency personnel notification for Entry Rescue; and

Entry Supervisor's, Qualified Entrant's and Attendant's responsibilities.

Each affected employee must be trained prior to initial assignment, prior to a change in assigned duties, if a new hazard has been created or special deviations have occurred.

All Confined Space Training is to be documented on the Training Certification Form (Form C-09). The Corporate Department or Site Safety Manager (If qualified) are available to coordinate and/or provide Confined Space Training.

The trainer shall certify that the required training has been accomplished. The certification shall include employee name, trainer signature/initials, date of training.

Certification must be made available to employees and their authorized representative.

The subcontractor must maintain training records to show that the required training of this section has been accomplished. The training records must contain each employee's name, the name of the trainers, and the dates of training. The documentation must be available for inspection by employees and their authorized representatives, for the period of time the employee is employed by that employer.

7.1.8 Duties of Authorized Entrants

The Entry Subcontractor must ensure that all authorized entrants:

Are familiar with and understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

Properly use equipment;

Communicate with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space;

Alert the attendant whenever:

There is any warning sign or symptom of exposure to a dangerous situation; or

The entrant detects a prohibited condition; and

Exit from the permit space as quickly as possible whenever:

An order to evacuate is given by the attendant or the entry supervisor;

There is any warning sign or symptom of exposure to a dangerous situation;

The entrant detects a prohibited condition; or

An evacuation alarm is activated.

7.1.9 Duties of Attendants

The Entry Subcontractor must ensure that each attendant:

is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

is aware of possible behavioral effects of hazard exposure in authorized entrants;

Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space;

Remains outside the permit space during entry operations until relieved by another attendant;

Note: Once an attendant has been relieved by another attendant, the relieved attendant may enter a permit space to attempt a rescue when the employer's permit space program allows attendant entry for rescue and the attendant has been trained and equipped for rescue operations.

Communicates with authorized entrants as necessary to assess entrant status and to alert entrants of the need to evacuate the space;

Assesses activities and conditions inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:

If there is a prohibited condition;

If the behavioral effects of hazard exposure are apparent in an authorized entrant;

If there is a situation outside the space that could endanger the authorized entrants; or

If the attendant cannot effectively and safely perform all the duties required under this section;

Summons rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

Warns the unauthorized persons that they must stay away from the permit space;

Advises the unauthorized persons that they must exit immediately if they have entered the permit space; and

Informs the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

Performs non-entry rescues as specified by the employer's rescue procedure; and

Performs no duties that might interfere with the attendant's primary duty to assess and protect the authorized entrants.

7.1.10 Duties of Entry Supervisors

The Entry Subcontractor must ensure that each entry supervisor:

is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

Terminates the entry and cancels or suspends the permit;

Verifies that rescue services are available and that the means for summoning them are operable, and that the subcontractor will be notified as soon as the services become unavailable;

Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

Determines, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

7.1.11 Rescue and Emergency Services

A subcontractor who designates rescue and emergency services must:

Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note: *What will be considered timely will vary according to the specific hazards involved in each entry. For example, [§1926.103 \(Respiratory protection\)](#) requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.*

Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;

Select a rescue team or service from those evaluated that:

Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;

Is equipped for, and proficient in, performing the needed rescue services;

Agrees to notify the subcontractor immediately in the event that the rescue service becomes unavailable;

Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and

Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue team or service can develop appropriate rescue plans and practice rescue operations.

Provide a written copy of operating and rescue procedures as required by these procedures at the worksite for the duration of the job.

A subcontractor whose employees have been designated to provide permit space rescue and/or emergency services must take the following measures and provide all equipment and training at no cost to those employees:

Provide each affected employee with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train each affected employee so the employee is proficient in the use of that PPE;

Train each affected employee to perform assigned rescue duties. The subcontractor must ensure that such employees successfully complete the training required and establish proficiency as authorized entrants;

Train each affected employee in basic first aid and cardiopulmonary resuscitation (CPR). The subcontractor must ensure that at least one member of the rescue team or service holding a current certification in basic first aid and CPR is available; and

Ensure that affected employees practice making permit space rescues before attempting an actual rescue, and at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces, except practice rescue is not required where the affected employees properly performed a rescue operation during the last 12 months in the same permit space the authorized entrant will enter, or in a similar permit space.

Representative permit spaces must, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

Non-entry rescue is required unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The subcontractor must designate an entry rescue service whenever non-entry rescue is not selected. Whenever non-entry rescue is selected, the Entry Subcontractor must ensure that retrieval systems or methods are used whenever an authorized entrant enters a permit space, and must confirm, prior to entry, that emergency assistance would be available in the event that non-entry rescue fails. Retrieval systems must meet the following requirements:

Each authorized entrant must use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the subcontractor can establish presents a profile small enough for the successful removal of the entrant. Wristlets or anklets may be used in lieu of the chest or full body harness if the subcontractor can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets or anklets is the safest and most effective alternative.

The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device must be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

Equipment that is unsuitable for retrieval must not be used, including, but not limited to, retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other authorized entrants, or retrieval lines that will not work due to the internal configuration of the permit space.

If an injured entrant is exposed to a substance for which a Safety Data Sheet (SDS) or other similar written information is required to be kept at the worksite, that SDS or written information must be made available to the medical facility treating the exposed entrant.

7.1.12 Employee participation

Employers must consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program.

Employers must make available to each affected employee and his/her authorized/competent representatives all information required to be developed by this plan.

7.2 Confined Space - Sewer System Entry

Sewer entry differs in three vital respects from other confined space permit entries; first, there rarely exists any way to completely isolate the space to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

Adherence to procedure.

Only workers trained in sewer entry are allowed in sewer systems.

Atmospheric monitoring.

Entrants will be trained in the use of, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout. Atmospheric monitors will be available for entrants

Surge flow and flooding.

Sewer crews shall communicate with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

Special Equipment.

Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBAs) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

7.2.1 Scope and Application

The sections that follow apply only to permit-required confined space entry. The information on alternate entry has been identified with a title.

Potential Hazards

Workers could be exposed to the following:

Engulfment and drowning

Presence of toxic gases that are equal to or more than 10 ppm hydrogen sulfide; measured as an eight-hour time-weighted average; or if the presence of other toxic contaminants is suspected, specific monitoring shall be implemented.

Presence of explosive/flammable gases that are equal to or greater than ten percent of the lower flammable limit (LFL)

Oxygen deficiency/enrichment where the oxygen concentration in the atmosphere which is equal to or less than 19.5% by volume is considered a deficiency, while an oxygen concentration which is greater than 23.5% by volume is enrichment.

Entry Permits

All sewers are considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise by completion of Burns & McDonnell "Work Permit" Safety Form C-7.

Any worker required or permitted to pre-check or enter a sewer shall have successfully completed, at a minimum, the training outlined in our training procedures.

A written copy of operating and rescue procedures as required by these procedures is at the worksite for the duration of the job.

The sewer entry permit is completed before approval can be given to enter a sewer.

The permit verifies completion of items required to protect workers.

The permit is kept at the job site for the duration of the job.

If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new sewer entry permit needs to be completed.

7.2.2 Control of Atmospheric and Engulfment Hazards

Surveillance

The surrounding area is surveyed to avoid hazards such as drifting vapors from tanks, piping, or sewers.

Testing

The sewer atmosphere shall be tested to determine whether dangerous air contamination or oxygen deficiency exists.

A direct reading gas monitor is used. Portable gas monitors shall be bump tested prior to use. Record of testing shall be documented using Burns & McDonnell Portable gas Monitor Bump Test Log Safety Form G-8.

Testing is performed by a supervisor who has successfully completed the gas detector training for the monitoring method used.

The minimum parameters to be monitored are oxygen deficiency, Lower Flammable Level (LFL), and hydrogen sulfide concentration.

A written record of the pre-entry test results is made and kept at the worksite for the duration of the job.

Affected workers are able to review the testing results.

The most hazardous conditions will determine when work is being performed in two adjoining, connected spaces.

Space ventilation

Mechanical ventilation systems, where required, are set at one hundred percent of the outside air.

Where possible, open additional manholes to increase air circulation.

Use portable blowers to increase natural circulation if needed.

After a suitable ventilation period, repeat the testing.

Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated or controlled.

7.2.3 Entry Procedures

Table 7 - 3 Entry Procedures for Confined Space Conditions	
If you have any of the following conditions	Then follow these procedures
<ol style="list-style-type: none"> 1. Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels 8. The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop 9. It is not feasible to provide for immediate exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems 10. An emergency exists and it is not feasible to wait for pre-entry procedures to take effect 	<p>All workers are trained A self-contained breathing apparatus is worn by any person entering the sewer. At least one worker stands by the outside of the sewer ready to give assistance in case of emergency. The rescue workers have a self-contained breathing apparatus available for immediate use. There is at least one additional worker within sight or call of the standby worker. Continuous powered communications is maintained between the worker within the sewer and standby personnel.</p>

7.2.4 Alternate Entry

Certification

Sewers may be entered without the need for a written permit or attendant if the space can be maintained in a safe condition for entry by mechanical ventilation alone.

All sewers are considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise.

Any worker required or permitted to pre-check or enter a sewer will have successfully completed, at a minimum, the training outlined in our training procedures.

A written copy of operating and rescue procedures shall be at the worksite for the duration of the job.

The sewer pre-entry checklist Burns & McDonnell Confined Space Entry Permit Safety Form G-7 shall be completed before entry into a sewer.

If circumstances dictate an interruption in the work, the sewer shall be reevaluated and a new checklist shall be completed.

Pumps and Lines:

All pumps and lines which may reasonably cause contaminants to flow into the sewer are disconnected, blinded, and locked out, or effectively isolated by other means to prevent development of dangerous air contamination or engulfment.

Not all lateral lines to sewers or storm drains require blocking. However, where experience or knowledge of use indicates a reasonable potential for contamination of air or engulfment into an occupied sewer, then all affected lateral lines are to be blocked.

If blocking or isolation requires entry into the sewer, the provisions for entry into a permit-required confined space are implemented.

Surveillance:

The surrounding area is surveyed to avoid hazards such as drifting vapors from tanks, piping, or sewers.

Testing:

The atmosphere within the sewer will be tested to determine whether dangerous air contamination or oxygen deficiency exists.

Detector tubes, alarm only gas monitors, and explosion meters are examples of monitoring equipment that may be used to test sewer atmospheres.

Testing is performed by the entry supervisor who has successfully completed the gas detector training for the monitoring method to be used.

The minimum parameters to be monitored are oxygen deficiency, LFL, and hydrogen sulfide concentration.

A written record of the pre-entry test results are made and kept at the worksite for the duration of the job.

The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated or controlled.

Affected workers shall be able to review the testing results.

The most hazardous conditions will determine when work is being performed in two adjoining, connecting spaces.

Entry Procedures

When entering without permit or an attendant, entry into and work within may proceed if:

- There are no non-atmospheric hazards present

- The pre-entry tests show there is no dangerous air contamination or oxygen deficiency within the space; and there is no reason to believe that any is likely to develop

- Continuous testing of the atmosphere in the immediate vicinity of the workers within the space is accomplished

- Workers will immediately leave the sewer when any of the gas monitor alarm set points are reached as defined

- Workers will not return to the area until a supervisor who has completed the gas detector training has used a direct reading gas detector to evaluate the situation and has determined that it is safe to enter.

- If you are entering a space without a permit or an attendant

- Arrangements for rescue services are not required for entries that do not require a permit.

- See the rescue section for instructions regarding rescue planning where an entry permit is required.

7.2.5 Rescue

Call the local rescue service

Rescue entries into sewers are made only by trained and properly equipped personnel.

If immediate hazards to injured personnel are present, workers at the site implement emergency procedures without entering the sewer.

Continuous gas monitoring performed during all sewer entry operations. If alarm conditions occur, entry personnel exit the sewer and permit is no longer valid.

When dangerous air contamination is attributable to flammable or explosive substances, lighting and electrical equipment needs to be Class 1, Division 1 rated per National Electrical Code (NEC) and no ignition sources may be introduced into the area.

When it is practical, the full-body harness is used to suspend a person upright and a hoisting device or similar apparatus is available for lifting workers out of the sewer.

If at any time the use of a hoisting device or full-body harness and attached lifeline may endanger the worker, their use may be discontinued.

NOTE: Review and follow the requirements for any of the situations in Table G-2, *Procedures for Removing Workers from Sewers*.

Table 7 - 4 Procedures for Safely Removing Workers from Sewers	
If	Then
There is any questionable action or non-movement by the worker inside	<ul style="list-style-type: none"> – Perform a verbal check. – Immediately remove the worker from the sewer if there is no response or a questionable response from them
The worker is disabled due to falling or impact	<ul style="list-style-type: none"> – Do not remove the worker from the sewer unless there is immediate danger to the worker's life. – Notify local rescue personnel immediately. – Make sure the standby worker doesn't enter the sewer in this case. – Only trained rescue personnel (wearing self-contained breathing apparatus-SCBA) may enter to perform a rescue. – Make sure all workers entering the space use a full-body harness with attached lifeline with the free end of the line secured outside the entry opening. – Make sure the standby worker uses the lifeline to attempt to rescue a disabled worker without entering the space and summons rescue services based on their assessment of the situation.

7.3 Hazardous Energy Control Program (Lockout/Tagout)

7.3.1 Purpose

The purpose of this procedure is to establish the means & methods in which the lockout / tagout and permit to work functions will be administered, and shall also establish the minimum requirements for the lockout of energy isolating devices whenever work is done on systems, machines or equipment.

The intent of implementing these procedures is to avoid the unanticipated release of Hazardous Energy that could threaten the health and safety of project employees or damage equipment. Hazardous Energy in this context includes, but is not limited to: electrical, thermal, hydraulic, pneumatic, chemical, stored, residual and potential energy such as from capacitors, batteries, elevated weights, and compressed springs.

These procedures shall be used to ensure that the machine, circuit or equipment is isolated from all potentially hazardous energy sources and Locked out before employees perform any work where the unexpected energization or start-up of the machine, circuit or equipment, or the release of stored energy could cause an injury or property damage.

7.3.2 Scope

Before work may be performed on systems, equipment and/or circuits which could cause injury by contact with electrically energized parts, by accidental startup of machinery, by release of fluid pressure (air, steam, hydraulic, temperature extremes etc.) or by contact with acids, corrosives, flammables or other hazardous materials, electrical circuits shall be de-energized, valves shall be closed, pressures shall be bled off, and hazardous materials shall be drained from lines and/or vessels when necessary.

7.3.3 Definitions

Affected Employee - An Affected Employee is an employee whose job requires him/her to operate or use a machine or equipment on which work is being performed under Lockout or Tagout, or whose job requires him/her to work in an area in which such work is being performed. These employees do not service or maintain machinery or perform lockout/tagout activities. Affected employees are trained in the purpose and use of energy-control procedures. They are also able to do the following:

- Recognize when the energy-control procedure is being used,

- Understand the purpose of the procedure, and

- Understand the importance of not tampering with lockout or tagout devices and not starting or using equipment that has been locked or tagged out.

Authorized Employee - An Authorized Employee is an employee who physically performs Lockout or Tagout on systems, machines or equipment in order to perform work on that system, machine or equipment. They have the knowledge and skills necessary for the safe application, use, and removal of energy-isolating devices. They are also trained and demonstrate understanding and competence in the following:

- Hazardous energy source recognition;

- The type and magnitude of the hazardous energy sources in the workplace; and

- Energy-control procedures, including the methods and means to isolate and control those energy sources.

- PTW (Permit to Work) program process

An Affected Employee becomes an Authorized Employee when that employee's duties include performing work on the machine or equipment.

Capable of being locked out - an Energy Isolating Device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if Lockout can be achieved without the need to dismantle, rebuild, or replace the Energy Isolating Device or permanently alter its energy control capability, such as a lockable valve cover or circuit breaker block out.

Client - A Client is the entity which owns or in some cases operates the facility where the project activities are being conducted. OSHA refers to this entity as the Host Employer

De-energized – De-energized means free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

Device – A device is a unit of an electrical system that is intended to carry, but not utilize electric energy.

Disconnecting means – A disconnecting means is a device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Disconnecting (or isolating) switch. (Over 600 volts, nominal.) - A mechanical switching device used for isolating a circuit or equipment from a source of power.

Employee - An Employee may be an individual person, an employee, an employee owner, a project worker, a contractor /subcontractor, or a member of a partnership, corporation, agency, association, or organization.

Energized - connected to a Hazardous Energy Source or containing residual or stored energy.

Energy Isolating Device – An energy isolating device is a mechanical device that physically prevents the transmission or release of hazardous energy, including but not limited to the following:

A manually operated electrical circuit breaker;

A disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently;

A line valve;

A blank flange, slip blind, or any similar device used to physically block or isolate energy.

A block and any similar device used to block or isolate hazardous energy.

CAUTION: *Push buttons, selector switches and other control circuit type devices are not energy isolating devices and are not acceptable for LOTO use.*

Hazardous Energy Source - Any electrical, rotational, mechanical, hydraulic, pneumatic, wind, thermal, chemicals, nuclear, residual stored energy, gravity or pressurized liquids or gasses that could cause injury to an Employee or property damage. .

Group Lock Box - a box utilized to organize lock keys which are used for the isolation of equipment. This box has multiple positions where locks and tags shall be attached, and cannot be completed with the multi-lock device. The Tagging Authority for the LOTO will sign on the LOTO Log for the lock box.

Hot Tap - A HOT TAP is a procedure used in the Work activities which involves welding on a piece of equipment (pipelines, vessels or tanks) while it is under pressure, in order to install connections or appurtenances. A HOT TAP is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Holder - Any Affected or Authorized worker who is signed onto the Isolation Record or the Electrical LOTO Log as a Holder. By signing on as a Holder, personnel ensure the LOTO is maintained until they have signed off. LOTOs cannot be removed without first clearing all Holders off the respective forms. All LOTOs must have at least one Holder.

Isolation Record (IR) - The Isolation Record is a form used to initiate or request energy isolation and to track the placement and removal of that isolation. All isolations requiring more than one lockout / tagout, or a single mechanical isolation, must be documented on an Isolation Record. Single electrical isolations can be controlled from the electrical LOTO log. Isolation Records have a unique number assigned for tracking purposes (Burns & McDonnell "Isolation Record" Safety Form G-13).

Lockout (LOTO) - Lockout is the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device - a Lockout device is a device that utilizes a positive means of securing an energy isolating device in the safe position and prevent the energizing of a system, machine or equipment. Examples include such items as a lock, (either key or combination type), blank flanges and bolted slip blinds.

Lockout/Tagout Log - The Lockout/Tagout Log is a form used to track the Authorized Employees that are directly involved in a hazardous energy isolation work procedure. The LOTO Log controls and tracks the placement and

removal of the lockout devices by individual Authorized Employees. This document also supports the LOTO manager's control of the Isolation Record.

LOTO Manager - The LOTO Manager is the employee that manages the overall LOTO program during the construction, testing and startup phases of the project. The LOTO Manager or his designee is the employee who approves the issuance of Permits to Work, Do Not Operate isolations, as well as the hanging of System Under Test and System Under Operation tags for the project. The LOTO Manager has been trained, and is competent in the applicable OSHA standards. The LOTO Manager's responsibilities transfer to the Client only after the system acceptance certificate has been submitted to Burns & McDonnell.

Lockout / Tagout Sequence and Responsibilities - Sequence steps and employee responsibilities for the Lockout / Tagout program vary with the three main stages of the project: Construction, Startup, and Operations. Details are outlined below under Roles & Responsibility section.

Normal Operations - the utilization of a machine or equipment to perform its intended production function.

Other Employee - All employees who are or may be in an area where Hazardous Energy control procedures may be utilized however are not directly involved with the work or the systems, equipment or machines.

Permit to Work (PTW) - A Permit to Work is a documented work authorization process which is required to perform work on equipment, areas, systems, or sub-systems that have been turned over to Startup or Operations. The PTW form is preprinted in triplicate and contains a unique sequential permit number (Burns & McDonnell safety form C-7 "Work Permit").

Readily accessible – Readily accessible means that it is capable of being reached quickly for operation, renewal, or inspections, so that those needing ready access do not have to climb over or remove obstacles or to resort to portable ladders, chairs, etc.

Setting Up - any work performed to prepare a system, machine or equipment to perform its normal production operation.

Start Up - The Startup stage starts on a system by system basis when construction turnover of a system is accepted by Startup as mechanically complete (in accordance with project turnover procedure).

SYSTEM UNDER OPERATION - the stage in the construction project where major equipment and systems under the control of Operations may be operated or energized as necessary to support the construction project's operational requirements.

SYSTEM UNDER TEST - the stage in the construction project where major equipment or systems under the control of Startup may be operated or energized as necessary for the testing of the system or components.

Tag - A Tag is a prominent warning device, which includes a means of attachment, which can be securely fastened to a Lockout Device and an Energy Isolating Device in accordance with an established procedure, to indicate that the Energy Isolating Device and the system, equipment or machine being controlled may not be operated until the Lockout Device is removed. Various different configurations of a TAG that are applicable to these procedures are detailed below:

Do Not Operate (DNO) Tags

The general construction LOTO red danger lockout Tag (DNO) signifies that a device is not to be operated or energized by anyone.

The Tag is placed on systems, equipment/mechanism that, if operated, can result in the injury of an Employee or damage to plant equipment.

The Tag implies that the equipment shall remain in the non-operative position.

In the case where the non-operative position is not readily apparent, it will be stated on the back of the tag.

This Tag will be placed and removed by the Employee doing the work.

The Tag will be logged with date and time, and signed by the Authorized Employee in the Lockout and Tag Log.

The Tag is always to be used with a lock.

Burns & McDonnell “Danger – Do Not Operate” (DNO) Tags (white w/red and black lettering):

The Tag used to identify an isolation point and control the position or status of any device (valve, breaker, etc.) required to ensure a safe lockout. These tags will have a unique number and will be accompanied by an appropriate Locking Device (Burns & McDonnell “Do Not Operate Tag” Safety Form G-14).

Burns & McDonnell “Caution – SYSTEM UNDER TEST” (SUT) Tags (yellow w/black lettering):

This Tag is used to identify major equipment or systems during the Startup phase which may be operated or energized as necessary for the testing of the system or components.

Each Tag must have the appropriate Tagging Authority's name written on it (Burns & McDonnell “Caution - System under Test Tag” Safety Form G-15).

Only the Employee whose name is on the Tag is authorized to operate or direct the operation of that device/system and or remove the Tag.

Client “Caution – SYSTEM UNDER OPERATIONS” (SUO) Tags (orange w/black lettering):

This Tag is used to identify major equipment and systems which are under the control of the Client's Operations team and may be operated or energized as necessary to support the project operational requirements (Burns & McDonnell “Caution System under Operations Tag” Safety Form G-16).

Tagging Authority - This is the Authorized and competent person acting in the role of Tagging Authority for a contractor in their assigned areas of responsibility. Their responsibilities shall include but are not limited to the following:

The Tagging Authority shall certify to the LOTO Manager all covered personnel's training commensurate with their level of responsibility and involvement in the LOTO program as identified below.

Tagging Authority affixes Lockout Devices and tags to the Energy Isolating Devices under the witness of the LOTO Manager or his designee

Tagging Authority, LOTO Manager or his designee verifies the effectiveness of isolation prior to allowing personnel to sign-on to the Electrical LOTO Log and begin work on a system.

Tagging Authority requests the removal of isolation from LOTO Manager

Tagging Authority takes responsibility to ensure equipment and devices are in a safe condition (i.e. status of energy isolating devices is safe for the level of completion or status of the equipment – test, operational or otherwise)

Tagging Authority List - The Tagging Authority List shall be posted in a conspicuous location and shall identify each company's authorized Tagging Authority. Use the Burns & McDonnell “Tagging Authority List” Safety Form G-11.

Tagging Safety Displays - Tagging Safety Displays shall be located throughout the project site. These compliance assurance exhibits are intended to identify and explain the Tags and Locking Devices which have been authorized for use on the project.

Tagout - A Tagout is the placement of a Tag on an Energy Isolating Device, in accordance with an established procedure, to indicate that the Energy Isolating Device and the equipment being controlled may not be operated until the Tagout device is removed.

All project Employees shall be trained to understand that the Tagout shall provide a level of safety equivalent to that obtained by using a Lockout Device.

Work - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing systems, machines or equipment. These activities include lubrication, cleaning or unjamming of system components, machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the system, machine or equipment and the release of hazardous energy.

7.3.4 Roles and Responsibilities

Lockout / Tagout Sequence and Responsibilities - Sequence steps and personnel responsibilities for the lockout / tagout program vary with the three main stages of the project: Construction, Startup, and Operations as shown in the following table.

Table 7 - 5 LOTO: Outline of Roles & Responsibilities in Each Stage			
Stage	Tagging Authority	Authorized Worker	Notes
Construction	Contractor assigned manager level Employee	General: Superintendent Foremen Discipline: Superintendent Foremen	1. Construction is in control of equipment and systems. 2. DNOs are used for LOTO.
Startup	Startup Manager Startup Engineers (by assigned system)	Startup: Engineer Technician	1. Startup has accepted items on a system basis. 2. SUTs indicate items are in startup phase. 3. DNOs are used for LOTO.
Operations (Client)	Operations Manager Operation Supervisors	Operations: Supervisors Operators	1. Operations have accepted control of the system. 2. Client SUO tags indicate items are in operation. 3. Client DNOs are used for LOTO.

Lockout / Tagout Sequence

Construction Stage Activities:

The Construction stage starts at site mobilization and lasts through construction execution. This stage ends on a system by system basis as the systems are turned over to the Startup team.

Startup Stage Activities:

The Startup stage starts on a system by system basis when construction turnover of a system is accepted by Startup as mechanically complete (in accordance with project turnover procedure). This status is indicated in the field by the presence of System under Test (SUT) tags on major equipment, valves, etc. The Startup stage ends on a system by system basis as the system is accepted by The Client's Operations team as being substantially complete.

Operations Stage Activities:

The Operational Stage starts on a system by system basis when Startup turnover of a system is accepted by the Client's Operations team as being substantially complete (in accordance with the project turnover procedures). This status is indicated in the field by the presence of System Under Operations (SUO) Tags on major equipment, valves, and the transition to the Client's permanent plant LOTO program is being implemented

Responsibilities

The BMcD LOTO Manager or designated alternate shall:

- Maintain a record of all Tagging Authority, Authorized, Affected, and other worker's training certifications.

- Maintain a list of Authorized Workers which shall be made available to Tagging Authorities for the purposes of verifying Authorized Workers.

- The Tagging Authority list (Burns & McDonnell "Tagging Authority List" Safety Form G-11) will be updated by the BMcD LOTO Manager on a routine basis as it becomes necessary to make adjustments to Employees and or assigned areas of responsibility.

- Copies of the updated Tagging Authority list will be maintained in the Site Project Management Trailer during the construction stages and the client control room (or designated location) during startup and operations.

- Approve LOTO Permit-To-Work (PTW) requests.

- Approves the isolation and release of isolation requests from the Tagging Authority,

- Approve DNO Isolations, and the hanging of SUT and SUO tags for the project.

- Issue tags and Isolating Devices required for LOTO compliance as applicable to the LOTO work scopes.

- Maintain, update, post and redistribute as necessary all LOTO records and supplies including, but not limited to the following.

 - Site-specific LOTO training compliance records

 - Certification Of Training (C-09)

 - Isolation Record (G-13)

 - LOTO Permit-To-Work (C-07)

 - Electrical LOTO Log (G-10)

 - Lock Removal Authorization (G-03)

 - Tagging Authority List (G-11)

 - Isolation tags and devices (G-14/15/16)

Tagging Authority

The Tagging Authority is the authorized and competent person acting in the role of Tagging Authority for a contractor in their assigned areas of responsibility. Their responsibilities shall include but are not limited to the following:

The Tagging Authority shall certify to the LOTO Manager all covered personnel's training commensurate with their level of responsibility and involvement in the LOTO program as identified below.

Tagging Authority affixes Lockout Devices and tags to the Energy Isolating Devices under the witness of the LOTO Manager or his designee

Tagging Authority, LOTO Manager or his designee verifies the effectiveness of isolation prior to allowing personnel to sign-on to the Electrical LOTO Log and begin work on a system.

Tagging Authority requests the removal of isolation from LOTO Manager

Tagging Authority takes responsibility to ensure equipment and devices are in a safe condition (i.e. status of energy isolating devices is safe for the level of completion or status of the equipment – test, operational or otherwise)

Violations

Only the LOTO Manager, Tagging Authority or designated Authorized Worker (Holder) are authorized to place or remove tags

Failure to comply with any of the Lockout/Tagout rules shall be considered just cause for discharge or removal of the persons involved from the job site. Examples of failure to comply include but are not limited to the following:

- Operating or working on a system or piece of equipment without obtaining a proper LOTO and/ or Permit-To-Work.

- Operating or working on a system or piece of equipment in violation of the tags in place.

- Removing tags from a system or piece of equipment without proper authorization.

7.3.5 Requirements

Controls that are to be deactivated during the course of work on equipment or circuits shall be locked and tagged when deemed necessary and recorded in the Lockout/Tagout Log.

Tags shall be labeled to plainly identify the equipment or circuits being worked on and shall be placed with the Lockout Device on the Lockout. Tag information shall include the name of the equipment, date, time and the employee responsible for its placement.

The Lockout Tagout Manager or their designee will place his/her lock and tag on any system prior to the employee placing theirs.

Each employee shall have his or her own lock and tag.

All employees are required to comply with the restrictions and limitations imposed upon them during the use of Lockout. The Authorized Employees are required to perform the Lockout in accordance with this procedure.

All employees, upon observing a system, machine or piece of equipment which is locked out to perform work shall not attempt to start, energize, or use that system, machine or equipment.

Only one type of Tag (DNO, SUT, or SUO) can be on the same device at the same time.

Training must be conducted (or verified) to ensure that all employees are knowledgeable of their duties with regard to Lockout / Tagout and hazardous energy control (i.e. training must be commensurate with their level of responsibility and involvement – Other, Affected, Authorized, and Tagging Authority).

In the event a Tag or Tags are found either missing or lying on the ground, they are to be reported to the LOTO Manager or his designee immediately. Do NOT assume you know where they are to be placed or replace them yourself. Upon notification, the LOTO Manager shall immediately investigate and determine the status of the LOTO and if the Tag can be reattached or a work stoppage is necessary for employee or equipment safety.

All Locking Devices should be accompanied by a DNO Tag and must be identified or traceable to the user by a name or unique number as determined by the lock user's supervisor. Locking Devices not accompanied by a DNO Tag are at risk of being removed, however the same stipulations shall apply for removal as described in an Emergency Release procedure, listed below.

Failure to comply with the Lockout and Tagging Procedure rules shall be considered just cause for discharge or removal of the employees involved from the project site

7.3.6 Periodic Inspection

Burns & McDonnell shall conduct a periodic inspection of the Hazardous Energy Control procedure at least annually to ensure that the procedure and the requirements of the OSHA standard are being followed.

The periodic inspection shall be performed by an Authorized Employee other than the ones(s) utilizing the Hazardous Energy Control procedure being inspected.

The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

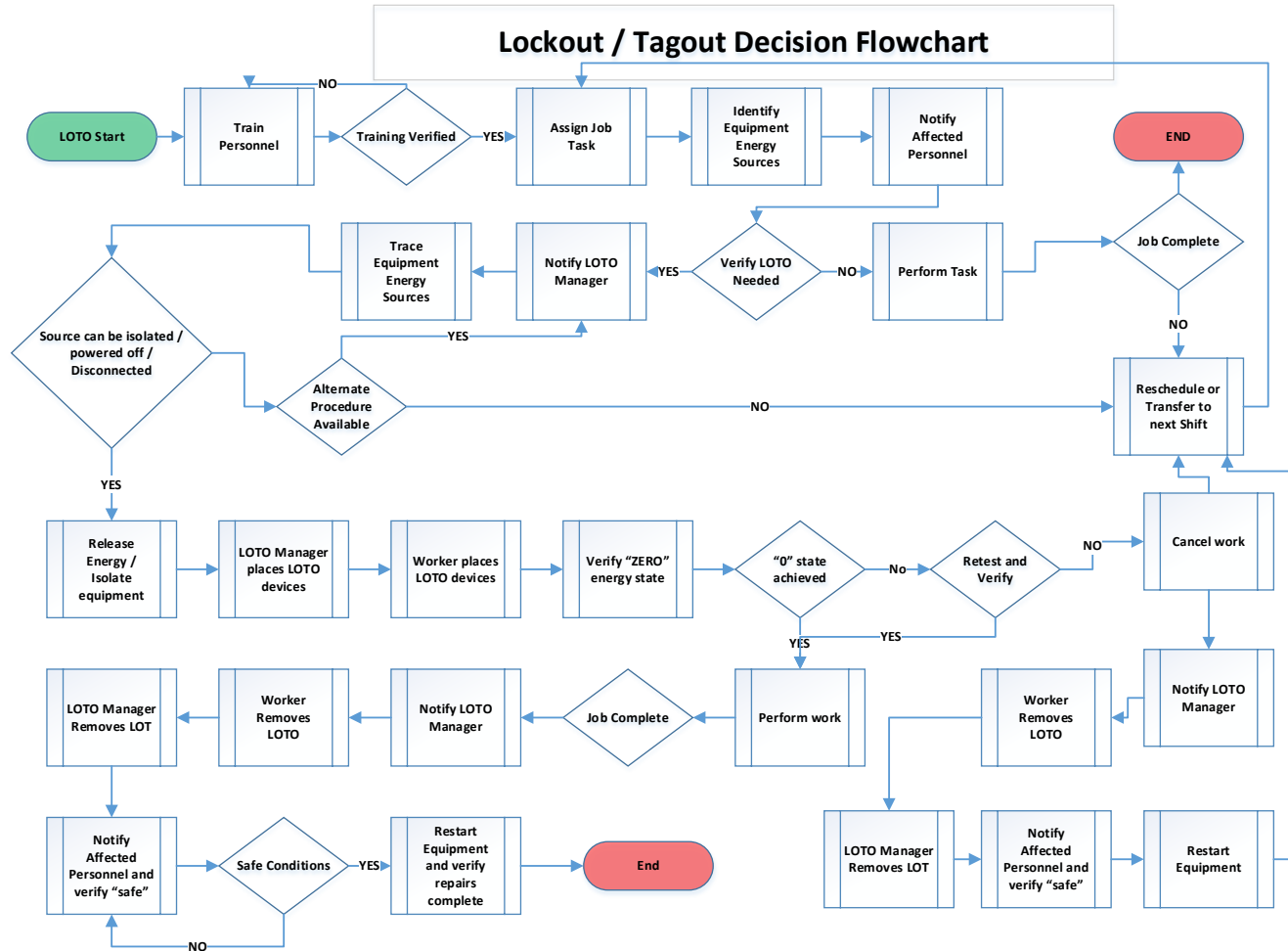
Where Lockout is used for Hazardous Energy control, the periodic inspection shall include a review, between the inspector and each Authorized Employee, of that employee's responsibilities under the Hazardous Energy control procedure being inspected.

Burns & McDonnell shall certify that the periodic inspections have been performed. The certification shall identify the systems, machines or equipment on which the Hazardous Energy Control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the employee performing the inspection.

