



Operational Safety Management Plan

Denova Project

Washington County, Colorado

September 2022

**Denova Sequestration, LLC a wholly-owned
subsidiary of Carbon America**

5525 W 56th Ave. Suite 200
Arvada, CO 80002



September 27, 2022

Ms. Julie Murphy, Director
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

RE: Operations Safety Management Plan

Dear Director Murphy,

Denova Sequestration LLC, a wholly-owned subsidiary of Carbon America (Carbon America), has filed a Form 2A with the Colorado Oil and Gas Conservation Commission (COGCC) for the Denova Project. Carbon America wishes to locate and drill a stratigraphic test well to obtain geologic samples to evaluate the suitability of deep formations for injection and sequestration of CO₂. This operational safety management program is provided to demonstrate Carbon America's corporate commitment to safety, health, and the environment. In accordance with Rule 602.d, a change management program is provided in Section 1.13. Our pre-start up safety program is provided below and is minimal given the limited scope of this stratigraphy well project.

Drilling/Completion Operations	Adequate blowout prevention equipment will be used for all well servicing operations
Drilling/Completion Operations	Upon initial rig-up and at least once every thirty (30) days during drilling operations thereafter, pressure testing of the casing string and each component of the blowout prevention equipment including flange connections will be performed to seventy percent (70%) of working pressure or seventy percent (70%) of the internal yield of casing, whichever is less. Pressure testing shall be conducted and the documented results will be retained by the operator for inspection by the Director for a period of one (1) year. Activation of the pipe rams for function testing shall be conducted on a daily basis when practicable.
Drilling/Completion Operations	No reserve pit will be utilized. A closed-loop solids control system will be utilized to capture all drilling operational waste. Generated waste will be transported to the nearest facility permitted to accept the waste.

If you have any questions or require additional information, please do not hesitate to contact me at (720) 838-5458 via email at Jessica.gregg@carbonamerica.com. Thank you for your consideration of this matter.

Respectfully,

Jessica Gregg
Director Environmental and Regulatory Compliance

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Making climate change history

Statement of Policy

Carbon America places a high value on the safety of its employees. The management of Carbon America is committed to providing a safe workplace for all employees and has developed this program for injury prevention to involve management, supervisors, and employees in identifying and eliminating hazards that may develop during our work process.

It is the basic safety policy of this company that no task is so important that an employee must violate a safety rule or take a risk of injury or illness in order to get the job done.

Employees are required to comply with all company safety rules and are encouraged to actively participate in identifying ways to make our company a safer place to work.

Supervisors are responsible for the safety of their employees. As a part of their daily duties, they must check the workplace for unsafe conditions, watch employees for unsafe actions, and take prompt action to eliminate any hazards.

Management will do its part by devoting the resources necessary to form a safety committee composed of management and elected employees. We will develop a system for identifying and correcting hazards. We will plan for foreseeable emergencies. We will provide initial and ongoing training for employees and supervisors. And, we will establish a disciplinary policy to ensure that company safety policies are followed.

Safety is a team effort – Let us all work together to keep this a safe and healthy workplace.

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Purpose

The purpose of the Carbon America Safety Manual is to standardize the safety programs across all Carbon America sponsored projects, offices and shops and to provide the team with the resources and documents needed to execute tasks in accordance with the contract requirements and the Carbon America safety policy. The links contained within this Safety Manual will provide the user with all the supplemental information and documents needed to run an effective safety program.

Scope

The Safety Manual applies to all work performed on Carbon America sponsored projects, offices and shops. Applicable legislative requirements, additional contract requirements, and site-specific policies are used in conjunction with this Safety Manual when work is performed.

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Safety Procedures

The Safety Procedure Documents describe the key safety functions that must stay consistent across all Carbon America projects, offices and shops.

Click the links below to find additional resources and information.

1.0 Management Leadership and Employee Involvement

Management Leadership and employee Involvement are integral components in performing safe operations. Below are procedures that will be implemented to help facilitate active employee involvement and ownership of the Safety Program.

1.1 Safety Meetings - The purpose of this procedure is to outline the various safety-related meetings which are required to take place on each project. These meetings will serve as the minimum standard, to which projects may add additional meetings.

1.2 Safety Recognition- This procedure has been established to encourage employee participation in the Company's safety program. This is a great opportunity for management to set safety goals for individuals, groups, crews, or the project and celebrate their achievements.

1.3 Safety Inspections- This procedure has been established to outline the various safety inspections which are required to take place on each project.

1.4 Job Hazard Analysis- This procedure has been established to outline the requirements of The Job Hazard Analysis (JHA), which is a means whereby work practices are reviewed and potential safety concerns are uncovered before an operation begins.

1.5 Subcontractor Safety Management- This procedure has been established in order to ensure subcontractor involvement in, and compliance to our safety program.

1.6 Disciplinary Action Procedure- This procedure has been established to ensure that safety and health policies are being followed and employees are actively engaged in the safety program.

1.7 Drugs and Alcohol Policy- This procedure has been established to ensure that employees are not under the influence of drugs and alcohol in the workplace.

1.8 Injury Management – Incident Reporting - To ensure the Injury Management Process is implemented and maintained in accordance with our Corporate Purpose and Core Values, along with establishing uniform procedures for the investigation and completion of reports regarding occupational accidents, injuries, and illnesses.

1.9 Access to Medical Records - The purpose of this section is to provide employees and their designated representatives a right of access to relevant exposure and medical records; and to provide representatives of OSHA a right of access to these records to fulfill responsibilities under the Occupational Safety and Health Act.

1.10 Short Service Employees - This program provides mentors and guidelines to appropriately supervise, train, and monitor new and inexperienced craft employees.

1.11 Stop Work Authority - Strategic project planning and execution is a fundamental necessity in reaching our safety vision.

1.12 Employee Safety Training - This procedure has been established to outline the requirements of New Hire Orientation for all Company employees, subcontractors, and site visitors.

1.13 Management of Change - Policy for safety program administrative changes that may impact procedures in regards to health and safety.

1.14 Project Safety Planning and Execution - Strategic project planning and execution is a fundamental necessity in reaching our vision of Nobody Gets Hurt.

1.15 Documentation and Regulatory Compliance - Documentation is a basic component of a successful Safety Program, and is essential for compliance with federal, state, provincial and local regulatory agencies, as well as company regulations. Laws have been passed in every jurisdiction

requiring employers to retain and produce records of various kinds.

1.16 Fatigue Management - The purpose of this document is to identify the safety procedures and requirements for fatigue management.

1.17 Fit for Duty - The Company has implemented this policy to help ensure that employees are physically fit and capable to perform the job duties assigned to them on projects sponsored by Carbon America.

1.18 Safe Process - To describe the elements of the Company's Safe Process and the expectations required of key roles in the implementation and maintenance of the overall process.

1.19 Safe Return to Work - The Company has implemented this policy to maintain ill or injured employees on the job and to return individuals with a disability to work soon as possible to best serve the employees that have a disability and to minimize liability and workers' compensation losses.

2.0 Worksite Analysis

2.1 Hazard Communication - The purpose of this Procedure is to provide minimum guidelines for the establishment and implementation of a project, or location, specific Hazard Communication Program and to provide guidance for Company employees when working with or in close proximity to certain specific toxic contaminants. Projects shall comply with the provisions outlined in OSHA 29 CFR 1910.1200 / OSHA 29 CFR 1926.59 for Hazard Communication.

2.2 Safety Assessments - Projects will maintain Safety Inspection records. At a minimum, safety tours will be conducted daily on each project.

2.3 Industrial Hygiene - This plan defines procedures and standards for Industrial Hygiene (IH) work and best practice while working with and around workplace hazards.

2.4 Incident Investigation Procedure- This procedure has been established to ensure that safety

incidents are investigated and communicated properly.

~~2.4 Mining the Diamond—Focusing on the potential outcome of an incident or event to proactively improve our safety culture, keeping our employees, subcontractors, and visitors safe.~~

3.0 Hazard Prevention and Control

The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart C General Safety and Health Provisions. These procedures “set the tone” for our commitment to safe operations.

3.1 Sandblasting Procedure- This procedure has been established to eliminate or minimize the hazards associated with sand blasting.

3.2 Asbestos- This procedure has been established to eliminate or minimize the hazards that arise when disturbing Asbestos.

3.3 Benzene – This document provides guidelines to achieve compliance with the OSHA Benzene Standard for the construction industry which is identical to OSHA 29 CFR 1910.1028 . This document does not address local, state, or contractual requirements that differ from the federal standard. This document does not replace site specific compliance programs that are required when exposures exceed the permissible exposure limit (PEL).

3.4 Bloodborne Pathogens - This procedure has been established to eliminate or minimize employee exposure to potentially infectious materials.

3.5 Confined Space Procedure - This procedure has been established to ensure that employees entering confined spaces are protected from known hazards and exposures associated with confined space entry.

3.6 Electrical Safety - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart K- Electrical.

3.7 Emergency Action Plan – This procedure has been established to ensure the safety and wellbeing of all employees in the event of an emergency.

3.8 Trenching and Excavation Procedure- This procedure has been established to eliminate or minimize the hazards associated with performing work in trenches and/or excavations. These procedures in this section are based upon the standards set forth in OSHA 1926 Subpart P Excavations.

3.9 Housekeeping and Access- This procedure has been established to outline the requirements of Housekeeping and Access on our projects.

3.10 Fire Prevention - To establish guidelines that must be incorporated in the development of a Fire Protection and Prevention Program to be followed throughout all phases of a project; to detect, alleviate and control construction fire

3.11 Hearing Conservation - This procedure has been established to eliminate or minimize employee exposure to noise levels exceeding allowable levels.

3.12 Cadmium and Hexavalent Chromium - Hexavalent Chromium is a hazard that is encountered in several operations in the construction industry. All parties that perform welding or cutting on stainless steel or chromium-containing materials will be covered under this program.

3.13 Ladder Procedure - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart X- Ladders. Ladder Procedure- This procedure has been established to eliminate or minimize the hazards associated with working on ladders.

3.14 Lead - It is Carbon America policy that when employees are involved in work where they will be exposed to or disturb materials which may contain lead they will follow the requirements of this section.

3.15 Lock Out Tag Out Procedure - The scope of this LOTO (Lock-out Tag-Out) procedure describes the methods to properly lock and tag a system or component both before and after turnover of the system from Construction to Start Up.

3.16 Mobile Equipment - This Procedure provides safety controls and requirements for the use of mobile equipment to protect workers from hazards while using this equipment by Company and

subcontract employees on all Company projects. Any applicable regulatory or Company requirements shall be followed, with the most stringent being met.

3.17 Personal Protective Equipment - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart E- Personal Protective and Life Saving Equipment. PPE Procedure - This procedure has been established to ensure that employees are adequately protected from known hazards using personal protective equipment.

3.18 Personnel Lifts Procedure - This procedure has been established to eliminate or minimize the hazards associated with the use of personnel lifts.

3.19 Respiratory Protection - This policy defines and outlines the Company Respiratory Safety standard and how it applies to the Company employees working on Company locations or in owner facilities.

3.20 Rigging - This Procedure establishes the Company policy for protection of employees during crane and rigging operations.

3.21 Scaffolding - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart L- Scaffolds. This procedure has been established to ensure the mitigation of the hazards associated with scaffolds through proper erection, tagging, and inspection practices.

3.22 Danger and Caution Barricades - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart G- Signs, Signals, and Barricades. This procedure has been established to ensure that employees are protected from and warned of known high hazard areas.

3.23 Silica Protection - This document defines the guidelines and procedures to use when performing work where there is a presence of silica at or above the 8 hour TWA. Silica is a natural constituent of the earth's crust and is a major component of sand and granite. Silica can be a hazard mainly as an airborne dust in its natural state or combined with other materials, as in paint. Other potential sources are inorganic Silica compounds and organic Silica soaps.

3.24 Steel Erection - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart R- Steel Erection. Steel Erection Procedure- This procedure has been established to eliminate or minimize the hazards associated with steel erection.

3.25 Tools and Equipment Procedure - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart I- Tools. This procedure has been established to ensure a safe work environment for employees using various types of tools.

3.26 Cutting and Welding Procedure - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart J- Welding and Cutting. This procedure has been established to eliminate or minimize the multitude of hazards associated with welding and cutting.

3.27 Dropped Object Prevention – This procedure has been established to ensure that dropped object prevention is at the forefront and provides guidance to our employees to minimize or eliminate dropped objects.

3.28 Severe Weather Procedures - Our employees' exposure to lightning puts them at risk of being struck by a bolt, causing personal injury. This policy covers the minimum requirements required on our

project to protect our workers.

3.29 Compressed Air - The Company has implemented this policy to help reduce the risk(s) associated with working with compressed air on projects sponsored by Carbon America.

3.30 Compressed Gases / Cylinders - This document provides requirements for the use, transportation, and storage of compressed gas, to ensure hazards are mitigated minimizing the risk to employees, the public, and the environment.

3.31 Concrete and Masonry Construction - Procedure outlines specific policies, considerations, and requirements while performing this type of work.

3.32 Drinking Water and Sanitation – Carbon America is committed to providing a sanitary, adequate, and readily available supply of drinking water for employees.

3.33 Hydrogen Sulfide - This document defines the procedures and guidelines for controlling and precluding exposures to Hydrogen Sulfide (H₂S).

3.34 Material Handling & Storage - The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart H- Materials Handling, Storage, Use, and Disposal.

3.35 Office Safety – The Health and Safety of employees shall be directed not only to those working within the elements of industrial and construction work areas, but also those employees assigned to office environments, in such a manner as to minimize the risk of accidents, injuries and illnesses

3.36 Protection of the Public - Although there are no specific regulations that address workplace security or protecting the public, Section 5(a)(1) of the Occupational Safety and Health Act (the General Duty clause), states that organizations are required to provide employees with a safe workplace. The Company also has a duty to provide protection to the general public from the hazards of construction activities.

3.37 Radiation Safety - This policy defines and outlines the Company Radiation Safety standard and how it applies to the Company employees working on Company locations or in owner facilities.

4.0 Occupational Health/ Environmental Controls

The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart D Occupational Health/ Environmental Controls.

4.1 First Aid and Medical - This procedure has been established to ensure preparedness for medical events which may arise at a company location.

4.2 Back Injury Prevention - This procedure has been established to reduce the potential for back injuries.

4.3 GFCI - This procedure has been established to ensure employee safety from electrical hazards

using GFCI's or an assured grounding program.

4.4 Arc Flash - This procedure has been established to ensure that when work is to be performed within an Arc Flash Boundary or Limited Approach Boundary the proper steps are followed to protect employees from potential hazards.

5.0 Fall Protection and Overhead Work

The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart M- Fall Protection.


5.1 Fall Protection Procedure - This procedure has been established to ensure proper application and use of fall protection systems.

5.2 Open Holes - This procedure has been established to eliminate employee exposure to open holes.

6.0 Cranes and Derricks

The procedures in this section are based upon the standards set forth in OSHA 1926 Subpart CC- Cranes and Derricks in Construction.

6.1 Corporate Crane Procedures Manual - The Corporate Crane Procedures Manual outlines the standards for crane operations as a Corporation.

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Section	Title	Revision	Revision Date	
1	Safety Meetings	0	05/12/2022	

REVIEW LOG:

Date	Purpose for review	Person
05/12/2022	New Safety Manual	Hinz

1.1 Purpose

1.1.1 The purpose of this procedure is to outline the various safety-related meetings which are required to take place on each project. These meetings will serve as the minimum standard, to which projects may add additional meetings.

1.2 Scope

1.2.1 This procedure applies to all Carbon America shop and field projects.

1.3 Responsibilities

1.3.1 The Project Manager will be responsible for the implementation of this procedure.

1.4 Procedure

1.4.1 Construction projects contain numerous safety and health issues that may easily cause a serious injury or illness to workers. Providing employees with information and hands-on training regarding these potential hazards is essential to a proactive safety program.


1.4.2 Projects will conduct safety meetings on a regular basis. The safety meetings are mandatory on all projects.

1.4.3 The required safety meetings:

1.4.3.1 Mass Safety / All Hands Meeting

1.4.3.2 Foreman Safety Meeting

1.4.3.3 Toolbox Meeting

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1.4.3.4 Pre-Shift Crew Safety Meeting *(May be conducted during Stretch & Bends)*

1.4.4 The required safety meetings conducted on the project are an opportunity to share safety information with craft, staff, and subcontractor employees. These meetings must be conducted in a structured, well planned and informative manner. The meetings should cover topics such as: Safety policies, programs, issues / concerns, lessons-learned, new equipment, leading indicators, upcoming and on-going operations, site specific information, weather, a plan of the day etc.

1.4.5 Supervisors responsible for these meetings should allow time for employee questions and comments, and should create an atmosphere where personnel feel free to communicate.

1.4.6 Each meeting must have documentation of the subjects covered and attendance recorded. These documents must be kept in the safety files.

1.5 Mass Safety / All Hands Meeting


1.5.1 All sites will hold a Mass Safety / All Hands Meeting conducted by the construction manager and the safety department. This meeting must be attended by all project personnel, including subcontractors on a weekly basis.

1.6 Foreman Safety Meeting

1.6.1 This meeting must be attended by all project foremen, including subcontractor foremen. The purpose of this meeting is to emphasize safety topics which are crucial to the project. This should also be an opportunity for project management to illicit feedback from the foremen on their ideas, concerns, needs, etc.


1.7 Toolbox Meeting

1.7.1 The Toolbox Meeting will be conducted by the superintendent, foremen or designee. This meeting will be conducted by each crew's foreman and attended by the entire crew, including the crew Superintendent and Engineer(s). The topics discussed may come from the Foreman Safety Meeting or other operation-specific safety subjects. A Foreman Toolbox form must be filled out completely (including Superintendent comments), signed by all in attendance, and submitted to the project safety department.

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1.8 Pre-Shift Crew Safety Meeting / Stretch & Flex

1.1.1. The Pre-Shift Crew Safety Meeting and Stretch & Flex Program shall be conducted at the beginning of every shift. These meetings must be attended by the superintendent, engineer, foreman and entire crew. The Pre-Shift Meeting and Stretch & Flex Program may be conducted at the same time. While stretching, the superintendent / foreman should discuss the crew's operation-specific safety focus for the day.

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2	Employee Recognition	0	05/12/2022	

REVIEW LOG:

Date	Purpose for review	Person
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2.1 Scope

2.1.1 A major part of safety on any project is employee awareness. An active, innovative Safety Recognition Program not only brings attention to safety, but also rewards employees for working safely. Safety recognition is not a stand-alone answer to a safe, incident-free workplace; but, combined with other safety program elements such as training, hazard analysis and accountability, they can bring a positive safety attitude to the project.


2.2 Policy

2.2.1 In compliance with VPP requirements, ALL Carbon America employees are involved with the VPP program in three (3) ways; participation in hazard reporting or attending training does not feature within the incentive program. All Carbon America Employees are trained/qualified for their participation activities.

2.2.2 Employee involvement is feature and documented in all employee annual reviews. This will place the accountability and emphasis on the importance of employee involvement.

2.2.3 All Employees earn “Safety Bucks” through participation in the program which is recorded in their individual training record. Safety Bucks can be exchanged for clothing, safety footwear, tools, an additional vacation day, etc.

2.2.4 Examples of participation:

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2.2.4.1 *Lead stretch and bends*

2.2.4.2 *Lead tool box talk*

2.2.4.3 *Conduct safety audit*

2.2.4.4 *Innovative way of altering a standard procedure to make it more safe*

2.2.4.5 *Correcting an unsafe hazard*

2.2.4.6 *Attending a safety committee meeting*

2.2.4.7 *Wellness coach visits*

2.2.4.8 *Complete Biometric Screening*

2.2.4.9 *Complete Health Risk Assessment*

2.2.4.10 *“Best” JHA – Daily*

2.2.4.11 *Safety audit on another site*

2.2.4.12 *Participate in Accident/Injury/Near Miss Investigation*

2.2.4.13 *Write a Tool Box Talk*


2.2.4.14 *Write a Safety Stand down*

2.2.4.15 *Compile a Job Specific SDS Book*

2.2.4.16 *Compile a Job Specific JHA Book*

2.2.5 Safety Bucks are also be used to reward quality, innovation and productivity.


2.3 Safety Buck Submissions:

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2	Employee Recognition	0	05/12/2022	

2.3.1 All Carbon America field employees issue Safety Bucks requests to their project manager who forwards to Vice President of Operations.

2.3.2 All approved Safety Bucks requests are submitted to the Corporate Business Analyst for record purposes and year-end processing. Safety Bucks can be turned in at the end of the year or may be rolled over year after year up to a maximum value of \$10,000.

2.3.3 Any employee who is laid off may opt to “cash out” their Safety Bucks. Any employee who is terminated foregoes any accumulated Safety Bucks.

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3	Safety Inspection	0	05/12/2022	

REVIEW LOG:

Date	Purpose for review	Person
05/12/2022	New Safety Manual	Hinz

3.1 Purpose

3.1.1 In order to maintain a safe work environment, inspections must be routinely conducted on our tools, equipment, PPE, and through jobsite inspections. Projects must maintain the records of these inspections.

3.2 Scope

3.2.1 This procedure applies to all Carbon America shop and field projects.

3.3 Responsibilities

3.3.1 The Project Manager will be responsible for the implementation of this procedure.

3.4 Procedure

3.4.1 Safety Tours / Safety Walks


3.4.1.1 At a minimum, safety tours will be conducted daily on each project.

3.4.1.2 Safety Tours will be conducted with the participation of at least one craft foreman and one staff member. Projects are encouraged to include additional participants at their own discretion.

3.4.1.3 Techniques and recommended items for inspection during a safety tour include the following:

3.4.1.3.1 Step back and observe

3.4.1.3.2 Observe in-progress operations

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3.4.1.3.3 Look for unsafe acts (Correct unsafe acts on the spot)

3.4.1.3.4 Look for poor body positioning (Focus on hand placement)

3.4.1.3.5 Provide feedback, positive and negative, to the crew

3.4.1.3.6 Utilize this time to coach the worker in our in safe work practices

3.4.1.3.7 Proper PPE for task?

3.4.1.3.8 Job Hazard Analysis / Pre-Task Card

3.4.1.3.9 Review and discuss JHA/Pre-Task Analysis with GF or Foreman

3.4.1.3.10 Compare JHA/Pre-Task Analysis to operation

3.4.1.3.11 Make any changes if required. If changes are made, have JHA/Pre-Task Analysis signed by crew and Superintendent.