7.3.7 Procedure

The following jobsite Lockout and Tagging procedure is to be followed. In some instances, particular requirements will dictate variances from this procedure. However, any change or variance must be viewed with caution by the Lockout Tagout Manager/designee and possible contingencies accounted for at all times. Changes to the procedure shall be documented on the Burns & McDonnell Safety & Health Form C-14 Amendment Form" and approved by BMcD Corporate Safety & Health.

Figure 7 - 1 LOTO Decision Flowchart



Verification

Verify that the authorized employee is trained in LOTO and refer to the manufacturer's and/or installer's company procedure/drawings to identify the type and magnitude of the energy that the machine or equipment utilizes. The authorized employee shall understand the hazards of the energy and shall know the methods to control the energy.

Identify Equipment.

Determine which equipment is involved with the work to be performed.

Determine Availability.

The site manager/designee, with client representatives as needed, will determine the available systems and equipment prior to locking out the equipment to ensure that normal operation of associated equipment will not cause activation of systems or equipment that are being worked on.

Notification

Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

De-energize and remove the Equipment from Service.

If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.). De-activate the energy isolating device(s) by placing all electrical disconnects in the off position and/or close all valves to equipment or systems to be worked on so that the machine or equipment is isolated from the energy source(s).

Lockout and tagout Equipment.

After de-energizing and/or closing of valves, the Lockout Tagout Manager (1st) and then the authorized employee(s) (with assigned individual lock(s)) thereafter who will accomplish the work will place their own appropriate locks and tags on all switches and/or valves, and wherever necessary to avoid accidental startup or energizing. The lockout mechanism shall be placed on the equipment/mechanism in such a way as to prevent operation or access to energizing switches or valves. The LOTO Manager and employees shall record their names and lock numbers in the lockout/tagout log.

Check for Safety.

The supervisor in charge of the work will physically inspect the equipment or systems prior to the actual work taking place and verify the authorized employee's LOTO.

The supervisor will make certain that all switches and/or valves are physically inoperative, that all fluid pressures are bled off, that all stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) have been dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc. (or by any other recognized control methods which may have been used as necessary). The supervisor shall also ensure that all hazardous materials are drained and removed from the immediate work area.

The supervisor shall ensure that the equipment is disconnected from the energy source(s) by first checking that no employees are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

After determining that all equipment, circuits and systems have been rendered safe for work, appropriate tags and locks shall be placed on the associated electrical disconnects, valves and wherever else required to prevent the accidental start-up of the equipment, circuits or systems being worked on.

Placement of Lockout –

If more than one employee is required to work on a system, each employee must place their separate Lock and Tag on the equipment before commencing work.

All employees working on systems/equipment that are to be locked out are to receive his/her own lock and key. The employee who places a lockout on an electrical disconnect or valve is the only one permitted to remove it.

Working on Equipment

Complete the work which was authorized to be performed

Restoring Equipment to Service.

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.

Check the work area to ensure that all employees have been safely positioned or removed from the area.

Verify that the controls are in neutral.

Remove the lockout devices and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.

Removal of Lockout –

After each portion of the work is completed, the employee who placed the lockout mechanism on the equipment will be responsible for its immediate removal. If more than one work operation is being performed on a piece of equipment or system, it will be necessary for each employee to remove his/her lockout mechanism immediately after the work task has ended. After the work is complete the supervisor in charge of the work activity will immediately notify the Lockout Tagout Manager. Then the Lockout Tagout Manager will remove his/her locking mechanisms.

Note: Prior to notifying the LOTO Manager it will be the responsibility of the employee(s) supervisor to ensure that all work has ended and the equipment or system is safe for normal operation. Removal of each lock and Tag will also be recorded in the log.

Emergency Release

Under extraordinary circumstances, it may be necessary to remove a Lock or Tag that has been affixed by someone else or without the proper signoff of a holder. Only the LOTO Manager or his designee may authorize the removal of a Lock or Tag and only in accordance with the following stipulations:

The worker who is responsible for the Lock or Tag or is a holder of the isolation is not present at the facility, and all reasonable efforts have been taken to contact the responsible worker.

All measures are taken to notify the worker prior to his resuming work.

If the employee is unavailable, only then after physical inspection by site manager or authorized supervisor has determined that all work has been completed and the safety of equipment and/or system is ensured, can a lockout mechanism be removed.

In addition, if the Lock or Tag is on an item that is in the construction or startup stage, the authorization of the project field manager or startup manager will also be required, respectively. A log will be kept to document these authorizations

Unauthorized removal of tags and lockout mechanisms is not permitted. Infraction of this rule will result in disciplinary action up to and including termination.

Notification of Completion

Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

When working on equipment which utilizes a plug-in device for power, action shall be taken to ensure that no one can energize the equipment until the work has been completed. These actions include the employee has

unplugged the equipment from the energy source and the plug is under the exclusive control of the employee performing the servicing or maintenance. The plug is under the exclusive control of the employee if it is physically in the possession of the employee, or in arm's reach and in line of sight of the employee, or if the employee has affixed a lockout/tagout device on the plug.

OSHA 1910.269 allows power distribution systems and power generating facilities to use a tagout and training system instead of a lockout requirement. While in compliance with OSHA, this procedure is not in compliance with Burns & McDonnell safety requirements. Contact the Burns & McDonnell Safety & Health Department if you are instructed not to lockout any energized systems on your project. There are alternative methods, which may be used to ensure the safety of all workers.

7.3.8 Tagging Systems

Special waterproof, sealed tags must be used.

Tags are to be used for Do Not Operate, Systems under Test, and Systems under Operations

7.3.9 Lock and Tag (LOTO) Log

The lockout and tagout log G-10 will indicate the tagged equipment, the number of the lock and the tag, the location of tags, the employee who attached the Tag and lock, the date and time of placement and removal.

The log will be maintained and updated daily.

7.3.10 Client LOTO

Some Burns & McDonnell projects are contractually obligated to use a client Lockout/Tagout procedure. Burns & McDonnell supervisory employees are to coordinate the use of all Lockout/Tagout procedures with the client representative. A single LOTO Manager shall be assigned to coordinate the LOTO process.

7.3.11 Training Requirements

Training must be conducted and documented to ensure that all personnel are knowledgeable of their duties with regard to Lockout/Tagout and Hazardous Energy control. The training must be commensurate with the employee's level of responsibility and involvement, e.g. Other, Affected, Holder, Authorized, and Tagging Authority. Prior to performing a job requiring Lockout / Tagout, training and verification of knowledge as outlined below shall be performed to ensure that the purpose and function of the Project Safety Tagging Program is clearly understood by all field workers.

Affected workers are required to be trained in the following areas:

- The use of this procedure.

- Recognition of hazardous energy sources.

- Type and magnitude of hazardous energy present in workplace (potential danger).

- Potential hazards caused by failing to adhere to the Safety Tagging Program.

Authorized Workers are required to be trained in the following areas:

- The use of this procedure.

- Recognition of hazardous energy sources.

- Type and magnitude of hazardous energy present in workplace (potential danger).

Methods and means necessary for proper isolation and control.

Proper use of the following forms: Isolation Record, PTW, Electrical LOTO Log).

Proper methods and sequencing for placing and removing LOTOs.

Closing out PTW.

Other Workers are required to be trained in the following areas:

The purpose of the safety tagging program.

The use and appearance of locks and tags.

The potential hazards that locks and tags protect against.

The penalties for removing locks and tags.

Prohibitions against attempting to operate locked or tagged equipment.

Tagging Authority is required to be trained in the following areas:

The use of this procedure.

Recognition of hazardous energy sources.

Type and magnitude of hazardous energy present in workplace (potential danger).

Methods and means necessary for proper isolation and control.

Proper use of the following forms: Isolation Record, PTW, Electrical LOTO Log).

Proper methods and sequencing for placing and removing LOTOs.

Closing out PTW.

Considerations in determining if and when a requested work activity can be approved to proceed.

Proper delegation of LOTO functions and follow-up to ensure program is implemented properly.

Proper identification of the need for additional permits (Confined Space Entry, Hot Work Permit, Safe Work Plan), and establishment of these programs in accordance with the project safety manual.

Retraining:

Retraining will be provided for all affected and authorized workers under the following conditions:

Change in job assignment.

Change in machinery/equipment/process that presents a new hazard.

Change in the Safety Tagging Procedure.

When deviations or inadequacies in worker's knowledge is identified.

When deviations in the use of the Safety Tagging Procedure are identified.

7.3.12 Records

The following records are to be maintained in the project files:

Permit to Work (PTW): (Burns & McDonnell Safety Form C-07 “Work Permit”).

Isolation Record (IR): (Burns & McDonnell “Isolation Record” Safety Form G-13).

Electrical LOTO Log: (Burns & McDonnell “Electrical LOTO Log” Safety Form G-10).

Tagging Authority List: (Burns & McDonnell “Tagging Authority List” Safety Form G-11).

Certification of Training: (Burns & McDonnell “Certification of Training” Safety Form C-09).

Lock Removal Authorization: (Burns & McDonnell “Lock Removal Authorization” Safety Form G-03).

7.4 Occupational Noise Exposure 1926

Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-4 of this section when measured on the A-scale of a standard sound level meter at slow response.

7.4.1 Administrative or Engineering Controls

When workers are subjected to sound levels exceeding those listed in the table below in this section, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of the table, personal protective equipment as required shall be provided and used to reduce sound levels to within the levels of the table.

7.4.2 Variations in Noise Level

If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

Impulsive or impact noise. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

In all cases where the sound levels exceed the values shown herein, a continuing, effective hearing conservation program shall be administered.

Table 7 - 6 Permissible Noise Exposure Levels	
Duration per day, hours	Sound level, dBA, slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. Exposure to different levels for various periods of time shall be computed according to the formula set forth below.

$F(e) = (T(1) \text{ divided by } L(1)) + (T(2) \text{ divided by } L(2)) + \dots + (T(n) \text{ divided by } L(n))$ where:

F (e) = The equivalent noise exposure factor.
 T = The period of noise exposure at any essentially constant level.
 L = The duration of the permissible noise exposure at the constant level (from Table G-6)

NOTE: If the value of F (e) exceeds unity (1) the exposure exceeds permissible levels.

A sample computation showing an application of the formula in paragraph (d) (2) (ii) of this section is as follows. An worker is exposed at these levels for these periods:

110 dBA @ 1/4 hour	100 dBA @ 1/2 hour	90 dBA @ 1 1/2 hours
F(e) = (1/4 divided by 1/2) + (1/2 divided by 2) + (1 1/2 divided by 8)		
F(e) = 0.500 + 0.25 + 0.188		
F(e) = 0.938		

NOTE: Since the value of F(e) does not exceed unity (1.0), the exposure is within permissible limits.

7.5 Heat Injury and Illness Prevention Plan

In areas where heat stress may impact employee health and safety, acclimatization and heat stress shall be assessed to establish proper work/rest regimens and fluid replacement. Heat Stress and heat strain are conditions resulting from environmental factors including temperature, relative humidity, radiant heat transfer, and air movement, as they are affected by clothing. The primary objective of the heat injury and illness plan is to prevent heat stroke which is life threatening and the most serious of the heat-induced disabilities.

7.5.1 Training

Subcontractors shall train all employees on the signs and symptoms of heat related illness' and prevention techniques through daily Pre-Task Analysis' and weekly toolbox safety training. See Table 7 - 7 Symptoms and Treatment of Heat Stress

The subcontractor shall have designated persons trained in first aid and cardiopulmonary resuscitation (CPR), including training in heat related illnesses.

7.5.2 Body Fluid Replacement

When heat stress is determined to be a concern, the subcontractor shall ensure water is made readily available for personnel fluid replacement, a minimum rate of 8 ounces each half hour per person.

7.5.3 Heat Assessment

The subcontractor will assess employee and weather conditions to determine when to start heat stress assessment. For employees with permeable work clothing, Wet Bulb Globe Temperature (WBGT) Index or physiological monitoring shall be conducted. For employees in impermeable work clothing, only physiological monitoring shall be conducted to determine appropriate controls.

WBGT Monitoring

The WBGT Index Monitoring for the Threshold Limit Values (TLVs) are provided as follows:

Table 7 - 8 WBGT Index Monitoring for TLV

Allocation of Work in a Cycle of Work and Recovery	TLV as based on WBGT readings in degrees Fahrenheit			
	Light	Moderate	Heavy	Very Heavy
	(Sitting with light manual work with hands or hands and arms, and driving. Standing with some light arm work and occasional walking.)	(Sustained moderate hand & arm work, moderate arm & leg work, moderate arm and trunk work or light pushing and pulling. Normal walking.)	(Intense arm and trunk work, carrying, shoveling, manual sawing; pushing and pulling heavy loads and walking at a fast pace.)	(Very intense activity at fast to maximum pace.)
75 to 100%	87.8	82.4	-	-
50 to 75%	87.8	84.2	81.5	-
25 to 50%	89.6	86	84.2	76.1
0 to 25%	90.5	88.7	86.9	80.6
(Adapted from AGCIH 2011 TLV®s and BEI®s, Thermal Stress, Tables 2 and 3)				
Operations conducted outdoors may expose workers to weather, ecological hazards, and other location-related hazards. The following sections summarize these hazards.				

Physiological Monitoring

(The Section below is taken from AGCIH 2011 TLV®s and BEI®s, Thermal Stress Table 4)

One or more of the following measures may mark excessive heat strain, and an individual's exposure to heat stress should be discontinued when any of the following occur:

Sustained (several minutes) heart rate is in excess of 180 bpm (beats per minute) minus the individual's age in years (e.g., 180-age), for individuals with assessed normal cardiac performance; or

Body core temperature is greater than 101.3° F for medically selected and acclimatized personnel; or greater than 100.4° F in unselected, un-acclimatized workers; or

Recovery heart rate at one minute after a peak work effort is greater than 120 bpm; or

There are symptoms of sudden and severe fatigue, nausea, dizziness, or lightheadedness.

An individual may be at greater risk of heat-related disorders if:

Profuse sweating is sustained over hours; or

Weight loss over a shift is greater than 1.5% of body weight; or

24-hour urinary sodium excretion is less than 50 moles.

7.5.4 Acclimatization

According to the OSHA Technical Manual, a properly designed and applied heat acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. The following protocol, based on NIOSH (1986), will be followed:

For workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four.

For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

7.5.5 Rest Breaks

When heat stress conditions are applicable, all rest breaks should be taken out of the zone of exclusion into a cooler, shaded, rest area. If these conditions are not available, more frequent rest breaks will be taken. Persons who are not acclimatized shall be allowed additional breaks.

7.5.6 Sun Screen

Where there is potential for sun burn to exposed skin to solar radiation (short or long term) employees shall be provided sun screen, to use according to manufacturer's directions, with a sun protection factor (SPF) appropriate for their skin type and exposure.

7.5.7 Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress.

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

Table 7 - 9 Symptoms and Treatment of Heat Stress

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	A skin irritation caused by excessive sweating during hot, humid weather. Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin cool, moist and/or clammy; complexion pale, muddy, flushed or red skin; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Life threatening. Red, hot, dry skin; dizziness; confusion; rapid breathing and rapid weak pulse; high oral temperature (as high as 105°F)

Table 7 - 9 Symptoms and Treatment of Heat Stress

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Keep skin clean and dry, preventing infection. Avoid using ointments or creams as they keep the skin warm and moist and may make the condition worse. Try to work in a cooler, less humid environment when possible.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Remove or loosen tight clothing and apply cool, wet cloths such as towels or wet sheets. Rest lying down, with head in low position. If person is awake and alert, give a half glass of cool water every 15 minutes. Do not let them drink too quickly. Seek medical attention.	CALL 911 or local Emergency Medical Services Move the person to a cooler place. Keep the person lying down. Quickly cool the body by wrapping wet sheets around the body and fan it. If you have ice packs or cold packs, wrap them in a cloth and place them on each victim's wrists and ankles, in the armpits and on the neck to cool the large blood vessels. Watch for signals of breathing problems and make sure the airway is clear.

7.6 Cold Stress Plan

This procedure applies to all employees who perform fieldwork in cold environments at risk of cold stress injury. Frostbite, hypothermia, and trench foot are the most common cold induced problems that personnel must be protected against.

7.6.1 Training

Subcontractors shall train all employees on the signs and symptoms of cold related illness and prevention techniques through daily Pre-Task Analysis' and weekly toolbox safety training. The training program will include, at a minimum, instruction in the following areas:

Proper first aid treatment

Proper clothing practices

Proper eating and drinking habits

Recognition of impending frostbite

Recognition of the signs and symptoms of impending hypothermia or excessive cooling of the body when shivering does not occur

Safe working practices

7.6.2 Environmental Monitoring

Frostbite and hypothermia are two types of cold injury that personnel must be protected against during the performance of field duties. Factors influencing the development of a cold injury include ambient temperature, wind velocity, and moisture from the environment and/or sweating.

The subcontractor will monitor environmental conditions by recording ambient temperature and estimated wind-speed. Information contained in Tables 7-9 and 7-10 will be used to evaluate the possibility of hypothermia among workers on-Site.

7.6.3 Protective Clothing and Rest Breaks

Wear appropriate cold weather clothing when temperatures are at or below 40°F to protect exposed skin. These protective items can include coats, thermal suites, gloves, facemask, and foot wear. The objective is to protect all parts of the body, with emphasis on the hands and feet. If wind chill is a factor on the work site, the cooling effect of the wind will be reduced by shielding the work area or requiring workers to wear an outer windbreak layer garment. Eye protection against a glare and ultraviolet light are recommended in snowy and icy conditions.

The work rate should slow to reduce probability of heavy sweating that could result in wet clothing. If heavy work must be done, opportunities for rest breaks will be provided where workers have the opportunity to remove clothing layers and/or to change into dry clothing. Conversely, plan work activities to minimize time spent sitting or standing still. Rest breaks should be taken in a warm, dry area. When fine work is required to be performed with bare hands, do not allow more than 10-20 minutes of work to occur in temperatures below 50 °F, without providing a hand warm-up break. Workers handling evaporative solvents during cold stress conditions will take special precautions to avoid soaking gloves and clothing because of the added danger of prolonged skin contact and evaporative cooling.

In addition to wearing gloves for hand warmth, the following recommendations are adapted from OSHA's 2007 cold-stress Emergency Preparedness Guide:

Wear at least three layers of clothing. An inner layer of wool, silk or synthetic to wick moisture away from the body. A middle layer of wool or synthetic to provide insulation even when wet. An outer wind and rain protection layer that allows some ventilation to prevent overheating.

Wear a hat or hood. Up to 40% of body heat can be lost when the head is left exposed.

Wear insulated boots or other footwear that is waterproof.

Keep a change of dry clothing available in case work clothes become wet.

With the exception of the wicking layer do not wear tight clothing. Loose clothing allows better ventilation of heat away from the body.

Avoid touching cold metal surfaces with bare skin.

Monitor your physical condition and that of your coworkers.

Move into warm locations during work breaks; limit the amount of time outside on extremely cold days.

Drink plenty of liquids to keep hydrated; avoiding caffeine and alcohol.

7.6.4 Identification and Treatment of Cold Stress

When frostbite, hypothermia, or other cold stress symptoms are suspected, treat the patient to relieve symptoms or transport them to the medical facility identified in this plan.

7.6.5 Hypothermia

When exposed to cold temperatures, your body begins to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up your body's stored energy. The result is hypothermia, or abnormally low body temperature. A body temperature that is too low affects the brain, making the victim unable to think clearly or

move well. This makes hypothermia particularly dangerous because a person may not know it is happening and will not be able to do anything about it.

Symptoms of hypothermia can vary depending on how long you have been exposed to the cold temperatures.

Early Symptoms

Shivering

Fatigue

Loss of coordination

Confusion and disorientation

Late Symptoms

No shivering

Blue skin

Dilated pupils

Slowed pulse and breathing

Loss of consciousness

Take the following steps to treat a worker with hypothermia:

Alert the supervisor and request medical assistance.

Move the victim into a warm room or shelter.

Remove their wet clothing.

Warm the center of their body first—chest, neck, head, and groin—using an electric blanket, if available; or use skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets.

Warm beverages may help increase the body temperature, but do not give alcoholic beverages. Do not try to give beverages to an unconscious person.

After their body temperature has increased, keep the victim dry and wrapped in a warm blanket, including the head and neck.

If victim has no pulse, begin cardiopulmonary resuscitation (CPR).

7.6.6 Chillblains

Chilblains are caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees F. The cold exposure causes damage to the capillary beds (groups of small blood vessels) in the skin. This damage is permanent and the redness and itching will return with additional exposure. The redness and itching typically occurs on cheeks, ears, fingers, and toes.

Symptoms of chilblains include:

Redness

Itching

Possible blistering

Inflammation

Possible ulceration in severe cases

Workers suffering from chilblains should:

Avoid scratching

Slowly warm the skin

Use corticosteroid creams to relieve itching and swelling

Keep blisters and ulcers clean and covered

7.6.7 Frostbite

Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in the affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. In extremely cold temperatures, the risk of frostbite is increased in workers with reduced blood circulation and among workers who are not dressed properly.

Symptoms of frostbite include:

Reduced blood flow to hands and feet (fingers or toes can freeze)

Numbness

Tingling or stinging

Aching

Bluish or pail, waxy skin

Workers suffering from frostbite should:

Get into a warm room as soon as possible.

Unless absolutely necessary, do not walk on frostbitten feet or toes-this increases the damage.

Immerse the affected area in warm-not hot-water (the temperature should be comfortable to the touch for unaffected parts of the body).

Warm the affected area using body heat; for example, the heat of an armpit can be used to warm frostbitten fingers.

Do not rub or massage the frostbitten area; doing so may cause more damage

Do not use a heating pad, heat lamp, or the heat of a stove, fireplace, or radiator for warming. Affected areas are numb and can be easily burned

Table 7 - 10 Threshold Limit Values for a Work/Warm Up Schedule (for a Four-Hour Shift)														
Air Temp. Range / Sunny Sky	Wind Speed Miles per Hour, mph													
	No Noticeable		5		10		15		20					
° F	MWP	#	MWP	#	MWP	#	MWP	#	MWP	#				
-15 / -19	Normal	1	Normal	1	75	2	55	3	40	4				
-20 / -24	Normal	1	75	2	55	3	40	4	30	5				
-25 / -29	75	2	55	3	40	4	30	5	Non-Emergency Work Should Cease					
-30 / -34	55	3	40	4	30	5								
-35 / -39	40	4	30	5										
-40 / -44	30	5												
≤ -45														
MWP = Maximum Work Period in minutes; # = Number of Breaks per 4-hour shift														
Temperature degrees are approximate for °F, Fahrenheit; Adopted from TLV 2007														

Table 7 - 11 Cooling Power of Wind on Exposed Flesh [Expressed as Equivalent Temperature - Under Calm Conditions]												
Estimated Wind Speed (mph)	Actual Temperature Reading (° F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds > 40 mph have little additional effect	LITTLE DANGER If < 1 hour with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one (1) minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trench foot and Immersion foot may occur at any point on this chart.											

- Developed by the U.S. Army Research Institute of environmental Medicine, Natick, MA.
- Shaded areas are equivalent chill temperature requiring dry clothing to maintain a core body temperature above 96.8°F per cold stress TLV.

This procedure applies to all employees who perform fieldwork in cold environments at risk of cold stress injury. Frostbite, hypothermia, and trench foot are the most common cold induced problems that personnel must be protected against.

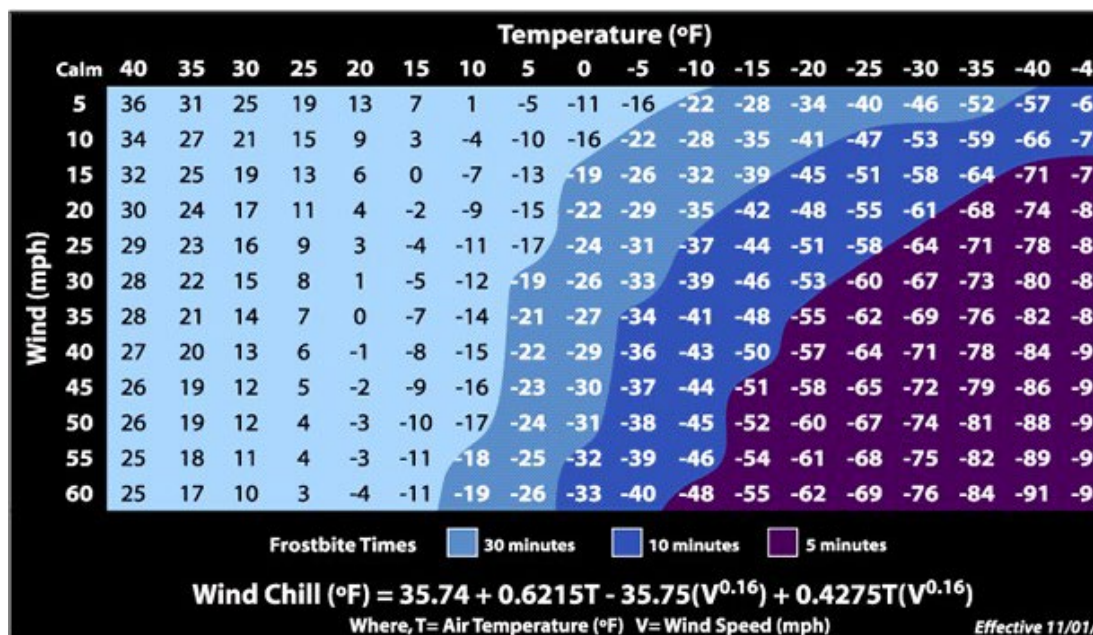
Employee-Owners and subcontractors/consultants who are exposed to extreme cold or work in cold environments may be at risk of cold stress. Extreme cold weather is a dangerous situation that can bring on health emergencies in susceptible people, such as those without shelter, outdoor workers, and those who work in an area that is poorly insulated or without heat. What constitutes cold stress and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered factors for "cold stress." Whenever temperatures drop decidedly below normal and as wind speed increases, heat can more rapidly leave your body. These weather-related conditions may lead to serious health problems.

7.6.8 Wind Chill

Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).

Wind-Chill Index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.

Figure 7 - 2 NOAA Wind Chill Chart



NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.

7.6.9 Cold Water Immersion

Cold water immersion creates a specific condition known as immersion hypothermia. It develops much more quickly than standard hypothermia because water conducts heat away from the body 25 times faster than air.

Typically people in temperate climates don't consider themselves at risk from hypothermia in the water, but hypothermia can occur in any water temperature below 70°F. Survival times can be lengthened by wearing proper clothing (wool and synthetics and not cotton), using a personal flotation device (PFD, life vest, immersion suit, dry suit), and having a means of both signaling rescuers (strobe lights, personal locator beacon, whistles, flares, waterproof radio) and having a means of being retrieved from the water.

7.7 Fatigue Management Plan

7.7.1 General

Burns & McDonnell is committed to providing a safe workplace for the benefit of their employees and subcontractors. In order to provide a safe work environment, employees must be able to perform their job duties in a safe, secure, productive, and effective manner, and remain able to do so throughout the entire time they are working. Burns & McDonnell recognizes that an effective fatigue management program can contribute to reducing the incidents and injuries among their workers.

Managing fatigue also means recognizing and assessing it as a possible factor in workplace incidents. Normal incident investigation questions should provide the investigator with an indication if fatigue could have been a contributing cause of an incident.

Fatigue is a message to the body to rest. It is not a problem if the person can and does rest. However, if rest is not possible, fatigue can increase until it becomes distressing and eventually debilitating. The symptoms of fatigue, both mental and physical, vary and depend on the person and his or her degree of overexertion. Some examples include: weariness, sleepiness, irritability, reduced alertness, lack of concentration and memory, lack of motivation, increased susceptibility to illness, depression, headache, giddiness, or loss of appetite and digestive problems.

A Fatigue Management Plan (FMP) shall be completed and implemented whenever work hours exceed:

- 10-hours a day for more than 5 consecutive days;

- 50-hours in a 5-day work week;

- 12-hours a day for more than 4 consecutive days, or

- 60-hours a week for sedentary (to include office) work.

The FMP shall address the following conditions for operator work hour limitations:

Rest Breaks

- No work period shall exceed 4.5 hours.

- All worker to have a minimum 30 minutes break after the each 4.5 hour work period.

- In extreme conditions (agreed and recorded at tailgate meetings) high energy use tasks will have an additional 15 minute break between work periods.

Equipment Operators.

- Any employee who shows signs of fatigue or who has reported fatigue will not be permitted to operate any heavy equipment or vehicle(s) until he/she has had a minimum of 14 hours of rest

- Operators of equipment, such as hoisting equipment and draglines, mobile construction equipment, electrical power systems, hydropower plants, industrial manufacturing systems, hydraulically operated equipment, powered vessels, and boats, shall not be permitted to exceed 12-hours of duty time in any 24-

hour period, including time worked at another occupation. A minimum of 8 consecutive hours of rest between shifts in a 24-hour period is required.

Rest is defined as: a period of time during which the person concerned is off duty; is not performing work, including administrative tasks; and is afforded the opportunity for uninterrupted sleep. This does not include time for breaks, meals, or travel time to/from work.

Motor Vehicle Operators.

Operators of motor vehicles, while on duty, shall not operate vehicles for a continuous period of more than ten 10-hours in any 24-hour period; moreover, no employee, while on duty, may operate a motor vehicle after being in a duty status for more than 12-hours during any 24-hour period.

A minimum of 8 consecutive hours shall be provided for rest in each 24-hour period.

7.7.2 Responsibilities

Supervisors / Managers / Foreman are responsible for

Observing the attentiveness, performance, and behavior of the employees they supervise

Assuring the employees they supervise are fit for duty

Following their FMP when presented with circumstances or knowledge that indicate that an employee may be showing signs of fatigue

Managing work schedules to help control worker fatigue.

The Supervisor will monitor workers that are near the end of their shift cycle for any signs of fatigue. If and when this is observed the worker shall be informed that he/she is required to return to their room and get extra time to sleep.

Upon their return to work on the following day they are to be monitored for any continued signs of fatigue.

The supervisor will also monitor the work to insure that the worker is attentive and performing his/her tasks in a safe and efficient manner.

The Supervisor will present the information or observations to the employee at the earliest possible time in order to address the fatigue issues that may arise from their work schedule. This discussion will include the possibility of changes to their tasks and time requirements (these may be adjusted to minimize the work conditions placed on the worker).

Workers / Employees are responsible for

Managing their time away from the worksite in a manner that allows them to get plenty of rest and approximately 7-8 hours of sleep every evening

Taking micro breaks throughout the day and taking advantage designated breaks to minimize fatigue and increase mental fitness

Notifying their supervisors when they feel like they are getting fatigued and are not fit for duty

Notifying the supervisor when they observe a coworker acting in a manner that indicates the coworker may be fatigued

Reporting any medication being taken including any over the counter medication such as for cold or flu, as these may impair the employee's ability to work safely and contribute to them getting fatigued at an quicker pace.

7.8 Severe Weather & Lightning

7.8.1 Lightning

There is no safe place outside when thunderstorms are in the area. If you hear thunder, you are likely within striking distance of the storm. Lightning often strikes more than three miles from the center of the thunderstorm, far outside the rain or thunderstorm cloud and can strike 10-15 miles from the thunderstorm.

When thunderstorms threaten, don't start anything you can't quickly stop. Monitor the weather to identify potentially hazardous weather approaching the area (TV/cable, radio, etc.) and pay attention to the daily forecasts (www.nws.noaa.gov) so you know what to expect during the day. Also pay attention to early signs of thunderstorms: high winds, dark clouds, rain, distant thunder or lightning. If these conditions exist, do not start a task you cannot quickly stop.

Lightning's distance: Count the time from the flash to the bang—for each 5 seconds between, the lightning is 1 mile away (activate lightning safety plan at count of 30 or 6 miles away). Stop work, stay in safe shelter and don't resume activities for 30 minutes—it's called the 30-30 rule.

Note: The 30-30 Rule is best suited for existing thunderstorms moving into the area. It cannot protect against the first lightning strike.

Caution is necessary in the field with regard to the hazards of lightning. Decide when to suspend activities and move to a safe location. The following precautions should be taken:

Outdoors

Be aware of the weather to foresee and watch for the buildup of possible thunderstorms.

Be prepared to demobilize and take shelter before thunderstorms are too close. A safe shelter is a substantial building with electricity or plumbing or an enclosed, metal-topped vehicle with windows up.

Stay off and away from anything tall or high, including rooftops, scaffolding, utility poles and ladders.

Stay off and away from large equipment such as bulldozers, cranes, backhoes, track loaders and tractors.

Do not touch materials or surfaces that can conduct electricity, including metal scaffolding, metal equipment, utility lines, water, water pipes and plumbing.

If you are caught outside with no safe shelter anywhere nearby the following actions may reduce your risk

- Immediately get off elevated areas such as hills, mountain ridges or peaks

- Never lie flat on the ground, seek shelter under an isolated tree, or shelter under a cliff or rocky overhang

- Immediately get out and away from ponds, lakes and other bodies of water

- Stay away from objects that conduct electricity (barbed wire fences, power lines, windmills, etc.)

Indoor Lightning Safety

Stay off corded phones, computers and other electrical equipment that put you in direct contact with electricity.

Avoid plumbing, including sinks, baths and faucets.

Stay away from windows and doors, and stay off porches.

Do not lie on concrete floors, and do not lean against concrete walls.

Curtailment of Site Activity

Lightning activity should be monitored using appropriate detection equipment. If lightning activity threatens during site activities, a number of incremental action steps to minimize personnel exposure are to be implemented.

Lightning at 20 miles – Action steps:

Notify personnel of increased lightning hazard.

Prepare to cease unnecessary outdoor activity.

Have nonessential personnel find shelter.

Lightning at 15 miles. Or thunder heard by personnel, but no lightning flash observed – Action steps:

Secure outdoor equipment.

Cease outdoor activity other than securing equipment and critical tasks.

Personnel not occupied due to activity curtailment should move to designated lightning shelter.

Lightning at 10 miles or lightning observed – Action steps:

Immediate cessation of outdoor activity. Abandon efforts to secure equipment if not completed.

All personnel take cover in designated shelter. If no other shelter is available, personnel can move to hardtop automobiles for shelter. Personnel on foot should find low risk locations and disperse if no other options are available

7.8.2 Thunderstorms

Monitor the weather to identify potentially hazardous weather approaching the area (TV/cable, radio, etc.).

Decide when to suspend activities and move to a safe location.

Safe evacuation sites include substantial and enclosed buildings and fully enclosed metal vehicles with the windows up.

Unsafe shelters include solitary trees, water, metal objects, electrical and electronic equipment, open fields, and high ground.

7.8.3 Flash Floods

Flash Flood Watch – Indicates that flash flooding is a possibility in or close to the watch area. Those in the affected area are urged to be ready to act if a flash flood warning is issued or flooding is observed. These watches are issued for flooding that is expected to occur within 6 hours after the heavy rains have ended.

Flash Flood Warning – A flood warning issued for life/property threatening flooding that will occur within 6 hours. It could be issued for rural or urban areas as well as for areas along the major rivers. Very heavy rain in a short period of time can lead to flash flooding, depending on local terrain, ground cover, degree of urbanization, amount

of man-made changes to the natural riverbanks, and initial ground or river conditions. Dam breaks or ice jams can also create flash flooding.

Listen to local radio and TV stations for information and advice.

Stop work if advised to evacuate

Move to a safe area...not cut off by floodwaters.

DO NOT attempt to drive over a flooded roadway.

7.8.4 Tornado

Tornado Watch – Tornadoes are possible in the area; remain alert for approaching storm.

Tornado Warning – A Tornado has been sighted or indicated by weather radar. If a tornado warning is issued for your area and the sky becomes threatening, move to a pre-designated place of safety.

When events and activities are calendared during tornado seasons, it is important that all participants are well informed and have a plan of action for their occurrence. Upon notification of a tornado warning, all activities and events should be cancelled until weather conditions and field conditions allow the activity to resume.

Recognizing the Danger – What to Look and Listen for

Look out for dark, often greenish skies, and a wall cloud, large hail and loud roar similar to a freight train. If a warning is issued and you are indoors, stay away from windows and move to an interior room or hallway or the lowest floor; get under a sturdy piece of furniture if possible. At the fields or enroute, get out of automobiles, trailers, or camping type vehicles.

7.8.5 Hurricane Safety Tips

Important Terms

It is important to remain informed and understand the terminology. By international agreement, all cyclone circulation originating over tropical waters are referred to as “tropical cyclones” and classified by form and intensity as follows:

Tropical Disturbance: A moving area of thunderstorms in the tropics that maintains its identity for 24 hours or more.

Tropical Depression: Rotary circulation at the surface, highest constant windspeed 38 mph or 33 knots.

Tropical Storm: Distinct rotary circulation, constant wind speed ranges from 39 – 73 mph or 34 – 63 knots.

Hurricane: A tropical cyclone with wind speeds of 74 mph or greater that is usually accompanied by heavy rain, thunder, lightning, coastal tidal surges and possible tornadoes. These storms are also known as typhoons in the Western Pacific and cyclones in the Indian Ocean and South Pacific Ocean.

Hurricane Watch: Issued for a coastal area where there is a threat of hurricane conditions within 24 - 36 hours.

Hurricane Warning: Issued when hurricane conditions are expected in a specified coastal area in 24 hours or less. Actions for protection of life and property should begin immediately.

Flash Flood Watch: A flash flood is possible in the area. Stay alert for deteriorating conditions.

Flash Flood Warning: A flash flood is imminent. Take immediate protective actions.

7.8.6 Earthquakes

Action to Take If an Earthquake Strikes

One of the greatest threats during an earthquake is falling debris. Earthquakes are unpredictable and strike without warning. Therefore, it is important to know the appropriate steps to take when one occurs, and to be so thoroughly familiar with these steps, that you can react quickly and safely. If you are in a commercial or residential building, remember the following procedures.

Steps to Take During An Earthquake:

Remain inside the building.

Seek immediate shelter under a heavy desk or table--or brace yourself inside a door frame or against an inside wall.

Stay clear of windows--at least 15 feet away.

Stay put. If shaking causes the desk or table to move, be sure to move with it.

Resist the urge to panic. Organize your thoughts. Think as clearly as possible, and anticipate the sights and sounds that may accompany an earthquake.

Don't be surprised if the electricity goes out, fire or elevator alarms begin ringing, or the sprinkler system is activated.

Expect to hear noise from broken glass, creaking walls, and falling objects.

Steps To Take Immediately After An Earthquake:

Remain in the same "safe" location for several minutes after the earthquake, in case of aftershocks.

Do not attempt to evacuate or leave your immediate area unless absolutely necessary or when instructed to do so by a proper authority.

Check for injuries and administer necessary first aid. Recognize and assist co-workers who are suffering from shock or emotional distress.

Implement your survival plan. Establish a temporary shelter if rescue teams are expected to be delayed.

Use a stairway when instructed to exit building.

7.9 Working Over or Near Water Hazards

7.9.1 Working Over or Near Water, Barges and Boats

Employees when working over or near water, where the danger of drowning exists shall be provided with U.S. Coast Guard (USCG) - approved personal flotation devices.

Inspect personal flotation devices before and after each use for defects which would alter their strength or buoyancy.

Do not use defective units.

Employees who will be working over or near water must be adequately trained in their responsibilities and the safe work practices associated with this task. All water work activities shall be documented and discussed on the PTA

(project task analysis) and shall be signed by all members of the crew prior to the start of work activities near or over water

At least one person in each crew shall be trained in cardiopulmonary resuscitation, first aid, and basic emergency-response skills

Employees who are unable to swim must notify their supervisor

Employees, who will be performing work over or near water, where the danger of drowning exists, are not permitted to work alone at any time.

Ensure a 30 in. diameter life ring with 150 ft. of (3/8" dia. – 600 lb. capacity) line is readily available and that travel distance between the life rings does not exceed 200 ft.

Warning rope and flags / barricade tape shall be installed a minimum of 10 ft. from the water's edge to restrict access.

All personnel will be accounted for on site by the person in charge of the operation, safety equipment will remain in place for the complete operation and until all persons are accounted for.

When preparing to go out on a boat the operator must check that the required safety equipment is onboard and the boat and other equipment is in good operating condition

All boats must carry one wearable (Type I, II, III or V) USCG - approved PFD for each person onboard or being towed.

All protective equipment must be worn in a manner that does not create a hazard in itself (loose straps, catch hazards, wrong sized etc.) Everyone who uses personal protective equipment shall be trained in its use, operation and maintenance.

All on-water activities must have a communication plan to ensure prompt and effective communication with boats, shoreline crews and On-Site Supervisor or trip plan holder.

The communication plan should make use of whatever technology is available.

All boat operators and shoreline captains should be equipped with radios and trained in the use of the radios.

Hand signals should also be reviewed and understood by all as a back-up communication system.

7.9.2 Boating Safety (Reserved)

7.9.3 Shoreline Safety

Shoreline crew and observer briefing checklists must be completed before any activity takes place

If chest waders are worn by personnel working on shore, in or near the water, they must have a waist belt capable of stopping water from entering the lower portion of the wader.

The "buddy system" will be used for any shoreline crews where water entry is required.

Shoreline safety equipment stations must be in place on any exercise or operation where shoreline crews are working in water.

Full body harnesses and safety lines will be used by shoreline crews that enter water with steep banks, or they are working immediately upstream of weirs, log jams, deep holes or rapids. These areas should be avoided if possible as equipment deployment sites.

7.9.4 Personal Flotation Devices

Inherently buoyant Type III, Type V work vests, or better USCG-approved personal flotation devices (PFDs) shall be provided and properly worn (zipped, tied, latched, etc., in closed fashion) by all persons in the following circumstances: **See Chapter 9 “Personal Protective Equipment” - Working Over Near Water - Figure 9 -1.**

On floating pipelines, pontoons, rafts, or stages;

On structures or equipment extending over or next to water except where guardrails, personal fall protection system, or safety nets are provided for employees;

Working alone at night where there are drowning hazards, regardless of other safeguards provided;

In skiffs, small boats, or launches, unless in an enclosed cabin or cockpit; or

Whenever there is a drowning hazard.

Automatic-Inflatable PFDs Type V or better, USCG Approved for Commercial Use, may be worn by workers in lieu of inherently buoyant PFDs, provided the following criteria are met:

PFDs are worn only by workers over 16 years of age and those who weigh 90 lb. or more;

An AHA must be performed for this activity;

PFDs must be inspected, maintained, stowed and used only in accordance with the manufacturer's instructions (currently not intended to be used in areas of heavy construction or maintenance or where hot work (welding, brazing, cutting, soldering, etc.) is to be performed;

PFDs shall provide a 30-lb. minimum buoyancy post deployment;

USACE projects shall comply with USACE's Auto-Inflatable Personal Flotation Device, Standards of Use Procedures, and current edition.

The USCG-approval for auto-inflatable PFD's is contingent upon the PFD being worn, not stowed. All auto-inflatable PFDs must be worn at all times drowning hazard exists.

Throwable devices (Type IV PFD).

On USCG-inspected vessels, ring buoys are required to have automatic floating electric water lights.

On all other floating plant and shore installations, lights on life rings are required only in locations where adequate general lighting (e.g., floodlights, light stanchions) is not provided. For these plants and installations, at least one life ring, and every third one thereafter, shall have an automatic floating electric water light attached.

All PFDs shall be equipped with retro-reflective tape in accordance with USCG requirements.

Life rings (rope attachment not required) and ring buoys (rope attachment required) shall be USCG-approved; shall have at least 70 ft. of 3/8 in. of attached solid braid polypropylene, or equivalent. Throw bags may be used in addition to life rings or ring buoys. Life rings or ring buoys shall be readily available and shall be provided at the following places:

At least one, not less than 24 in. dia. on each safety skiff up to 26 ft. in length

At least one (1) 30 in. in diameter on all motor boats longer than 26 ft. in length up to 65 ft. in length and for motor boats 65 ft. in length or longer, a minimum 3 life buoys of not less than 30 in dia. and one additional for each increase in length of 150 ft. or fraction thereof; and

At least one (1) at intervals of not more than 200 ft. on pipelines, walkways, wharves, piers, bulkheads, lock walls, scaffolds, platforms, and similar structures extending over or immediately next to water, unless the fall distance to the water is more than 45 ft. , in which case a life ring shall be used. (The length of line for life rings at these locations shall be evaluated, but the length may not be less than 150 feet.)

At navigation locks, an analysis of the benefits versus the hazards of using floating safety blocks (blocks that may be quickly pushed into the water to protect individuals who have fallen in the water from being crushed by vessels) shall be made.

This analysis shall be documented as an AHA.

If the use of blocks is found acceptable, consideration shall be given to the size and placement of the blocks, the appropriate means of securing and signing the blocks, etc.

When the use of blocks is found unacceptable, alternative safety measures shall be developed.

7.9.5 Lifesaving and Safety Skiffs

At least one skiff shall be immediately available at locations where employees work over or immediately next to water. Skiffs shall be kept afloat or ready for instant launching.

Personnel trained in launching and operating the skiff shall be readily available during working hours. Lifesaving personnel shall perform a lifesaving drill, including the launching and recovery of the skiff, before the initiation of work at the site and periodically thereafter (but at least monthly or whenever new personnel are involved).

Skiffs shall be kept afloat or ready for instant launching. A lifesaving skiff is considered as being "immediately available" when the following criteria are met:

The skiff must be in the water or capable of being quickly launched by one person.

There must be at least one person present and specifically designated to respond to water emergencies and operate the skiff at all times when there are employees above water.

When the operator is on break another operator must be designated to provide the requisite coverage while employees are above water.

The designated operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway.

The skiff operator may be assigned other tasks provided the tasks do not interfere with the operator's ability to quickly reach the skiff and get underway.

The communication system, such as a walkie-talkie, must be used to inform the skiff operator of an emergency and to inform the operator where the skiff is needed.

The skiff must be equipped with both a motor and oars.

Required equipment must be onboard and meet or exceed USCG requirements. Skiffs shall be equipped as follows:

Four (4) oars (two (2) if the skiff is motor powered);

Oarlocks attached to gunwales or the oars;

One (1) ball-pointed boat hook;

One (1) ring buoy with 70 ft. of 3/8 in. solid braid polypropylene, or equivalent, line attached; and
PFDs in number equaling the skiff rating for the maximum number of personnel allowed on board.

Fire Extinguisher.

In locations where waters are rough or swift, or where manually operated boats are not practical, a power boat suitable for the waters shall be provided and equipped for lifesaving.

Skiffs and power boats shall have buoyant material capable of floating the boat, its equipment, and the crew.

On vessels (such as skiffs) without permanently mounted navigation lights, portable battery-operated navigation lights will be available and used for night operations.

Lifesaving Boats.

One or more lifesaving boats, either manually or power-operated, shall be provided and readily accessible at all times.

Lifesaving boats shall be properly maintained, ready for emergency use and equipped with oars and oarlocks attached to the gunwales, boathook, anchor, ring buoy with 50 ft. of 600 pound capacity line and two life preservers. Oars are not required on boats that are powered by an inboard motor.

Where, because of swift current, lifeboats cannot be used, a line shall be stretched across the stream with tag lines or floating planks trailing in the water at intervals not to exceed 6 ft. If this is impracticable, some other arrangement for providing effective life lines near the water surface shall be provided.

The employer shall ensure that there is in the vicinity of each barge in use at least one portable or fixed ladder which will reach from the top of the apron to the surface of the water. If the above equipment is not available at the pier, the employer shall furnish it during the time that the barge is in use.

7.9.6 Access to and from Wharves, Floats, Barges, and/or Boats.

Ramps for access of vehicles to or between barges shall be of adequate strength, provided with side boards, well maintained, and properly secured.

Unless employees can step safely to or from the wharf, float, barge, or river towboat, either a ramp or a safe walkway shall be provided.

When dredge discharge pipe lines are used as walkways, they shall be provided with a flat surface walkway at least 12 in. wide, anchored to the pipe line to prevent displacement. A railing providing at least a single rail or taut rope 42 to 45 in. high shall be provided along one side. When rope is used, it shall be at least as strong as 3/4-in. diameter Manila or at least 3/8-in. diameter wire rope, or equivalent.

Catwalks or platforms shall be at least 20 in. wide with railings provided at all locations over bodies of water more than 4 feet deep. Plank for such use at those locations subject to immersion shall be rough sawn and treated to resist rot. Railings shall be installed in accordance OSHA guardrail regulations.

When the upper end of the means of access rests on or is flush with the top of the bulwark, substantial steps properly secured and equipped with at least one substantial hand rail not less than thirty-four (34) in. or more than thirty-eight (38) in. above the tread nosing shall be provided between the top of the bulwark and the deck.

Obstructions shall not be laid on or across the gangway, ramp, catwalk or other means of access.

The means of access shall be adequately illuminated for its full length.

Jacob's ladders shall be of the double rung or flat tread type. They shall be well maintained and properly secured.

A Jacob's ladder shall either hang without slack from its lashings or be pulled up entirely.

7.9.7 Working Surfaces of Barges.

Employees shall not be permitted to walk along the sides of covered lighters or barges with coamings more than 5 ft. high unless there is a 3-ft. clear walkway or a grab or a taut hand line is provided.












Decks and other working surfaces shall be maintained in a safe condition.

Employees shall not be permitted to pass fore and aft, or over, or around deck loads, nor shall employees be permitted to walk over deck loads from rail to coaming, unless there is a safe passage.

If it is necessary for an employee to stand at the outboard or inboard edge of the deck load where less than 36 in. of bulwark, rail, coaming, or other protection exists, the employee shall be provided with a suitable means of protection against falling from the deck load.

7.10 Outdoor Biological Exposures

7.10.1 Bees, Wasps, and Hornets

Figure 7 - 3 Stinging Insects			
Bees			
			
Honey Bee	Bumble Bee	Carpenter Bee	Sweat Bee
Wasps			
			
Yellow Jacket	Common Wasp	Mud Dauber	Paper Wasp
Hornets			
			
European Hornets	Baldfaced Hornet	Oriental Hornet	

Stinging insects such as bees, wasps, and hornets are found throughout the United States. Workers should take the following steps to prevent insect stings:

Wear light-colored, smooth-finished clothing.

Avoid perfumed soaps, shampoos, and deodorants.

Don't wear cologne or perfume.

Avoid bananas and banana-scented toiletries.

Wear clean clothing and bathe daily. (Sweat may anger bees.)

Wear clothing to cover as much of the body as possible.

Avoid flowering plants when possible.

Keep work areas clean. Social wasps thrive in places where humans discard food.

Remain calm and still if a single stinging insect is flying around. (Swatting at an insect may cause it to sting.)

If you are attacked by several stinging insects at once, run to get away from them. (Bees release a chemical when they sting, which may attract other bees.)

Go indoors.

A shaded area is better than an open area to get away from the insects.

If you are able to physically move out of the area, do not attempt to jump into water. Some insects (particularly Africanized Honey Bees) are known to hover above the water, continuing to sting once you surface for air.

If a bee, wasp, or hornet comes inside your vehicle, stop the car slowly and safely and open all the windows.

CAUTION: Workers with a history of severe allergic reactions to insect bites or stings should carry an epinephrine auto injector (EpiPen) and should wear a medical identification bracelet or necklace stating their allergy.

If a worker is stung by a bee, wasp, or hornet:

Have someone stay with the worker to be sure that they do not have an allergic reaction.

Wash the site with soap and water.

Remove the stinger using gauze wiped over the area or by scraping a fingernail over the area.

Never squeeze the stinger or use tweezers.

Apply ice to reduce swelling.

Do not scratch the sting as this may increase swelling, itching, and risk of infection.

7.10.2 Dog Safety

Dogs will bite the first thing they come to. If an employee holds out their hand to fend off the dog, that is what the dog will bite. If a large enough stick is nearby, that can be used to give something else to bite on while the

employee moves towards safety (while the employee pulls it and inches towards safety – similar to a less friendly game of tug of war with a dog toy).

Any dog may bite - even one familiar to you.

Most dog bites occur on the owner's premises.

Avoid all dogs - both leashed and stray.

Be aware that chained dogs are also dangerous. Dogs do not like to be restrained. A chained dog is only as secure as the chain holding it.

Do not disturb a dog while it is sleeping, eating, or caring for puppies.

A dog is wary of anything it does not understand; if you have tools or equipment in your hands, a dog may consider these a threat to its safety.

Dogs react strongly to body language; strangers should project confidence.

If a dog approaches to sniff you, stay still and do not reach out to the dog; this may be interpreted as an act of aggression.

Dogs are more aggressive when they travel in packs. Even docile dogs often become uncharacteristically violent and vicious when they are in a pack.

Dogs may attack if they are angry, afraid, or rabid. Know how to spot an angry, afraid, or rabid dog and leave the area immediately.

If you are threatened by a dog, remain calm, do not scream, and avoid direct eye contact – staring a strange dog directly in the eyes can be perceived as a challenge.

If you say anything, speak calmly and firmly.

Dogs want to attack from the rear, coming up from behind. Even one who sits up in his yard ahead of you may wait until you pass before giving chase. Do not turn your back on a dog.

While working position yourself so you face your partner, so you have a view of any animals, people, or vehicles that may come up from behind.

Don't turn and run (running from a dog will trigger its natural chase instinct and increase its aggression, and you will not be able to outrun the dog). Try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g., vehicle, outside a gated/fenced area).

If attacked, retreat to vehicle or attempt to place something between you and the dog.

Get a solid object between you and the dog if possible. Or, if you are holding a jacket or other soft item, stuff it in the dog's mouth.

If you cannot reach your vehicle, try to climb on the roof of a nearby car, or get on the other side of a nearby gate or doorway until you get assistance or wait for the dog to leave.

If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck, and protect your face.

If there is no chance to retreat and no chance of using any of the above techniques, do whatever you can to defend yourself and get out of the situation; kicking is safer than using your hands and arms (assuming you are wearing jeans).

If a dog grabs a hand or a leg, go limp, the dog may let go.

If bitten, immediately scrub the bite site vigorously with soap and water, seek medical attention as soon as possible, and report the incident to your supervisor and the local authorities.

Report all dog-related incidents to your supervisor, even if they do not result in a bite.

7.10.3 Mosquitoes (ZIKA and West Nile Virus)

The West Nile and ZIKA virus is most often spread to humans from the bite of an infected mosquito. West Nile Virus was first reported in the United States in 1999. By 2004, the virus was reported throughout the United States.

Most human infections with West Nile Virus (about 80%) cause no symptoms. Approximately 20% of those infected experience flu-like symptoms. Less than 1% of those infected develop severe symptoms. Employee-Owners and subcontractors/consultants of all ages may be affected.

Exposure Symptoms, Prevention and Treatment

Workers are at risk of West Nile Virus exposure any time infected mosquitoes are biting, the most are most active from dusk to dawn from July to September.

Workers who have potential for exposure should:

- Use insect repellent when mosquitoes are biting

- Apply insect repellent containing DEET (more than 20% DEET for longer protection), picaridin, or oil of lemon eucalyptus to exposed skin and to clothing

- Use permethrin on clothing only

- Carefully follow label directions for repellent use

- Do not apply pump or aerosol products directly to the face

- Spray products onto the hands and carefully rub them over the face, avoiding the eyes and mouth

- Use a repellent that provides protection for the amount of time that you will be outdoors and reapply it as needed. The percentage of active ingredient in the repellent determines the length of protection

- Wash skin treated with insect repellent with soap and water after returning indoors

- Use protective clothing when mosquitoes are biting, such as long-sleeved shirts, long pants, and socks

- Spray clothing with products containing DEET, picaridin, oil of lemon eucalyptus, or permethrin, as mosquitoes may penetrate thin clothing

- Use permethrin repellents on clothing as directed; Do Not apply them to skin

- Wash clothing treated with insect repellent before wearing it again

- Do not apply repellent to skin that is covered by clothing

7.10.4 Poison Ivy, Poison Oak and Poison Sumac

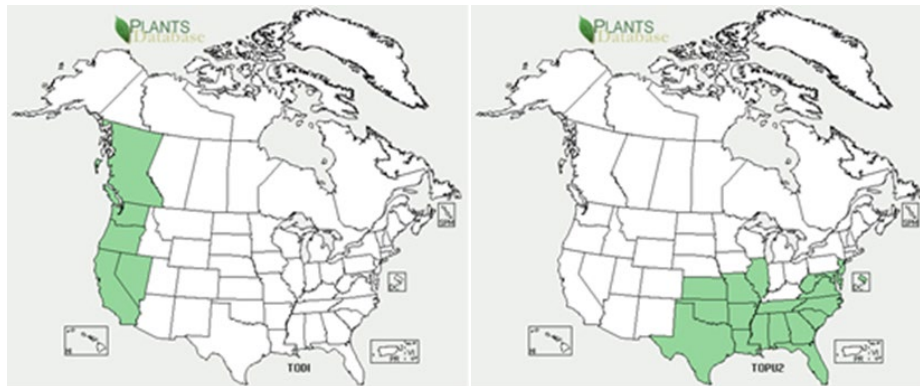
Poison ivy, poison oak, and poison sumac can release urushiol, when the leaf or other plant parts are bruised, damaged, or burned. When the oil gets on the skin an allergic reaction, referred to as contact dermatitis, occurs in most exposed people as an itchy red rash with bumps or blisters.

Figure 7 - 4 Poisonous Plant Locations

Poison Ivy is Across the United States, except California, Alaska, and Hawaii



Poison Oak is Primarily the Southeast and West Coast

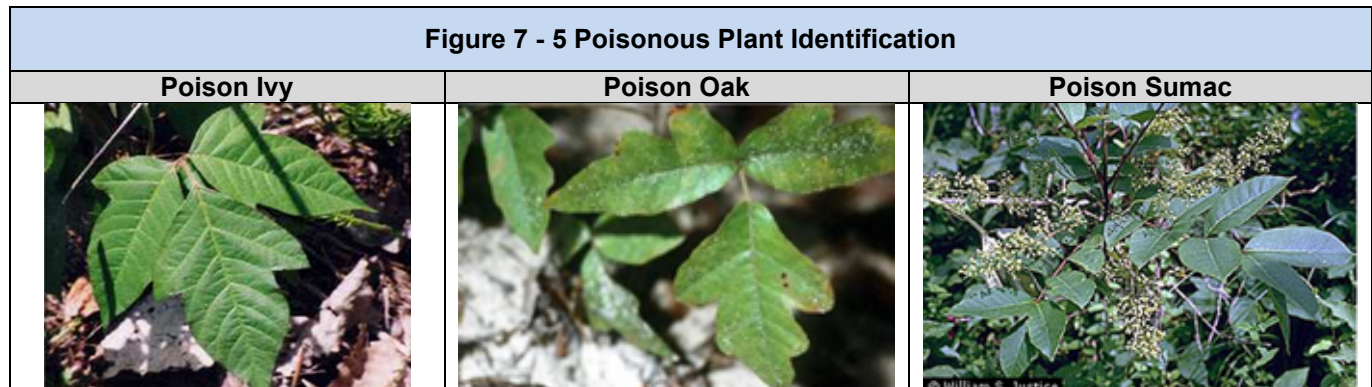


Poison Sumac is abundant along the Mississippi River and boggy areas of the Southeast



Plant Identification

The old saying "*Leaves of three, Let it be!*" is a helpful reminder for identifying poison ivy and oak, but not poison sumac which usually has clusters of 7-13 leaves.



Exposure Prevention, Symptoms, and Treatment

Workers can prevent contact with poisonous plants by taking these steps:

- Wear long sleeves, long pants, boots, and gloves.

- Wash exposed clothing separately from the rest of the laundry using hot water with an oil cutting detergent.

- Use barrier creams

Barrier skin creams, such as a lotion containing bentoquatam, may offer some protection before contact.

Barrier creams should be washed off and reapplied twice a day.

After use, clean tools with rubbing alcohol (isopropanol or isopropyl alcohol) or soap and lots of water.

Urushiol can remain active on the surface of objects for up to 5 years.

Wear disposable gloves during this process.

Do not burn plants that may be poison ivy, poison oak, or poison sumac as inhaling smoke from burning plants can cause severe allergic respiratory problems. Supervisors should prevent workers from being exposed to burning poisonous plants whenever possible. However, when exposure to burning poisonous plants is unavoidable, supervisors should provide workers with:

- A NIOSH-certified half-face piece particulate respirator rated R-95, P-95, or better.

- These respirators should protect against exposure to burning poisonous plants, but will not protect against all possible combustion products in smoke, such as carbon monoxide.

- Respirators must be worn correctly and consistently throughout the time they are used.

- For respirators to be effective there must be a tight seal between the user's face and the respirator.

- Respirators must be used in the context of a written comprehensive respiratory protection program.

Workers who have come in contact with poisonous plants should:

- Immediately rinse skin with rubbing alcohol, specialized poison plant washes, degreasing soap (such as dishwashing soap) or detergent, and lots of water.

Rinse frequently so that wash solutions do not dry on the skin and further spread the urushiol.

Scrub under nails with a brush.

Apply wet compresses, calamine lotion, or hydrocortisone cream to the skin to reduce itching and blistering.

Follow the directions on any creams and lotions. Do not apply to broken skin, such as open blisters.

Oatmeal baths may relieve itching.

An antihistamine such as diphenhydramine (Benadryl) can be taken to help relieve itching.

Follow directions on the package.

Drowsiness may occur.

In severe cases or if the rash is on the face or genitals, seek professional medical attention.

Call 911 or go to a hospital emergency room if the worker is suffering a severe allergic reaction, such as swelling or difficulty breathing, or has had a severe reaction in the past.

7.10.5 Venomous Snakes

Venomous snakes found in the United States include rattlesnakes, copperheads, cottonmouths/water moccasins, and coral snakes. They can be dangerous to Employee-Owners and subcontractors/consultants. Although rare, some workers with a severe allergy to snake venom may be at risk of death if bitten. It is important for supervisors to train their workers about their risk of exposure to venomous snakes, how they can prevent and protect themselves from snake bites, and what they should do if they are bitten.

Below is a guide to identifying poisonous snakes from non-poisonous snakes.

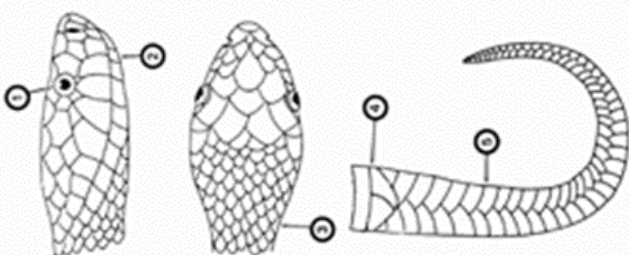
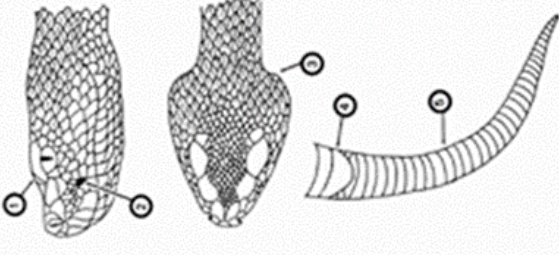
Table 7 - 12 Major Identification Features of Snakes	
Non-Venomous Snake	Venomous snake
<ol style="list-style-type: none"> 1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail 	<ol style="list-style-type: none"> 1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail
	

Figure 7 - 6 Rattlesnakes



Timber Rattlesnake

Rattlesnakes are the largest of the venomous snakes in the United States. They can accurately strike at up to one-third their body length. Rattlesnakes use their rattles or tails as a warning when they feel threatened. Rattlesnakes may be found sunning themselves near logs, boulders, or open areas. These snakes may be found in most work habitats including the mountains, prairies, deserts, and beaches across the US.

U.S. Geographic Region: Across the entire United States



Kansas Prairie Rattlesnake



Eastern Diamondback



Mojave Rattlesnake



Massasauga



Western Diamond-backed Rattlesnake

Figure 7 - 7 Copperheads



Copperheads vary in color from reddish to golden tan. The colored bands on their body are typically hourglass-shaped. Most adults are 18–36 inches long. They are not usually aggressive, but will often freeze when frightened. Workers are more likely to be bitten when they unknowingly step on or near a copperhead. Copperheads are often found in the Eastern states and extending as far west as Texas and are most likely located in forests, rocky areas, swamps, or near sources of water like rivers.

U.S. Geographic Region: Eastern states, extending as far west as Texas



Figure 7 - 8 Cottonmouths / Water Moccasins



Cottonmouth snakes average 50–55 inches long. The adult snake's skin is dark tan, brown, or nearly black, with vague black or dark brown cross-bands. Juveniles have a bold cross-banded pattern of brown or orange with a yellow tail. Cottonmouths are frequently found in or around water. They do not scare easily and will defend themselves when threatened.

U.S. Geographic Region: Wetland areas, rivers, lakes, etc., in the southeastern states



Exposure Symptoms, Prevention, and Treatment

Workers should take the following steps to prevent a snake bite:

Do not try to handle any snake.

Stay away from tall grass and piles of leaves when possible.

Avoid climbing on rocks or piles of wood where a snake may be hiding.

Be aware that snakes tend to be active at night and in warm weather.

Wear boots, snake chaps and long pants when working in areas with the potential for venomous snake presence.

Wear leather gloves when handling brush and debris.

Workers should take the following steps if they are bitten by a snake:

Seek medical attention as soon as possible (dial 911 or call local Emergency Medical Services.)

Try to remember the color and shape of the snake, which can help with treatment of the snake bite.

Keep still and calm. This can slow down the spread of venom.

Inform your supervisor.

Apply first aid if you cannot get to the hospital right away.

Lie or sit down with the bite below the level of the heart.

Wash the bite with soap and water.

Cover the bite with a clean, dry dressing.

Workers should NOT do any of the following steps if they are bitten by a snake:

Do not pick up the snake or try to trap it.

Do not wait for symptoms to appear if bitten, seek immediate medical attention.

Do not apply a tourniquet.

Do not slash the wound with a knife.

Do not suck out the venom.

Do not apply ice or immerse the wound in water.

Do not drink alcohol as a painkiller.

Do not drink caffeinated beverages




7.10.6 Venomous Spiders

Venomous spiders found in the United States include the black widow, brown recluse, and hobo spiders. Spiders are usually not aggressive and most bites occur because a spider is trapped or unintentionally contacted.

Figure 7 - 9 Black Widows



Black widow spiders are found throughout North America, but are most common in the southern and western areas of the United States. They are identified by the pattern of red coloration on the underside of their abdomen. They are usually found in workplaces containing undisturbed areas such as woodpiles, under eaves, fences, and other areas where debris has accumulated. They may also be found living in outdoor toilets where flies are plentiful.

	<p>Black widow spiders build webs between objects, and bites usually occur when humans come into direct contact with these webs.</p> <p>A bite from a black widow can be distinguished from other insect bites by the two puncture marks it makes in the skin. The venom is a neurotoxin that produces pain at the bite area and then spreads to the chest, abdomen, or the entire body.</p>
Figure 7 - 10 Brown Recluse Spiders	
	<p>The brown recluse spider, also known as the violin spider, is most commonly found in the Midwestern and southern states of the United States. It is brown in color with a characteristic dark violin-shaped (or fiddle-shaped) marking on its head and has six equal-sized eyes (most spiders have eight eyes). Brown recluse spiders are usually found in workplaces with secluded, dry, sheltered areas such as underneath structures logs, or in piles of rocks or leaves. If a brown recluse spider wanders indoors, they may be found in dark closets, shoes, or attics.</p>
	<p>The brown recluse spider cannot bite humans without some form of counter pressure, for example, through unintentional contact that traps the spider against the skin. Bites may cause a stinging sensation with localized pain. A small white blister usually develops at the site of the bite. The venom of a brown recluse can cause a severe lesion by destroying skin tissue (skin necrosis). This skin lesion will require professional medical attention</p>

Exposure Symptoms, Prevention, and Treatment

Workers can take the following preventive steps:

- Inspect or shake out any clothing, shoes, towels, or equipment before use.

- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.

- Minimize the empty spaces between stacked materials.

- Remove and reduce debris and rubble from around the outdoor work areas.

- Trim or eliminate tall grasses from around outdoor work areas.

- Store apparel and outdoor equipment in tightly closed plastic bags.

- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

Workers should take the following steps if they are bitten by a spider:

- Stay calm. Identify the type of spider if it is possible to do so safely. Identification will aid in medical treatment.

- Wash the bite area with soap and water.

Apply a cloth dampened with cold water or filled with ice to the bite area to reduce swelling.

Elevate bite area if possible.

Do not attempt to remove venom.

Notify your supervisor.

Immediately seek professional medical attention.

7.10.7 Ticks

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas, exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permethrin and spray skin with only DEET; and check yourself frequently for ticks.

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

Avoid habitats where possible; reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local/regional warehouse for preventative equipment such as repellants, protective clothing, and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue fieldwork until these controls can be implemented.

Figure 7 - 11 Tick Varieties Identification and Ranges

American Dog Tick



American dog tick is the most commonly identified species responsible for transmitting *Rickettsia rickettsii*, which causes Rocky Mountain spotted fever in humans. The American dog tick can also transmit tularemia. This tick is widely distributed east of the Rocky Mountains and also occurs in limited areas on the Pacific Coast. American Dog Tick larvae and nymphs feed on small rodents. Dogs and medium-sized mammals are the preferred hosts of adults, although it feeds readily on other large mammals, including humans.



Blacklegged Tick



The blacklegged tick, commonly known as a "deer tick", can transmit the organisms responsible for anaplasmosis, babesiosis, and Lyme disease. This tick is widely distributed in the northeastern and upper midwestern United States. Blacklegged Tick larvae and nymphs feed on small mammals and birds, while adults feed on larger mammals and will bite humans on occasion. It is important to note that the pathogen that causes Lyme disease is maintained by wild rodent and other small mammal reservoirs, and is not transmitted everywhere that the blacklegged tick lives. In some regions, particularly in the southern U.S., the tick has very different feeding habits that make it an unlikely vector in the spread of human disease.



Brown Dog Tick



The brown dog tick has recently been identified as a reservoir of *R. rickettsii*, causing Rocky Mountain spotted fever, in the southwestern U.S. and along the U.S.-Mexico border. Brown dog ticks are found throughout the U.S. and the world. Dogs are the primary host for the brown dog tick for each of its life stages, although the tick may also bite humans or other mammals



Lone Star Tick



The Lone Star Tick transmits *Ehrlichia chaffeensis* and *Ehrlichia ewingii*, causing human ehrlichiosis, tularemia, and STARI. The lone star tick is primarily found in the southeastern and eastern United States. White-tailed deer are a major host of lone star ticks and appear to represent one natural reservoir for *E. chaffeensis*. Lone Star Tick larvae and nymphs feed on birds and deer. Both nymphal and adult ticks may be associated with the transmission of pathogens to humans.