3.4.2 Housekeeping

3.4.2.1 Look for cluttered areas, trash, access and egress.

3.4.2.2 Material properly stored and staged?

3.4.2.3 Cords and leads strung off ground and floors?

3.4.2.4 Is the area “Tongue Licking Clean”?

3.4.3 Tool/Gang Box


3.4.3.1 Clean, well-organized, storage of items?

3.4.3.2 Harnesses hung properly?

3.4.3.3 Tools in good condition, electrical cords ok?

3.4.3.4 Complete Safety Walk and ensure all remaining open items are scheduled for correction.

3.5 Monthly Site Assessment

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3.5.1 Each project will conduct a Site Safety Assessment on a monthly basis.

3.5.2 The individuals assigned to this assessment are decided at the project's discretion.

3.6 Subcontractor Inspections

3.6.1 At minimum of weekly, subcontractors must complete a documented safety inspection of their work and provide the record of inspection to the assigned supervisor and the Project Safety Manager.

3.7 Ground Fault Circuit Interrupters (GFCI)

3.7.1 Ground Fault Circuit Interrupters must be inspected at an interval not to exceed quarterly, as well as prior to be put into service.

3.7.2 The method of inspection must allow for a record to be maintained either on/near the GFCI equipment or by a log utilizing a means of identifying specific corresponding GFCIs, such as an ID Number.

3.8 Crane Inspections

3.8.1 All Crane Inspections (Daily, Quarterly, Annual) will be conducted in accordance with the Kiewit Corporate Crane Manual.

3.9 Rigging Equipment

3.9.1 All rigging will be inspected by a competent person prior to each use.

3.10 Fall Protection

3.10.1 Fall Protection equipment must be inspected upon being issued and prior to each use.


3.11 Equipment

3.11.1 A "Daily Visual" Equipment Inspection must be completed by the equipment operator, once per shift prior to use.

3.11.2 For Daily Visual Inspection Forms for projects not utilizing the Daily Visual Inspection Applications.

3.12 Small Tools

3.12.1 Small Tools are to be inspected by the user prior to each use.

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3.13 Fire Extinguishers

3.13.1 Fire extinguishers must be inspected visually each month by an individual trained to recognize common defects.

3.13.2 Fire extinguishers will be re-certified annually by a competent person.

3.14 Excavations

3.14.1 Excavations must be inspected by a competent person prior to entry each day that they will be accessed.

3.14.2 Inspections must follow after any significant weather event.

3.15 Scaffolds


3.15.1 All scaffolds which will be used must be inspected prior to use each shift.

3.16 Hot Work Permits

3.16.1 Hot Work Permits must be renewed each shift in which the requirements of the hot work procedure requires the use of a permit.

3.17 Ladders

3.17.1 Ladders must be inspected prior to each use by the user.

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4.1 Policy Statement

- 4.1.1** It is the policy of Carbon America provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.


4.2 Purpose

- 4.2.1** The purpose of this policy is to provide a procedure for the initiation and implementation of a Daily JHA.
- 4.2.2** To provide a systematic identification and mitigation of site-specific hazards before work begins.
- 4.2.3** This policy applies to all jobs or tasks where all Carbon America work is being performed. A Daily JHA is required due to the job or task frequency and severity of injuries, illness, near incidents, the potential for frequency and severity of all Carbon America jobs and tasks.
- 4.2.4** This policy applies to all jobs or tasks including non-routine work that has not be previously performed and analyzed.

4.3 References

- 4.3.1** OSHA Booklet 3071 – Job Hazard Analysis

4.4 General Requirements

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4.4.1 A Safety Analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. After identifying hazards, controls (engineering, work practice, and/or PPE) will be implemented to eliminate or control the hazard to an acceptable risk level.


4.5 Responsibilities

4.5.1 Supervisors

- 4.5.1.1** Supervisors must recognize the need for a Daily JHA and initiate completion of a Daily JHA for all jobs and tasks that will be conducted.
- 4.5.1.2** The supervisor will coordinate the completion of task safety analyses and ensure a written Daily JHA is completed before work commences.
- 4.5.1.3** Supervisors or the person leading the job will be listed on the Daily JHA as the person in-charge of the work being conducted.
- 4.5.1.4** Supervisors will review and approve written Daily JHA's once completed.
- 4.5.1.5** Supervisors must communicate the approved Daily JHA with all affected site employees, addressing the hazards and control requirements of the job task prior to commencing work. The communication of the Daily JHA will be conducted during daily tailgate meetings before work commences and prior to permitting employees to start work.
- 4.5.1.6** Supervisors must retain all applicable Daily JHA's on site until the job is completed.

4.5.2 Safety Department

- 4.5.2.1** Safety Supervisors or designee will batch review completed written Daily JHA's for accuracy and content.

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4.6 Priorities for establishing Daily JHA's should be based on the following:

- 4.6.1** Potential injury or illness severity of the task or job.
- 4.6.2** Injury or illness severity rate of the task or job.
- 4.6.3** Frequency rate of the task or job.
- 4.6.4** Any new tasks or jobs involving new or modified processes, equipment, or significant changes in manpower.
- 4.6.5** Addition or replacement of tools, fixtures, equipment, and machinery; and changes in processes which can affect the safety of the operation will require that the Daily JHA be developed (or revised to include the necessary changes).

4.7 The Daily JHA and job-specific safety checklist will be used for initial job training to introduce new employees and SSE's to the hazards of the job and the safe work practices required to avoid injuries.


4.8 When an incident occurs (injury, illness, or near incident event), the Daily JHA will be reviewed to determine whether it needs to be updated to cover a previously overlooked unsafe practice or whether the Daily JHA was not being properly followed.

4.9 Employee Involvement.

- 4.9.1** Employees will have a unique understanding of the job, and this knowledge is invaluable for finding hazards. Involving employees will help minimize oversights, ensure a quality analysis, and get workers to "buy in" to the solutions by sharing ownership in their safety and health program.

4.10 Written Daily JHA.

- 4.10.1** Observe the employee(s) perform the job and list each step of work activity. Be sure to record enough information to describe each job action without getting overly detailed. Avoid making the breakdown of steps so detailed that it becomes unnecessarily long or so broad that it does not include basic steps.

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4.10.2 Review the job steps with the employee(s) to ensure they are complete and cover the entire task being reviewed.

4.10.3 Identify hazards associated with each job step. For a list of common hazards and descriptions to be considered in the creation of the Daily JHA. The following questions should be addressed when completing the Daily JHA form.

4.10.3.1 What can go wrong?

4.10.3.2 What are the consequences? How could it arise?

4.10.3.3 What are other contributing factors?

4.10.3.4 How likely is it that the hazard will occur?

4.10.3.5 Upon completion of the task, what items went right, what items went wrong. Debrief of the task with communications of the lessons learned.

4.10.4 Written Daily JHA form –

4.10.4.1 The written Daily JHA form is required to be completely filled out for all tasks.


4.10.4.2 The written Daily JHA form is required to be completed/revised by on-site personnel for the following additional situations to ensure systematic identification and mitigation of site-specific hazards before work begins:

4.10.4.2.1 Job scope changes significantly.

4.10.4.2.2 New personnel are added to the work party.

4.10.2.3 Site conditions have changed beyond those originally identified.

4.10.2.3.1 A near miss, incident, or other work stoppage occurs.

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4.10.2.3.2 A concern is raised as the result of a personal hazard assessment or stop work condition.

4.10.2.4 When a Daily JHA is completed or revised, it must be reviewed with site employees, and any time a new hire, or any other employee is going to be performing the job task.

4.10.2.5 These reviews must be completed daily by the site supervisor through daily tool-box talks and prior to work commencing.

4.10.2.6 Debrief should also be conducted post job task to identify any other relative areas of improvement.

4.10.3 Supervisors or Foreman with the consultation of their crews will complete the Daily JHA form on-site before commencing work. The form should be completely filled out by the work crew to ensure the following information is captured:

4.10.3.3 The name of the person leading the work, in most case this is the company supervisor/foreman and their name should be the first name on the signature line of the Daily JHA form.

4.10.3.4 The job description or the name of the task the crew will be performing for the day. This is considered the Daily JHA scope.

4.10.3.5 The work location should be documented. This can be accomplished several ways:


4.10.3.5.1 By listing the company assigned job number.

4.10.3.5.2 By listing the common site name as assigned by the crew.

4.10.3.5.3 By listing the assigned name of the location as designated by the customer.

4.10.3.5.4 By listing GPS coordinates for sites that currently have not received a designated or assigned name/location.

4.10.4 Job Description

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4.10.4.3 The steps required to accomplish the task from set up to completion shall be adequately described in the Daily JHA form. Employees shall describe each step with as much detail to ensure persons not familiar with the job steps can be orientated to the site hazards without being familiar with the overall operation.

4.10.4.4 Once the job steps are established all hazards should be fully accounted for. All hazards should be considered, including actual and potential hazards.

4.10.5 Acknowledgement of understanding of the work team.

4.10.5.3 The final step to fully completing a Daily JHA is to ensure that each member of the work team has a thorough understanding of the hazards of the job task and the controls used to mitigate those hazards.

4.10.5.4 Acknowledgement of each member of the work crew is obtained through finalizing the Daily JHA by signature on the Daily JHA form.


4.10.5.5 Signatures should include each member of the work team, with the Daily JHA lead listed first.

4.10.5.6 Signatures do not finalize the Daily JHA, as every employee under Carbon America still retains the authority and responsibility to Stop Work if any unsafe condition arises or the job task deviates from the documented Daily JHA. If work deviation occurs, employees shall revise the Daily JHA to ensure mitigation of any new hazards. Employees can refer to section 3.4.8.H for additional guidance.

4.10.6 Revising & Reviewing the Daily JHA

4.10.6.3 A Daily JHA is only effective if it is reviewed and updated periodically, therefore even if no changes have been made to the job, the written Daily JHA must be updated at least daily.

4.10.6.4 A Daily JHA must be immediately reviewed if an injury or illness occurs on a specific job to determine whether changes are needed in the job procedure or the applicable Daily JHA.

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4.10.6.5 A Daily JHA must be reviewed and revised as needed if a near-miss has resulted from the job procedure.

4.10.6.6 Any time a Daily JHA has been revised, training on the new job methods, procedures, or protective measures should be reviewed with all affected site employees performing under the applicable Daily JHA by their immediate supervisor prior to commencing work.

4.11 Job Hazard Analysis Team

4.11.2 The below listed personnel may be assembled to develop a job safety analysis; team members will be chosen as appropriate for the specific job to be analyzed:

4.11.2.3 Safety representative.

4.11.2.4 Operations Manager.

4.11.2.5 Field Supervisor.

4.11.2.6 Foreman.

4.11.2.7 Employees.


4.11.2.8 Subcontractors - when applicable.

4.11.2.9 Owner representative – when applicable.

4.12 The Job Safety Analysis shall include a verification action to ensure controls do not introduce or create additional hazards to employees or other personnel on the job site. Verification must be completed prior to a Daily JHA being modified, revised, or before re-issue.