Illnesses, Signs, and Symptoms

Six notable tick-borne pathogens cause human illness in the United States. These pathogens may be transmitted during a tick bite, normally hours after attachment (a reason to find tick bites and remove ticks quickly). The illnesses, presented in order of most common to least, include:

Table 7 - 13 Table Tick Borne Diseases and Common US Regions	
Tick-Borne Disease	Common US Regions

Lyme disease (bacteria)	Northeast, North Central, Pacific Coast
Babesia / Babesiosis (protozoan parasite)	Northeast, Midwest, Northwest
Ehrlichiosis (bacteria)	East, Southeast, Central
RMSF Rocky Mountain Spotted Fever (bacteria)	Southeast, Atlantic Coast
STARI Southern Tick-Associated Rash Illness (bacteria)	Southeast, Atlantic Coast
Tick-Borne Relapsing Fever	Rocky Mountains, Pacific Coast
Tularemia (Rabbit Fever) (bacteria)	All States except Hawaii
Anaplasmosis	Northeast, North Central, Pacific Coast
Colorado Tick Fever	Northwest, Rocky Mountains
Powassan Encephalitis	Northeast
Q fever	Throughout the United States

These illnesses include some or all of the following: fever, headache, muscle aches, chills, stiff neck, joint aches, nausea, vomiting, abdominal pain, bone pain, diarrhea, fatigue, malaise, weakness, and small solid ring-like or spotted rashes.

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. Lyme: a rash might appear that looks like a bull's-eye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop.

If symptoms appear, contact the site safety and health supervisor and seek medical attention.

Controls

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

Avoiding tick habitats, and ceasing operations in heavily infested areas

Reducing tick abundance through habitat disruption or application of insecticide

Personal protection through use of protective clothing, repellants (DEET), and contact insecticides (permethrin or permethrin)

Frequent tick inspections and proper hygiene

Note: Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

When avoiding the habitat or reducing tick abundance is not feasible, to prevent tick bites:

Clothing

Wear light-colored clothing so they may be more easily seen before they bite.

Wear long sleeves and long pants.

Tuck in your clothes (shirt inside your pants, and pants legs inside your socks or boots)

Check your clothing frequently for ticks.

Repellants and Contact Insecticides

Use repellents (DEET) on your skin with contact insecticide (permethrin or permethrin) on your clothing only, as directed on the product label; these products are nearly 100-percent effective in preventing tick bites when used together, and used correctly.

Apply repellants to all areas of exposed skin. Insects may only need unprotected skin the size of a quarter, repellent on nearby skin or on clothes will not protect this area of skin.

Reapply repellants before the duration of protection expires:

5 to 10 percent: 2-4 hours

15 percent: 6 hours

25 to 30 percent: up to 8 hours

100 percent: 10+ hours

Tick Check

A tick check should be performed after field activities in potential tick habitats, before entering the field vehicle (you do not want to infest your field vehicle with ticks).

Have your field partner check your back; the backs of your legs, arms and neck; and your hairline. Shake off clothing as thoroughly as possible before entering the vehicle.

Once the field day is completed, repeat this procedure and perform a thorough self-check at the end of the day, search your entire body carefully for ticks, (particularly the groin, armpits, neck and head), and shower.

Tick Removal

If a tick has embedded itself into the skin, remove the tick, preferably using a Tick Removal Kit, if available.

The tick should be removed quickly, the sooner it is removed the less likely the transmission of potentially infectious organisms, if it is carrying them.

The tick should be removed cleanly, to prevent the bite wound from becoming infected.

The tick should be removed intact, to prevent infecting the tick's fluids into the bite wound, which may contain infectious organisms. In addition, if intact, the tick may be assessed to determine if it is carrying infectious organisms (see procedures below).

Use pointed precision tweezers. Cosmetic tweezers with wide, flat ends may crush the tick, increase the potential of the transmission of potentially infectious organisms if the tick is carrying them, and make the wound worse. Choose un-rasped fine-pointed tweezers whose tips align tightly when pressed firmly together.

After disinfecting the area first, grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure.

Do not twist or jerk the tick as this may cause the tick's mouth parts to break off and remain in the skin. If this happens, remove the mouthparts with tweezers, and consult your healthcare provider if infection occurs.

Do not grasp, squeeze, crush, or puncture the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.

Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin.

Place tick in a zip lock bag in the event that management or the health-care provider asks for analysis of the tick.

Thoroughly disinfect the bite wound and wash your hands with soap and water.

Tick Bite Treatment

Tick bites should be treated with first aid. Clean and wash hands and disinfect the bite wound site before and after removing the embedded tick. Monitor the site of the bite for the appearance of a rash or early tick-borne illness symptoms beginning 3 to 30 days after the bite.

7.11 Lone Worker / Working Alone

7.11.1 General

The purpose of this section is to establish methods to maintain the safety of personnel who are working alone. This includes providing a method to identify potential hazards, pre-planning to eliminate or protect against these hazards, establishing itineraries and communication plans, and responsibilities for plan implementation and activities. Concern for the lone worker is fundamental to Burns & McDonnell's responsibility to providing a safe workplace to all employees. Effective risk assessment can play a major role in controlling or eliminating risks associated with health, violence, travel, or level of work experience.

7.11.2 Definitions

Effective Means of Communication – Radio, telephone (landline or cellular) or other electronic communication device

Hazard Assessment – A documented review of working conditions and foreseeable emergency situations, e.g. fire, equipment failure, illness, and accidents in all situations where employees may be working alone and identification of the mitigation and controls necessary to assure worker safety.

Imminent Danger – A danger that is not normal for that occupation. A danger under which a person engaged in that occupation would not normally carry out his/her work

Lone Worker – Persons are considered to be a lone worker if they have neither visual nor audible communication with someone who can summon assistance in the event of an injury or illness. Some examples of times when personnel might work alone are the beginning and end of flexible working periods, holidays, and weekends and after hours.

7.11.3 Hazard Assessment

All employees who will have to work alone must fill out an Activity Hazard Analysis (AHA) prior to performing the work. The AHA shall identify and document existing or potential hazards arising from the conditions and circumstances of the work, shall address hazards and identify control measures in order to minimize risk associated with working alone, and shall specify procedures for emergency response including provisions for contacting appropriate local officials. The hazard assessment will identify specific criteria to determine when an employee search is necessary cover all aspects of the work at hand and countermeasure that need to be put in place to minimize the risk associated with the work.

This written hazard assessment will document and be used to communicate that assessment to all affected workers. The hazard assessment will address hazards and identify control measures in order to minimize risk associated with working alone. The AHA shall be reviewed with the employee's department head or designee as they will be communicating to them during their work activity.

Any type of field work (day, overnight, remote or not) requires the completion of a trip itinerary by the work supervisor. The trip itinerary must be posted in the site office and a copy should be taken into the field. Workers and supervision should be familiar with their responsibilities prior to any field work being conducted.

Note: When a danger is judged to be imminent due to work being done by a lone worker, postpone the work and put mitigation procedures in place. Perform the work at such time that the risk(s) can be effectively controlled or eliminated.

7.11.4 Communications

The employee shall make contact with the appropriate authorities prior to commencing work operations informing them of the future work and the details of the work scope.

Employees will carry an appropriate communication device that, no matter where the employee is located, can communicate back to their supervisor for checking in at a minimum of every two hours or more frequently if defined by the risk assessment of the AHA. A back up means of communication shall also be carried by the employee in case an unforeseen event happens to the primary means of communication. The selected communication shall be readily available (easily within the immediate reach) of the employee and shall be tested prior to the start of work to verify that it effectively operates in the area/environment.

When the employee calls their supervisor they shall communicate their current location and direction they are heading, wellbeing, and estimated time until completion of their work assignment. The supervisor shall document this information during each call.

If the employee misses a scheduled call the supervisor shall attempt to make contact with the employee. If after a reasonable amount of time the supervisor cannot make contact with the employee, then the supervisor shall contact the appropriate authorities and report the employees last known location and the direction the employee would be traveling to enable the authorities to begin a search for the employee.

If effective means of communication is not practicable or readily available at the work site, the company shall ensure that there is a minimum of two people dispatched to the job, or that a system is in place so that the worker is visited at regular set intervals, or that the worker contacts a company representative on regular set intervals.

7.11.5 Training

Instruction and training help ensure that staff understands the risks and required safety precaution associated with their work. Training should include, but is not limited to:

Burns & McDonnell Work Alone standard

Identification and participation in hazard assessment

Requirements and limitations of working alone situation

Use and maintenance of any required personal protective equipment

Instruction to perform tasks safely

7.12 Project Site Ergonomics and Manual Material Handling

7.12.1 General

Some of the most common injuries in construction are the result of job demands when workers must often lift, stoop, kneel, twist, grip, stretch, reach overhead, or work in other awkward positions to do a job. Repeated or continual exposure to one or more of these factors initially may lead to fatigue and discomfort. Over time, injury to the back, shoulders, hands, wrists, or other parts of the body may occur. Injuries may include damage to muscles,

tendons, ligaments, nerves, and blood vessels. These workers are at risk of developing a work-related musculoskeletal disorder (WMSD). These risks can be reduced by performing a hazard analysis of the job focusing on the interaction between the worker's capabilities and the work demands and providing appropriate countermeasures.

7.12.2 Goals

The goals of construction ergonomics are to assure that jobs and tasks can be performed by the workers in a safe, efficient, effective and pain-free manner, achieve those interactions between the work and the worker that will optimize productivity, and preserve the safety and health of the workforce.

7.12.3 Ergonomic Concerns (What to Look for)

The ergonomic concerns during construction include, but are not limited to the following:

Repetitive motions

Examples are bending and lifting, twisting, reaching

Awkward postures

Examples are low headroom, restricted accessibility, twisting, kneeling, squatting, standing, sitting in one position too long, reaching and lifting –low or high, load obscuring the carriers vision, static posture where fixed positions are maintained for extended periods

Forceful exertions (Weight places stress on the back at a 10:1 ratio)

Lifting heavy materials or equipment (>50lbs.)

Carrying heavy materials or equipment

Lifting or carrying awkward or odd shapes, or load instability

Pressure points

Examples are grasping [or contact from] loads, leaning against parts or surfaces that are hard or have sharp edges

Environmental issues

Examples are temperature and humidity, vibration, lighting, air movement, or the walking surface and path where the object is to be carried.

Stress – tense muscles are more susceptible to strains and sprains

7.12.4 Hazard Assessment - PTA

Before manual lifting/carrying is performed, a hazard assessment must be completed. This assessment can be included in the daily PTA using Burns & McDonnell Safety Form C-10. Supervisors must also periodically evaluate work areas and employees' work techniques to assess the potential for and prevention of injuries as well as evaluate any new operations to engineer out hazards before work processes are implemented.

The pre- task assessment must consider the ergonomic concerns noted above and implement hazard mitigation and controls for the identified hazards. These controls should follow the hierarchy of controls, some examples include the following:

Engineering improvements

Provide mechanical devices, tools, or equipment

Ergonomically designed handles and grips

Tool balancers / supports

Benches and material stands / lift tables to maintain material near waist height and in lifting zone

Tool and/or tooling extensions

Mechanical lifting and/or transporting equipment

Aerial lift usage to get personnel closer to work

Dividing the load into smaller units, repackaging

Redesigning the packaging with lifting grips or using non-slip materials

Automatic material feeds

Administrative improvements

Proper lifting techniques

Using a two-person lift

Alternate heavy tasks with light tasks.

Provide variety in jobs to eliminate or reduce repetition (i.e., overuse of the same muscle groups).

Adjust work schedules, work pace, or work practices.

Provide recovery time (e.g., short rest breaks).

Modify work practices so that workers perform work within their power zone (i.e., above the knees, below the shoulders, and close to the body).

Rotate workers through jobs that use different muscles, body parts, or postures.

Working at ground level rather than overhead

PPE

Anti-vibrations gloves

Slip resistant coated gloves

Kneeling pads / knee pads / kneeling creepers

7.12.5 Training

Training of workers should include the general principles of ergonomics, recognition of ergonomic hazards and types of injuries, the project procedures for reporting hazardous conditions, and the methods and procedures for early reporting of injuries. Additionally, job specific training should be given on safe lifting and work practices, and ergonomic hazards and controls. This training should include planning the lift/carry and injury prevention/reduction techniques.

Plan the lift

Where use of lifting equipment is impractical or not possible, two man lifts must be used.

Use manual lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, carts, or hoists

Utilize other engineering controls such as conveyors, lift tables, cranes and hoists

8 Process Safety Management and HAZWOPER

8.1 Process Safety Management of Highly Hazardous Chemicals

Process Safety Management of Highly Hazardous Chemicals

Application

Worker Participation

Process Safety Information

Process Hazard Analysis

Operating Procedures

Training

Contractors

Pre-Startup Safety Review

Mechanical Integrity

Hot Work Permit

Management of Change

Incident Investigation

Emergency Planning and Response

Compliance Audits

Trade Secrets

Appendix A List of Highly Hazardous Chemicals, Toxics and Reactives

Appendix B Block Flow Diagram and Simplified Process Flow Diagram

Diagram (a) Block Flow

Diagram (b) Process Flow

Appendix C Compliance Guidelines and Recommendations for Process Safety Management

Introduction to Process Safety Management

Worker Involvement in Process Safety Management

Process Safety Information

Process Hazard Analysis

Operating Procedures and Practices

Worker Training

Contractors

Pre-Startup Safety

Mechanical Integrity

Non-Routine Work

Managing Change

Investigation of Incidents

Emergency Preparedness

Compliance Audits

Appendix D - Sources Of Further Information (Non-mandatory)

8.1.1 Hot Work Permit

The workplace shall issue Burns & McDonnell Health & Safety Form C-7 “Work Permit” for hot work operations conducted on or near a covered process.

The permit shall document that the fire prevention and protection requirements have been implemented prior to beginning the hot work operations; it shall indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed.

The permit shall be posted at the site until completion of the hot work operations.

8.1.2 Incident Investigation

Each incident which resulted in (Accident), or could reasonably have resulted (Near Miss) in a catastrophic release of highly hazardous chemical in the workplace shall be investigated using the Burns & McDonnell Health & Safety Form C-2 “Incident / Accident Investigation Report”.

The incident shall be reported in conformance with Chapter 3 – Program Administration, part (3) “Reporting Requirements”, the investigation shall be initiated as promptly as possible, with the report due to Corporate Health & Safety not later than 24 hours following the incident.

The incident investigation team shall consist of at least one person knowledgeable in the process involved, including a contract worker if the incident involved work of the contractor, and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident.

The report shall be reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract workers where applicable.

Incident investigation reports shall be retained for five years.

8.1.3 Emergency Planning and Response

Burns & McDonnell Health & Safety Form E-1 “EAP and Fire Prevention Plan” shall be completed and made available on site.

8.2 HAZWOPER

Hazardous Waste Operations and Emergency Response

Scope, Application, and Definitions

Health & Safety Program

Site Characterization and Analysis

Site Control

Training

Medical Surveillance

Engineering Controls, Work Practices, and Personal Protective Equipment for Worker

Protection

Monitoring

Informational Programs

Handling Drums and Containers

Decontamination

Emergency Response by Workers at Uncontrolled Hazardous Waste Sites

Illumination

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9.1 General Requirements

9.1.1 Application

If a hazard requires affected workers to use PPE - all workers within 10' of the (originally) affected workers shall be required to wear equivalent protection.

9.1.2 Hazard Assessment and PPE equipment Selection

The workplace shall verify that an activity hazard analysis (AHA) has been performed through a written certification that identifies the workplace evaluated; the person certifying that the AHA has been performed; the date(s) of the AHA; and, which identifies the document as an AHA. Burns & McDonnell Health & Safety Form C-12 "Activity Hazard Analysis".

The subcontractor shall assure that the worker is instructed in and uses protective equipment in accordance with the manufacturer's instructions and the hazard assessment.

The subcontractor shall assure that all required safety devices and safeguards, whether employer or worker provided, including personal protective equipment for the eyes, face, head, hand, foot, and extremities (limbs), protective clothing, respiratory protection, protective shields and barriers, comply with the applicable standards, are adequate for the hazards, and are maintained in a safe, sanitary condition.

Protectors shall be of such design, fit and durability as to provide adequate protection against the hazards for which they are designed. They shall be reasonably comfortable and shall not unduly encumber the worker's movements necessary to safely perform his or her work.

Defective and damaged equipment shall be removed from service until repaired or destroyed. Defective or damaged personal protective equipment shall not be used.

9.1.3 Training

Initial

Training shall be provided to each worker required to use PPE.

Each worker shall demonstrate an understanding of the training and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

Documentation of training shall be submitted using Burns & McDonnell "Certification of Training" Health & Safety Form C-9.

Each such worker shall be trained to know the following:

- When PPE is necessary;

- What PPE is necessary;

- How to properly don, doff, adjust, and wear PPE;

- The limitations of the PPE; and,

- The proper care, maintenance, useful life and disposal of the PPE.

Re-Training

When there is reason to believe that any affected worker who has already been trained does not have the understanding and skill required to properly use the PPE, they shall be retrained such that they can demonstrate their ability and understanding of the training items listed above.

Circumstances where retraining is required include, but are not limited to, situations where:

Changes in the workplace render previous training obsolete; or

Changes in the types of PPE to be used render previous training obsolete; or

Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

9.2 Body Protection

9.2.1 General

The minimum general protection shall be full length work pants, coveralls, jeans, etc. and a work shirt with a minimum 4" sleeve length. Tank tops and sleeveless shirts are not allowed.

Clothing material which is in direct contact with the skin is considered a primary personal protection zone when performing a hazard assessment

Primary personal protection zone clothing includes socks, underwear, T-shirts, shirt or blouse, and pants or overalls. All primary personal protection zone apparel must be in good repair -- frays and holes are not acceptable.

NOTE: 100% cotton clothing is not a PPE item.

Workers exposed to the hazards of flames or electrical arc shall not wear clothing that, when exposed to flames, electric arcs, or hot piping, could increase the extent of injury.

Workers shall wear appropriate clothing when exposed to welding operations, poisonous plants, insects, hazardous chemicals or when scratches, abrasions, or burns could occur.

Loose clothing or jewelry shall not be worn near rotating equipment.

Clothing shall not be worn if they are torn or have holes. If damaged at work, precautions should be taken to reduce employee's exposure to injuries for the completion of the shift.

Exposed jewelry shall not be worn near exposed energized equipment.

The bottoms of pant legs shall be taped, bloused, or otherwise secured while working near power augers and mowing equipment.

9.2.2 Chemical resistant

Coveralls and splash suits shall be required as determined by the hazard assessment.

9.2.3 FRC and/or Arc Flash Clothing

FRC and/or Arc Flash Resistant with ratings determined by the hazard assessment

Workers working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.

Electric arc flash protection shall be provided for any person who enters the flash protection zone. They must wear flame-resistant clothing and PPE, based on the incident exposure associated with the specific task. Refer to NFPA 70E for specific Hazard Risk Classifications and clothing/equipment requirements.

Synthetic clothing such as acetate, nylon, polyester, rayon, either alone or in blends with cotton, may not be worn while in the flash protection zone.

Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected or tested.

9.2.4 Vests - heating and/or cooling,

Vests with internal pockets which are used to hold the cooling or heating packets which assist with controlling the core body temperature.

9.2.5 Outerwear

Raincoat/Raingear

Cold Weather Wear – A. Exterior garments include coats, jackets, overalls, coveralls, parkas, etc., which are worn over the primary work clothing.

Outer apparel shall meet the minimum requirements for the hazard rating, e.g. FRC 2 required for working in the “zone”, then outmost apparel shall be rated at FRC2 or higher.

9.2.6 High Visibility apparel rated for traffic zone

High visibility apparel meeting, at a minimum, ANSI/ISEA 07-2004 Performance Class 2 requirements, shall be worn by workers (such as, but not limited to, signal persons, spotters, survey crews, and inspectors) whenever:

Workers are exposed to vehicular or equipment traffic at speeds up to 45 mph (72.4 kph)

There is limited visibility of workers exposed to mobile/heavy equipment operations, vehicles, load handling, or other hazardous activities

Reduced visibility conditions exist due to weather conditions, illumination, or visually complex backgrounds where ambient visibility is at least 50ft (15.2 m); or

Workers are involved in activities in close proximity to vehicular traffic with no protective barriers

The following conditions require the determination (based on risk assessments) if Performance Class 3 high-visibility apparel is needed

Exposed to vehicular traffic in excess of 50 mph (72.4 kph)

Reduced visibility conditions exist due to weather conditions, illumination, or visually complex backgrounds where ambient visibility is less than 50 ft. (15.2 m); or

Workers are performing tasks which divert attention from approaching vehicular traffic, traveling in excess of 50 mph (72.4 kph), as posted

9.3 Head Protection

9.3.1 General Requirements

Affected workers shall wear a protective helmet in all work areas other than in the office/trailers.

The protective helmet designed to reduce electrical shock hazard shall be worn by affected workers when near exposed electrical conductors.

Workers name (first and last) shall be clearly visible on the front of the hard hat.

Burns & McDonnell projects shall require the use of a Class E/G hard hat

The Hard hats shall not be reversed even if suspension is reversed.

9.3.2 Criteria for Protective Helmets

Protective helmets shall comply with ANSI Z89.1-1986, American National Standard for Personal Protection-Protective Headwear for Industrial Workers-Requirements.

9.4 Occupational Foot Protection

9.4.1 Criteria for Protective Footwear

Each affected worker shall use protective footwear in all work areas other than in the office/trailers

Protective footwear shall comply with:

ASTM F2413-11 Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear

Footwear certified as meeting ASTM F2413-11 must first meet the requirements of Section 5.1 Impact Resistant Footwear and Section 5.2 Compression Resistant Footwear.

Additional requirements such as metatarsal protection, conductive protection, electric hazard resistance, static dissipative protection and protection against punctures can be met.

ASTM F2412-11 Standard Test Methods for Foot Protection,

Footwear shall be of leather, or equivalent non-porous material,

Footwear shall extend above the ankle (minimum 6" height) and have a defined heel.

9.5 Eye and Face Protection

9.5.1 General Requirements

Each affected worker shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Each affected worker shall use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable.

Each affected worker who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.

Affected worker shall use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

9.6 Hearing Protectors

9.6.1 General Requirements

Hearing protection will be made available at no cost to all workers whose exposure equals or exceeds 85 dBA TWA and required for all workers who work in areas where exposure may equal or exceed the limiting values in [OSHA Standard 1910.95 App A, Table G-16A](#).

If a worker has experienced an STS, the worker is required to wear hearing protection if the noise exposure equals or exceeds 85 dBA.

Workers will be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors.

Hearing protectors will be replaced as necessary.

Each hearing protector available for selection must have a Noise Reduction Rating (NRR) sufficient to reduce the noise level below 90 dBA.

Workers required to wear hearing protectors will receive training in the proper use, care, and fitting of hearing protection issued to them.

Hearing protection will be periodically evaluated to ensure that the hearing protection attenuates noise levels to less than 90 dBA, or less than 85 dBA for workers who have had a threshold shift. Methods specified in Appendix B of the OSHA Occupational Noise Exposure [Standard](#) will be used.

The adequacy of hearing protector attenuation will be re-evaluated whenever worker noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. More effective hearing protectors will be provided, if needed.

9.6.2 Training

All workers who are exposed to noise at or above a TWA of 85 dBA will be included in an annual hearing conservation training program.

Initial training must be provided upon assignment to a job that has been identified as having an exposure level above the 85 dBA TWA. Training must be provided annually thereafter.

9.7 Hand Protection

9.7.1 General Requirements

Contractor / subcontractor employees shall be required to use appropriate hand protection at all times while on the project site, with exception given for field project offices and lunch / break areas, providing work activity requiring hand protection is not being performed.

9.7.2 Selection

Appropriate hand protection shall be selected based upon evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, the hazards

and potential hazards identified, and in accordance with the minimum requirements of the Hand Protection Reference Guide.

Table 9 - 1 Hand Protection Reference Guide	
Activity / Exposure	Glove Type
Light lifting, moving boxes, etc.	Cotton, Leather, or cut-resistant
Handling lumber, steel, rebar, etc.	Leather or cut-resistant
Exposure to sharp edges, glass, box cutters, etc.	Cut-resistant
Exposure to open flame or molten metal, etc.	Insulating gloves w/ gauntlet cuff (welding glove, etc.)
Low Temperature	Insulating gloves
Electrical	Use appropriate PPE for high voltage - NFPA 70E
Chemicals	Refer to SDS / manufacturer recommendations

9.8 Respiratory Protection

9.8.1 General

Due to the respiratory hazards associated with chemical and dust exposures, respiratory protection is a crucial part of the Health and Safety Program. At no time shall an employee be forced to work in a hazardous situation without proper respiratory protection. Respiratory protection shall be in compliance with federal, state and local regulations. (29 CFR 1910.134 & 1926.103)

The nature of the hazard must be identified to make sure that and overexposure does not occur. Relevant factors include oxygen deficiency, physical and chemical properties of the hazard, physiological effects on the body, concentrations of the toxic substances, the Permissible Exposure Limits (PEL) and warning properties (odor, skin or upper respiratory irritation).

When feasible engineering controls are not enough to control airborne hazardous materials, the contractor shall provide respiratory protective equipment for its employees. NIOSH, OSHA and EPA safety criteria will be used as guidelines for selecting the equipment. Only NIOSH approved respiratory protective equipment shall be used. Employees who are required to use the respirators will be medically screened, properly fit-tested, fitted with the appropriate respirator and filters, and trained.

The effective use of a respirator depends on an individual's ability to wear a respirator, which must be determined by a physician or other licensed health care professional (PLHCP).

Burns and McDonnell employee owners working at the project site who are required to utilize respiratory protection shall refer to the Burns & McDonnell Policy Manual, Chapter 9 for respiratory protection program requirements.

Burns & McDonnell employee owners are not allowed, under any circumstances, to enter any work area containing an atmosphere with unknown concentrations of a hazardous air contaminant or a measured atmosphere determined to be Immediately Dangerous to Life or Health (IDLH).

The IDLH levels for many substances are published by the National Institute for Occupational Safety and Health (NIOSH). Air monitoring must be performed to determine air contaminant levels prior to respiratory protection equipment selection and prior to entry into an unknown concentration during routine entry or emergency releases of hazardous chemicals.

9.8.2 Duration of Respiratory Protection Use

The length of time a respirator will be worn by an employee owner must be evaluated. This is very important when using a self-contained breathing apparatus (SCBA) in which the air supply is limited, or when using an air-purifying respirator whose filter cartridges can become clogged or saturated to the point that they do not protect the worker from gases and vapors. Therefore, a respirator cartridge change-out schedule will be implemented depending upon the type and concentration of chemicals expected to be present

9.8.3 Selection of Respirators

The two general types of respirators typically used include:

Air-purifying respirators use cartridges or particulate air filters to remove contaminants from the breathing zone.

Air-supplying respirators use supplied air from compressed air tanks or air compressors.

Respirators for IDLH atmospheres. Even with an appropriate respirator *under no circumstances* shall an IDLH atmosphere be entered.

9.8.4 Assigned Protection Factors (APF)

The protection afforded by respirators depends on the seal of the face-piece to the face; no leakage should be evident around valves and through or around cartridges or canisters. Depending on these criteria, the degree of protection may be ascertained and a relative safety factor assigned. Protection factors are only applicable if all elements of an effective respirator program are in place and being enforced. APFs are used to determine what type of respiratory protection is required to be worn depending upon the hazardous atmosphere. Respirators may be worn in atmospheres where the contaminants are less than the APF when multiplied by the Occupational Safety and Health Administrations Permissible Exposure Limit.

Table 9 - 2 Respirator Assigned Protection Factor ⁵		
Type of Air Purifying Respirator ^{1,2}		Assigned Protection Factor, APF
Maintenance-Free and Dual Cartridge-Half Face		10 ³
Maintenance-Free and Dual Cartridge-Full Face		50 ⁶
Powered Air Purifying	Loose Fitting Face Piece	25
	Half Mask	50
	Full Face Piece	1000
	Helmet / Hood	25 - 1000 ⁴
Notes: 1. Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration. 2. The assigned protection factors in Table 9-2 are only effective when the employer implements a continuing, effective respirator program, including training, fit testing, maintenance, and use requirements. 3. This APF category includes filtering facepieces, and half masks with elastomeric facepieces. 4. The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25. 5. These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134(d)(2)(ii). 6. To Achieve an APF of 50, a quantitative fit test is required		

9.8.5 Fit Testing

Employees whose work includes tasks that require respirator use will be fit tested to determine if a proper face-piece-to-face seal has been accomplished. However, they must first be medically cleared to wear a respirator.

If a successful fit-test cannot be achieved, alternate sizes and manufacturer's equipment will be tried and tested. If a proper seal remains unattainable, the employee may be offered a powered-air-purifying-respirator (PAPR), a supplied-air respirator, or will not be allowed to perform work requiring respiratory protection

9.8.6 Field Tests

Positive and negative pressure fit tests are used to check the seal of the respirator being used in the field. Both tests must be performed each time a respirator is put on and prior to entering a contaminated area. Although the positive and negative tests are essential to a good respiratory protection program and should always be used prior to entering an area of exposure, they are solely used as a field test and cannot be substituted for the qualitative or quantitative fit test.

9.8.7 Inspection, Cleaning, Maintenance, and Storage

Respirators must be stored in a clean area unlikely to be contaminated by the work in progress. They should be stored in a secure atmosphere, such as a plastic bag, in a way that does not deform the shape of the face-piece.

Employees will be responsible for the inspection, cleaning and maintenance of their own air-purifying respirators. The respirators will be inspected by the employee prior to and after each use. Cleaning and disinfecting will be performed after each day's use (or sooner if necessary). Only employees who have completed the appropriate training courses and are qualified can perform maintenance on respirators.

9.8.8 Training and Information

Training shall be provided prior to requiring the worker to use a respirator in the workplace. At a minimum, all employees using respirators will be trained in basic respirator practices, their Respiratory Protection Program, the hazards of the job and related topics required by the OSHA regulations in 29 CFR 1910.134. This training shall be documented via Burns & McDonnell Safety Form I-1 "Respirator Training Record".

Respirators are effective only when they are fitted to the employee owner and worn properly. Since proper use often depends upon the wearer's motivation, it is important that the need for the respirator be explained fully.

9.9 Personal Hydrogen Sulfide Monitors (Reserved)

9.10 Personal Floatation Devices

9.10.1 Working Over or Near Water, Barges and Boats

Employees when working over or near water, where the danger of drowning exists shall be provided with U.S. Coast Guard (USCG) - approved personal flotation devices.

Inspect personal floatation devices before and after each use for defects which would alter their strength or buoyancy.

Do not use defective units: remove from site and destroy.

Ensure a 30 in. diameter life ring with 150 ft. of (3/8" dia. – 600 lb. capacity) line is readily available and that travel distance between the life rings does not exceed 200 ft.

All boats must carry one wearable (Type I, II, III or V) USCG - approved PFD for each person onboard or being towed. All personnel in the boat must wear a USCG approved Lifejacket or Personal Flotation Device.

All protective equipment must be worn in a manner that does not create a hazard in itself (loose straps, catch hazards, wrong sized etc.) Everyone who uses personal protective equipment shall be trained in its use, operation and maintenance.

9.10.2 Personal Flotation Devices

All PFDs must be:

- U. S. Coast Guard-approved

- In good and serviceable condition.

- Readily accessible.

Readily accessible means you must be able to put the PFD on in a reasonable amount of time in an emergency.

PFDs should not be stowed in plastic bags, in locked or closed compartments or have other gear stowed on top of them.

Of the proper size for the intended wearer. Sizing for PFDs is based on body weight and chest size.

Life rings (rope attachment not required) and ring buoys (rope attachment required) shall be USCG-approved; shall have at least 70 ft. of 3/8 in of attached solid braid polypropylene, or equivalent. Throw bags may be used in addition to life rings or ring buoys. Life rings or ring buoys shall be readily available.

All wearable PFDs shall be of a highly visible orange/reddish color. Each PFD shall have at least 31 in² of retro-reflective material attached to its front side and at least 31 in² on its back side, per USCG requirements

Each PFD shall be equipped with a USCG-approved automatically activated light. Lights are not required for PFDs on projects performed exclusively during daylight hours.

Before and after each use, the PFD shall be inspected for defects that would alter its strength or buoyancy.

Throwable devices (Type IV PFD).

On USCG-inspected vessels, ring buoys are required to have automatic floating electric water lights.

On all other floating plant and shore installations, lights on life rings are required only in locations where adequate general lighting (e.g., floodlights, light stanchions) is not provided. For these plants and installations, at least one life ring, and every third one thereafter, shall have an automatic floating electric water light attached.

All PFDs shall be equipped with retro-reflective tape in accordance with USCG requirements.

TYPE I: Offshore Life Jacket

These vests are geared for rough or remote waters where rescue may take a while.

They are excellent for flotation and will turn most unconscious persons face up in the water.

TYPE II: Near-Shore Vest

These vests are good for calm waters and fast rescues.

Type II vests may lack the capacity to turn unconscious wearer's face up.

TYPE III: Flotation Aid

These vests or full-sleeved jackets are good for calm waters and fast rescues.

They are not for rough waters since they will not turn a person's face up.

TYPE IV: Throw-able Device

To be acceptable, Type V - PFDs must be used in accordance with their label

These cushions or ring buoys are designed to be thrown to someone in trouble.

They are not for long hours in rough waters, non- swimmers or the unconscious.

TYPE V: Special-Use Device

These windsurfing vests, deck suits, hybrid PFDs and others are designed for specific activities, such as kayaking or water skiing.

Figure 9 - 1 Personal Floatation Device Type Classification

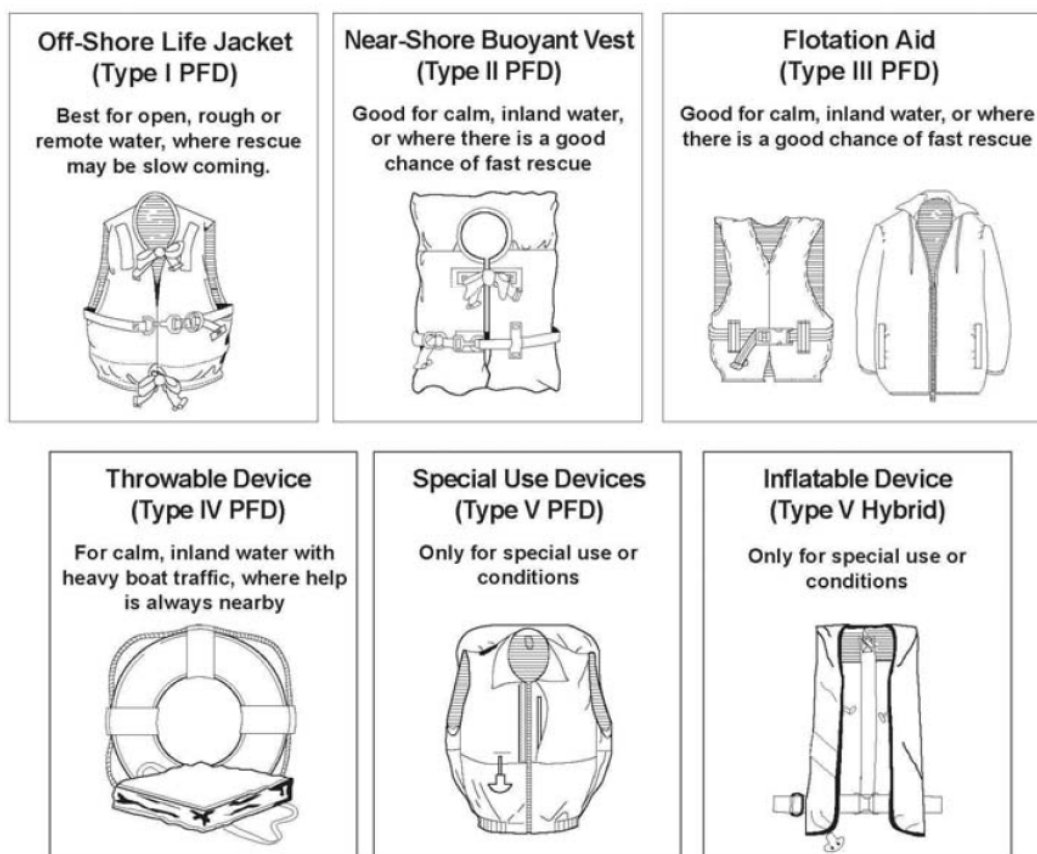


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10.1 Excavation Requirements

10.1.1 Determination of Requirements

Site specific excavations requirements shall be determined (and followed) using Burns & McDonnell Site Specific Excavation Plan Safety Form J-1.

10.1.2 Inspection by Competent Person

Any excavation which is bodily entered by any worker must first be inspected by a competent person using Burns & McDonnell Excavation Inspection Safety Form J-2. The form shall be completed at the start of each shift, posted at the entrance to the excavation and updated as often as necessary.

10.2 Requirements for Protective Systems

10.2.1 Protection of Workers in Excavations

Burns & McDonnell Selection of Protective Systems Safety Form J-5 shall be used to determine requirements.

10.3 [Appendix A - Soil Classification](#)

Basis of classification - The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using the tests described in Burns & McDonnell Soil Classification Safety Form J-3. This completed form shall be transmitted to Burns & McDonnell as documentation of the soil classification.

Soil classification - Soil and rock deposits shall be classified in accordance with [appendix A](#) of this chapter. [Burns & McDonnell Soil Classification Safety Form J-3](#) shall be transmitted to Burns & McDonnell as documentation of the soil classification.

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11.1 Medical Services and First Aid

11.1.1 Incident Accident Injury Tracking Log

The Burns & McDonnell “Incident Accident Injury Tracking Log” Safety Form K-1, log will be utilized to track all first aid cases on the project.

11.1.2 First Aid Kits

First aid kits shall be checked by the employer before being sent out on each job. While on the project site the first aid kits shall be inspected at least weekly to ensure that the expended items are replaced. The Burns & McDonnell “Weekly First Aid Kit Inspection” Safety Form K-2, shall be used to document the weekly inspections.

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12.1 Fire Brigades

12.1.1 Fire Brigades

Fire Brigades shall not be utilized. Trained workers are only authorized to combat fires at the incipient stage.

12.2 Flammable and Combustible Liquids

12.2.1 "Fire control for flammable or combustible liquid storage"

At least one portable fire extinguisher, having a rating of not less than 20-B units, shall be located outside of, but not more than 10 feet from, the door opening into any room used for storage of more than 60 gallons of flammable or combustible liquids.

At least one portable fire extinguisher having a rating of not less than 20-B units shall be located not less than 25 feet, nor more than 75 feet, from any flammable liquid storage area located outside.

At least one portable fire extinguisher having a rating of not less than 20-B:C units shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids.

12.3 Temporary Aboveground Storage Tanks

12.3.1 General requirements

Provide a completed initial installation checklist (Burns & McDonnell Safety and Health Form L-2, Initial Installation Checklist for Aboveground Flammable and Combustible Liquid Tanks) to the project manager for approval prior to installation of the temporary storage tank. The installation checklist includes items for the following:

- Storage Tank Design -Atmospheric

- Normal Venting for Tanks

- Emergency Relief Venting for Fire Exposure

- Tank System Corrosion Protection

- Foundations for and Anchoring of Tanks

- Location with Respect to Property Lines, Public Ways, and Important Buildings on the Same Property

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- Control of Spills from Aboveground Tanks

- Collision Protection for the tank(s)

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- Inspection and Maintenance

Prevention of Overfilling of Tanks

12.3.2 Inspection, Maintenance and Testing

The aboveground flammable and combustible liquid storage tank(s) shall be inspected monthly using Burns & McDonnell Safety and Health Form L-3, "Aboveground Storage and Dispensing Tanks Monthly Inspection Checklist". The checklist includes items for the following:

Identification markings

Labeling

Spill control and spill containment maintained for

Equipment is in good repair and safe operating condition

Alarms, interlocks, and controls are tested and working

Demarcation of hazard areas is in place

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14.1 General Requirements for Equipment

14.1.1 General

All equipment shall have a daily pre-use inspection performed prior to each shift of operation, using the appropriate Burns & McDonnell Safety form, e.g. Burns & McDonnell Safety form N-8 “Daily Construction Vehicle Pre-Use Inspection Checklist”, Burns & McDonnell Health & Safety Form N-5 “Daily Forklift Pre-Inspection” or Burns & McDonnell “Crane Inspection” Safety Forms N-1A or N-1B

All equipment operators shall be trained and qualified to operate the specific equipment

Operator’s license in accordance with OSHA (Burns & McDonnell Safety Form C-21 “OSHA Required Training and Training Guidelines” as identified on the Burns & McDonnell Safety Form C-9 “Certification of Training”

14.2 Cranes and Derricks

14.2.1 General

Superintendents, General Foremen, Foremen, or other members of management (persons supervising workers) shall not operate cranes on Burns & McDonnell projects.

14.2.2 Cranes and Derricks in Construction

14.2.3 Crane Inspection and Lift Plan Submittal:

An annual third party crane inspection shall be conducted and certification shall be submitted to Burns & McDonnell prior to the use of any crane on site. This inspection shall be performed by a qualified crane inspector or by a certified inspection service.

This procedure shall in no way eliminate any requirements set forth for crane inspections in the OSHA Standard 1926.1400.

Critical Lift plans shall be completed for all lifts that are over 20 tons, lifts that involve more than one crane, lifts are over an operating or occupied area, or the load to be lifted exceeds 75% of the crane manufacturer’s load rating chart for configuration of the crane. Burns & McDonnell Safety & Health Form N-2 “Critical Lift Plan” shall be used to document this information.

Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the job site Burns & McDonnell Safety & Health Form N-4 “Hand Signals”.

A competent person shall inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Competent persons shall be designated on Burns & McDonnell Safety & Health Form C-17 “Competent Person Designation”. Any deficiencies shall be repaired, or defective parts replaced, before continued use.

A third party annual inspection of the hoisting machinery shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. The employer shall maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment. No crane shall be used on a Burns & McDonnell project prior to transmittal of the inspection document to Burns & McDonnell.

14.2.4 General Requirements for Personnel Platforms

The use of a crane or derrick to hoist workers on a personnel platform is prohibited, except when the erection, use, and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or worksite conditions.

This use must be approved by Burns & McDonnell Corporate Safety & Health. The Burns & McDonnell Safety & Health Form N-3 “Suspended Personnel Platform Checklist” shall be completed and submitted to Burns & McDonnell for review and approval prior to use of the personnel platform.

14.3 Material Hoists, Personnel Hoists, and Elevators

14.3.1 Personnel Hoists

Following assembly and erection of hoists, and before being put in service, an inspection and test of all functions and safety devices shall be made under the supervision of a competent person designated to Burns & McDonnell by transmittal, Burns & McDonnell Health & Safety Form C17 “Competent Person Designation. A similar inspection and test is required following major alteration of an existing installation.

All personnel hoists shall be inspected and tested at not more than 3-month intervals. A certification record which includes the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; and a serial number, or other identifier, for the hoist that was inspected and tested shall be maintained onsite.

These hoists shall be inspected and maintained on a weekly basis, using Burns & McDonnell Health & Safety Form N3 “Suspended Personnel Platform Checklist”.

Whenever the hoisting equipment is exposed to winds exceeding 35 miles per hour it shall be inspected and put in operable condition before reuse.

14.4 Conveyors

14.4.1 General Requirements

Conveyors shall be locked out using the Burns & McDonnell Health & Safety Form G1 – Lockout Tagout Procedure or otherwise rendered inoperable, and tagged out with a Do Not Operate tag during repairs and when operation is hazardous to workers performing maintenance work.

14.5 Powered Industrial Trucks

14.5.1 Operator Training

Certification - The employer shall certify that each operator has been trained and evaluated. The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation. Documentation of the certification shall be transmitted to Burns & McDonnell via Burns & McDonnell Health & Safety Form C-9 “Certification of Training”. Additionally, all PIT operators shall carry on their person documentation of their training (card, hard hat sticker, etc.)

14.5.2 Maintenance of PITs

PITs shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily and documented via Burns & McDonnell Health & Safety Form N-5 “Daily Forklift Pre-Inspection”.

14.6 Rigging Equipment for Materials Handling

14.6.1 General

Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service. Inspections shall be documented using the Burns & McDonnell Health & Safety Form N6 "Rigging Inspection Record".

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15.1 Motor Vehicles Project Program

15.1.1 Coverage

This procedure covers all motor vehicles that operate on the project jobsite. All vehicles regardless of ownership, including employee owned or leased vehicles being used for company business; company rented or fleet vehicles; and Contractor vehicles, including but not limited to: automobiles, trucks, utility vehicles (gators, carts, mules, etc.)

15.1.2 Objective:

The primary objective of the motor vehicle project safety program is to prevent injuries, deaths and expenses related to vehicular accidents while operating at the jobsite.

15.1.3 General Requirements

All motor vehicles operating on the project site shall

Be checked using [Burns & McDonnell Safety & Health form O-1 "Vehicle Checklist"](#) at the beginning of each shift to assure that the equipment is in safe operating condition. Defects shall be corrected before vehicles are placed in service

Have a service brake system, an emergency brake system, and a parking brake system, and shall be maintained in operable condition.

Be equipped with at least two headlights and two taillights in operable condition.

Have brake lights in operable condition.

Be equipped with an operable audible warning device at the operator's station.

Have seats adequate for the number of workers to be carried.

Have [Seat belts](#) and anchorages installed.

Be backed in to parking spots

All [equipment](#) shall have an un-obstructed view to the rear unless:

The vehicle has a reverse signal alarm or:

The vehicle is backed up only when an observer signals that it is safe to do so.

Or the vehicle horn must be sounded before backing the vehicle.

All vehicles with cabs shall be equipped with windshields, and operable windshield washers and powered wipers.

Cracked and broken glass shall be replaced.

Vehicles shall be equipped with operable defogging or defrosting devices.

All [hauling vehicles](#) shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

Tools and material shall be secured to prevent movement when transported in the same compartment with workers.

15.2 All Subcontractor Site Supervision

Superintendents, General Foremen, Foremen, or other members of management (persons supervising workers) shall not operate equipment (e.g. material handling, monitoring, etc.) on Burns & McDonnell projects

15.3 Dump Trucks

15.3.1 Operator's station of dump trucks shall be clear of dump area.

Dump trucks shall be capable of being locked in position to prevent accidental lowering of the body.

Operating levers shall be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.

15.4 Pneumatic Rubber Tired Vehicles

All pneumatic rubber-tired motor vehicles shall be equipped with fenders.

Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

15.5 Earthmoving Equipment

15.5.1 General

All equipment on Burns & McDonnell projects shall be equipped with roll over protective structures.

15.5.2 Audible alarms

All bi-directional equipment, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.

Earthmoving or compacting equipment which has an obstructed view to the rear shall not be used in reverse gear unless the equipment has a reverse signal alarm or a worker (spotter) signals that it is safe to do so.

Scissor points on equipment shall be guarded.

Where necessary for safe operation a spotter or spotters, equipped with Hi-visibility vests, flags, horns or the like, shall be used for moving equipment.

15.6 Vacuum Truck

15.6.1 General

Before starting any vacuum truck operations— make sure that workers understand the following:

The hazards associated with the liquids or substances to be vacuumed or transferred

Sources of ignition

Flammable atmospheres

Toxic vapor PEL and STEL limits

The evacuation and rescue procedures in the event of a toxic gas leak s

Specific site hazards which may affect the truck operation the safe operation of the vacuum equipment

15.6.2 Bonding and Grounding

The complete vacuum transfer system needs to be bonded so that there is a continuous conductive path from the vacuum truck through the hose and nozzle to the tank or source container and grounded to dissipate stray currents to earth (ground).

Prior to starting transfer operations, vacuum truck need to be grounded directly to the earth or bonded to another object that is inherently grounded (due to proper contact with the earth) such as a large storage tank or underground piping

15.6.3 Operations

The operator shall ensure that:

Air quality monitoring at the work site is conducted at such locations as the discharge area of the vacuum truck venting hose. Testing should be completed by a qualified person using properly calibrated and adjusted detectors.

First aid is readily available on site in the event of exposure to toxic gas.

The manufacturer's instructions are consulted to confirm that the vacuum equipment is designed for the particular transfer operation.

All equipment—including tank and vacuum trucks, and pumping equipment—is in safe working condition.

The tank interior, filter baghouse, and cyclone separators are clean and free of any substances that may react with the liquids to be vacuumed or transferred.

The Vacuum hose is constructed of conductive material or thick walled hose with imbedded conductive wiring, shall be used when transferring flammable and combustible liquids when the potential for a flammable atmosphere exists in the area of operations.

Conductive hose shall provide suitable electrical conductance less than or equal to 1 mega ohm per 100 feet (as determined by the hose manufacturer).

Thin walled metallic spiral-wound conductive hoses should not be used because of the potential for electrical discharge through the thin plastic that covers the metal spiral.

Any required permits and inspect for vacuum trucks, equipment, and loading/off-loading sites have been obtained to assure safe operations

Smoking, or any other source of ignition, shall not be permitted within at least 100' (depending on local procedures and atmospheric conditions) of the truck, the discharge of the vacuum pump, or any other vapor source

To prevent exposure to toxic gases during transfer operations:

Vacuum trucks shall not enter into tank dike area until such areas have been checked/monitored and rendered safe:

Vacuum trucks cargo tanks shall be depressurized

All personnel shall leave the vacuum truck cab during loading and off-loading operations

When transferring flammable liquids or hazardous materials, vacuum truck operators shall remain positioned between the vacuum truck and the source or receiving tank, vessel, or container and within 25' of the vacuum truck throughout the duration.

Vacuum truck operators shall monitor the transfer operation and be ready to quickly close the product valve and stop the pump in the event of a blocked line or release of material through a broken hose or connection;

Never transfer fluids from one truck to another unless it has been established that no chemical reaction will occur.

Position trucks to minimize exposure to any discharged gases and fumes.

Ensure that discharge lines are long enough and large enough for safe operation.

Position vent lines away from workers and workstations, including control panels, valve handles, gauges, shut-offs, and hose attachment points. If possible, use a vertical exhaust stack to divert exhaust gases away from workers and ignition sources.

Check air monitoring equipment during operations to confirm that venting is proceeding safely.

Monitor the following: tank level indicators to avoid overfilling tank pressure gauges to avoid over-pressurizing receiving tanks or creating excessive vacuum in supply tanks tank temperature gauges to help identify possible chemical reactions

Under normal conditions, the absence of oxygen minimizes the risk of ignition in a vacuum truck.

Operating blowers and vacuum pumps at high speeds creates high air movement and high vacuum levels, resulting in high discharge air temperatures and high discharge vapor concentrations that can present potentially ignitable conditions.

Minimize the air introduced into the system when pressure loading or unloading. Submerge the suction line in liquid, or reduce the vacuum pump speed when skimming or nearing the end of a load.

Maintain a log of transported fluids and any potential residue.

Use gravity loading and unloading whenever possible.

Use a vapor recovery system—when available—to avoid venting tanks directly to the atmosphere.

15.6.4 Training

Employers are responsible for properly training, instructing, and supervising workers. These responsibilities include the following:

Vacuum truck operators shall be trained and properly licensed in accordance with applicable regulations:

Vacuum truck operators must be aware of the effect of speeds, turns and the changing center of gravity:

Vacuum truck operators shall maintain proper distances when operating vacuum trucks inside facilities with restricted clearances.

All workers involved with the process shall attend pre-work meetings. These meetings should cover the hazards to which workers are exposed by their work.

Training should include:

Slip, trip and fall awareness

The use of personal protective equipment—such as H₂S personal alarms and air-supplied respirators.

The hazards of toxic gas exposure and trained to know what to do in case of a release.

A site-specific orientation which includes:

Hazards of the petroleum products, by-products, wastes and materials being transferred

Relevant government and facility safety procedures and emergency response requirements

SDS locations

Appropriate PPE

15.7 Drilling, Boring, and Direct-Push

The following safety procedures cover various boring methods, including but not limited to rotary (mud and air rotary), sonic, hollow-stem auger, hammer, cable-tool, top drive, direct-push, and directional boring.

15.7.1 Overhead Obstructions

Check for proper clearance of overhead lines and other obstructions prior to setup and each time the rig derrick or drilling rods are raised, lowered, or moved.

Borings should not be conducted in locations that will place any part of the rig, rods, or equipment within 20 feet of overhead power lines, even when raised. If any part of the drill rig will be closer than 20 feet to an overhead line, prior arrangements must be made to take the line out of service or have it booted (blanketed and insulated) by the electric utility. Refer to OSHA 29 CFR 1910.333 (i) (1) and Table S-5 and 29 CFR 1926.550 (a) (15) for proper clearance distances.

Avoid unnecessary touching of the rig when being raised or lowered.

Do not move the rig when in a raised position.

15.7.2 Underground Utilities

Initiate a utility clearance call in advance of boring (and sub-surface) activities for each designated work area and document the utility clearance prior to start of work, including the ticket number, utilities notified, and the names of all persons granting utility clearance and record on the Field Safety Checklist- Intrusive Activities (Form J-4). It is illegal in some states to perform any subsurface excavation without calling the utilities clearance service for the state (e.g. One Call).

Coordinate with the Owner to confirm known locations of underground utilities.

If a utility clearance cannot be obtained for a certain area (such as within plant boundaries) then use non-mechanical methods such as hydro-excavation/pot-holing, air-knifing, or hand-tool methods.

If a significant increase in resistance to drilling or digging occurs in an area where bedrock is not expected, STOP WORK immediately, reassess the situation, reevaluate the data on the locations of underground utilities, and do not proceed until safety has been verified.

Call the Project Manager if any uncertainty exists as to the clearance of utilities.

Minimize borings in the immediate vicinity of known or suspected underground utilities.

In the event that underground utilities are encountered, the following steps should be taken:

- Cease drilling or digging immediately.

- Notify the Project Manager.

- Submit an incident notification through the Safety & Health reporting system.

15.7.3 Turning or Rotating Machinery

The principal hazard of turning or rotating machinery is the danger of snagging clothing or body parts. Therefore, the following guidelines should be observed:

- Whenever possible, stay at least two feet from turning or rotating machinery. This includes augers, cathead, engine power takeoff, and drill rods.

- If machinery must be approached closer than two feet, minimize the amount of time in close proximity to the machinery and use caution.

- Near turning or rotating machinery, be aware of where other workers are standing and moving so that no one is jostled into the machinery.

- Use caution when wearing loose or baggy clothing

- Keep clear of the cathead rope at all times it may break while in use, also, it is often coiled on the ground and presents a tipping hazard.

15.7.4 Hydraulic Machinery

The hazards of hydraulic machinery include the following guidelines:

- Stay at least two feet from the hydraulic systems. When under pressure, hydraulic hoses are subject to breaking and 'whipping' around or they may sustain a pinhole leak which can spray out hydraulic fluid at a high pressure.

- If machinery must be approached closer than two feet, minimize the amount of time in close proximity to the machinery and use caution.

- Do not allow the operator to 'overdrive' the equipment, which could cause a 'blow-out' of hydraulic equipment or hoses.

15.7.5 Working Safely Around Vehicles

Use extra caution when on a site with traffic and/or construction vehicles. The investigation area may be present in the following traffic areas and extra precautions should be taken:

- Highway and road shoulders

City streets

Parking lots

Construction site equipment

Landfills

Airports

Precautions to be taken when working near other operating equipment or traffic include:

Wear high-visibility clothing,

Establish controlled areas using traffic barricades, cones, or signs,

Utilize a flagger for traffic watch and control

Beware of heavy truck and vehicle traffic as the view of operators of large equipment may be limited. Do not position yourself or your vehicle behind equipment or haul trucks.

Precautions to be taken when working near the operating equipment include:

Watch the rig operations to know where all machinery and equipment are located

Stay visible to the operator as much as possible when near operations.

Keep out of, or move cautiously, in areas where work is in progress, including the hoist and derrick, sample driving equipment, auger and drill rod storage and hoisting areas, water pump or compressor, and rig exhaust.

When equipment or the hole must be approached, signal for the operator to stop work.

Work inside buildings requires venting of the rig exhaust and monitoring of the air for exhaust gasses.

As possible, position yourself and work up-wind from the vehicle exhaust.

Terrain Hazards

While working around borings, excavations, and backhoe test pits the following precautions should be taken:

Stay at least 6-feet away from the edge of holes or provide barricades / fall protection.

Watch for stress cracks, forming in the ground near the edge of the excavation and holes, as a sign of potential soil collapse into the excavation.

Keep 6-feet away from the soil stockpile as it may be unstable and collapse

Additional concerns to be alert and watch for are:

Stability of the rig:

Sliding of the rig in muddy conditions

Tipping or rolling of the rig on sloping or muddy ground

Tipping of the rig while the hydraulic leveling jacks are being raised or lowered

Tipping of the rig because of poor support structures or timbering under the hydraulic leveling jacks

Possible collapse of the rig derrick

Possible falling or flying rig and derrick parts

Possible breakage of the Standard Penetration Test hammer

Possible bending or breaking of drilling rods if the driller is inappropriately stacking the drill rods above the top of the derrick while pulling rods

Breaking of hydraulic lines.

Work at quarry and construction sites requires caution in the following areas:

Stay well back from precipitous terrain and rock walls.

Beware of falling rock.

Coordinate your schedule to avoid blasting operations, and check in with the quarry operator before entering.

Rig Kill Switch

If the rig has a kill switch, learn where it is and how to use it to shut the rig off in case of an emergency. A discussion should be held with the driller on each rig at the startup of the field work to discuss the location and use of the kill switch.

15.8 Rail Car and Truck Dock Procedures

15.8.1 General Requirements

Personal Protective Equipment (PPE)

Approved hard hats, approved metatarsal boots and approved safety glasses with permanently attached side shields shall be worn in designated areas.

Training

Appropriate training based on complexity of the job and potential hazards related to in plant rail shall be provided to all applicable employees.

Assessments shall be used to determine whether the personnel have the knowledge and have demonstrated skills to safely perform their work assignments.

Retraining and testing shall be required for unsatisfactory/unsafe performance of job assignments.

Training shall be documented; form C-9 Training Certification

Date of class completion

Name of Course

Name Of Trainee

Name of Trainer

Traffic Crossing

In all cases pedestrians/employees shall cross at existing designated pedestrian rail crossings where provided.

Additionally, vehicle crossings are not intended as pedestrian crossings unless they are so identified and/or located, and no other pedestrian crossings exist in the area.

If a designated crossing is not available.

Do not cross within 10 feet of the end of a parked rail car,

do not cross between uncoupled cars,

Stop, look and listen prior to proceeding across the tracks, and

Never step on rails, as they may be slippery.

Crossing around / through equipment:

Never attempt to crawl under rail equipment or

Never climb over moving rail equipment or

Never attempt to cross in front of moving equipment.

Never position any part of the body in a potential pinch point, as rail equipment can move in either direction at any time.

Working around RR tracks

Obtain permission from the railroad supervisor (or designated person) prior to performing work within six (6) feet of any railroad track,

Permission must be obtained to take the track out of service.

15.8.2 Rail Dock Procedure

A warning system and operational procedure shall be in place

The use of de-rails or derailing devices shall be included in the system

Track wells, internal tracks and loading and unloading areas shall be equipped with audible and visual warning devices that operate while the derail is disengaged

Electronic locking devices operated by trained /designated personnel are to be used to lock the derails in place

Spotted cars shall be secured by chocks, blocks, or the handbrake

Employees shall be trained in the use of car shakers, mechanical assists, etc.

Employees who enter a full or partially full bulk car shall be provided with fall protection and/or confined space entry procedures (hazards such as engulfment, material bridging, auger pits, etc).

Lockout control procedures shall be in place when performing activities where rail car movement could present a hazard.

Note: Examples include, but are not limited to, cleaning around rails, maintenance of tracks or track areas, work in or around rail track wells or rail car bumpers

Ensure that the railroad is contacted and made aware of where and when the employees will be working

The procedure to move trains into and out of a facility shall be under the control and responsibility of a trained/ designated person

Designated personnel shall inspect the rail dock area and tracks at the beginning of each shift ensuring:

- The warning system /equipment are properly positioned and functional.

- Audible and visual warning devices are operating properly while the derail is disengaged.

- The tracks are clean and free of debris

The local procedures shall include the designated personnel ensuring the following during switching activities:

- The track well is clear and no one is working in the area around the tracks.

- All pedestrian doors into the track well are secured during switching.

- All dock plates have been removed, bridges have been lifted and overhead doors have been opened

- The audible and visual warning devices are operating properly

- Electronic locking devices are operational.

- A system shall be in place to prevent rail cars from moving once they are in place on the dock

- Chocks and wheel stops shall be periodically inspected for cracking and other deterioration

- Hand brake shall be set

Powered or portable dock boards when used, shall be:

- Provided a good fit between the dock edge and the rail car

- Prevented from slipping

- Periodically visually inspected for cracking and other deterioration

Boxcar loading and/or unloading

Visually inspect all doors before opening and closing

Regularly lubricate the rail car doors

Use a mechanical assist which moves parallel with the travel of the door

Assure no other employees are in the “line-of-fire” during the opening and closing of the door

Tank cars loading and/or unloading

If located remote from the rail dock, requires separate warning operation

Spotted cars shall be secured by chocks, blocks, or the handbrake

If the tank car contains a hazardous material:

Are the people loading /unloading it trained in the safe handling of the material?

Are they trained in emergency procedures?

Are proper warning signs used during loading and unloading operations?

15.8.3 Truck Dock Procedures

The facility shall have a written safe operating practice for truck dock operations including, but not limited to:

The spotting, securing and inspecting trailers prior to loading/unloading activities

The covering of trailers or trucks which are loaded or unloaded away from the dock areas (i.e. loading/unloading from ground level, side loading/unloading of open side trailers).

The Inspection of the trailers prior to any loading or unloading operations including:

Interior items including: floor, sidewalls, doors and roof structure.

Exterior items including: floor cross members and fasteners, top and bottom rails, sidewalls, doors, rear impact bar (ICC bar), trailer landing gear.

The dock safety procedures shall be posted in a highly visible location which provides easy access

The SOP shall ensure that

Outside tractor drivers do not place or remove trailer control (stop) signs or perform any other dock safety procedures unless specifically authorized to do so

All dock spots are marked with a unique means of identification visible to both dock employees and drivers from inside the building, the dock well, and the outside of the dock.

All fork trucks used at the loading dock shall clearly be marked with the vehicle's lifting capacity

Markings should be in the format: CAP: 6,000 lbs.

Trucks with a capacity greater than 8,000 lbs., but less than 10,000 lbs. must also be marked “H D”.

“HD” heavy-duty fork trucks are prohibited from entering standard-duty over the road trailers to load and unload material

HD fork trucks are only used in heavy-duty trailers, which are properly identified and marked

Fork trucks with lifting capacities in excess of 10,000 lbs. are prohibited from entering highway trailers except where the trailer floor system has been certified and labeled by the manufacturer to match or exceed the capacity of the fork truck being used.

All trailers shall be chocked and properly restrained prior to any loading or unloading operations

Single and double axle trailers require a chock on each side. Triple axle trailers require two chocks on each side.

Moveable axles must be locked in the rear most position.

Trailer “dock locks” or other automatic restraint systems in use shall be visually verified they are properly engaged

Jack stands shall be used properly for dropped trailers

A single center-mount spreader beam style jack stand or two corner-post style jack stands are required.

The jack stands must be placed under the trailer supporting the frame (not the floor).

Jack stands must make contact with the underside of the trailer frame.

They should be adjusted up to the trailer frame equally.

Trailers with an overhang of six (6) feet or more or equipped with adjustable axle positions that cause the rear of the trailer to over/hang the rear axles a distance of six (6) feet or more must have corner-post style jack stands placed under the rear corners.

Trailers equipped with Air-Ride systems must have the system deflated and jack stands placed under the rear corners.

Truck Dock Facilities & Equipment

Chocks and jack stands shall be periodically inspected for cracks, wear and deterioration

Procedures shall be in place to protect workers while performing maintenance work on dock plates, dock locks or other automatic restraint systems, including:

Prohibit work being performed between a parked trailer and the dock plate.

Requiring dock plates on either side of the work location be taken out of service, barricaded or marked with caution tape to prevent other activities from occurring.

Require trailers on either side of the work location be moved out where possible.

Adequate lighting shall be provided on the dock and in loading areas

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16.1 Hand and Portable Powered Tools and Other Hand-Held Equipment

16.1.1 General Requirements

Each company shall be responsible for the safe condition of tools and equipment used by workers, including tools and equipment which may be furnished by the workers. Any tool which does not pass the pre-use inspection or is not in compliance with any applicable requirement is prohibited and shall be identified as unsafe by tagging or locking the controls to render them inoperable and removed from the site for repair or disposal.

Workers using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mists vapors, or gases shall be provided with particular PPE necessary to protect them from the hazard. ([See Chapter 9 for the requirements for a Hazard Assessment and determination of the appropriate PPE](#))

The Burns & McDonnell Health & Safety Form P1 - Hand & Portable Power Tools Pre-Operation Inspection Checklist can serve as a basis for the daily pre-use inspection of the tools, as well as to document the monthly inspection.

16.1.2 Tool Guarding

Guards shall be in place and operable at all times while the tool is in use. The guard may not be manipulated in such way that will compromise its integrity or compromise the protection in which intended. Guarding shall meet the requirements set forth in ANSI B15.1.

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17.1 Gas Welding and Cutting

17.1.1 Hose

Flashback arrestors shall be used at both the gauge and the torch end of the hose.

17.1.2 Additional Rules

For additional details not covered in this chapter, applicable technical portions of American National Standards Institute, Z49.1-1967, Safety in Welding and Cutting, shall apply.

17.2 Arc Welding and Cutting

17.2.1 Ground Returns and Machine Grounding

The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.

Grounding circuits, other than by means of the structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

17.2.2 Operating Instructions

When welding on galvanized metals a respirator with a P100 filter is required.

17.2.3 Welding Equipment Inspection

Daily pre-operational equipment inspections shall be performed on all welding machines and equipment. The inspections shall be documented using the Burns & McDonnell Safety Form Q-1.

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18.1 Electric Power Generation, Transmission, and Distribution

18.1.1 General

18.1.2 Training

Workers shall be trained in and familiar with the [safety-related](#) work practices, safety procedures, and other safety requirements in this section that pertain to their respective job assignments. Workers shall also be trained in and familiar with any other safety practices, including applicable emergency procedures, that are not specifically addressed by this section but that are related to their work and are necessary for their safety.

Documentation of this training shall be submitted via Burns & McDonnell Pole & Bucket Rescue Safety Form R-2.

18.1.3 Job Briefing

Daily job briefing is required, using Burns & McDonnell Daily Job Briefing Safety Form R-1, and shall be conducted with all the workers involved before they start each job.

Information Transfer.

Before work begins:

The host company shall inform the contractor of the characteristics of the host company's installation that are related to the safety of the work to be performed such as:

- Conditions that are related to the safety of the work to be performed that are known to the host company;

- Information about the design and operation of the host company's installation that the contractor needs to make the assessments required by this section; and

- Any other information about the design and operation of the host company's installation that is known by the host company that the contractor requests, and that is related to the protection of the contractor's employees.

Contractors shall comply with the following requirements:

- The contractor shall ensure that each of its employees is instructed in the hazardous conditions relevant to the employee's work that the contractor is aware of as a result of information communicated to the contractor by the host company

- Before work begins, the contractor shall advise the host company of any unique hazardous conditions presented by the contractor's work.

- The contractor shall advise the host company of any unanticipated hazardous conditions found during the contractor's work that the host company did not previously mention. The contractor shall provide this information to the host company within 2 working days after discovering the hazardous condition.

The contractor and the host company shall coordinate their work rules and procedures so that each worker is protected.

Confirmation of the information exchange shall be documented on Burns & McDonnell Safety Form R-10 "Host –Contractor Information Transfer"

18.1.4 Personal Protective Equipment

Fall protection equipment shall be inspected Burns & McDonnell Safety Form R-8 “Fall Protection Equipment Inspection”. See [Chapter 9, Personal Protective Equipment](#) for additional PPE requirements.

18.1.5 Crane Lifting Plans

Lifting plans shall be developed prior to any crane lifts to verify reasons for lift, the description of work responsibilities, the crane inspection, and operator qualifications. The lift plan shall be reviewed at the PTA / Daily Job Briefing / lift crew meeting to assure personnel are aware of the work to be performed, hazards, and control measures prior to the crane lift.

A pre-lift crane permit Burns & McDonnell Safety Form R-4 “Pre-Lift Crane Permit” and pre-lift safety checklist Burns & McDonnell Safety Form R-5 “Pre-Lift Safety Checklist” shall be completed

Additionally, Critical Lift Plans shall be completed for all lifts that are over 20 tons, lifts that involve more than one piece of equipment or the load to be lifted exceeds 75% of the manufacturer’s load rating chart for configuration of the equipment. Burns & McDonnell Safety Form N-2 “Critical Lift Plan” shall be used to document this information.

18.1.6 Substations

Upon entering an attended substation, each worker other than those regularly working in the station shall report his or her presence to the worker in charge in order to receive information on special system conditions affecting worker safety.

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18.2 Telecommunications

18.2.1 General

Tower Climbers and Ground Crew Workers

All work crews must be provided with and must use proper safety equipment at all times.

If proper safety equipment is unavailable or not functioning, no work at heights should be done.

All workers should annually certify their commitment to “100 percent tie off.”

For every level in the contracting chain, however, “100 percent tie off” cannot simply be a written policy. All entities and individuals involved, particularly job site supervisors and individual workers, must have a firm commitment to enforcing 100 percent tie off at every worksite at all times when workers are climbing.

All climbing work should include comprehensive safety planning, including Activity Hazard Analysis (AHA) and Emergency Action Plan (EAP), for every job site

When starting work for the day, foremen should conduct a toolbox meeting where the Activity Hazard Analysis (AHA) is discussed. Part of the AHA review should also include a mental and physical check-in with climbers. Do they feel mentally and physically ready to climb safely that day? If there are any situations or conditions that may prevent them from being focused on climbing safely, the foreman has a responsibility to remove that climber from the climbing team.

Subcontractors should take special care when training new employees and ensure that each new employee is working alongside experienced workers at all times.

All work crews should not work at heights when weather conditions raise safety risks.

Keep track of employee work schedules, including travel and driving time, to ensure that employees are not climbing while fatigued.

All work crews should continually seek to enhance their safety skills and awareness through regular trainings and stand-downs.

Particular attention should be paid to inspections, including equipment inspections and PPE inspections.