4.13 Record Retention

4.13.1 All Daily JHA's should be periodically reviewed by the Safety Department for completeness and accuracy.

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4.13.2 Daily JHA's should be retained for at least one year.

4.13.3 Daily JHA's that require additional permits as controls; such as Hot Work, CSE, Excavation, or Customer General Work permits shall also be retained for at least one year.

4.13.4 Revisions or corrections to existing Daily JHA's post safety department review should be returned to the respective supervisor/foreman for review. The supervisor/foreman affected by the revised Daily JHA shall use the reviewed Daily JHA as a toolbox talk for crews to ensure continual improvement.

4.14 Training


4.14.1 Supervisors will be trained on the purpose of a Daily JHA, his/her responsibilities regarding Daily JHA's, how to complete a Daily JHA, and all the elements of this written program including hazard identification.

4.14.2 Employees will be trained on the purpose of a Daily JHA, his/her roles and responsibilities regarding Daily JHA's, and all the elements of this written program. Employees will also receive job specific hazard identification training to coincide with completing a Daily JHA.

4.14.3 Employee will be trained on the safe use of any additional protective measures required by the applicable Daily JHA.

4.15 Definitions


Task Safety Analysis- The Daily JHA is a tool for analyzing a task, specifically in the area of health, environment, and safety. This analysis occurs at the work site before work begins and involves those individuals that may be affected by the task. The Daily JHA should identify the hazards present at the time the work starts as well as identify specific mitigation actions necessary to prevent incidents. After the analysis is done, it may be kept as a reference for future similar operations. Since the Daily JHA is a tool intended for individuals and teams performing the work,

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it should be developed in the language appropriate for the entire work crew (sometimes multiple languages and/or verbal translation may be needed).

It includes a breakdown of each step of the work, hazards associated with each step, and the final safe plan to deal with those hazards. Refers to both:

- (1) The analytical process of developing safer job procedures, and
- (2) A written document that captures the results of the analysis.

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5.1 Policy Statement

5.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

5.2 Purpose


5.2.1 Carbon America values the safety of all workers and the protection of our environment and is committed to having incident-free operations. The primary purpose of this Subcontractor Management Plan is to provide guidance and establish a minimum set of expectations for employees and contractors regarding subcontractor work.

5.2.2 To prevent personal injury or property damage through subcontractor safety management.

5.2.3 This Subcontractor Management Plan applies to Company and subcontractor employees.

5.2.4 This program is intended to supplement, not replace, the contractor's safety program, which the contractor is required to implement. In the event of a conflict between Carbon America safety program requirements and the contractor's safety program, the more stringent rule shall apply.

5.2.5 It is the responsibility of the contractor to protect his/her employees, subcontractors, and suppliers, and to provide a safe place of employment. The implementation of this Program does not imply that

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Carbon America is establishing or enforcing safety practices on the behalf of a contractor, subcontractor, supplier or their employees.

5.3 References

5.3.1 ANSI/AIHA z10.2005 Safety Management System Standards

5.4 General Requirements

5.4.1 Responsibilities

5.4.1.1 Company Management


- 5.4.1.1.1 Ensure the requirements of this written program are implemented for every project/job.
- 5.4.1.1.2 Ensure all subcontractors are pre-qualified as per the elements of this written program. Pre-qualification shall be completed prior to executing contractual agreements.
- 5.4.1.1.3 Review subcontractor safety programs and other related pre-qualification information and approve or reject the information.

5.4.1.2 Company Project Supervision.

- 5.4.1.2.1 Ensure the requirements of this written program are implemented for every project/job.
- 5.4.1.2.2 Ensure that subcontractors are aware of Company and host employer expectations.
- 5.4.1.2.3 Ensure that all subcontractors are meeting the expectations of the Company and host employer requirements.

5.4.1.3 Subcontractors.

- 5.4.1.3.1 Required to follow their internal policies and procedures as well as those established by the Company or host employer.

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5.4.1.3.2 Contractor management is responsible for the contractor's employees' safety and for ensuring that the contractor's employees perform their day-to-day work in a safe and proper manner.

5.4.1.3.3 The contractor must become familiar with and abide by the Company and host employer requirements and expectations.

5.5 Subcontractor Pre-Qualification and Selection.

5.5.1 Subcontractors shall be pre-qualified prior to performing contract work for the Company.

5.5.2 Pre-qualification shall include, but not limited to, the following:

5.5.2.1 Appropriate Insurance Coverage.

5.5.2.1.1 Subcontractors shall provide articles of insurance when requested.

5.5.2.1.2 Subcontractors shall have limits of coverage that comply with Company and host employer requirements.


5.5.2.2 Experience Modification Rate (EMR).

5.5.2.2.1 The subcontractor shall submit their EMR for the three most recent years.

5.5.2.2.2 The rates should be at 1.0 or lower, or sanctions shall be imposed.

5.5.2.3 OSHA Incidence Rates

5.5.2.3.1 The subcontractor shall submit their OSHA Incidence Rates (TRIR, DART, and DAFW) for the three most recent years.

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5.5.2.3.2 The incidence rates should be within 1 point of the national average for the subcontractor's business line (NAICS code), or sanctions shall be imposed.

5.5.2.4 OSHA Inspection History

5.5.2.4.1 The subcontractor shall submit an OSHA inspection history to include the type of violation, penalty, and abatement activity.

5.5.2.4.2 A 5 year inspection history is required.

5.6 Safety Training

5.6.1 Subcontractors shall provide certification that their employees are trained in accordance with applicable federal, state and local regulations.

5.6.2 All subcontractor employees, vendors, and suppliers are required to adhere to Company and Host Employer requirements and attend required training (including pre-job safety orientation).


5.7 Company project management will inform subcontractors of site conditions that might raise health and safety concerns that are unusual or unique to the project.

5.8 The Company requires that contractors certify their compliance, in writing, with applicable Occupation Safety and Health Administration (OSHA) regulations prior to commencing construction activities.

5.9 Company employees, upon discovering health and safety concerns that are not compliant with generally accepted safe work practices or OSHA standards, are authorized to take the appropriate action to ensure that the contractor is informed of such concerns, and to ensure that personnel are not exposed to a known and recognized hazardous condition.

5.10 Pre-Project Meetings ("Kick-Off" Meetings). Subcontractors will be included in pre-project planning meetings and orientations. Agenda to include, but not limited to, project goals, requirements and expectations.

5.11 Subcontractor Safety Program requirements:

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5.11.1 Subcontractors shall submit a copy of their safety program to Company management for approval. The most stringent requirements shall apply.

5.11.2 Job Hazard Analyses (JHA).

5.11.2.1 All job tasks should be evaluated to identify hazards and assign appropriate controls in the form of a Job Hazard Analysis.

5.11.2.2 Subcontractors will submit written JHA to Company job site supervision.

5.11.3 Tailgate Safety Meetings

5.11.3.1 Subcontractor personnel will conduct and/or attend daily “Tailgate Safety Meetings”.

5.11.3.2 Subcontractors will submit meeting attendance rosters to Company job site supervision.

5.11.4 Safety Performance Audits

5.11.4.1 The subcontractor should implement a job site inspection program (Safety Performance Audits) that provides a score for measuring safety.

5.11.4.2 Safety Performance Audits will be reviewed by the subcontractor and, when applicable, corrective actions shall be implemented.


5.11.4.3 Safety Performance Audits will be reviewed by the subcontractor and Company supervision to identify trends and promote continuous safety improvement.

5.12 Post-Job Safety Performance Review

5.12.1 When a subcontractor is finished with work associated with the contract, a post-job review should be completed and submitted.

5.12.2 The post-job review will include, but not limited to, the following:

5.12.2.1 Comparison of performance data versus project goals.

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5.12.2.2 Review of incidents and corrective actions.

5.12.2.3 Review of project successes.

5.12.2.4 Lessons Learned and Recommendations for Improvement.


Attachment 1 Contractor Safety Prequalification

Attachment 1 Sub-Contractor Safety Evaluation


Sub-
Contractor:
Contact:
Date:
Address:
Phone:
Fax:
E-mail

General Safety

- Does the company have a company safety policy?
YES ☐ NO ☐
 - Does the company hold Monthly Safety Committee Meetings?
YES ☐ NO ☐
 - Does the company have an annual goal in safety?
YES ☐ NO ☐
 - Does the company have full time safety representative in the company?
YES ☐ NO ☐
 - Does the company hold onsite (tailgate/toolbox) safety meetings?
YES ☐ NO ☐
 - Does the company provide safety training for all employees?
YES ☐ NO ☐
-

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7. Does the company have a new employee orientation?
YES ☐ NO ☐
 8. Is all of the safety training documented?
YES ☐ NO ☐
 9. Is there a subcontractor management plan in place?
YES ☐ NO ☐
 10. Does the company perform Job Safety Analysis (JSA) before start of work?
YES ☐ NO ☐
 11. Does the company have a formal accident investigation program in place?
YES ☐ NO ☐
 12. Does the company have a program or procedure for safety inspections?
YES ☐ NO ☐
 13. Does the company implement corrective actions?
YES ☐ NO ☐
 14. Does the company utilize Stop work?
YES ☐ NO ☐
 15. Does the company have a program for near misses?
YES ☐ NO ☐
 16. Are Near misses reported and documented with corrective action?
YES ☐ NO ☐
 17. Does the company have a Short Service Employee (SSE) program?
YES ☐ NO ☐
 18. Does the company clearly define safety roles for supervisor, manager, & workers?
YES ☐ NO ☐
 19. Does managers and supervisors attend training for their position?
YES ☐ NO ☐
-

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20. Is preventative maintenance performed on all equipment?