18.2.2 Work Site Safety Practices:

All contractors shall require supervisors to conduct a tailgate meeting at the beginning of each work day. The purpose of these meetings is to highlight the most important safety issues for the day.

In addition to covering issues such as the location of rescue equipment, other topics to address include possible hazards specific to the jobsite, the need for hard hats and eye protection at all times, the need to be aware of overhead hazards, especially during lifts, and keeping clear of the load.

Other critical topics include the location of the nearest hospital, and how to direct someone to call 911 in an emergency.

Activity Hazard Analysis: Before any worker sets foot on a job site, the contractor shall complete a comprehensive Activity Hazard Analysis. The AHA is required to be on-site for all work activities.

The AHA should provide an overview of the location of the work site, the type of tower, and an overview of the work to be done. It should include the precise location of the work site, the location and contact information for all local emergency services including the nearest hospital or medical center.

It should provide a detailed analysis of each individual job task to be completed, the hazards associated with that task, as well as the preventative measures to avoid those hazards, including applicable personal protective equipment.

Finally the JHA should include a list of all personnel working on site, along with information regarding the training and certifications held by each individual.

For work sites where personnel will be working at heights and/or where hoisting personnel or materials will be performed, a more detailed AHA is required, and shall include specific hazard control measures unique to the work activities being performed on that job site.

Subcontractors shall institute work policies and procedures that guarantee that safe work practices will always be followed on site.

For example: when contractors begin every single work day with a tailgate meeting discussing the day's work, and then immediately follow the meeting with daily equipment inspections, critical safety practices are less likely to be overlooked.

18.2.3 Zero-Tolerance Policy to Unsafe Work Practices

Subcontractors shall institute a zero-tolerance policy regarding unsafe practices, in particular towards free climbing and shall require 100 percent tie off. Any individual employee who is found to be violating that rule is shall be immediately disciplined, with penalties ranging from mandated re-training to dismissal depending on the individual circumstances.

18.2.4 Rescue

Subcontractors must ensure that there is a competent person on site at all times. This person should monitor the mental and physical wellbeing of climbers on their team. The competent person has the responsibility and obligation to remove an unfit worker from climbing duty for any reason.

18.2.5 Tools and Personal Protective Equipment

Personal protective equipment, protective devices and special tools needed for work shall be provided and used. Daily a competent person shall inspect and ensure that these personal protective devices, tools, and equipment are in good condition. Burns & McDonnell Daily Job Briefing Safety Form R-1

18.2.6 Personal Climbing Equipment

General - Harnesses with safety belts and straps shall be provided and used when work is performed at positions more than 4 feet above ground, on poles, and on towers. Inspection of this equipment shall be completed daily, using the Burns & McDonnell Safety Form V-2 "Fall Protection Equipment Inspection".

18.2.7 Vehicle-Mounted Material Handling Devices and Other Mechanical Equipment

Visual inspections of equipment shall be made by a competent person each day the equipment is to be used to ascertain that it is in good condition. Burns & McDonnell Boom Truck Inspection Safety Form R-3

18.2.8 Derrick Trucks and Similar Equipment

Derricks and its associated equipment are to be inspected by a competent person at intervals set by the manufacturer but in no case less than once per year. Records shall be maintained including the dates of

inspections, and necessary repairs made, if corrective action was required. Burns & McDonnell Boom Truck Inspection Form R-3

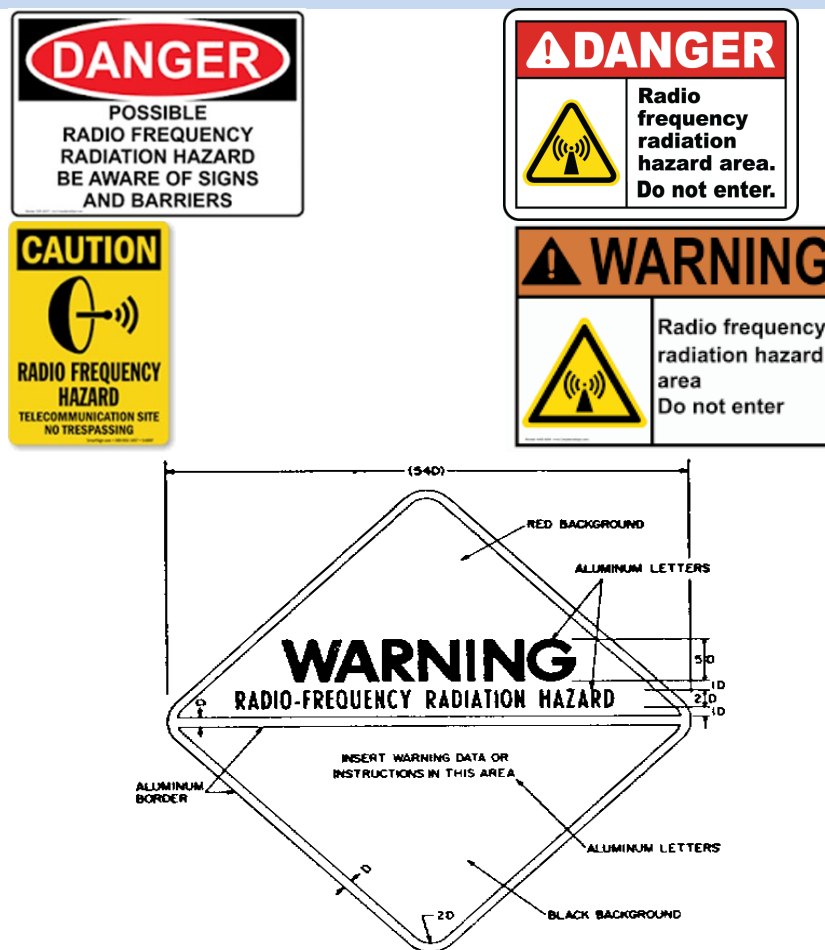
18.2.9 Underground Lines

Requirements prior to entering manholes and unvented vaults. Before a worker enters a manhole, a Confined Space permit is to be completed. Burns & McDonnell Safety Form C-7 “Work Permit” (Confined Space Entry Section)

18.2.10 Definitions

For definitions for this Chapter refer to definitions within [1910.269 - Electric Power Generation, Transmission, and Distribution](#).

Figure 18 - 1 Radio Frequency Radiation Hazard Sign



1. Place handling and mounting instructions on reverse side.
2. D = Scaling unit.
3. Lettering: Ratio of letter height to thickness of letter lines.
 - Upper triangle : 5 to 1 Large
 - 6 to 1 Medium
 - Lower triangle 4 to 1 Small
 - 6 to 1 Medium
4. Symbol is square, triangles are right-angle isosceles.

Figure G-11

Radio-Frequency Radiation Hazard Warning Symbol

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Electrical Safe Work Practices

19.1 Electrical Safe Work Practices

19.1.1 Contractor Relationships

Host Site Responsibilities.

The host site shall inform the contractor of known electrical hazards related to the contract that might not be recognized by the contractor's employees and any other pertinent electrical information the contractor needs to make the required safety assessments.

Contractor Responsibilities.

The contractor shall ensure that each of his workers is instructed in the electrical hazards communicated by the host site.

The contractor shall ensure that each of his workers follows electrical safe work practices including **NY TRANSCO** safety-related work rules.

The contractor shall advise the host site of any unique hazards presented by his work, any unanticipated hazards found during the work, and any additional needed measures taken to perform the work.

19.1.2 Training Requirements.

Safety Training.

The training requirements shall apply to employees who face a risk of electrical hazard that is not reduced to a safe level by the applicable electrical installation requirements.

Employees shall be trained to understand the specific hazards associated with electrical energy.

They shall be trained in the safety-related work practices and procedural requirements needed to provide protection from the electrical hazards associated with their work

Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury.

The training shall be classroom, on-the-job, or a combination of the two.

Emergency Procedures.

Employees exposed to shock hazards shall be trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts.

Employees shall be regularly instructed and annually certified in methods of first aid and emergency procedures, such as approved methods of resuscitation, if their duties warrant such training.

Employee Training.

Qualified Person - A qualified person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method.

They shall also be familiar with the proper use of the special precautionary techniques, personal protective equipment, including arc-flash, insulating and shielding materials, and insulated tools and test equipment.

A person can be considered qualified with respect to certain equipment and methods but still are unqualified for others.

Workers permitted to work within the Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:

- The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment

- The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts

- The approach distances specified in Table 6

- The decision-making process necessary to determine the degree and extent of the hazard

- The personal protective equipment and job planning necessary to perform the task safely

An employee, who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.

Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved.

Employees shall be trained to select an appropriate voltage detector and shall demonstrate how to use a device to verify the absence of voltage, including interpreting indications provided by the device and understand all limitations of each specific voltage detector that may be used.

Unqualified Persons.

Unqualified persons shall be trained in and be familiar with any of the electrical safety related practices that are necessary for their safety.

Retraining.

An employee shall receive additional training (or retraining) under any of the following conditions:

- If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices

- If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use

- If the employee must use safety-related work practices that are not normally used during his or her regular job duties

Training Documentation.

The employer shall document that each employee has received the required training when the employee demonstrates proficiency in the work practices involved

Shall be maintained for the duration of the employee's employment.

Shall contain each employee's name and the dates of the training.

19.1.3 Electrical Safety Program.

Procedures.

The procedures for working within the Limited Approach Boundary of energized electrical conductors and circuit parts operating at 50 volts or more or where an electrical hazard exists shall be identified before work is started.

Hazard/Risk Evaluation Procedure.

The hazard/risk evaluation procedure shall be determined prior to work starting within the Limited Approach Boundary when energized electrical conductors and circuit parts are operating at 50 volts or more.

The procedure shall identify the hazard/risk process that shall be used by employees to evaluate tasks before work is started.

Pre-job briefing.

Before starting each job, the employee in charge shall conduct a job briefing with the employees involved.

The briefing shall cover such subjects as hazards associated with the job, work procedures involved, special precautions, energy source controls, and personal protective equipment requirements.

If the work or operations to be performed during the work day or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of the day or shift.

Additional job briefings shall be held if changes that might affect the safety of employees occur during the course of the work.

If the work involved is routine, a brief discussion shall be reasonably expected to accomplish the briefing for hazard recognition and avoidance

A more extensive discussion shall be conducted if either of the following apply:

The work is complicated or particularly hazardous.

The employee cannot be expected to recognize and avoid the hazards involved in the job.

Other Precautions for Personnel Activities

Alertness

Employees shall be alert at all times when they are working within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more and in work situations where electrical hazards might exist.

Employees shall not be permitted to work within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more, or where other electrical hazards exist, while their alertness is recognizably impaired due to illness, fatigue, or other reasons.

Employees shall be instructed to be alert for changes in the job or task that may lead the person outside of the electrically safe work condition or expose the person to additional hazards that were not part of the original plan.

Blind Reaches

Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.

Illumination

Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely.

Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

Conductive Articles and Materials

Conductive articles of jewelry and clothing shall not be worn where they present an electrical contact hazard with exposed energized electrical conductors or circuit parts. Conductive materials, tools, and equipment that are in contact with any part of an employee's body such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses shall be handled in a manner that prevents accidental contact with energized electrical conductors or circuit parts.

Such materials and equipment include, but are not limited to, long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, bull floats, and chains.

19.1.4 Working While Exposed to Electrical Hazards.

General.

Safety-related work practices shall be used to safeguard employees from injury while they are exposed to electrical hazards from electrical conductors or circuit parts that are or can become energized.

The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

Energized Electrical Conductors and Circuit Parts — Safe Work Condition.

Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works within the Limited Approach Boundary of those conductors or parts.

Energized Electrical Conductors and Circuit Parts — Unsafe Work Condition.

Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into an electrically safe work condition.

Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.

Prior to working within the Limited Approach Boundary of exposed electrical conductors and circuit parts operating at 50 volts or more, lockout/tagout devices shall be applied.

Electrical Hazard Analysis.

If the energized electrical conductors or circuit parts operating at 50 volts or more are not placed in an electrically safe work condition, other safety-related work practices shall be used to protect employees who might be exposed to the electrical hazards involved.

Such work practices shall protect each employee from arc flash and from contact with energized electrical conductors or circuit parts operating at 50 volts or more directly with any part of the body or indirectly through some other conductive object.

Work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the energized electrical conductors or circuit parts.

Appropriate safety-related work practices shall be determined before any person is exposed to the electrical hazards involved by using both shock hazard analysis and arc flash hazard analysis.

Shock Hazard Analysis. A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electrical shock to personnel.

Arc Flash Hazard Analysis. An arc flash hazard analysis shall determine the Arc Flash Protection Boundary and the personal protective equipment that people within the Arc Flash Protection Boundary shall use.

Energized Electrical Work Permit.

When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards) work shall be performed by written permit only.

Unqualified Persons.

Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment are placed in an electrically safe work condition.

Safety Interlocks.

Only qualified persons following the requirements for working inside the Restricted Approach Boundary shall be permitted to defeat or bypass an electrical safety interlock and then only temporarily while the qualified person is working on the equipment.

The safety interlock system shall be returned to its operable condition when the work is completed.

Overhead lines.

If work is to be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

Qualified Persons”

Qualified workers must adhere to the approach distances in the Table when working in the vicinity of overhead lines.

Table 19 - 1 Approach Distances For Qualified Workers Alternating Current	
Voltage range (phase to phase)	Minimum approach distance
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in.
Over 750V, not over 2kV	1 ft. 6 in.
Over 2kV, not over 15kV	2 ft. 0 in.
Over 15kV, not over 37kV	3 ft. 0 in.
Over 37kV, not over 87.5kV	3 ft. 6 in.
Over 87.5kV, not over 121kV	4 ft. 0 in.
Over 121kV, not over 140kV	4 ft. 6 in.

Unqualified Persons.

When an unqualified person is working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances:

For voltages to ground 50kV or below - 10 feet (305 cm);

For voltages to ground over 50kV - 10 feet (305 cm) plus 4 inches (10 cm) for every 10kV over 50kV.

When an unqualified person is working on the ground in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the distances given above.

Note: For voltages normally encountered with overhead power line, objects which do not have an insulating rating for the voltage involved are considered to be conductive.

19.1.5 Use of Equipment.

Test Instruments and Equipment.

Rating.

Test instruments, equipment, and their accessories shall be rated for circuits and equipment to which they will be connected.

Design.

Test instruments, equipment, and their accessories shall be designed for the environment to which they will be exposed, and for the manner in which they will be used.

Visual Inspection.

Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before each use. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee shall use it until repairs and tests necessary to render the equipment safe have been made.

Operation Verification.

When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.

Portable Electric Equipment.

This section applies to the use of cord-and-plug-connected equipment, including cord sets (extension cords).

Portable equipment shall be handled in a manner that will not cause damage.

Flexible electric cords connected to equipment shall not be used for raising or lowering the equipment.

Flexible cords shall not be fastened with staples or hung in such a fashion as could damage the outer jacket or insulation.

Grounding-Type Equipment.

A flexible cord used with grounding-type utilization equipment shall contain an equipment grounding conductor.

Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor. Additionally, these devices shall not be altered in order to allow use in a manner that was not intended by the manufacturer.

Adapters that interrupt the continuity of the equipment grounding conductor shall not be used.

Visual Inspection of Portable Cord-and-Plug- Connected Equipment and Flexible Cord Sets.

Frequency of Inspection.

Before each use, portable cord-and-plug-connected equipment shall be visually inspected for external defects (such as loose parts or deformed and missing pins) and for evidence of possible internal damage (such as a pinched or crushed outer jacket).

Defective Equipment.

If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee shall use it until repairs and tests necessary to render the equipment safe have been made.

Proper Mating.

When an attachment plug is to be connected to a receptacle, the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of mating configurations.

Conductive Work Locations.

Portable electric equipment used in highly conductive work locations or in job locations where employees are likely to contact water or conductive liquids shall be approved for those locations.

Connecting Attachment Plugs.

Employees' hands shall not be wet when plugging and unplugging flexible cords and cord-and-plug-connected equipment if energized equipment is involved.

Energized plug and receptacle connections shall be handled only with insulating protective equipment if the condition of the connection could provide a conductive path to the employee's hand (if, for example, a cord connector is wet from being immersed in water).

Locking-type connectors shall be secured after connection.

GFCI Protection Devices.

GFCI protection devices are required on all jobs

GFCI protection devices shall be tested per manufacturer's instructions and prior to use; and the GFCI testing shall be documented at least monthly

Overcurrent Protection Modification.

Over current protection of circuits and conductors shall not be modified beyond that permitted by applicable portions of electrical codes and standards dealing with overcurrent protection.

19.1.6 Achieving an Electrically Safe Work Condition.

An electrically safe work condition shall be achieved when LOTO has been performed and verified by the following process:

Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are de-energized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the voltage detector is operating satisfactorily.

Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably anticipated that the conductors or circuit parts being de-energized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

19.1.7 Justification for Work.

General.

Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works within the Limited Approach Boundary of those conductors or parts, except:

Greater Hazard. Energized work shall be permitted where the employer can demonstrate that de-energizing introduces additional or increased hazards.

Infeasibility. Energized work shall be permitted where the employer can demonstrate that the task to be performed is infeasible in a de-energized state due to equipment design or operational limitations.

Less Than 50 Volts. Energized electrical conductors and circuit parts that operate at less than 50 volts to ground shall not be required to be de-energized where the capacity of the source and any over-current protection between the energy source and the worker are considered and it is determined that there will be no increased exposure to electrical burns or to explosion due to electric arcs.

Energized Electrical Work Permit.

When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition, work to be performed shall be considered energized electrical work and shall be performed by written permit only.

Elements of Work Permit. The energized electrical work permit shall include, but not be limited to, the following items:

- A description of the circuit and equipment to be worked on and their location
- Justification for why the work must be performed in an energized condition
- A description of the safe work practices to be employed
- Results of the shock hazard analysis
- Determination of shock protection boundaries
- Results of the arc flash hazard analysis
- The arc flash protection boundary
- The necessary personal protective equipment to safely perform the assigned task
- Means employed to restrict the access of unqualified persons from the work area
- Evidence of completion of a job briefing, including a discussion of any job-specific hazards
- Energized work approval signature: authorizing or responsible management, safety officer, or owner, etc.

Exemptions to Work Permit.

Work performed within the Limited Approach Boundary of energized electrical conductors or circuit parts by qualified persons related to tasks such as testing, troubleshooting, voltage measuring, etc., shall be permitted to be performed without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment are provided and used.

If the purpose of crossing the Limited Approach Boundary is only for visual inspection and the Restricted Approach Boundary will not be crossed, then an energized electrical work permit shall not be required.

19.1.8 Personal and Other Protective Equipment.

General.

Employees working in areas where electrical hazards are present shall be provided with, and shall use, protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be performed.

The PPE requirements are intended to protect a person from arc flash and shock hazards.

Burns to the skin, even with the protection selected, should be reduced and survivable.

Due to the explosive effect of some arc events, physical trauma injuries could occur.

When incident energy exceeds 40 Cal/cm², greater emphasis may be necessary with respect to de-energizing before working within the Limited Approach Boundary.

Care of Equipment.

Protective equipment shall be maintained in a safe, reliable condition.

The protective equipment shall be visually inspected before each use.

Protective equipment shall be stored in a manner to prevent damage from physically damaging conditions and from moisture, dust, or other deteriorating agents.

Maintenance and Use.

Electrical and personal protective equipment (such as the following) shall be maintained in a safe and reliable working condition:

Grounding equipment

Hot sticks

Rubber gloves, sleeves, and leather protectors

Voltage test indicators

Blanket and similar insulating equipment

Insulating mats and similar insulating equipment

Protective barriers

External circuit breaker rack-out devices

Portable lighting units

Safety grounding equipment

Dielectric footwear

Protective clothing

Bypass jumpers

Insulated and insulating hand tools

Inspections and Testing

Insulating equipment shall be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage.

Insulating gloves shall be given an air test, along with the inspection.

Electrical protective equipment shall be subjected to periodic electrical tests. Test voltages and maximum intervals between tests shall be in accordance with Table 4.

Inspection and Testing of Protective Equipment and Protective Tools.

Visual

Safety and protective equipment and protective tools shall be visually inspected for damage and defects before initial use and at intervals thereafter, as service conditions require, but in no case shall the interval exceed 1 year

Testing.

The insulation of protective equipment and protective tools shall be verified by the appropriate test and visual inspection to ascertain that insulating capability has been retained before initial use, and at intervals thereafter, as service conditions and applicable standards and instructions require,

Personal Protective Equipment, PPE.

General.

When an employee is working within the Arc Flash Protection Boundary he or she shall wear protective clothing and other personal protective equipment.

All parts of the body inside the Arc Flash Protection Boundary shall be protected.

Selection of Personal Protective Equipment When Required for Various Tasks.

Where selected in lieu of the incident energy analysis Table 3 shall be used to determine the hazard/risk category and requirements for use of rubber insulating gloves and insulated and insulating hand tools for a task.

The assumed short-circuit current maximum capacities and maximum fault clearing times for various tasks are listed in the notes to Table 3.

For tasks not listed, or for power systems with greater than the assumed maximum short circuit current capacity or with longer than the assumed maximum fault clearing times, an arc flash hazard analysis shall be required.

Movement and Visibility.

When flame-resistant (FR) clothing is worn to protect an employee, it shall cover all ignitable clothing and shall allow for movement and visibility.

Head, Face, Neck, and Chin (Head Area) Protection.

Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with energized electrical conductors or circuit parts or from flying objects resulting from electrical explosion.

Employees shall wear nonconductive protective equipment for the face, neck, and chin whenever there is a danger of injury from exposure to electric arcs or flashes or from flying objects resulting from electrical explosion.

If employees use hairnets and/or beard nets, these items must be non-melting and flame resistant.

Eye Protection.

Employees shall wear protective equipment for the eyes whenever there is danger of injury from electric arcs, flashes, or from flying objects resulting from electrical explosion.

Body Protection.

Employees shall wear FR clothing wherever there is possible exposure to an electric arc flash above the threshold incident-energy level for a second degree burn (1.2 Cal/cm²).

Such clothing can be provided as an arc flash suit jacket and arc flash suit pants, shirts and pants, or as coveralls, or as a combination of jacket and pants, or, for increased protection, as coveralls with jacket and pants.

Various weight fabrics are available. Generally, the higher degree of protection is provided by heavier weight fabrics and/or by layering combinations of one or more layers of FR clothing.

Hand and Arm Protection.

Hand and arm protection shall be provided in accordance with below.

Shock Protection.

Employees shall wear rubber insulating gloves with leather protectors where there is a danger of hand injury from electric shock due to contact with energized electrical conductors or circuit parts.

Employees shall wear rubber insulating gloves with leather protectors and rubber insulating sleeves where there is a danger of hand and arm injury from electric shock due to contact with energized electrical conductors or circuit parts.

Rubber insulating gloves shall be rated for the voltage for which the gloves will be exposed.

Exception: Where it is necessary to use rubber insulating gloves without leather protectors, the requirements of ASTM F 496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves, shall be met.

Arc Flash Protection.

Hand and arm protection shall be worn where there is possible exposure to arc flash burn.

Leather or FR gloves shall be required for protection of hands from burns.

Foot Protection.

Where insulated footwear is used as protection against step and touch potential, dielectric overshoes shall be required.

Insulated soles shall not be used as primary electrical protection.

Factors in Selection of Protective Clothing.

Protective clothing includes shirts, pants, coveralls, jackets, and parkas worn routinely by workers who, under normal working conditions, are exposed to momentary electric arc and related thermal hazards. Flame-resistant rainwear worn in inclement weather is included in this category of clothing.

Clothing and equipment that provide worker protection from shock and arc flash hazards shall be utilized.

Clothing and equipment required for the degree of exposure shall be permitted to be worn alone or integrated with flammable, non-melting apparel. If FR clothing is required, it shall cover associated parts of the body as well as all flammable apparel while allowing movement and visibility.

All personal protective equipment shall be maintained in a sanitary and functionally effective condition.

Personal protective equipment items will normally be used in conjunction with one another as a system to provide the appropriate level of protection.

Layering.

Non-melting, flammable fiber garments shall be permitted to be used as under-layers in conjunction with FR garments in a layered system for added protection.

If non-melting, flammable fiber garments are used as under-layers, the system arc rating shall be sufficient to prevent break-open of the innermost FR layer at the expected arc exposure incident energy level to prevent ignition of flammable under-layers.

A typical layering system might include cotton underwear, a cotton shirt and trouser, and a FR coverall. Specific tasks might call for additional FR layers to achieve the required protection level.

Outer Layers.

Garments worn as outer layers over FR clothing, such as jackets or rainwear, shall also be made from FR material.

Under-layers.

Fibers such as acetate, nylon, polyester, polypropylene, and spandex which melt shall not be permitted in fabric under-layers (underwear) next to the skin. Exception: An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted.

FR garments (e.g., shirts, trousers, and coveralls) worn as under-layers that neither ignite nor melt and drip in the course of an exposure to electric arc and related thermal hazards generally provide a higher system arc rating than non-melting, flammable fiber under-layers.

FR underwear or undergarments used as under-layers generally provide a higher system arc rating than non-melting, flammable fiber underwear or undergarments used as under-layers.

Coverage.

Clothing shall cover potentially exposed areas as completely as possible. Shirt sleeves shall be fastened at the wrists, and shirts and jackets shall be closed at the neck.

Fit.

Tight-fitting clothing shall be avoided. Loose-fitting clothing provides additional thermal insulation because of air spaces. FR apparel shall fit properly such that it does not interfere with the work task.

Interference.

The garment selected shall result in the least interference with the task but still provide the necessary protection. The work method, location, and task could influence the protective equipment selected.

Arc Flash Protective Equipment.

Arc Flash Suits.

Arc flash suit design shall permit easy and rapid removal by the wearer. The entire arc flash suit, including the hood's face shield, shall have an arc rating that is suitable for the arc flash exposure.

When exterior air is supplied into the hood, the air hoses and pump housing shall be either covered by FR materials or constructed of non-melting and nonflammable materials.

Face Protection.

Face shields shall have an arc rating suitable for the arc flash exposure.

Face shields without an arc rating shall not be used.

Eye protection (safety glasses or goggles) shall always be worn under face shields or hoods.

Face shields made with energy-absorbing formulations that can provide higher levels of protection from the radiant energy of an arc flash are available, but these shields are tinted and can reduce visual acuity and color perception. Additional illumination of the task area might be necessary when these types of arc-protective face shields are used.

Hand Protection.

Leather or FR gloves shall be worn where required for arc flash protection.

Where insulating rubber gloves are used for shock protection, leather protectors shall be worn over the rubber gloves.

Insulating rubber gloves and gloves made from layers of flame-resistant material provide hand protection against the arc flash hazard.

Heavy-duty leather (e.g., greater than 12 oz./yd²) gloves provide protection suitable up to Hazard/Risk Category 2.

The leather protectors worn over insulating rubber gloves provide additional arc flash protection for the hands. During high arc flash exposures leather can shrink and cause a decrease in protection.

Foot Protection. .

Heavy-duty leather work shoes provide some arc flash protection to the feet and shall be used in all tasks in Hazard/Risk Category 2

Clothing Material Characteristics.

Clothing made from flammable synthetic materials that melt at temperatures below 600°F, such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends, shall not be used.

Clothing and other apparel (such as hard hat liners and hair nets) made from materials that do not meet the melting or flammability requirements shall not be permitted to be worn.

Some flame-resistant fabrics, such as nondurable flame-retardant treatments of cotton, are not recommended for industrial electrical or utility applications.

Other Protective Equipment.

Insulated Tools and Equipment.

Employees shall use insulated tools and/or handling equipment when working inside the Limited Approach Boundary of exposed energized electrical conductors or circuit parts where tools or handling equipment might make accidental contact.

Table 3 provides further information for tasks that require insulated and insulating hand tools.

Insulated tools shall be protected from damage to the insulating material.

Requirements for Insulated Tools.

The following requirements shall apply to insulated tools:

Insulated tools shall be rated for the voltages on which they are used.

Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.

Insulated tools and equipment shall be inspected prior to each use.

The inspection shall look for damage to the insulation or damage that may limit the tool from performing its intended function or could increase the potential for an incident (e.g., damaged tip on a screwdriver).

Fuse or Fuse Holding Equipment.

Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to remove or install a fuse if the fuse terminals are energized.

Ropes and Hand lines.

Ropes and hand lines used within the Limited Approach Boundary of exposed energized electrical conductors or circuit parts operating at 50 volts or more, or used where an electrical hazard exists, shall be nonconductive.

Fiberglass-Reinforced Plastic Rods.

Fiberglass reinforced plastic rod and tube used for live line tools shall meet the requirements of applicable portions of electrical codes and standards dealing with electrical installation requirements.

Portable Ladders.

Portable ladders shall have nonconductive side rails if they are used where the employee or ladder could contact exposed energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists. Nonconductive ladders shall meet the requirements of ANSI standards for ladders listed in Table 5.

Protective Shields.

Protective shields, protective barriers, or insulating materials shall be used to protect each employee from shock, burns, or other electrically related injuries while that employee is working within the Limited Approach Boundary of energized conductors or circuit parts that might be accidentally contacted or where dangerous electric heating or arcing might occur.

When normally enclosed energized conductors or circuit parts are exposed for maintenance or repair, they shall be guarded to protect unqualified persons from contact with the energized conductors or circuit parts.

Rubber Insulating Equipment.

Rubber insulating equipment used for protection from accidental contact with energized conductors or circuit parts shall meet the requirements of the ASTM standards listed in Table 5.

Voltage-Rated Plastic Guard Equipment.

Plastic guard equipment for protection of employees from accidental contact with energized conductors or circuit parts, or for protection of employees or energized equipment or material from contact with ground, shall meet the requirements of the ASTM standards listed in Table 5.

Physical or Mechanical Barriers.

Physical or mechanical (field-fabricated) barriers shall be installed no closer than the Restricted Approach Boundary distance given in Table 6.

While the barrier is being installed, the Restricted Approach Boundary distance specified in Table 6 shall be maintained, or the energized conductors or circuit parts

19.1.9 Alerting Techniques.

Safety Signs and Tags.

Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards that might endanger them.

Barricades.

Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing energized conductors or circuit parts.

Conductive barricades shall not be used where it might cause an electrical hazard.

Barricades shall be placed no closer than the Limited Approach Boundary given in Table 6.

Attendants.

If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

The primary duty and responsibility of an attendant providing manual signaling and alerting shall be to keep unqualified employees outside a work area where the unqualified employee might be exposed to electrical hazards.

An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.

Look-Alike Equipment.

Where work performed on equipment that is de-energized and placed in an electrically safe condition exists in a work area with other energized equipment that is similar in size, shape, and construction, identification shall be provided to prevent the worker from entering look-a-like equipment

The use of Table 19-2 is a simplified approach to provide minimum PPE for electrical workers within facilities with large and diverse electrical systems. The clothing listed in Table 19-2 fulfills the minimum arc-rated clothing requirements of Tables 19-11, 19-12, and 19-13 and Table 19-5.

The clothing systems listed in this table should be used with the other PPE appropriate for the arc flash PPE category, see Table 19-5.

The notes to Tables 19-11, 19-12, and 19-13, must apply as shown in those tables.

Table 19 - 2 Simplified Two-Category, Arc-Rated Clothing System	
Clothing ^a	Applicable Tasks
Everyday Work Clothing Arc-rated long-sleeve shirt with arc-rated pants (minimum arc rating of 8) or Arc-rated coveralls (minimum arc rating of 8)	All arc flash PPE category 1 and arc flash PPE category 2 tasks listed in Tables 19-11, 19-12, & 19-13
Arc Flash Suit A total clothing system consisting of arc-rated shirt and pants and/or arc-rated coveralls and/or arc flash coat and pants (clothing system minimum arc rating of 40)	All arc flash PPE category 3 and arc flash PPE category 4 tasks listed in Tables 19-11, 19-12, & 19-13
<p>^a Note that other PPE listed in Table 19-5 which include arc-rated face shields or arc flash suit hoods, arc-rated hard hat liners, safety glasses or safety goggles, hard hats, hearing protection, heavy-duty leather gloves, rubber insulating gloves, and leather protectors, could be required. The arc rating for a garment is expressed in Cal/cm².</p> <p>^b The estimated available short-circuit current capacities and fault clearing times or arcing durations are listed in the text of Table 19-12 and Table 19-13).</p> <p>Various tasks are listed in Table 19-11</p> <p>For tasks not listed or for power systems with greater than the estimated available short-circuit capacity or with longer than the assumed fault clearing times or arcing durations, an arc flash risk assessment is required.</p> <p>NFPA 70E -2015 Annex H Table H.2</p>	

Table 19-3 provides a summary of specific sections within the NFPA 70E standard describing PPE for electrical hazards which may be referred to for additional information as needed.

Table 19 - 3 Summary of Specific Sections Describing PPE for Electrical Hazards Where Additional Information can be Found in NFPA 70E - 2015	
Shock Hazard PPE	Applicable NFPA 70E (2015) Section(s)
Rubber insulating gloves and leather protectors (unless the requirements of ASTM F 496 are met)	130.7(C)(7)(a)
Rubber insulating sleeves (as needed)	130.7(C)(7)(a)
Class G or E hard hat (as needed)	130.7(C)(3)
Safety glasses or goggles (as needed)	130.7(C)(4)
Dielectric overshoes (as needed)	130.7(C)(8)
Arc Flash Hazard PPE	Applicable NFPA 70E (2015) Section(s)
<i>Incident energy exposures up to 1.2 Cal/cm²</i>	
Clothing: non-melting or untreated natural fiber long-sleeve shirt and long pants or coverall	130.7(C)(1); 130.7(C)(9)(d)
Gloves: heavy-duty leather	130.7(C)(7)(b); 130.7(C)(10)(d)
Hard hat: class G or E	130.7(C)(3)
Face shield: covers the face, neck, and chin (as needed)	130.7(C)(3)
Safety glasses or goggles	130.7(C)(4); 130.7(C)(10)(c)
Hearing protection	130.7(C)(5)
Footwear: heavy-duty leather (as needed)	130.7(C)(10)(e)
<i>Incident Energy Exposures ≥ 1.2 Cal/cm²</i>	
Clothing: arc-rated clothing system with an arc rating appropriate to the anticipated incident energy exposure	130.7(C)(1); 130.7(C)(2); 130.7(C)(6); 130.7(C)(9)(d)
Clothing underlayers (when used): arc-rated or non-melting untreated natural fiber	130.7(C)(9)(c); 130.7(C)(11); 130.7(C)(12)
Gloves: Exposures ≥ 1.2 Cal/cm ² and ≤ 8 Cal/cm ² : heavy-duty leather gloves	130.7(C)(7)(b); 130.7(C)(10)(d)

Table 19 - 3 Summary of Specific Sections Describing PPE for Electrical Hazards Where Additional Information can be Found in NFPA 70E - 2015	
Exposures > 8 Cal/cm ² : rubber insulating gloves with their leather protectors; or arc-rated gloves	
Hard hat: class G or E 130.7(C)(1); 130.7(C)(3)	
Face shield: Exposures >1.2 Cal/cm ² and 12 Cal/cm ² : arc-rated face shield that covers the face, neck, and chin and an arc-rated balaclava or an arc-rated arc flash suit hood Exposures >12 Cal/cm ² : arc-rated arc flash suit hood	130.7(C)(1); 130.7(C)(3); 130.7(C)(10)(a); 130.7(C)(10)(b); 130.7(C)(10)(c)
Safety glasses or goggles	130.7(C)(4); 130.7(C)(10)(c)
Hearing protection	130.7(C)(5)
Footwear: Exposures <4 Cal/cm ² : heavy-duty leather footwear (as needed) Exposures > 4 Cal/cm ² : heavy-duty leather footwear	130.7(C)(10)(e)
Notes: <ul style="list-style-type: none"> NFPA 70E – 2015: Table H.3(a) 	

Table 19-4 provides guidance on the selection of arc-rated and other PPE for users who determine the incident energy exposure in Cal/cm², or when there is an arc flash label provided with the incident energy listed.

Arc flash labels shall only list the incident energy and NOT incident energy and PPE Category. They should also list the minimum required PPE for the specific site

Table 19 - 4 Guidance on Selection of Arc-Rated Clothing and Other PPE for Use When Incident Energy Exposure Is Determined	
Incident Energy Exposure	Protective Clothing and PPE
≤ 1.2 Cal/cm²	
Protective clothing, nonmelting (in accordance with ASTM F 1506) or untreated natural fiber	Shirt (long sleeve) and pants (long) or coverall
Other PPE	<ul style="list-style-type: none"> Face shield for projectile protection (AN) Safety glasses or safety goggles (SR) Hearing protection Heavy-duty leather gloves or rubber insulating gloves with leather protectors (AN)
1.2 to 12 Cal/cm²	
Arc-rated clothing and equipment with an arc rating equal to or greater than the determined incident energy (See Note 3.)	Arc-rated long-sleeve shirt and arc-rated pants or arc-rated coverall or arc flash suit (SR) (See Note 3.) Arc-rated face shield and arc-rated balaclava or arc flash suit hood (SR) (See Note 1.) Arc-rated jacket, parka, or rainwear (AN)
Other PPE	Hard hat Arc-rated hard hat liner (AN) Safety glasses or safety goggles (SR) Hearing protection Heavy-duty leather gloves or rubber insulating gloves with leather protectors (SR) (See Note 4.) Leather footwear
> 12 Cal/cm²	

Table 19 - 4 Guidance on Selection of Arc-Rated Clothing and Other PPE for Use When Incident Energy Exposure Is Determined

Incident Energy Exposure	Protective Clothing and PPE
Arc-rated clothing and equipment with an arc rating equal to or greater than the determined incident energy (See Note 3.)	Arc-rated long-sleeve shirt and arc-rated pants or arc-rated coverall and/or arc flash suit (SR) Arc-rated arc flash suit hood Arc-rated gloves Arc-rated jacket, parka, or rainwear (AN)
Other PPE	Hard hat Arc-rated hard hat liner (AN) Safety glasses or safety goggles (SR) Hearing protection Arc-rated gloves or rubber insulating gloves with leather protectors (SR) (See Note 4.) Leather footwear
AN: As needed [in addition to the protective clothing and PPE required above] SR: Selection of one in group is required	
Notes: <ol style="list-style-type: none"> 1. Face shields with a wrap-around guarding to protect the face, chin, forehead, ears, and neck area are required, for full head and neck protection, use a balaclava or an arc flash hood. 2. All items not designated “AN” are required 3. Arc ratings can be for a single layer, such as an arc-rated shirt and pants or a coverall, or for an arc flash suit or a multi-layer system consisting of a combination of arc-rated shirt and pants, coverall, and arc flash suit. 4. Rubber insulating gloves with leather protectors provide arc flash protection in addition to shock protection. Higher class rubber insulating gloves with leather protectors, due to their increased material thickness, provide increased arc flash protection. 5. NFPA 70E – 2015; Table H.3(b) 	

Table 19 - 5 Personal Protective Equipment (PPE)

PPE Category	PPE
1	Arc-Rated Clothing, Minimum Arc Rating of 4 Cal/cm2 (see Note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated face shield (see Note 2) or arc flash suit hood Arc-rated jacket, parka, rainwear, or hard hat liner (AN) Protective Equipment Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear (AN)
2	Arc-Rated Clothing, Minimum Arc Rating of 8 Cal/cm2 (see Note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated flash suit hood or arc-rated face shield (see Note 2) and arc-rated balaclava Arc-rated jacket, parka, rainwear, or hard hat liner (AN) Protective Equipment Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear
3	Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 25 Cal/cm2 (see Note 1) Arc-rated long-sleeve shirt (AR) Arc-rated pants (AR) Arc-rated coverall (AR)

Table 19 - 5 Personal Protective Equipment (PPE)	
PPE Category	PPE
	Arc-rated arc flash suit jacket (AR) Arc-rated arc flash suit pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket, parka, rainwear, or hard hat liner (AN) Protective Equipment Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear
4	Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 40 Cal/cm² (see Note 1) Arc-rated long-sleeve shirt (AR) Arc-rated pants (AR) Arc-rated coverall (AR) Arc-rated arc flash suit jacket (AR) Arc-rated arc flash suit pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket, parka, rainwear, or hard hat liner (AN) Protective Equipment Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear
AN: as needed (optional). AR: as required. SR: selection required. Notes: (1) Arc rating is defined in Article 100. (2) Face shields are to have wrap-around guarding to protect not only the face but also the forehead, ears, and neck, or, alternatively, an arc-rated arc flash suit hood is required to be worn. (3) If rubber insulating gloves with leather protectors are used, additional leather or arc-rated gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement. (4) NFPA 70E – 2015; Table 130.7(C)(16)	

Table 19 - 6 Protective Clothing Characteristics			
PPE Category	Clothing Description	Required Minimum Arc Rating of PPE	
		J/cm ²	Cal/cm ²
N/A	Non-melting materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz./yd ²	N/A	N/A
1	Arc-rated FR shirt and FR pants or FR coverall	16.74	4
2	Arc-rated FR shirt and FR pants or FR coverall	33.47	8
3	Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum	104.6	25
4	Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum	167.36	40
Note: Arc rating can be either ATPV or EBT. ATPV is defined in ASTM F 1959, Standard Test Method for Determining the Arc Thermal Performance Value of Materials for Clothing, as the incident energy on a material or a multilayer system of materials that results in a 50% probability that sufficient heat transfer through the tested specimen is predicted to cause the onset of a second-degree skin burn injury based on the Stoll curve, Cal/cm².			

Table 19 - 6 Protective Clothing Characteristics		
PPE Category	Clothing Description	Required Minimum Arc Rating of PPE
		J/cm ² Cal/cm ²
<i>EBT is defined in ASTM F 1959 as the incident energy on a material or material system that results in a 50% probability of break-open. Arc rating is reported as either ATPV or EBT, whichever is the lower value</i>		

Table 19 - 7 Standards on Protective Equipment		
Subject	Document Title	Document #
Apparel-Arc Rated	Standard Performance Specification for Flame Resistant and Arc Rated Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards	ASTM F1506
	Standard Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing	ASTM F1449
	Standard Guide for Home Laundering Care and Maintenance of Flame, Thermal and Arc Resistant Clothing	ASTM F2757
Aprons-Insulating	Standard Specification for Electrically Insulating Aprons	ASTM F2677
Blankets	Standard Specification for Rubber Insulating Blankets, 2005	ASTM D 1048,
	Standard Specification for In-Service Care of Insulating Blankets, 2006	ASTM F 479,
Covers	Standard Specification for Rubber Covers, 1998 (R 2002)	ASTM D 1049
Eye and Face Protection-General	Practice for Occupational and Educational Eye and Face Protection	ANSI Z87.1
Face-Arc Rated	Standard Test Method for Determining the Arc Rating and Standard Specification for Eye or Face Protective Products	ASTM F2178
Fall Protection	Standard Specification for Personal Climbing Equipment	ASTM F887
Fiberglass tools/ladders	Standard Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Line Tools, 2002 (R 2007)	ASTM F 711
Footwear-Dielectric Specification	Standard Specification for Dielectric Footwear	ASTM F1117
Footwear-Dielectric Test Method	Standard Test Method for Determining Dielectric Strength of Dielectric Footwear	ASTM F1116
Footwear-Standard Performance Specification	Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear	ASTM F2413
Footwear-Standard Test Method	Standard Test Methods for Foot Protections	ASTM F2412
Gloves-Leather Protectors	Standard Specification for Leather Protectors for Rubber Insulating Gloves and Mittens	ASTM F696
Gloves-Rubber Insulating	Standard Specification for Rubber Insulating Gloves	ASTM D120
Gloves and Sleeves –In-Service Care	Standard Specification for In-Service Care of Insulating Gloves and Sleeves	ASTM F496
Hand tools, Insulated	<i>Standard Specification for Insulated and Insulating Hand Tools, 2007</i>	ASTM F 1505
Head Protection-Hard Hats	Requirements for Protective Headwear for Industrial Workers	ANSI Z89.1
Ladders	<i>Safety Requirements for Portable Wood Ladders, 2000</i>	ANSI A14.1
	<i>Safety Requirements for Fixed Ladders, 2002</i>	ANSI A14.3
	<i>Safety Requirements for Job-Made Ladders, 2002</i>	ANSI A14.4
	<i>Safety Requirement for Portable Reinforced Plastic Ladders, 2000</i>	ANSI A14.5
Line hoses and covers	<i>Standard Specification for Rubber Insulating Line Hoses, 2005</i>	ASTM D 1050
	<i>Standard Specification for In-Service Care of Insulating Line Hose and Covers, 1999 (R 2007)</i>	ASTM F 478
Plastic guards	<i>Standard Test Methods and Specifications for Electrically Insulating Plastic Guard Equipment for Protection of Workers, 2006</i>	ASTM F 712
Rainwear-Arc Rated	Standard Specification for Arc and Flame Resistant Rainwear	ASTM F1891
Rubber Protective Products-Visual Inspection	Standard Guide for Visual Inspection of Electrical Protective Rubber Products	ASTM F1236
Safety signs and tags	<i>Series of Standards for Safety Signs and Tags, 2006</i>	ANSI Z535,

Table 19 - 7 Standards on Protective Equipment

Subject	Document Title	Document #
Sleeves-Insulating	Standard Specification for Rubber Insulating Sleeves	ASTM D1051
Temporary grounding	Standard Specification for Temporary Protective Grounds to Be Used on De-Energized Electric Power Lines and Equipment, 2004	ASTM F 855
Notes: <ul style="list-style-type: none"> NFPA 70E – 2015: Table 130.7(C)(14) 		

Table 19 - 8 Rubber Insulating Equipment, Maximum Test Intervals

Rubber Insulating Equipment	When to Test	Governing Standard* for Test Voltage
Blankets	Before first issue; every 12 months thereafter†	ASTM F 479
Covers	If insulating value is suspect	ASTM F 478
Gloves	Before first issue; every 6 months thereafter†	ASTM F 496
Line hose	If insulating value is suspect	ASTM F 478
Sleeves	Before first issue; every 12 months thereafter	ASTM F 496
Specific Notes (as referenced in the table): *ASTM F 478, <i>Standard Specification for In-Service Care of Insulating Line Hose and Covers</i> ; ASTM F 479, <i>Standard Specification for In-Service Care of Insulating Blankets</i> ; ASTM F 496, <i>Standard Specification</i> †If the insulating equipment has been electrically tested but not issued for service, it may not be placed into service unless it has been electrically tested within the previous 12 months.		

Table 19 - 9 Approach Boundaries to Energized Electrical Conductors/Circuit Parts for Shock Protection for Alternating-Current Systems

(All dimensions are distance from energized electrical conductor or circuit part to employee.)

1	2	3	4
Nominal System Voltage Range, Phase to Phase ^a	Limited Approach Boundary ^b		Restricted Approach Boundary ^b ; Includes Inadvertent Movement Adder
	Exposed Movable Conductor ^c	Exposed Fixed Circuit Part	
<50 V	Not specified	Not specified	Not specified
50 V–150 V ^d	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	Avoid Contact
151 V–750 V	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.3 m (1 ft 0 in.)
751 V–15 kV	3.0 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.7 m (2 ft 2 in.)
15.1 kV–36 kV	3.0 m (10 ft 0 in.)	1.8 m (6 ft 0 in.)	0.8 m (2 ft 7 in.)
36.1 kV–46 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	0.8 m (2 ft 9 in.)
46.1 kV–72.5 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 3 in.)
72.6 kV–121 kV	3.3 m (10 ft 8 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 4 in.)
138 kV–145 kV	3.4 m (11 ft 0 in.)	3.0 m (10 ft 0 in.)	1.2 m (3 ft 10 in.)
161 kV–169 kV	3.6 m (11 ft 8 in.)	3.6 m (11 ft 8 in.)	1.3 m (4 ft 3 in.)
230 kV–242 kV	4.0 m (13 ft 0 in.)	4.0 m (13 ft 0 in.)	1.7 m (5 ft 8 in.)
345 kV–362 kV	4.7 m (15 ft 4 in.)	4.7 m (15 ft 4 in.)	2.8 m (9 ft 2 in.)
500 kV–550 kV	5.8 m (19 ft 0 in.)	5.8 m (19 ft 0 in.)	3.6 m (11 ft 10 in.)
765 kV–800 kV	7.2 m (23 ft 9 in.)	7.2 m (23 ft 9 in.)	4.9 m (15 ft 11 in.)

Notes:

- All dimensions are distance from exposed energized electrical conductors or circuit part to employee.
- For Arc Flash Protection Boundary - When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.
 - Voltage Levels Between 50 Volts and 600 Volts. In those cases, where detailed arc flash hazard analysis calculations are not performed for systems that are between 50 volts and 600 volts, the Arc Flash Protection Boundary shall be 4.0 ft., based on the product of clearing time of 2 cycles (0.033 sec) and the available bolted fault current of 50 kA or any combination not exceeding 100 kA cycles (1667 ampere seconds). When the product of clearing times and bolted fault current exceeds 100 kA cycles, the Arc Flash Protection Boundary shall be calculated.

Table 19 - 9 Approach Boundaries to Energized Electrical Conductors/Circuit Parts for Shock Protection for Alternating-Current Systems			
(All dimensions are distance from energized electrical conductor or circuit part to employee.)			
1	2	3	4
Nominal System Voltage Range, Phase to Phase ^a	Limited Approach Boundary ^b		Restricted Approach Boundary ^b ; Includes Inadvertent Movement Adder
	Exposed Movable Conductor ^c	Exposed Fixed Circuit Part	
(2) Voltage Levels Above 600 Volts. At voltage levels above 600 volts, the Arc Flash Protection Boundary shall be the distance at which the incident energy equals 1.2 Cal/cm ² . For situations where fault-clearing time is equal to or less than 0.1 sec, the Arc Flash Protection Boundary shall be the distance at which the incident energy level equals 1.5 Cal/cm ² .			
• NFPA 70E - 2015; Table 130.4(D)(a)			
a. For single-phase systems above 250V, select the range that is equal to the system’s maximum phase-to-ground voltage multiplied by 1.732.			
b. Limited Approach Boundary -An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists. Restricted Approach Boundary - An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part			
c. <i>Exposed movable conductors</i> describes a condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.			
d. This includes circuits where the exposure does not exceed 120V.			

Table 19 - 10 Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection, Direct-Current Voltage Systems			
1	2	3	4
Nominal System Voltage Range, Phase to Phase ^a	Limited Approach Boundary ^b		Restricted Approach Boundary ^b ; Includes Inadvertent Movement Adder
	Exposed Movable Conductor ^c	Exposed Fixed Circuit Part	
<100 V	Not specified	Not specified	Not specified
100 V–300 V	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	Avoid contact
301 V–1 kV	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.3 m (1 ft 0 in.)
1.1 kV–5 kV	3.0 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.5 m (1 ft 5 in.)
5 kV–15 kV	3.0 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.7 m (2 ft 2 in.)
15.1 kV–45 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	0.8 m (2 ft 9 in.)
45.1 kV– 75 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 2 in.)
75.1 kV–150 kV	3.3 m (10 ft 8 in.)	3.0 m (10 ft 0 in.)	1.2 m (4 ft 0 in.)
150.1 kV–250 kV	3.6 m (11 ft 8 in.)	3.6 m (11 ft 8 in.)	1.6 m (5 ft 3 in.)
250.1 kV–500 kV	6.0 m (20 ft 0 in.)	6.0 m (20 ft 0 in.)	3.5 m (11 ft 6 in.)
500.1 kV–800 kV	8.0 m (26 ft 0 in.)	8.0 m (26 ft 0 in.)	5.0 m (16 ft 5 in.)
<p>Notes:</p> <ul style="list-style-type: none"> All dimensions are distance from exposed energized electrical conductors or circuit parts to worker. * <i>Exposed movable conductor</i> describes a condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles. Improper or inadequate maintenance can result in increased opening time of the overcurrent protective device, thus increasing the incident energy. Where equipment is not properly installed or maintained, PPE selection based on incident energy analysis or the PPE category method may not provide adequate protection from arc flash hazards. Both larger and smaller available short-circuit currents could result in higher available arc flash energies. If the available short-circuit current increases without a decrease in the opening time of the overcurrent protective device, the arc flash energy will increase. If the available short-circuit current decreases, resulting in a longer opening time for the overcurrent protective device, arc flash energies could also increase. The occurrence of an arcing fault inside an enclosure produces a variety of physical phenomena very different from a bolted fault. For example, the arc energy resulting from an arc developed in the air will cause a sudden pressure increase and localized overheating. Equipment and design practices are available to minimize the energy levels and the number of procedures that could expose an employee to high levels of incident energy. Proven designs such as arc-resistant switchgear, remote racking (insertion or removal), remote opening and closing of switching devices, high-resistance grounding of low-voltage and 5000 volts (nominal) systems, current limitation, and specification of covered 			

Table 19 - 10 Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection, Direct-Current Voltage Systems

1	2	3	4
Nominal System Voltage Range, Phase to Phase ^a	Limited Approach Boundary ^b		Restricted Approach Boundary ^b ; Includes Inadvertent Movement Adder
	Exposed Movable Conductor ^c	Exposed Fixed Circuit Part	
<p>bus or covered conductors within equipment are available to reduce the risk associated with an arc flash incident. See NFPA 70E 2015 - Informative Annex O for Safety-Related Design Requirements.</p> <ul style="list-style-type: none"> For additional direction for performing maintenance on overcurrent protective devices, see Chapter 2, Safety-Related Maintenance Requirements. See IEEE 1584, Guide for Performing Arc Flash Calculations, for more information regarding arc flash hazards for three-phase systems. NFPA 70E – 2015; Table 130.4(D)(b) 			

Table 19 - 11 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems

Code	Task	Equipment Condition	Arc Flash PPE Required
N/A	Reading a panel meter while operating a meter switch	Any	No
E,C	Normal operation of a circuit breaker (CB), switch, contactor, or starter	All of the following: The equipment is properly installed The equipment is properly maintained All equipment doors are closed and secured All equipment covers are in place and secured There is no evidence of impending failure	No
		1 or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
E,C	For ac systems: Work on energized electrical conductors and circuit parts, including voltage testing	Any	Yes
E,C	For dc systems: Work on energized electrical conductors and circuit parts of series-connected battery cells, including voltage testing	Any	Yes
E,C	Voltage testing on individual battery cells or individual multi-cell units	All of the following: The equipment is properly installed The equipment is properly maintained Covers for all other equipment are in place and secured There is no evidence of impending failure	No
		1 or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
C	Removal or installation of CBs or switches	Any	Yes
E,C	Removal or installation of covers for equipment such as wireways, junction boxes, and cable trays that does not expose bare energized electrical conductors and circuit parts	All of the following: The equipment is properly installed The equipment is properly maintained There is no evidence of impending failure	No
		Any of the following:	Yes

Table 19 - 11 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems

Code	Task	Equipment Condition	Arc Flash PPE Required
		The equipment is not properly installed The equipment is not properly maintained There is evidence of impending failure	
C	Removal of bolted covers (to expose bare energized electrical conductors and circuit parts). For dc systems, this includes bolted covers, such as battery terminal covers.	Any	Yes
C	Removal of battery intercell connector covers	All of the following: The equipment is properly installed. The equipment is properly maintained Covers for all other equipment are in place and secured There is no evidence of impending failure	No
		1 or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
E,C	Opening hinged door(s) or cover(s) (to expose bare energized electrical conductors and circuit parts)	Any	Yes
E,C	Perform infrared thermography and other noncontact inspections outside the restricted approach boundary. This activity does not include opening of doors or covers.	Any	No
C	Application of temporary protective grounding equipment after voltage test	Any	Yes
E,C	Work on control circuits with exposed energized electrical conductors and circuit parts, 120 volts or below without any other exposed energized equipment over 120 V including opening of hinged covers to gain access	Any	No
E,C	Work on control circuits with exposed energized electrical conductors and circuit parts, greater than 120 V	Any	Yes
C	Insertion or removal of individual starter buckets from motor control center (MCC)	Any	Yes
C	Insertion or removal (racking) of CBs or starters from cubicles, doors open or closed	Any	Yes
C	Insertion or removal of plug-in devices into or from busways	Any	Yes
E,C	Insulated cable examination with no manipulation of cable	Any	No
E,C	Insulated cable examination with manipulation of cable	Any	Yes
E,C	Work on exposed energized electrical conductors and circuit parts of equipment directly supplied by a panelboard or motor control center	Any	Yes
C	Insertion and removal of revenue meters (kW-hour, at primary voltage and current)	Any	Yes
C	For dc systems, insertion or removal of individual cells or multi-cell units of a battery system in an enclosure	Any	Yes

Table 19 - 11 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems			
Code	Task	Equipment Condition	Arc Flash PPE Required
C	For dc systems, insertion or removal of individual cells or multi-cell units of a battery system in an open rack	Any	No
C	For dc systems, maintenance on a single cell of a battery system or multi-cell units in an open rack	Any	No
E,C	For dc systems, work on exposed energized electrical conductors and circuit parts of utilization equipment directly supplied by a dc source	Any	Yes
C	Arc-resistant switchgear Type 1 or 2 (for clearing times of <0.5 sec with a prospective fault current not to exceed the arc-resistant rating of the equipment) and metal enclosed interrupter switchgear, fused or unfused of arc resistant type construction, tested in accordance with IEEE C37.20.7: Insertion or removal (racking) of CBs from cubicles Insertion or removal (racking) of ground and test device Insertion or removal (racking) of voltage transformers on or off the bus	All of the following: The equipment is properly installed The equipment is properly maintained All equipment doors are closed and secured All equipment covers are in place and secured There is no evidence of impending failure	No
		1 or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
E,C	Opening voltage transformer or control power transformer compartments	Any	Yes
C	Outdoor disconnect switch operation (hookstick operated) at 1 kV through 15 kV	Any	Yes
C	Outdoor disconnect switch operation (gang-operated, from grade) at 1 kV through 15 kV	Any	Yes
BMcd Qualified Person CODE: N/A-Not Applicable; E- Engineering; C-Commissioning Notes: <ul style="list-style-type: none"> Hazard identification is one component of risk assessment. Risk assessment involves a determination of the likelihood of occurrence of an incident, resulting from a hazard that could cause injury or damage to health. The assessment of the likelihood of occurrence contained in this table does not cover every possible condition or situation. Where this table indicates that arc flash PPE is not required, an arc flash is not likely to occur. *The phrase <i>properly installed</i>, as used in this table, means that the equipment is installed in accordance with applicable industry codes and standards and the manufacturer's recommendations. The phrase <i>properly maintained</i>, as used in this table, means that the equipment has been maintained in accordance with the manufacturer's recommendations and applicable industry codes and standards. The phrase <i>evidence of impending failure</i>, as used in this table, means that there is evidence of arcing, overheating, loose or bound equipment parts, visible damage, deterioration, or other damage NFPA 70E – 2015: Table 130.7(C)(15)(A)(a) 			

Table 19 - 12 Arc-Flash Hazard PPE Categories for Alternating Current (ac) Systems

Equipment	Arc Flash PPE Category	Arc-Flash Boundary	
		m. meters	In., ft.
Panelboards or other equipment rated 240 V and below Parameters: Maximum of 25 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	1	485 mm	19 in.
Panelboards or other equipment rated >240 V and up to 600 V Parameters: Maximum of 25 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	2	900 mm	3 ft.
600-V class motor control centers (MCCs) Parameters: Maximum of 65 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	2	1.5 m	5 ft.
600-V class motor control centers (MCCs) Parameters: Maximum of 42 kA short-circuit current available; maximum of 0.33 sec (20 cycles) fault clearing time; working distance 455 mm (18 in.)	4	4.3 m	14 ft.
600-V class switchgear (with power circuit breakers or fused switches) and 600 V class switchboards Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.5 sec (30 cycles) fault clearing time; working distance 455 mm (18 in.)	4	6 m	20 ft.
Other 600-V class (277 V through 600 V, nominal) equipment Parameters: Maximum of 65 kA short circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	2	1.5 m	5 ft.
NEMA E2 (fused contactor) motor starters, 2.3 kV through 7.2 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	12 m	40 ft.
Metal-clad switchgear, 1 kV through 15 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	12 m	40 ft.
Arc-resistant switchgear Type 1 or 2 [for clearing times of < 0.5 sec (30 cycles) with a perspective fault current not to exceed the arc-resistant rating of the equipment], and metal-enclosed interrupter switchgear, fused or unfused of arc-resistant-type construction, tested in accordance with IEEE C37.20.7, 1 kV through 15 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	N/A (doors closed)	N/A (doors closed)	
	4 (doors open)	12 m	40 ft.
Other equipment 1 kV through 15 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	12 m	40 ft.

Note:

- For equipment rated 600 volts and below, and protected by upstream current-limiting fuses or current-limiting circuit breakers sized at 200 amperes or less, the arc flash PPE category can be reduced by one number but not below arc flash PPE category 1.
- NFPA 70E – 2015; Table 130.7(C)(15)(A)(b)

Table 19 - 13 Arc-Flash Hazard PPE Categories for Direct Current (dc) Systems

Equipment	Arc Flash PPE Category	Arc-Flash Boundary
Storage batteries, dc switchboards, and other dc supply sources 100 V > Voltage < 250 V Parameters: Voltage: 250 V; Maximum arc duration and working distance: 2 sec @ 455 mm (18 in.)		
Short-circuit current < 4 kA	1	900 mm (3 ft)
4 kA ≤ short-circuit current < 7 kA	2	1.2 m (4 ft)
7 kA ≤ short-circuit current < 15 kA	3	1.8 m (6 ft)
Storage batteries, dc switchboards, and other dc supply sources 250 V ≤ Voltage ≤ 600 V Parameters: Voltage: 600 V; Maximum arc duration and working distance: 2 sec @ 455 mm (18 in.)		
Short-circuit current 1.5 kA	1	900 mm (3 ft)
1.5 kA ≤ short-circuit current < 3 kA	2	1.2 m (4 ft)
3 kA ≤ short-circuit current < 7 kA	3	1.8 m (6 ft.)
7 kA ≤ short-circuit current < 10 kA	4	2.5 m (8 ft)
Note: <ul style="list-style-type: none"> Apparel that can be expected to be exposed to electrolyte must meet both following conditions: Be evaluated for electrolyte protection in accordance with ASTM F1296, <i>Standard Guide for Evaluating Chemical Protective Clothing</i> Be arc-rated in accordance with ASTM F1891, <i>Standard Specification for Arc Rated and Flame Resistant Rainwear</i>, or equivalent NFPA 70E – 2015; Table 130.7(C)(15)(B) 		

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20.1 Preparatory Operations

20.1.1 General

Before and demolition occurs elements (a) through (k) shall be evaluated by a competent person. Documentation of this shall be submitted via Burns & McDonnell "Demolition Preparatory Checklist" Safety Form T-1.

Demolition - Prior to starting demolition operations, a competent person shall determine the possibility of unplanned collapse of any portion of the structure or adjacent structures.

Damaged Structure - When workers are required within a structure which has been damaged, the walls or floor shall be shored or braced.

Utilities - All utilities shall be shut off outside the building line and utility companies shall be notified before demolition work is started.

Temporarily Relocated Utilities - If it is necessary to maintain any utilities during demolition, utilities shall be temporarily relocated, and protected.

Hazardous Chemicals - If the presence of hazardous chemicals is determined the hazard shall be eliminated before demolition is started.

Fragmentation of Glass - Where a hazard exists from fragmentation of glass, such hazards shall be removed.

Wall openings shall be protected with appropriate fall protection.

Floor Openings & Dropped Debris - If debris is dropped through holes in the floor without chutes, the drop area shall be barricaded. Warning signs shall be posted at each level, and removal shall not be permitted in this lower area until debris handling ceases above.

Floor Openings which are not Used As Material Drops - All floor openings, not used as material drops, shall be covered with material that can support the weight of any load which may be imposed and properly secured to prevent its accidental movement.

Begin Structure Demolition - Demolition shall begin at the top of the structure and proceed downward.

Worker entrances shall be protected from falling materials.

20.1.2 Hazardous Materials

Prior to starting demolition, a building asbestos survey must be completed and a demolition notification, identifying locations and types of asbestos, must be provided to the state. Other hazardous building materials, such as lead paint, also needs to be identified in a pre-demolition survey. Locations of hazardous materials, as identified in a building survey report, need to be provided to any contractors working in the vicinity of existing hazardous materials and if hazardous materials are to be disturbed, work plans need to be developed that comply with OSHA requirements and describe protective measures and controls to be taken.

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21.1 Site Layout, Site Specific Erection Plan and Construction Sequence

21.1.1 Approval to Begin Steel Erection

Approval to Begin Steel Erection - Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector has been notified by Burns & McDonnell Safety Form U-1 "Concrete and Anchor Bolt Release" that :

Any repairs, replacements and modifications to the anchor bolts were conducted with the approval of the project structural engineer of record Burns & McDonnell "Discrepancy Report" QF-005.

21.1.2 Commencement of Steel Erection

Commencement of Steel Erection - A steel erection contractor shall not erect steel unless it has received written notification by Burns & McDonnell "Approval to Begin Steel Erection" Safety Form U-3.

21.1.3 Site-Specific Erection Plan

Burns & McDonnell Safety Form U-2 "Site-Specific Steel Erection Plan" shall be developed by a qualified person and submitted to Burns & McDonnell.

21.2 Hoisting and Rigging

21.2.1 Multiple Lift

Multiple Lift Rigging Procedure or "Christmas treeing" – may only be performed by permission of the Burns & McDonnell Director of Corporate Health & Safety, and then a multiple lift shall only be performed if the following criteria are met:

- A multiple lift rigging assembly is used;

- A maximum of five members are hoisted per lift;

- Only beams and similar structural members are lifted; and

- All workers engaged in the multiple lift have been trained in these procedures.

No crane is permitted to be used for a multiple lift where such use is contrary to the manufacturer's specifications and limitations.

Components of the multiple lift rigging assembly shall be assembled with a maximum capacity for total assembly and each individual attachment point.

The total load shall not exceed:

- The rated capacity of the hoisting equipment specified in the hoisting equipment load charts;

- The rigging capacity specified in the rigging rating chart.

The multiple lift rigging assembly shall be rigged with members:

- Attached at their center of gravity and maintained reasonably level;

- Rigged from top down; and

Rigged at least 7 feet apart.

The members on the multiple lift rigging assembly shall be set from the bottom up.

Controlled load lowering shall be used whenever the load is over the connectors.

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All covers shall be marked with Burns & McDonnell “Hole Cover” Safety Form D-6.

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Each worker on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest system.

22.2 Personal Fall Arrest Systems

Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two. Documentation of the design, installation and approval process shall be transmitted to Burns & McDonnell refer to Burns & McDonnell Health & Safety Form C-20 "Safety Submittals"

Inspections of the Horizontal Lifeline shall be documented using the Burns & McDonnell Safety Form V-2 "Fall Protection Equipment Inspection".

22.3 Controlled Access Zones

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

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23.2 Appendix B Lift-Slab Operations

No worker, except those essential to the jacking operation, shall be permitted in the building/structure while any jacking operation is taking place.

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26.1 Hazard Communication Program

26.1.1 Hazard Communication Program

The purpose of the Hazard Communication Program (HAZCOM) is to safeguard the health of workers by providing a guide for safe compliance, and information concerning health and physical hazards of the chemical materials in use at the work place.

Burns & McDonnell is committed to performing work in the safest manner possible while providing the safest possible working conditions for all employees. It is the policy of Burns & McDonnell that employees receive training on their company's Hazard Communication Program and agree to abide by all its requirements.

26.1.2 Introduction

Chemicals are often used during project work and some of these chemicals may pose a hazard to health and can cause physical harm if used improperly or carelessly. These chemicals can be used safely with proper knowledge and recognition of the hazards.

While risks of exposure to chemical hazards exist, they can be minimized and controlled. Each potentially exposed employee should have chemical hazard training, and access to HAZCOM information and the material's Safety Data Sheets (SDS).

Burns & McDonnell employee owners should comply with the Burns & McDonnell Hazard Communication Program contained in the Corporate Policy Manual, Chapter 8. All Burns & McDonnell employee owner questions or inquiries regarding the program or chemicals used by company personnel should be directed to the Corporate Health & Safety Department.

The project manager will inform independent contractors who are retained by Burns & McDonnell of the presence of hazardous chemicals known to be in the areas where the contractor will be working. This information will be provided before they begin work.

On projects where multiple employers are contracted by Burns & McDonnell, a master SDS compilation along with a chemical inventory list (see Burns and McDonnell Chemical Inventory List Safety Form Z-1) for the project shall be kept. The list identifies each chemical or mixture and the conditions in which the chemical or mixture is stored or used. The list is updated as hazardous chemicals or mixtures are removed from or introduced to the project.

At the time of the pre-construction meeting, Subcontractors to Burns & McDonnell are informed that all chemicals and products brought onto the project by the Subcontractor shall have a copy of the SDS submitted to Burns & McDonnell at the time of arrival for that chemical. This responsibility shall be to the Subcontractor to notify Burns & McDonnell. A SDS compilation of all chemicals or products submitted to Burns & McDonnell shall be kept along with a title sheet listing these chemicals. All workers on site shall be made aware of this requirement, the location of the SDS compilation and all workers shall be granted free access to the SDS compilation.

26.1.3 Safety Data Sheets (SDS)

Project management will keep on file a Safety Data Sheet (SDS for each hazardous chemical brought onto the project site.

If workers cannot read English, a special effort will be undertaken to explain the necessary information verbally to them in their language. Bilingual supervision and instructors could be utilized if it is needed.

SDSs will be accessible during normal work hours in the project management trailer/office. Applicable SDSs are also to be maintained and available at each subcontractor's project site office.

26.1.4 Labeling

All containers of hazardous chemicals brought onto the project site are to be labeled. The labels should identify the hazardous chemicals with the appropriate hazard warnings associated with its exposure. The labels shall be in English, legible and prominently displayed on the container. Employees should be careful not to deface or remove warning labels from containers of hazardous chemicals. The labels must remain on the containers and remain legible at all times. Employees who deface hazardous warning labels are subject to disciplinary action.

Burns & McDonnell uses the Hazardous Material Identification System (HMIS) on containers used for storing transferred hazardous chemicals. Burns & McDonnell also uses the HMIS to identify specific hazards in buildings and on projects sites.

In addition, any employee owner transferring a hazardous chemical from a labeled container to an unlabeled container (e.g., a can, bucket or bottle) must affix the appropriate label on the new container. The chemical should never be left unattended in an unlabeled container. Those found will be disposed of properly to avoid potential exposure to an unknown chemical. Chemicals found in unlabeled containers should Not be Used.