YES ☐ NO ☐

Drug and Alcohol

1. Does the company have a formal drug and alcohol policy?

YES ☐ NO ☐

2. Are company employees subject to pre-employment drug and alcohol screening?

YES ☐ NO ☐

3. Are company employees subject to post accident drug and alcohol screening?

YES ☐ NO ☐

4. Are employees subject to reasonable suspicion drug and alcohol screening?

YES ☐ NO ☐

5. Are company employees subject to random drug and alcohol screening?

YES ☐ NO ☐

6. Are employees subject to return to duty drug and alcohol screening?

YES ☐ NO ☐

7. Are company employees subject to follow-up drug screening?

YES ☐ NO ☐

Citations/ Statistics

1. Has the company received any citations from a regulatory agency (OSHA, MSHA, ect.) within the last 3 calendar years?


YES ☐ NO ☐

2. Has the company experienced any fatalities within the last 3 calendar years?

YES ☐ NO ☐

Insurance

2019	2020	2021
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1. Does the company meets all insurance requirements?
YES ☐ NO ☐

Safety Stats

1. What is the Company's TRIR?
2. What is the Company's EMR?
3. Number of Lost Time Cases?
4. Number of Restricted Duty Cases?
5. Hours worked

Safety Report Card			
<u>Overall TRIR:</u>			
	<u>Possible</u>	<u>Actual</u>	
TRIR < 0.99	10		
1.0 >= TRIR < 2.49	5		
TRIR >= 2.5	0		
<u>Safety Questionnaire</u>			
	<u>Possible</u>	<u>Actual</u>	
23-25 is Exceptional	25		
20-22 is Satisfactory	15		
19 & Below is Unsatisfactory	10		
<u>Core Process</u> = 21% reduction if missing 1 or more			
	<u>Possible</u>	<u>Actual</u>	
Pass:	0		
Fail:	-21		
Behavior Based Safety (BBS) Incident Investigation & Reporting Short Service Employee (SSE) Job Safety Analysis (JSA) Drug and Alcohol Policy			
<u>On-Site Audit % Score*</u>			
	<u>Possible</u>	<u>Actual</u>	
	30		
<u>Training</u> = based on total number completed			

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% Compliant	<u>Possible</u>	<u>Actual</u>
90-100%	15	
80-89.99%	10	
70-79.99%	5	
0-69.99%	0	
<u>Insurance Certificate</u>		
	<u>Possible</u>	<u>Actual</u>
	0	
	-21	
<u>Total Score</u>	 Approved 85-100%	 Conditionally Approved 70-84%
Below		 Rejected 69% &
	<u>Possible</u>	<u>Actual</u>
	100%	
<u>Comments:</u>		

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6	Disciplinary Action		0	05/12/2022

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6.1 Purpose

6.1.1 Our goal as a company is to send everyone home in the same if not better condition than when they arrived and to achieve that goal this procedure provides a set of rules and guidelines to help us with this process. The Disciplinary Action Procedure will help ensure we have an effective and consistent message.

6.2 Scope

6.2.1 This procedure applies to all Carbon America shop and field offices.

6.3 Responsibilities

6.3.1 It is the responsibility of the Project Manager to establish a jobsite specific policy and ensure the disciplinary action plan is followed.

6.4 Procedure

6.4.1 Each project will have a written Disciplinary Action Plan for their job. This plan shall include the types of violations and the consequences for non-compliance. The Disciplinary Action Plan will be reviewed with every jobsite employee, subcontractor, and site visitor prior to them being allowed to begin work at the project.

6.5 Zero Tolerance Policies

6.5.1 *Willful or accidental violation(s) of a Zero Tolerance issue will result in either (a.) loss of a minimum of three days work without pay or (b.) immediate termination. The determination of which of the two actions to be taken will be at the discretion of the Project Manager. Verbal and written warnings are not required in cases involving Zero Tolerance issues*

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6.5.1.1 Carbon America Projects has established a list of zero tolerance policies that they will establish at a minimum on every jobsite. They are as follows:

6.5.1.1.1 Fall Protection: Carbon America has a 100% tie-off policy. This means a worker must be continually and properly tied off to an appropriate anchorage point whenever their feet are more than six (6) feet above the ground or surrounding surface must have a guardrail system that complies with all regulatory guidelines.

6.5.1.1.2 Lock-out/Tag-out (LOTO): Failure to lock and/or tag out when it is required or the inappropriate removal of a lock/tag.

6.5.1.1.3 Designated Operator: Designated operators are required for all cranes, forklifts, earthmoving equipment, and man lifts (scissor lifts and articulating personnel baskets). This designation must be specific and determined by a project authorized individual. Individuals found to be operating these or any other equipment determined by a Project to require operator designation without such designation will be in violation of the Zero Tolerance policy.

6.5.1.1.4 Confined Spaces: Any person(s) entering a Confined Space without prior training and authorization will be considered in violation of the Zero Tolerance policy.

6.5.1.1.5 Drug and Alcohol Use: Any person(s) found to be under the influence of drugs (without a prescription from a licensed health care provider and notification to the site safety manager) and/or alcohol on any of the projects properties, worksite, or while using a company vehicle, will be considered in violation of the Zero Tolerance Policy.

6.6 Violations with Imminent Danger

6.6.1 Safety reprimands will be issued for unsafe acts and conditions posing an imminent safety or health risk as follows:

6.6.1.1 First Occurrence: Employee and/or supervisor(s) will be immediately sent home for a minimum of one (1) day without pay

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6.6.1.2 Second Occurrence: Employee and/or supervisor(s) will be terminated.

6.7 Violations without Imminent Danger

6.7.1 Safety reprimands will be issued for unsafe acts and conditions *not* posing imminent safety or health risk as follows:


6.7.1.1 First Occurrence: Employee and/or supervisor(s) will be given a written reprimand

6.7.1.2 Second Occurrence: Employee and/or supervisor(s) will be immediately sent home for a minimum of one (1) full day without pay

6.7.1.3 Third Occurrence: Employee and/or supervisor(s) will be terminated

6.7.2 The Project Manager is ultimately responsible for discipline on the Project. They retain the right to terminate an employee immediately should the situation warrant. Examples of this might include unsafe work habits, unsafe acts, attitude, or other actions that might endanger themselves or other employees.

6.7.3 The majority of our workforce will never be involved in disciplinary problems. However, this is consistent with our policy that **"WORKING SAFELY IS A CONDITION OF EMPLOYMENT"**.

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7.1 Purpose

7.1.1 The use of illegal drugs and alcohol misuse by employees are inconsistent with the long-standing commitment of Carbon America to a safe and productive work environment. This procedure has been established to maintain a safe and productive work environment.

7.2 Scope


7.2.1 This procedure applies to all Carbon America projects and locations.

7.3 Definitions

7.3.1 *Adulterated Specimen:* This refers to a sample of bodily fluid (typically urine) that contains a substance that is not expected to be present, or contains a substance expected to be present but is at a concentration so high that it is not consistent with typical results. Adulteration of urine specimens is common, while adulteration of saliva / oral fluid or hair specimens is more difficult, if not improbable. A sample that is “drug free” that is substituted for the donors sample at or after the time of collection is also referred to as an adulterated specimen.

7.3.1 *Alcohol:* This means the intoxicating agent in beverage alcohol or any low molecular weight alcohol’s such as ethyl, methyl or isopropyl alcohol. The term includes beer, wine, spirits and medications such as cough syrup that contain alcohol.

7.3.2 *Company premises:* Includes, but is not limited to, all buildings, offices, facilities, grounds, parking lots, projects, locations and places owned, leased or managed by the Company.

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7.3.3 *Company vehicle:* All vehicles owned, leased or managed by the Company and all vehicles that are used by employees, regardless of who owns them, while working for the Company.

7.3.4 *Illegal drugs:* All controlled substances that are not being used or possessed under the supervision of a licensed health care professional. (Controlled substances are listed in Schedules I-V of 21 CFR Part 1308.)

7.3.5 *Medical Review Officer (MRO):* A person who is a licensed physician and who is responsible for receiving and reviewing laboratory/confirmatory testing results generated by an employer's drug testing program and evaluating medical explanations for certain drug test results.

7.3.6 *Refusal to cooperate:* This means obstructing the collection and/or testing process, submitting an altered, adulterated or substitute sample, or failure to promptly provide adequate specimen(s) for testing when directed.

7.3.7 *Substituted Specimen:* A specimen, typically encountered with urine specimens, which are not from the original donor, and provided in order to falsely "pass" drug of abuse tests.


7.3.8 *Test positive for alcohol:* Alcohol test results with an alcohol concentration of .02 or more, pursuant to this policy.

7.3.9 *Test positive for drugs:* Drug test results showing a concentration of marijuana, cocaine, opiates, phencyclidine, amphetamines, barbiturates, benzodiazepine, Methamphetamine, methadone, and tricyclic antidepressant or their metabolites exceeding the cutoff levels.

7.3.10 *Under the influence:* To test positive for drugs and/or alcohol or an employee's actions, appearance, speech or bodily odors that reasonably cause a supervisor to conclude that the employee is impaired because of illegal drug or alcohol use.

7.3.11 *Prescriptions:* Any employee upon their arrival to the job site must notify project staff if he/she is taking prescription medication. Management or a PLHCP must determine if that employee can do their job safely without any effects from the prescription medication.

7.4 Responsibilities

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7.4.1 This section will define the responsibilities or criteria that personnel within the organization have in performing, reviewing, or documenting the procedures.

7.5 Procedure

7.5.1 Work Rules

7.5.1.1 Whenever employees are working, operating Company vehicles or equipment, present on Company premises, or present in any other location performing services for the Company without proper notification to the Safety Manager, they are prohibited from:

7.5.1.2 Using, possessing, buying, selling, manufacturing, distributing, dispensing or transferring drugs, or being under the influence of drugs or alcohol; and

7.5.2 Possessing or consuming alcohol.

7.5.3 Employees shall report to work fit for duty and free of any adverse effects of all drugs or alcohol.


7.5.4 This procedure does not prohibit employees from the lawful use and possession of prescribed medications for individuals assigned to and performing in non-safety sensitive functions/construction activities. Employees must consult with their doctor about the effect of prescribed medications on their ability to work in a safe manner, and the Doctor must promptly disclose any medications or treatment to the Safety Director. The company reserves the right to consult additional medical providers and/or the Medical Review Officer and determine the best course of action for the employee and company safety.

7.6 Testing

7.6.1 Testing or screening includes but is not limited to, urine drug test, breathalyzer tests, blood test or other tests and examinations to determine the use of any illegal or unauthorized drugs or substances prohibited in this policy.

7.6.2 Testing will occur under the following circumstances:

7.6.2.1 Pre-employment: All applicants must be found in compliance with the policy before they receive an offer of employment and/or begin working for the Company.

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7.6.2.2 Reasonable Suspicion: If a supervisor reasonably suspects an individual of using or being under the influence of alcohol or a drug(s) while they are working, operating Company vehicles or equipment, present on Company premises, or present in any other location performing services for the Company.

7.6.2.3 Post-incident: If you are involved in any compensable injury and/or contributed to an incident that seriously damages property, and/or results in an injury to a person who requires immediate medical treatment away from the scene of the incident or significant near miss.

7.6.2.4 Random: A percentage of the Company's employees, including managers, will be subject to random drug and/or alcohol testing.

7.6.2.5 Return to Duty and Follow-up: After any lapse of employment individuals must resubmit as a new employee. Individuals who are away from the project due to injury or for violations of this policy are subject to follow-up drug and alcohol testing at times and frequencies determined by the Company for up to two years.

7.6.2.6 Mass: The company reserves the right to conduct mass testing of all employees [including the Company's managers, officers and directors,] as allowed per applicable federal or state laws.


7.7 Specimen Collection and Testing Procedures

7.7.1 Applicants and employees subject to drug testing shall be sent or escorted to a Company designated collection facility where they shall be required to verify their identity and cooperate in the facility's normal urine specimen collection procedures.

7.7.2 Applicants and employees shall be allowed to provide specimens in private unless they submit or attempt to submit an altered, adulterated or substituted specimen.

7.7.3 Urine specimens shall be labeled and collections documented. A chain of custody shall be maintained from collection through laboratory testing.

7.7.4 Collected urine specimens shall be transmitted to and tested by a federally certified laboratory that holds all required state licenses. The laboratory shall test specimens for marijuana, cocaine, opiates, phencyclidine (PCP), amphetamines, barbiturates, benzodiazepine, methamphetamine,

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methadone, and tricyclic Antidepressant (and such other controlled substances as may be dictated by the circumstances). The laboratory shall first screen specimens; specimens that screen positive shall be subject to gas chromatography/mass spectrometry confirmation testing.

7.7.5 Applicants and employees who have tested positive for drugs shall be offered a reasonable opportunity, in a confidential setting, to explain or rebut their results to the Company's Medical Review Officer ("MRO") before the MRO reports a positive result to the Company. The MRO shall also advise persons with positive test results of their rights to have their split specimen tested by another federally certified laboratory, at their expense. If the second lab does not find any evidence of the drug(s) found by the first lab or the split specimen cannot be tested, the MRO will cancel the test results.

7.7.6 The MRO shall advise the Company if an applicant or an employee has passed or failed the test, refused to cooperate with the MRO, or if a test should be canceled.


7.7.7 If an employee tests positive on an initial screening test, the employee will be placed on unpaid administrative leave. The employee will be given the opportunity to explain the non-negative result and will be informed that employee may have the same sample retested at a laboratory of their choice at their cost.

7.8 Alcohol Collection and Testing Procedures

7.8.1 Employees subject to alcohol testing shall be sent or escorted to a Company designated collection facility where they shall be required to verify their identity and cooperate with collection procedures.

7.8.2 The testing will be conducted in a private setting by trained technicians.

7.8.3 A screening test will be done first. If the screen test result is less than .02, the employee will have passed the alcohol test. If the employee's measured alcohol concentration is .02 or more, the employee shall be required to provide a second specimen or confirmation testing. The results of the confirmation test, not the screen test, will be used as a final determination of alcohol concentration. If an employee's confirmation test result is .02 or more, the employee has tested positive for alcohol, pursuant to this policy.

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7.8.4 The employee's identity and the results of the alcohol test shall be documented. The laboratory shall advise the Company if the employee has passed or failed the test, refused to cooperate, or if a test should be canceled.

7.9 Inspections

7.9.1 The Company reserves the right to inspect all parts and aspects of its premises for illegal drugs, alcohol or other contraband. All employees and visitors may be asked to cooperate in inspections of their persons, work areas and property (such as purses, tool boxes, lunch boxes, briefcases, desks, lockers or cars) that might conceal illegal drugs, alcohol or other contraband. Employees who possess illegal drugs, alcohol or other contraband or refuse to cooperate in inspections will be subject to appropriate disciplinary action up to and including termination of employment.

7.10 Consequences


7.10.1 Employees who test positive for drugs and/or alcohol or who otherwise violate this policy will be subject to appropriate disciplinary action up to and including termination of employment. Depending on the circumstances, an employee's continued employment, reinstatement or return to work may be conditioned on the employee's successful participation in and/or completion of any and all evaluations, counseling, treatments, and rehabilitation programs, passing of return to duty tests, and/or appropriate conditions as determined by the Company and subject to Federal and State law.

7.10.2 Any employee who refuses to submit to testing as provided for in this policy may also be subject to disciplinary action, up to and including termination of employment. An employee will not be eligible for rehire if said employee refuses to submit to testing.

7.10.3 Possession of drug paraphernalia such as pipes, scales, synthetic urine or any other type determined by the company to be paraphernalia could result in disciplinary action up to and including termination.

7.11 Confidentiality

7.11.1 Information and records relating to test results, drug and alcohol dependencies, medical restrictions, and legitimate medical explanations

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provided to the MRO shall be kept confidential and maintained in files separate from employees' personnel files. Such records and information may be disclosed to applicants and employees or any other person designated in writing by an applicant or an employee, the Company's MRO, to and among the Company's supervisors on a need to know basis and where relevant to a grievance, charge, claim, lawsuit or other legal proceeding initiated by or on behalf of an applicant or an employee.

7.12 Drug / Alcohol Problem: Signs and Symptoms

7.12.1 Drugs and alcohol can result in such work-related problems as absenteeism, tardiness, lower productivity, missed deadlines, poor work quality, and, increased incidents and injuries. People misusing alcohol and using illegal drugs may experience a number of odd behavioral problems.

7.12.2 Examples include problems relating to and/or communicating with co-workers and customers, refusing to accept directives from supervisors, sudden changes in attitude, mood or work performance, and changes in personal appearance and hygiene. Drug use and alcohol misuse can also result in a number of health problems.

7.12.3 Evidence of use can include paraphernalia such as pipes, syringes, foil packets, pills, pill bottles, powders and empty alcohol containers. Physical signs and symptoms of use can include:

7.12.3.1 Marijuana and alcohol odors

7.12.3.2 Hangovers

7.12.3.3 Droopy eyelids, bloodshot eyes, dilated or pinpoint pupils

7.12.3.4 Nosebleeds, excessive sniffing, chronic sinus problems, nasal sores

7.12.3.5 Needle tracks or blood spots on clothing


7.12.3.6 Tremors, racing or irregular heartbeats

7.12.3.7 Slowed, slurred or incoherent speech

7.12.3.8 Coordination problems

7.12.3.9 Fatigue, lethargy and sleepiness

7.12.3.10 Depression or anxiety

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7.12.3.11 Neurotic or psychotic behavior


7.12.3.12 Slow, delayed or erratic decision-making and reactions

7.12.3.13 Jitters, hand tremors or hyper-excitability

7.12.3.14 Loss of concentration or memory

7.13 Process

7.14.1 Guidelines for Administering Specimen Collection

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8.1 Policy Statement


- 8.1.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 8.1.2** Sub-contractors shall also comply with requirements of this written program OR have their own company program meeting at least the minimum requirements of this program.

8.2 Purpose

- 8.2.1** To prevent the recurrence of incidents by establishing a procedure for identifying unsafe actions and/or conditions that contributed to an incident event and eliminate or control those unsafe acts and/or conditions.
- 8.2.2** To establish a protocol for identifying systematic deficiencies, control and correct them.

8.3 References

- 8.3.1** OSHA 29 CFR 1901 through 1904

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8.4 General Requirements

8.4.1 OSHA Reporting/Recording Requirements

8.4.2 OSHA Recordable Incident. Carbon America will keep records of fatalities, injuries, and illnesses and must record each fatality, injury and illness that:

8.4.2.1 Is work-related; and

8.4.2.2 Is a new case; and

8.4.2.3 Meets one or more of the general recording criteria (i.e. medical treatment beyond first aid).

8.4.3 The OSHA recordable incident shall be recorded on the 300 log within 7 calendar days of the day that the incident was reported.

8.4.4 Upon completion of the calendar year the OSHA 300A Summary shall be completed and posted in a conspicuous location during the months of February, March, and April.

8.4.5 The OSHA 300A Summary shall be reviewed and signed by a company official.


8.4.6 OSHA recordkeeping documents shall be maintained for 5 years following the end of the calendar year that the records cover.

8.5 Incident Reporting Procedure

8.5.1 Incident occurs.

8.5.2 Ensure treatment for the injured and implement Emergency Action Procedures (i.e. call 9-1-1, CPR, basic first aid, injured receiving treatment, etc.)

8.5.3 Secure the incident scene for all Diamond level incidents

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8.5.4 Conditions that may injure additional employees or other persons must be controlled. (i.e. equipment shut down)

8.5.5 Person or barricade is in place to keep people away from identified hazards.

8.5.6 If the incident involves a company vehicle, call the police department to provide a record of incident.

8.5.7 The person in charge of the job site or shop shall report the incident. If the person in charge of the job site/shop is not able to report the incident the next most senior person will report the incident.

8.5.8 The Supervisor shall be notified.

8.5.9 The Safety Director shall be notified.

8.6 Incident Classification

8.6.1 An Incident Investigation Summary will be completed by the supervisor including the details of the investigation and corrective action for all diamond level incidents or near-misses. Diamond level incidents are defined on the Incident Classification Form. Following all diamond level events, a conference call will be conducted with Carbon America corporate management and site management.

8.7 Incident Investigation


8.7.1 Immediately after the incident scene is under control, a 0-60 notification will be sent out with basic information of the incident.

8.7.2 Identifying the causal factors is the most critical part of successful corrective action, because it directs the corrective action and finds the key elements of the problem.

8.7.3 Basic sequence of an Incident Investigation:

8.7.3.1 Define the problem.

8.7.3.2 Gather data/evidence.

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8.7.3.3 Ask why and identify the causal relationships associated with the defined problem.

8.7.3.4 Identify which causes if removed or changed will prevent recurrence.

8.7.3.5 Identify effective solutions that prevent recurrence, are within your control, meet your goals and objectives and do not cause additional or unforeseen problems.

8.7.3.6 Implement the recommendations or corrective actions.

8.7.3.7 Observe the recommended solutions to ensure effectiveness.

8.8 Catastrophic and Critical Incidents (Diamond Level Incidents)

8.8.1 Any injury or illness resulting in the hospitalization of one (1) or more employees or results in death shall be reported **(within 8 hours)** to the nearest OSHA area office.


8.8.2 Immediately contact the Corporate Safety Manager @ 303-618-8908 and formulate an investigative response plan. Typically, the investigation will include the following:

8.8.2.1 Site visit by a Safety Manager.

8.8.2.2 Site investigation – conducted by Field/Shop Supervisor, Safety Manager, and affected Employees using effective investigation methods. These named personnel will form the basis for the Incident Investigation Team.

8.8.2.3 Completion of the Incident Investigation Summary to include all findings that contributed to the incident. These finding and corrective actions will be communicated out in a conference call with Carbon America Management Team and onsite Management Team.

8.8.2.4 Implementation schedule of corrective action will be included following the investigation.

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8.8.2.5 Verification that corrective actions are implemented and effective as determined by the incident investigation team.

8.8.2.6 Communication of corrected actions to affected site employees and contractors.

8.9 Protecting the Incident Scene

8.9.1 Secure the area where the incident took place. **Safety of life and health for the people and the environment is more important than incident investigations.** Do not begin the incident investigation until medical care has been given to anyone who has been injured, and the abnormal situation has been brought under control. In most cases, this will be the responsibility of the person in charge of the job site at the time of the incident namely the job supervisor. If the person in charge of the job site is not able to secure the scene, the next most senior person will secure the scene.

8.9.2 Preserve all the conditions which existed at the time of the incident – leave PPE, tools, and equipment in their exact location until the investigation is concluded. Rope or tape off the area to keep additional people out of the area.


8.9.3 Ensure conditions that pose a hazard to responders are identified and made safe or barricaded to prevent further incident.

8.9.4 During the field investigation photographs should be taken of the scene, including pictures from multiple vantage points (i.e. take a picture from all angles, close and far, take close ups of equipment, point of failure, etc.). Place a tape measure or other object of reference for distance or measurement sensitive pictures.

8.9.4.1 Pictures and other fact gathering will be completed by an employee trained in incident investigation protocol.

8.9.4.2 Include specific measurements and indicate locations of people, places and things at the time of the incident in a sketch.

8.9.4.3 Gather and save physical parts, pieces and other small objects, recording the location where they are found.

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Especially gather things that might be removed, cleaned up, or damaged if they are left where they are found. If the physical data is too large to move or would need disassembly, make notes to investigate those things later once the team has been formed.