26.1.5 Training

All employees who may be potentially exposed to hazardous chemicals under normal operating conditions, while performing non-routine tasks, or under foreseeable emergencies, will receive training on how to safely use any hazardous chemicals present in their work areas.

All new and transferred employees will receive training before performing duties in work areas or on projects where hazardous chemicals are present, whenever a new chemical hazard is introduced into their work area, or when a changed process alters the threat of chemical exposure.

26.1.6 Emergencies

If a chemical emergency occurs, the Emergency Action Plan (refer to Burns & McDonnell Safety Form E1 – EAP and Fire Prevention Plan) will go into effect. Burns & McDonnell will notify all appropriate personnel and contractors, and provide support during the notification of local authorities, evacuation, spill response, clean up and return to operations. The designated person indicated in the Emergency Action Plan is responsible for directing and coordinating all relief efforts.

If an employee comes in contact with a hazardous chemical and needs medical treatment, a copy of the chemical's SDS should be forwarded to the hospital immediately upon request.

26.1.7 Hazardous Material Identification System (HMIS)

The HMIS (Hazardous Material Identification System) helps satisfy the hazard communication standard (HCS) requirements by providing a format for hazard determinations, offering a basic written hazard communication program, and simplifying the worker training and information process. The HMIS provides clear, recognizable information to workers by standardizing the presentation of chemical information. This is accomplished by the use of color bar system and color codes corresponding to the hazards of a product, assigned numeric ratings indicating the degree of hazard, and alphabetical codes designating appropriate personal protective equipment (PPE) workers should wear while handling the material.

Table 26- 1 HMIS Protective Equipment Examples

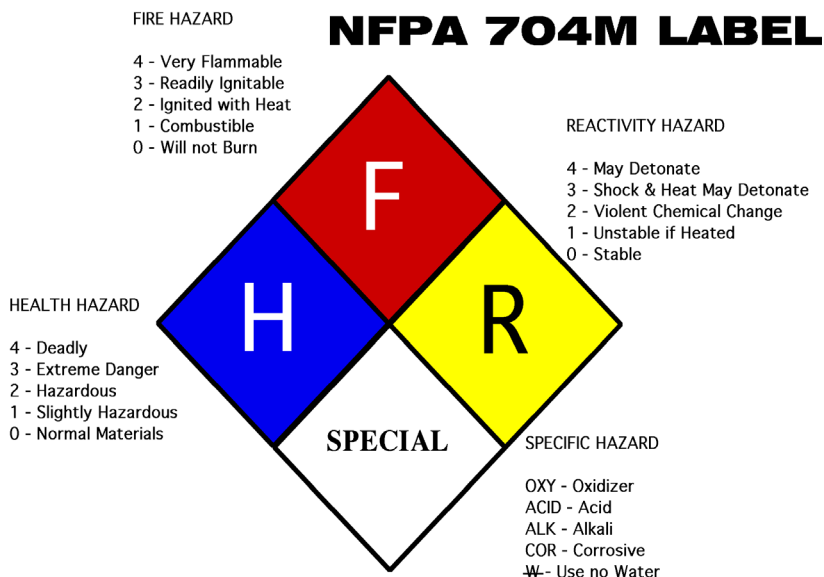
Chemical Name	Protective Equipment Examples	
Health 0	A	Safety Glasses
Flammability 0	B	Safety Glasses and Gloves
Physical Hazards 0	C	Safety Glasses, Gloves and an Apron
Personal Protection 0	D	Face Shield, Gloves and an Apron
	E	Safety Glasses, Gloves and a Dust Respirator
	F	Safety Glasses, Gloves, Apron and a Dust Respirator
	G	Safety Glasses, a Vapor Respirator
	H	Splash Goggles, Gloves, Apron and a Vapor Respirator
	I	Safety Glasses, Gloves and a Dust/Vapor Respirator
	J	Splash Goggles, Gloves, Apron and a Dust/Vapor Respirator
	K	Airline Hood or Mask, Gloves, Full Suit and Boots
L-Z Custom PPE Specified by Employer	N	Splash Goggles
	O	Face Shield & Eye Protection (Safety glasses)
	P	Gloves
	Q	Boots
	R	Apron
	S	Full Body Suit
	T	Dust Mask
	U	Vapor Respirator (APR)
	W	Combination Dust & Vapor Respirator
	Y	Full Face Respirator
	Z	Airline Hood or Mask (Supplied Air)
Notes: <ul style="list-style-type: none"> This lettering system indicates the level of PPE to be worn to work safely with a material. Each of the individual PPE icons has been designated with a corresponding letter of the alphabet ranging from 'm' through 'z'. An employer can list appropriate letters to customize the PPE required for handling a specific material. HMIS allows an "*" to designate a material as a carcinogen or for materials known to have an adverse effect given chronic exposure. This designation would appear next to the numerical ranking within the blue health bar. 		

26.1.8 NFPA 704 Labeling System

The "NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response" is a standard maintained and revised by the National Fire Protection Association. It defines the "fire diamond" used by emergency personnel to quickly and easily identify the risks posed by hazardous materials. This helps determine what, if any, special equipment should be used, procedures followed, or precautions taken during the initial stages of an emergency response.

The four divisions are typically color-coded, with blue indicating level of health hazard, red indicating flammability, yellow (chemical) reactivity, and white containing special codes for unique hazards. Each of health, flammability and reactivity is rated on a scale from 0 (no hazard; normal substance) to 4 (severe risk). See the latest version of NFPA 704 for the specifications of each classification.

Figure 26 - 1 NFPA 704M Label



26.1.9 OSHA Required Labeling for GHS

The following figure is a sample of the new GHS style labeling using Sulfuric Acid as the material. There are six required information areas meeting the requirements previously mentioned:

Product Identifier - One of the new label categories is Product Identifier. This represents the name or number used for a hazardous chemical on a label or in the Safety Data Sheet. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label, and the Safety Data Sheet.

Pictograms - One of the new label categories is Pictograms. A pictogram means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color intended to convey specific information about the hazards of a chemical.

There are Nine (9) pictograms designated under the Hazard Communication Standard for application to a hazard category.

As of June 1, 2015, the Hazard Communication Standard will require pictograms on labels to alert users of chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard. The pictogram on the label is determined by the chemical hazard classification.

Signal word - The signal word means a word used to indicate the relative severity of the hazard and it is used on the label to alert the reader to a potential hazard. The signal words used in this category are "Danger" and "Warning." "Danger" is used for more severe hazards, while "Warning" is used for less severe hazards

Hazard Statements - The Hazard Statement means a statement assigned to a hazard class and category describing the nature of the hazard of a chemical, including - where appropriate - the degree of hazard.

Precautionary Statements - Precautionary Statements mean a phrase describing the recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.

Supplier Information - Supplier Information is another new label. The chemical manufacturer, importer, or distributor shall ensure information provided is in accordance with the Hazard Communication Standard - Appendix C. For each hazard class and associated hazard category for the hazardous chemical, the information must be prominently displayed and in English (other languages may also be included if appropriate).

Signal words, hazard statements, and pictograms have all been harmonized, and assigned to each hazard class and category in the Globally Harmonized System.

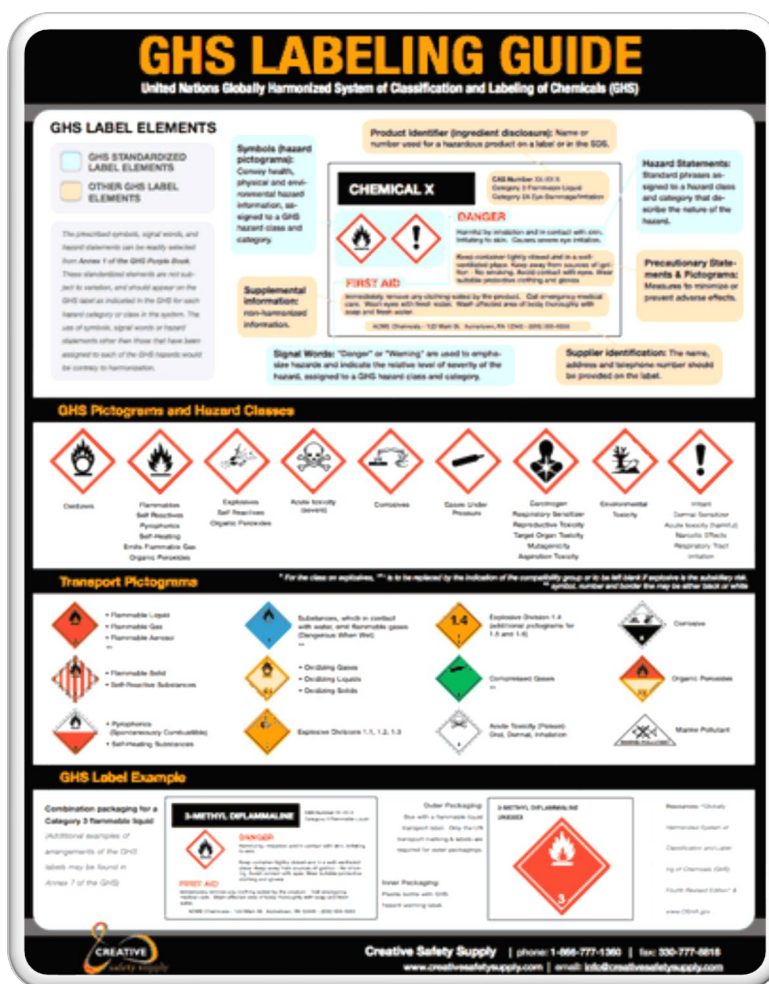
Once a chemical has been classified, the relevant harmonized information can be found in HAZCOM 2012, Appendix C.

Figure 26 - 2 Required Label Information

2	1	2
	Sulfuric Acid	
	3 Danger! May be harmful if swallowed. Causes severe skin burns and eye	
	4 damage. Fatal if inhaled. Harmful to aquatic life.	
	Do not breathe dust/fume/gas/mist/vapors/spray. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection.	
5		
	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.	
	In case of fire Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.	
	See Material Safety Data Sheet for further details regarding safe use of this product.	
	6 Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA Telephone : +18003255832	
1	4	
Product Identifier	Hazard Statements	
2	5	
Pictograms	Precautionary Statements	
3	6	
Signal word, "Danger!"	Supplier Information	

The Globally Harmonized System of Classification provides standardized criteria for Hazard Classification using the categories of Physical, Health, and Environment. OSHA has added the category for Hazards not Elsewhere Classified. The system also requires hazard communication for employees using standardized labels, pictograms, and Safety Data Sheets.

Figure 26 - 3 GHS Labeling Guide



26.2 Silica Dust in Construction

26.2.1 General

This section addresses the control of employee exposures to respirable dust containing crystalline silica, which is known to cause silicosis, a serious lung disease, as well as increase the risk of lung cancer and other systemic diseases.

Quartz is the most common form of crystalline silica. In fact, it is the second most common surface material accounting for almost 12% by volume of the earth's crust. Quartz is present in many materials in the construction industry, such as brick and mortar, concrete, slate, dimensional stone (granite, sandstone), stone aggregate, tile, and sand used for blasting. Other construction materials that contain crystalline silica are asphalt filler, roofing granules, plastic composites, soils, and to a lesser extent, some wallboard joint compounds, paint, plaster, caulking and putty.

Construction sites often involve many operations occurring simultaneously that can generate respirable silica dust. Therefore, it is important and necessary to utilize effective controls (such as wet methods and/or

vacuum dust collection) in order to minimize total exposures to silica-exposed tool operators or potential exposures to other employees.

The types of materials where Silica can be found.

- | | | |
|-------------------------|-----------------------------------|----------------------------------|
| • Asphalt | • Gunit/Shotcrete | • Roof Tile - Concrete |
| • Brick | • Mortar | • Roof Tile – Ceramic/Brick/Clay |
| • Cement | • Paints containing silica | • Sand |
| • Concrete | • Plaster | • Soil - Fill |
| • Concrete Block | • Refractory - Mortar | • Soil – Top |
| • Drywall | • Refractory - Castable Materials | • Stone *** |
| • Fiber Cement Products | • Refractory Units | • Stucco/EIF |
| • Grout | • Rock | • Terrazzo |

***including: granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.

Types of operations where Silica dust is generated.

- | | | |
|--------------------------|--------------------|------------------------|
| • Abrasive blasting | • Grinding | • Sanding |
| • Bush hammering | • Jackhammering | • Scabbling |
| • Cutting/sawing | • Milling | • Scarifying |
| • Demolishing/disturbing | • Mixing/pouring | • Scraping |
| • Drilling/coring | • Polishing | • Sweeping/cleaning up |
| • Earthmoving | • Sacking/patching | |

The OSHA permissible exposure limit (PEL) limits worker exposures to 50 micrograms of respirable crystalline silica per cubic meter of air ($\mu\text{g}/\text{m}^3$), averaged over an eight-hour day. The OSHA Action Level for silica is set at 25 $\mu\text{g}/\text{m}^3$, averaged over an 8-hour day.

26.2.2 Silica Exposure Control Plan (SECP)

Subcontractors shall develop a documented Silica Exposure Control Plan (SECP) for their scope of work. The objective of the SECP is to prevent, avoid or eliminate any risk of exposure to silica for employees. In order to achieve this, an effective program must be established. The SECP will include the following:

- (1) Objectives of the SECP.
- (2) Coordination of work activities, including a description of tasks in the workplace that involve exposure to respirable crystalline silica.
- (3) Appointing an SECP administrator, and a Competent Person for silica hazard control.
- (4) Risk identification, assessment, workplace walk through survey of exposed areas, and non-exposed areas.
- (5) Education and training.
- (6) Work procedures, including a description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task; description of housekeeping measures to limit employee exposure to respirable crystalline silica; and, a description of the procedures used to restrict access to work areas to minimize the number of employees exposed.
- (7) Hygiene Facilities and Decontamination Procedures.
- (8) Health Monitoring.
- (9) Documentation.
- (10) SECP annual review.

The written exposure control plan must be available for examination and copying by each employee. Copies may be available electronically or physically, depending on location needs and requirements.

The written exposure control plan must be evaluated at least once per year and as necessary. Situations where reevaluation may be necessary include regulatory updates, changes in equipment, and exposure incidents.

26.2.3 ECP Training

A training program shall be provided for all employees who are exposed to action level respirable crystalline silica. The training shall ensure that employees covered by the written exposure control plan can demonstrate knowledge and understanding of the health hazards associated with respirable crystalline silica, the specific tasks in the workplace that could result in exposure to respirable crystalline silica, the specific measures taken to protect employees from exposure to crystalline silica, the contents of the respirable crystalline silica rule, and the purpose of the medical surveillance program

26.2.4 Silica Exposure Controls

Following the hierarchy of controls Employers must first use engineering controls, then work practices as the primary way keep exposures at or below the PEL and use PPE / Respirators as the last line of defense..

(1) Engineering controls include:

- (i) wetting down work operations or
- (ii) using local exhaust ventilation (such as vacuums) to keep silica-containing dust out of the air and out of workers' lungs.
- (iii) enclosing an operation ("process isolation").

(2) Work practices to control silica exposures include:

- (i) wetting down dust before sweeping it up or
- (ii) using the water flow rate recommended by the manufacturer for a tool with water controls.

(3) Respirators are only allowed when engineering and work practice controls cannot maintain exposures at or below the PEL.

- (i) When required to maintain respirable Silica dust exposure levels at or below the PEL, respirators will be provided to those employees that are exposed to the respirable crystalline silica.

For construction Table 26-2 includes a list of common construction tasks along with exposure control methods and work practices that work well for those tasks and can be used to comply with the requirements of the standard.

26.2.5 Silica Dust Control Measures

Visible and Respirable Dust

Visible dust contains large particles that are easy to see. The tiny, respirable-sized particles (those that can get into the deep lung) containing silica pose the greatest hazard and are not visible. Most dust-generating construction activities produce a mixture of visible and respirable particles.

Do use visible dust as a general guide for improving dust suppression efforts. If you see visible dust being generated, emissions of respirable silica are probably too high. Measures that control tool-generated dust at the source usually reduce all types of particle emissions, including respirable particles.

Do not rely only on visible dust to assess the extent of the silica hazard. There may be airborne respirable dust present that is not visible to the naked eye.

Wet Cutting

Most stationary saws come equipped with a water basin that typically holds several gallons of water and a pump for recycling water for wet cutting. If a saw's water supply system is not currently operating, the manufacturer may be able to supply the necessary accessories to reactivate wet cutting capability. Most suppliers stock these accessories since water cooling prolongs the life of the saw blade and tool. Wet cutting is the most effective method for controlling silica dust generated during sawing because it controls the exposure at its source. Dust that is wet is less able to become or remain airborne.

Maintenance. To minimize dust emissions from saws equipped for wet cutting, keep pumps, hoses and nozzles in excellent operating condition. Regular saw maintenance reduces silica exposures and ensures optimal operation of the equipment. Saws and dust control devices should be on a routine maintenance schedule.

Electrical Safety. Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites

Vacuum Dust Collection Systems

When wet methods cannot be implemented, one alternative is the use of vacuum dust collection (VDC) systems. Stationary masonry saws with VDC systems are commercially available and have the ability to capture a substantial amount of dust. With these systems, a vacuum pulls dust from the cutting point through special fittings connected directly to the saw (fixed-blade saws) or, alternatively, through a dust collection device connected to the back of the saw (plunge-cut saws) (Croteau, 2000). A dust collector (exterior hood) mounted to the back of a saw requires a high exhaust airflow to ensure good dust capture between the saw blade and dust collector.

With any type of vacuum system, employee protection from respirable dust is only as good as the filter in the vacuum. The less efficient the filter, the more respirable dust will pass through with the vacuum exhaust air. Locating the vacuums far from employees as possible is one way to help limit exposure. For optimal dust collection, the following measures are recommended:

- (1) Keep the vacuum hose clear and free of debris, kinks and tight bends. Maintain the vacuum at peak performance to ensure adequate airflow through the dust collector and vacuum hoses.
- (2) On vacuums with manual back-pulse filter cleaning systems, activate the system frequently (several times per day). Empty collection bags and vacuums as frequently as necessary. Dispose of collected dust in a way that prevents it from becoming re-suspended in the air.
- (3) For best results, set up a regular schedule for filter cleaning and maintenance. For example, institute a rule to clean the filter or change the bag at each break. This will prevent pressure loss and ensure that exhaust airflow stays constant on the VDC system.
- (4) Remember, the absence of visible dust does not necessarily mean that employees are adequately protected from silica exposure.

Adjustments in work methods and equipment.

Adjustments in work methods and equipment, when possible, can lower exposure levels. For example, the use of jigs to increase the distance between the employee and the point of work can reduce exposure levels. Modifications in construction work methods for pouring, casting, finishing and installing concrete can reduce the amount of grinding required, which, in turn, can lower exposures.

Employee Positioning

Where possible, exposures can be reduced if employees work at a greater distance from the grinding point.

Grinding Wheel Size

Whenever possible, use a smaller rather than a larger wheel, and use the least aggressive tool that will do the job.

Construction Work Methods

Where practical, employers can reduce employees' silica exposures by utilizing construction methods and techniques that minimize the amount of grinding required. Examples include

- (1) taking steps to minimize pouring/casting flaws and defects by ensuring tighter fitting forms,
- (2) improved finishing, grinding on pre-cast panels outdoors before installation inside,
- (3) using factory installed chase and grooves on pre-cast structural concrete
- (4) grinding is done while the concrete is still "green"
- (5) use a hammer and chisel or power chipping equipment to remove most of the mass before using a grinder to smooth the surface.

The use of compressed air to clean surfaces or clothing is strongly discouraged. Using compressed air to clean work surfaces or clothing can significantly increase employee exposure, especially in enclosed and semi-enclosed spaces. Cleaning should be performed with a HEPA-filtered vacuum or by wet methods.

26.2.6 Construction – Specified Exposure Control Methods

Table 26-2 is a flexible compliance option that effectively protects workers from silica exposures. It identifies 18 common construction tasks that generate high exposures to respirable crystalline silica and for each task, specifies engineering controls, work practices, and respiratory protection that effectively protect workers. Employers who fully and properly implement the engineering controls, work practices, and respiratory protection specified for a task on Table 26-2 are not required to measure respirable crystalline silica exposures to verify that levels are at or below the PEL for workers engaged in the Table 26-2 task(s).

- (1) Table 26-2 in the construction standard matches 18 tasks with effective dust control methods and, in some cases, respirator requirements.
- (2) Employers that fully and properly implement controls on Table 26-2 do not have to:
 - (ii) Comply with the PEL
 - (iii) Conduct exposure assessments for employees engaged in those tasks

Table 26- 2 Exposure Control Tasks and Protection			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
		None	None

Table 26- 2 Exposure Control Tasks and Protection

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturers' instruction to minimize dust		
	• When used outdoors	None	APF 10
	• When used indoors or in an enclosed area	APF 10	APF 10
Handheld power saws for fiber cement board	For tasks performed outdoors only: • Use saw equipped with commercially available dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.		
	• When used outdoors	None	None
Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	• When used outdoors.	None	None
	• When used indoors or in an enclosed area.	APF 10	APF 10
Drivable saws	For tasks performed outdoors only: • Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
		None	None
Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
		None	None
Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowl with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.		
		None	None
	For tasks performed outdoors only:		

Table 26- 2 Exposure Control Tasks and Protection

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
Dowel drilling rigs for concrete	<ul style="list-style-type: none"> Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes. 		
		APF 10	APF 10
Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.		
		None	None
	Operate from within an enclosed cab and use water for dust suppression on drill bit.		
		None	None
Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	<ul style="list-style-type: none"> When used outdoors. 	None	None
	<ul style="list-style-type: none"> When used indoors or in an enclosed area 	APF 10	APF 10
Jackhammers and handheld powered chipping tools	Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	<ul style="list-style-type: none"> When used outdoors. 	None	None
	<ul style="list-style-type: none"> When used indoors or in an enclosed area 	APF 10	APF 10
Handheld grinders for mortar removal (i.e., tuck pointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	When used	APF 10	APF 25
Handheld grinders for other than mortar removal	For tasks performed outdoors only: <ul style="list-style-type: none"> Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	When using water	None	None
	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		

Table 26- 2 Exposure Control Tasks and Protection

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
	Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	• When used outdoors.	None	None
	• When used indoors or in an enclosed area.	None	APF 10
Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	When using water	None	None
	Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.		
	When using vacuum	None	None
Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.		
		None	None
Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: • Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. • Operate and maintain machine to minimize dust emissions. • For cuts of four inches in depth or less on any substrate: • Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.		
		None	None
	Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.		
		None	None
Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers,	None	None

Table 26- 2 Exposure Control Tasks and Protection

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
	conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.		
Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab.	None	None
	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

NOTE 1: When implementing the control measures specified in Table 1, each employer shall:

- (i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
- (ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
- (iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - (A) Is maintained as free as practicable from settled dust;
 - (B) Has door seals and closing mechanisms that work properly;
 - (C) Has gaskets and seals that are in good condition and working properly;
 - (D) Is under positive pressure maintained through continuous delivery of fresh air;
 - (E) Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 µm range (e.g., MERV-16 or better); and
 - (F) Has heating and cooling capabilities.

NOTE 2: Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks

Table 26- 2 Exposure Control Tasks and Protection

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hour/shift	> 4 hour/shift
on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.			

Fully and Properly Implementing Controls Specified on Table 26-2. The presence of controls is not sufficient.

- (1) Employers are required to ensure that:
 - (i) Controls are present and maintained
 - (ii) Employees understand the proper use of those controls and use them accordingly
- (2) Employees Engaged in Table 26-2 Tasks
 - (i) Employees are “engaged in the task” when operating the listed equipment, assisting with the task, or have some responsibility for the completion of the task
 - (ii) Employees are not “engaged in the task” if they are only in the vicinity of a task

Respiratory Protection Requirements on Table 26-2

- (1) Respirators required where exposures above the PEL are likely to persist despite full and proper implementation of the specified engineering and work practice controls
- (2) Where respirators required, they must be used by all employees engaged in the task for the entire duration of the task
- (3) Provisions specify how to determine when respirators are required for an employee engaged in more than one task

Alternative Exposure Control Methods – Methods of Compliance - (Hierarchy of Controls)

Alternative exposure control methods. For tasks not listed in Table 1, or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 26-2:

- (1) Permissible exposure limit (PEL). The employer shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50 µg/m³, calculated as an 8-hour TWA.
- (2) Exposure assessment—
 - (i) General. The employer shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level in accordance with either the performance option in paragraph (d)(2)(ii) or the scheduled monitoring option in paragraph (d)(2)(iii) below of this section.
 - (ii) Performance option. The employer shall assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.
 - (iii) Scheduled monitoring option. (A) The employer shall perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, in each work area. Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative fraction of these employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.

- a. If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.
 - b. Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring.
 - c. Where the most recent exposure monitoring indicates that employee exposures are above the PEL, the employer shall repeat such monitoring within three months of the most recent monitoring.
 - d. Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, the employer shall repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring, except as otherwise provided in paragraph (d)(2)(iv) of this section.
- (3) Reassessment of exposures.
- (i) The employer shall reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.

Abrasive Blasting

Adequate ventilation shall be provided

Medical Surveillance

For general industry, a medical surveillance program must be established for employees who are exposed to the action level of 8-hour TWA of 25µg/m³ of respirable crystalline silica.

A baseline medical assessment must be available to exposed employees within 30 days of initial assignment unless they have previously received a suitable medical examination in the past three years.

For construction, a medical surveillance program must be established for employees who would be required to wear a respirator more than 30 days per year due to the silica standard. A suitable prescreen that meets the same requirements is also acceptable.

Recordkeeping

Accurate records of all air monitoring data, objective data, and medical surveillance shall be maintained as required by the regulation.














Respiratory Protection

Refer to Chapter 9

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27 Appendix A – Safety Forms

Link	Form No.	Form Name
 Standard Subcontract Safety	n/a	Standard Subcontract =Safety
 B-01 Violation_Notice.doc	B-01	Violation Notice
 B 2 Daily Field Safety Health Report.doc	B-02	Daily Field Safety & Health Report
 B 3 Subcontractor Verification.doc	B-03	Subcontractor Verification Form
 B 7 Classification of Injury.docx	B-07	Classification of Injury
 C 2 Incident Investigation EO CWK	C-02	BMcD Incident Investigation for Burns & McDonnell Employees
 C 2 Near Miss Report Only Form.doc	C-02	Near Miss / Report Only Form
 C 2 Incident Investigation Subs For	C-02S	Subcontractor Incident Investigation
 C 3 Subcontractor Work Hour and Incide	C-03	Weekly and Monthly Workhour Report
 C 4 Regulatory Contact.doc	C-04	Regulatory Contact Report
 C 6 Confined Space Entry Request.doc	C-06	Confined Space Entry Request Form
 C 6A Confined Space Host – Contractor Inf	C-06A	Confined Space Host – Contractor Information Transfer
 C 6B Confined Space Hazard Assessment.d	C-06B	Confined Space Hazard Assessment

Link	Form No.	Form Name
 C 7 Work Permit.docx	C-07	Safe Work Permit
 C 8 Orientation.docx	C-08	Project Orientation Training Record
 C-09 Certification_of_Trainir	C-09	Certification of Training
 C10 TnD PTA Final.docx	C-10 T&D	Pre-Task Hazard Analysis for Transmission & Distribution - GP
 C11 Weekly Work Area Assessment.docx	C-11	Weekly Work Area Assessment
 C11A1 Weekly Work Area Action Items.doc	C-11A	Weekly Work Area Assessment Action Items Report
 C12 Activity Hazard Analysis.docx	C-12	Activity Hazard Analysis
 C13 Weekly Toolbox Safety Training.doc	C-13	Weekly Toolbox Safety Talk
 C14 Amendment Form.doc	C-14	Safety Plan Amendment Form
 C-15 S_ H_Violation_Log.xls	C-15	Safety & Health Violation Log
 C16 Visitor Sign-in Sheet Updated.doc	C-16	Visitor Sign In Sheet
 C17 Competent Person Designation R	C-17	Competent Person Designation
 C18 Site Access Drug Screen.docx	C-18	Site Access Drug Screening





Link	Form No.	Form Name
 C20 Safety Submittals.docx	C-20	Safety Form Submittal Requirements List
 C21 OSHA Required Training.doc	C-21	OSHA Required Training
 C24 Corrective Action Completion Log.docx	C-24	Corrective Action Completion Log
 C25 Work Related Injury and Illness Case	C-25	Work Related Injury and Illness Case Management Plan
 C-26 Confined Space Hazard Assessment.d	C-26	Confined Space Hazard Assessment
 C-27 Confined Space Log.xlsx	C-27	Confined Space Log
 D 1 Floor Grating and Guardrail Removal	D-01	Floor Grating and Guardrail Removal Permit
 D-02 Perimeter_Guardrail_Inspection	D-02 / D-03	Perimeter Guardrail Inspection & Turnover
 D 4 Ladder Inspection.doc	D-04	Ladder Inspection Form
 D 5 JobMade Ladders Checklist.doc	D-05	Job Made Ladder Checklist
 D-06 Hole Cover Safety Label.doc	D-06	Hole Cover Safety Label
 E-01 Emergency_Action_plan	E-01	Emergency Action Plan
 F 1 Aerial Platform Inspection.doc	F-01	Aerial Lift Equipment Inspection Checklist

Link	Form No.	Form Name
 G 1 Lockout Tagout Procedure.doc	G-01	Lockout Tagout Procedure
 G 2 LOTO Periodic Inspection Checklist.doc	G-02	Lockout Tagout Periodic Inspections
 G 3 Lockout Lock Removal Authorization	G-03	Lockout Tagout Lockout Lock Removal
 G 4 Lockout Tagout Procedures Submittal.	G-04	Lockout Tagout Procedure Submittal
 G 5 Lockout Tagout Training Record Form	G-05	Lockout Tagout Training Record
 G-06 Confined Space Flow Chart.docx	G-06	Confined Space Decision Flowchart
 G-08 Portable_Gas_Monitor	G-08	Portable Gas Monitor Bump Test Log
 G-09 Portable_Gas_Monitor	G-09	Portable Gas Monitor Calibration Test Log
 G-10 LOTO Log.doc	G-10	Lockout Log
 G-11 Tagging_Authority_List	G-11	Tagging Authority List
 G-12 LOTO_Permit_to_Work	G-12	LOTO permit to Work
 G-13 Isolation_Record.doc	G-13	LOTO Isolation Record
 G-14 Do_Not_Operate_Tag.	G-14	Do Not Operate Tag
 G-15 Caution_System_Under	G-15	Caution System Under Test Tag
 G-16 Caution_System_Under	G-16	Caution System Under Operation Tag

Link	Form No.	Form Name
 G-17 SystemTurnoverAccep	G-17	System Turnover Acceptance Certificate
 G-27 PID or Single-Gas Monitor C	G-27	PID or Single-Gas Monitor Calibration Log
 I-01 Respirator_Training_R	I-01	Respirator Training Report Form
 I-02 Respirator_Monthly_Ir	I-02	Respirator Monthly Inspection Record
 I 3 SCBA Monthly Inspection Log.doc	I-03	SCBA Monthly Inspection Record
 I-05 Respirator_Not_Requi	I-05	Respirator Not Required Waiver Release Form
 J-01 Site_Specific_Excavatic	J-01	Site Specific Excavation Plan
 J-02 Excavation_Inspection	J-02	Daily Excavation Inspection Form
 J 3 Soil Classification.doc	J-03	Soil Classification Decision Form
 J 4 Intrusive Activities Checklist.doc	J-04	Intrusive Activities Checklist
 J 5 Protective System Decision Flowchart.do	J-05	Excavation Protective System Decision Flowchart
 J 6 Confined Space Permit Flow Chart.doc	J-06	Confined Space Permit Decision Flowchart
 K-01 Incident_Accident_Injui	K-01	Injury/Illness Incident/Accident Log
 K 2 Weekly First Aid Kit Inspection.doc	K-02	Weekly First Aid Kit Inspection
 L-01 Fire_Extinguisher_Insp	L-01	Portable Fire Extinguisher Monthly Inspection Report

Link	Form No.	Form Name
 L-02 Above_Ground_Tank_I	L-02	Initial Installation Checklist for Aboveground Flammable and Combustible Liquid Tanks
 L-03 Above_Ground_Storage	L-03	Aboveground Storage And Dispensing Tanks Monthly Inspection Checklist
 N 1A Daily Rubber Tire and Hydraulic Tru	N-01A	Daily RT and Hydraulic Truck Crane Inspection Checklist
 N-1B Daily_Crawler_Crane_C	N-01B	Daily Crawler Crane Inspection Checklist
 N 1C Daily Crane Inspection.docx	N-01C	Daily Crane Inspection
 N 1W Wire Rope Inspection.docx	N-01W	Wire Rope Inspection
 N-02 Critical_Lift.doc	N-02	Crane Critical Lift Plan
 N-03 Suspended_Personnel	N-03	Suspended Personnel Basket/Platform Checklist
 N 4 Crane Signals.doc	N-04	Crane Hand Signals
 N-05 Daily_Forklift_PreInspe	N-05	Daily Forklift Pre-Use Inspection
 N 6 Rigging Inspection Record.doc	N-06	Rigging Inspection Report
 N-07 Helicopter_Critical_Lift	N-07	Helicopter Critical Lift Plan
 N-08 Daily_construction_veh	N-08	Daily Construction Vehicle Pre-Use Inspection Checklist
 O-01 Vehicle Inspection Checklist.d	O-01	Motor Vehicle Inspection Checklist
 O-03 Motor_Vehicle_ Accident_Report.doc	O-03	Motor Vehicle Accident Report Form

Link	Form No.	Form Name
 P 1 Hand and Power Tools Inspection Chec	P-01	Power and Hand Tool Inspection
 Q 1 Welding Machine Inspection.docx	Q-01	Welding Machine Inspection
 R 1 Daily Job Briefing Form.doc	R-01	Daily Job Briefing
 R2 Pole And Bucket Skill Proficiency Rating	R-02	Pole and Bucket Skill Proficiency Rating Sheet
 R-03 Boom_Truck_Inspectio	R-03	Safety Inspection - Hydraulic Boom Trucks/Cranes
 R-04 Prelift_Crane_Permit.d	R-04	Pre-Lift Crane Permit
 R-05 PreLift_Safety_Checklis	R-05	Pre-Lift Inspection Checklist
 R-10 Host – Contractor Informatio	R-10	Host – Contractor Information Transfer
 S-01 GFCI_Testing_Log.doc	S-01	GFCI Testing Log
 T-01 Demolition_Preparato	T-01	Demolition Preparatory Checklist
 U-01 Concrete_and_Anchor	U-01	Concrete and Anchor Bolt Release
 U-02 Site_Specific_Steel_Ere	U-02	Site Specific Steel Erection Plan
 U-3 Approval_to_Begin_St	U-03	Approval to begin Steel Erection
 V-01 Competent_Climber.d	V-01	Competent Climber
 V-02 Fall_Protection_Equipr	V-02	Fall Protection Equipment Inspection
 V-03 Fall_Protection_Harr	V-03	Fall Protection Harness Agreement

Link	Form No.	Form Name
 Z-01 Chemical_Inventory_List	Z-01	Chemical Inventory List
 Z-02 BMCD_ Exposure_Control_Plan	Z-02	BBP Exposure Control Plan
 Silica Dust Exposure Assessment Form.doc	Z-03	Silica Dust Exposure Assessment
 Silica Dust Exposure Control Plan.docx	Z-04	Silica Dust Exposure Control Plan