8.9.5 Remove tools and equipment from service. Ensure that all tools and personal protective equipment of the injured are collected and available for inspection. Remove equipment and place in a secure location for inspection.

8.9.6 Take necessary samples; Using the Sample Log Form.

8.9.7 Capture any relative process data before it is lost. See Data Gathering section for more information.

8.10 Data Gathering

8.10.1 Data Gathering is collecting all the facts that are associated with the incident. The quicker the information is collected, the higher the quality of the data, and the more reliable it will be to the incident investigation process.


8.10.2 This stage may be required before the incident investigation team is formed due to the nature of disintegration of the data; therefore it is critical that the local supervisor act in a timely fashion to ensure the relevant data is retained.

8.10.3 All data recovered must be properly identified and labeled. It needs to be organized and stored in a secure location until the investigation is complete.

8.10.4 It is important to note that data collection is an ongoing part of the incident investigation. Additional data may still be collected in accordance with this procedure after the investigation team is formed and investigation commences.

8.10.5 The Data should be collected from various sources including but not limited to People, Position, Paper, Parts.

8.10.5.1 People

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8.10.5.1.1 People act as an important data source for the incident investigation process by relaying information about the incident to the incident investigation team.

8.10.5.1.2 Interviews in accordance to the Witness Statement Section should be conducted when appropriate during the investigation process.

8.10.5.2 Position

8.10.5.2.1 Position refers to what the status was before the incident occurred. This includes the following key pieces of information:

8.10.5.2.1.1 Weather Conditions

8.10.5.2.1.2 Process and equipment status(normal operations, start-up, shutdown, maintenance, within operating limits/intended function


8.10.5.2.1.3 Job status or work status (examples could be shift change, operating, or maintenance)

8.10.5.2.1.4 Human Factor issues (Facility Layout, design considerations, ect.)

8.10.5.3 Paper

8.10.5.3.1 Paper refers to the document trail, both before and after the incident requiring investigation. The following areas should be thoroughly reviewed as part of the Investigation:

8.10.5.3.1.1 Logs, charts, notes, turnovers, handbook logs, work orders, JSA's, TSA's, tags or print outs which could indicate what was going on at the time of the incident, and the state of any equipment in the area.

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8.10.5.3.1.2 Electronic records and data in control systems, including trends and process variables and listing of alarms if applicable.

8.10.5.3.1.3 Any metallurgical reports of broken parts, send off to a lab as part of the investigation process. The Safety Department will assist the Incident investigation team in these type of situations

8.10.5.3.1.4 Copies of standing orders, procedures in use or applicable to the situation when the incident occurred.

8.10.5.3.1.5 Training records for all affected employees on site at the time the incident occurred.


8.10.5.4 Parts

8.10.5.4.1 Parts refer to how the incident sight looks after the incident occurred and what areas of physical evidence are gathered.

8.10.5.4.1.1 Example of physical evidence for incident investigation teams to collect include:

8.10.5.4.1.1.1 Parts, pieces and other things that can be picked up and removed from the site after recording their relative location. Emphasis should be placed on documenting parts which might be moved, cleaned up, or damaged if they are left in place. If pieces and parts are to large to be moved, incident investigation team should take notes to investigate those items later after the smaller parts are documented and examined.

8.10.5.4.1.1.2 Pictures, videos, taken should be time and date logged using the camera if setting is available to ensure accuracy.

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8.10.5.4.1.1.3 Documentation of all parts samples should include:

8.10.5.4.1.1.3.1 Name of the person collecting the sample

8.10.5.4.1.1.3.2 Date and time the sample is collected

8.10.5.4.1.1.3.3 Exact location and source of the sample

8.10.5.4.1.1.3.4 Record all samples taken on the sample log

8.11 Witness Statements

8.11.1 Witnesses to the incident will be identified and interviewed. Every effort shall be made to ensure unbiased testimony.

8.11.2 The following information should be obtained:

8.11.2.1 Name, Address, Phone.

8.11.2.2 Affiliation to the incident.

8.11.2.3 A description of the witness' account of events (who, what, where, when, how).


8.12 Incident Investigation Team Members

8.12.1 The number of members on the team may vary based on the incident complexity

8.12.2 Each team member should add value to the investigation process

8.12.3 The minimum required personnel for an incident investigation team include:

8.12.3.1 A representative of the safety department

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8.12.3.2 Job Site Supervisor

8.12.3.3 2 members of the sites affected employees

8.12.4 If the incident requires specific expertise or involves a complex situation, additional technical personnel may be included in the incident investigation team. Additional members for these situations include:

8.12.4.1 A design or process engineer, if required

8.12.4.2 Safety/ Environmental Specialist

8.12.4.3 Outside Safety Consultant

8.12.4.4 Equipment inspectors

8.12.4.5 Reliability specialists

8.12.4.6 Fire Protection specialists

8.12.4.7 Maintenance Mechanics

8.12.4.8 Emergency Response Personnel


8.12.4.9 Vendor Representatives

8.12.5 Higher members of Management are discouraged from being team members due to the concern for uncovering details that might lead to a management deficiency.

8.13 Corrective Action Implementation

8.13.1 When corrective action is determined, the person in charge of the site from which the loss occurred will be notified in the following manner:

8.13.1.1 Catastrophic/Critical Incidents – the person in charge will receive written notification of required corrective actions. An implementation schedule for corrective action will be provided with the written notification.

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8.13.1.2 Other than Critical Incidents – the person in charge will receive written or verbal notification of required corrective actions. An implementation schedule for corrective action will be provided with the written/verbal notification.

8.13.2 Completion of corrective action will be verified during the follow up to the incident (time frame specified during investigation and corrective action implementation).

8.13.3 Corrective actions must be tracked from time of implementation to completion. All implemented corrective actions should be remitted to the Safety Department to ensure closure and recording in a database.

8.13.4 Lessons learned from the incident should be communicated to other work crews. Based on the severity of the incident, the communication could be in the form of a safety alert, or verbal tool box talk, up to and including a companywide safety stand down for catastrophic incidents.

8.13.5 The Corrective Actions Database

8.13.5.1 Must be regularly updated in a timely fashion by the Safety Department

8.13.5.2 Key information maintained in the database includes:

8.13.5.2.1 Incident number

8.13.5.2.2 Date of the incident


8.13.5.2.3 Description of corrective action

8.13.5.2.4 Corrective action Owner or Responsible party for implementation

8.13.5.2.5 Current Status of the corrective action(open, closed, complete)

8.13.5.2.6 Date of the last update or closure date

8.13.5.2.7 Actions taken during the corrective action period

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8.14 Quality Assurance

8.14.1 To Ensure Proper and Complete documentation and evidence is collected on all diamond level events using multiple investigation techniques may be necessary for the Safety Department, or there designated representative (outside safety consultant) to audit the incident investigation process.

8.14.2 The Quality Assurance Checklist will be used during this process to ensure accurate investigations.

8.14.3 The Quality assurance audit can be performed during the incident investigation process, and for previously closed investigations to ensure closure of corrective actions and communication of the corrective actions to affected employees.

8.15 Training

8.15.1 Affected employees are trained on correct incident reporting procedures.

8.15.2 Affected employees conducting incident investigations (supervisors) shall be trained on the following:

8.15.2.1 All elements of this written program.

8.15.2.2 Instruction on how to protect an incident scene.


8.15.2.3 Investigation techniques.

8.15.2.4 Taking photographs.

8.15.2.5 Interviewing witnesses.

8.15.2.6 How to complete an Incident Investigation Summary.

8.15.2.7 How to complete an incident Analysis.

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8.15.2.8 Causal factor and Corrective actions identification, implementation and validation.

8.15.2.9 Reporting and Recording the completed investigation.


8.16 Definitions

Incident Investigation - a fact-finding procedure for the review of an incident to identify unsafe actions or conditions that could have contributed to the incident event. Facts identified through investigation are used to identify the causal factors of the incident to prevent recurrence of similar incidents, improve safety and health awareness, and to resolve relative injury or property damage claims. All medical related information shall be kept confidential.

Accident - An undesired event that results in personal injury or property damage.

Incident - An incident is an unplanned, undesired event that adversely affects completion of a task.

Near Miss - Near misses describe incidents where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.

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9.1 Policy Statement

- 9.1.1** It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 9.1.2** Carbon America will comply with the OSHA ***Employees Access to Records*** standard, 29 CFR 1910.20 through implementation of this written program.

9.2 Purpose


- 9.2.1** To establish procedures for providing current employees, and former employees and designated employee representatives access to exposure and medical records as mandated by OSHA standard 29 CFR 1910.20

9.3 References

- 9.3.1** 29 CFR 1910.1020

9.4 General Requirements

- 9.4.1** All current and former Carbon America employees shall be granted, following written request, permission to examine and copy their personal medical and exposure record and any analysis based upon the record. All identities of other employees shall be deleted before the release of information.

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9.4.2 In the case of a deceased or legally incapacitated employee, the employee's legal representative may directly exercise all of the employee's rights as outlined in 29 CFR 1910.20.

9.4.3 An employee may designate an individual or organization as a representative and must provide written authorization for the designated representative's right of access.

9.4.4 Access to Medical and Exposure Records

9.4.5 The following table indicates those individuals that have been granted access to Employee Medical and Exposure Records and the type of access.

Title	Type of Access
Select Medical Providers for all Work Locations	Unlimited Access to Medical and Exposure Records.
Safety and Human Resource Department	Unlimited Access to Exposure Records
Safety and Human Resource Department	Restricted Access to Medical Records as it pertains to evaluation of fitness for duty.


9.5 RECORDS RETENTION

9.5.1 Employee exposure and medical records shall be retained in accordance with the following schedule:

9.5.1.1 Medical Records - duration of employment, except:

9.5.1.1.1 Health insurance claims maintained separately from the medical program.

9.5.1.1.2 First aid reports if maintained separately from the Safety Department.

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9.5.1.1.3 Medical records of employees who have worked less than one year need not be maintained beyond term of employment.

9.5.1.1.4 Exposure Records - at least 30 years plus term of employment, except:

9.5.1.1.4.1 Laboratory reports and worksheets need only be retained for one year.

9.5.1.1.4.2 Material Safety Data sheets as long as an identity of the chemical, where it was used and when it was used is retained for at least 30 years.

9.5.1.1.4.3 Biological monitoring results designated as exposure records by specific OSHA standards shall be preserved as required by the specific standard.

9.6 PROCEDURE


9.6.1 Requests for access to exposure or medical records by an employee or designated representative shall be submitted in writing on a designated Carbon America release form.

9.6.2 The requested information shall be supplied within 15 working days of the receipt of the written request if possible.

9.6.3 A copy of all written requests as well as the exposure or medical records provided to the employee or designated representative shall be maintained by the Safety and Human Resource Department in the employee's corporate medical file.

9.6.4 Prior to the release of requested information, all pertinent requests shall be reviewed and approved by the Safety Director and VP of Human Resources of Carbon America or their designee.

9.7 FORMER EMPLOYEES, DESIGNATED REPRESENTATIVES, AND ORGANIZATIONS

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9.7.1 All requests for exposure and medical records, from former employees, designated representatives and organizations must have authorization from the Safety Director and VP of Human Resources of Carbon America.

9.8 OSHA ACCESS

9.8.1 Any OSHA representative shall be provided access to employee exposure and medical records and to corresponding analyses. A written authorization is not required. The Safety Director or designee shall be consulted prior to the release of any information.

9.9 Training

9.9.1 Initial Training

9.9.1.1 Employees shall be informed of the OSHA standard and the pertinent parts of the guidelines during new employee orientation and annually thereafter.

9.9.1.2 The elements are the training programs include:

9.9.1.2.1 The existence, location and availability of the exposure and medical records, and any analyses.

9.9.1.2.2 The person responsible for maintaining and providing access to the records.


9.9.1.2.3 Each employee's rights of access to these records.

9.10 Definitions

9.10.1 Exposure Record- The following shall constitute employee exposure records:

9.10.1.1 Workplace monitoring or measurement of substances or physical agents including related data on methodologies.

9.10.1.2 Biological monitoring results.

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9.10.1.3 Material Safety Data Sheets. (If not available, a chemical inventory stating when and where a chemical was used will satisfy this requirement).

9.10.2 Medical Record- A record of the health status of an employee made by a physician, nurse, or other health care personnel which may include:

9.10.2.1 Medical and employment questionnaires or histories, to include job descriptions and occupational exposures.

9.10.2.2 Results of medical examinations and laboratory tests.

9.10.2.3 Medical opinions, diagnoses, progress notes, and recommendations.

9.10.2.4 First aid reports, unless such first aid reports are maintained at a location other than the Safety Department.

9.10.2.5 Descriptions of treatments and prescriptions.

9.10.2.6 Employee medical reports.


9.10.3 Medical Record Exceptions- Employee medical records do not include:

9.10.3.1 Physical specimens which are routinely discarded.

9.10.3.2 Records concerning insurance claims if maintained separately from the medical program and which are not accessible by employee name or other personal identifier.

9.10.3.3 Records created solely in preparation for litigation.

9.10.3.4 Records concerning voluntary employee assistance programs if maintained separately from the medical program and records.

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10.1 General Policy

10.1.1 The purpose of the Short-Service Employee policy of Carbon America is to assure that workers with less than six months experience are identified, adequately supervised, trained and managed so as to prevent injury to themselves or others, property damage or environmental harm.

10.1.2 Any worker with less than six months service in the same job/position with Carbon America will be considered a short-service employee (SSE). Experienced workers who are new to a location will be considered by the Supervisor or the Safety Manager for inclusion in the SSE program based on the specifics of their assignment.

10.1.3 Factors to consider would include significant differences in:

10.1.3.1 Job responsibilities/duties from previous assignments/employers

10.1.3.2 Work processes/practices from previous assignments/employers


10.1.3.3 Equipment/tools from previous assignments/employers

10.1.3.4 Their Skill level, and

10.1.3.5 Their Familiarity with co-workers

10.2 Short-Service Employee Requirements

10.2.1 All Carbon America SSEs, regardless of job function, shall participate in any necessary site-specific orientations before performing work on project locations. These employees must also complete any

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additional specific training required by their job assignment that is being visited.

10.2.2 SSE requirements may also include the following:


10.2.2.1 Carbon America SSEs will wear a hard hat with a distinctive difference in appearance (color, Stripe, Decal, etc.) whenever they are in the field that will allow quick and sure identification of the SSE by other team members. The method used to identify SSEs should be communicated to the Owner Client. This also serves as a reminder of each person's responsibility for the safety of others.

10.2.3 All SSE personnel must be assigned an experienced mentor to assist the employee during his/her SSE period. It is the mentor's responsibility to closely supervise the assigned SSE and prevent him/her from performing tasks for which he/she is not properly trained. A mentor may only be assigned to one crew that includes Short Service Employees, and he/she must remain on site with them.

10.2.4 Formal meetings between the SSE, his/her supervisor and mentor will take place one month and three months after the hire or transfer date (more frequently if necessary). The purpose of these meetings is to provide performance feedback to the SSE and evaluate his/her progress in understanding workplace hazards and Carbon America health, environmental and safety (HES) policies.

10.2.5 A final meeting is held at the six-month point to make a formal determination whether the SSE can work without posing a hazard to himself/herself or others. When the supervisor and mentor have agreed to this, employees are removed from the SSE program.


10.2.6 If concerns remain about the employee's ability to work safely after six months, the supervisor evaluates the situation and develops a forward plan for the employee in consultation with Human Resources. To be removed from SSE status, an employee must exhibit safe behavior for six months (i.e., incident-free performance, proactive participation in HES programs such as incident reporting including near misses, Behavior-Based Safety (BBS), Job Safety Analysis (JSA) development, safety meetings) and have a general awareness and

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working knowledge of Carbon America HES policies. Release from SSE status requires the approval of both the employee's mentor and the supervisor. Documentation should be maintained for a period of one year after an employee has been removed from SSE status.

10.3 Working with Experienced Crews

- 10.3.1** Prior to starting work, the contractor shall notify the Owner Client (project coordinator, contractor contact, and/or on-site supervisor) if Short Service Employees are present on work crews.
- 10.3.2** Because of the nature of SSE status, a single person "crew" cannot be an SSE. Working multiple SSEs on a crew has the potential to increase the risk of crew injuries; therefore: Two to five-person crews can have only one SSE per crew, and crews with six to ten persons or more should not exceed 2 SSEs. Exceptions to these requirements require a plan to mitigate the risks and written approval of the Safety Manager. Exceptions for crews with more than 50% SSEs require the approval of the Safety Manager, and supervisor. For purposes of this policy, a crew is defined as those workers working at a single location who are employed by Carbon America.
- 10.3.3** Any subcontractors employed by Carbon America must manage their Short Service Employees in accordance with the requirements of the above Short Service Employee program.

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11	STOP Work Authority Program	02	05/11/2022	

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11.1.0 Policy Statement

- 11.1.1. It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

11.2.0 Purpose


- 11.2.1. The purpose of this written program is to provide guidelines, requirements and procedures that will ensure employee safety when conducting any form of work. This program identifies areas of high hazard potential and the steps to reduce the likelihood of injury. This program utilizes a STOP Work Authority (SWA) procedure.
- 11.2.2. This program applies to all sites and employees under Carbon America. Any employee under this group has the authority to utilize the STOP Work Authority (SWA) without fear of management reprimand.
- 11.2.3 To ensure the following process is utilized, stop, notify, correct, and resume.

11.3.0 References

- 11.3.1. OSHA Section 5 of the General Duty Cause

11.4.0 General Requirements

- 11.4.1. Management Responsibilities

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11.4.1.A. Ensure compliance with this program.

11.4.1.B. Provide support on the STOP Work Authority program. This includes information, training and applicability.

11.4.1.C. Review all SWA and provide corrective actions/ recommendations to reduce or eliminate hazards.

11.4.1.D. Assist in the supervision and implementation of the SWA program.

11.4.1.E. Audit and make changes to the SWA program as work scope, jobs and tasks change. These changes will be then communicated to all employees under Carbon America ensuring the item has been completely corrected and closed.

11.4.2. Supervisor (General Forman, Lead Foreman, Foreman)

11.4.2.A.1. Ensure the STOP Work Authority procedure is utilized when a hazardous situation to life or health is identified.

11.4.2.B.2. Ensure that the procedures are followed under the requirements of the STOP Work Authority program.

11.4.2.C.3. All SWA are reported the management team for review and recommendations are provided.


11.4.2.C.4. Ensure that no work is resumed until all issues identified in the Stop Work Authority have been corrected

11.4.3. Employees

11.4.3.A.1. Understand the process of the STOP Work Authority and their responsibility under the program.

11.4.3.B.2. Assist in the recognition of hazardous conditions and identify them to upper management.

11.4.4. STOP Work Authority Implementation

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11.4.4.A. The following areas are where STOP Work Authority must be enforced:

11.4.4.A.1. Abrasive Blasting/ Sandblasting, *See Abrasive Blasting/ Sandblasting Program*

11.4.4.A.2. Live Electrical Work, *See Electrical Non-Qualified Program*

11.4.4.A.3. Any Industrial Hygiene Monitoring,

11.4.4.A.4. Environmental Issues, *See Environmental Program*

11.4.4.A.5. Work with Respirators, *See Respirator Protection Program*

11.4.4.A.6. Any work that poses potential to be hazardous to life or health where adequate controls are not in place to provide protection of the employee.

11.4.4.A.7. Any of the following tasks that are not currently performed by any area of Carbon America:

11.4.4.A.7.a. Work on scaffolds

11.4.4.A.7.b. Work that involves overhead protection

11.4.4.A.7.c. Work with lead

11.4.4.A.7.d. Work with asbestos


11.5.0 Training

11.5.1. Each employee of Carbon America shall be trained on the following requirements set forth by this program:

11.5.1.A. The application of the STOP Work Authority specific to each subsidiary of Carbon America


11.5.1.B. Personal responsibilities outlined under the General Requirements

11.5.1.C. Procedure for implementation of STOP Work Authority

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11.6.0 Definitions

Stop Work Authority- is defined as the ***‘authority and obligation’*** of any individual to suspend a single work task or group operation when the control of SH&E risk is not clearly established or understood. In general terms, the SWA process involves a stop, notify, correct and resume approach for the resolution of a perceived unsafe condition, act, error, omission, or lack of understanding that could result in an undesirable event.

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12	Employee Training Requirements Program	0	05/11/2022	

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12.1 Policy Statement

12.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

12.1.2 Carbon America will comply with all applicable OSHA standards, which address employee training through implementation of this written program.

12.2 Purpose

12.2.1 The purpose of this program is to provide a process for the initiation and implementation of Training Modules and Safety Alerts for all employees within Carbon America.

12.2.2 This program applies to all employees and subcontractors on all Carbon America facilities and customer sites.


12.2.3 To set target dates for ongoing training, continuous health and safety improvements, and accident avoidance.

12.3 References

12.3.1 The Carbon America Safety and Health Program Manual

12.3.2 The Carbon America Employee Handbook

12.4 General Requirements

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12.4.1 All employees and subcontractors under Carbon America must participate in the required training modules and Safety Alerts set forth by this program.

12.4.2 All trainings and safety alerts will be managed and distributed by the Safety Department.

12.4.3 All trainings and Safety Alerts will require employees and subcontractors to sign and date that they understand and will comply with the information. Additionally, testing for sections will be conducted as required based on the topic or as required by any certification requirements. This is a requirement of Carbon America, the Safety Director, and the majority of companies for who Carbon America or their subsidiary companies (Construction/Trucking) perform contract work.

12.4.4 Through the course of work or through the addition of new processes or equipment additional training could be required to consider employees qualified to perform operations. These situations will be reviewed by the safety department or through identification by the safety committee. Management of change will be the primary process by which new applicable training needs will be identified. Some areas used to address managing of change include:

12.4.5 Systematic review of JSA's and safe work procedures.


12.4.6 Review of site layouts and emergency action plans.

12.4.7 Employee response to injuries and emergencies on sites during both actual events and drill scenarios.

12.4.8 Acquisition of new equipment, or vehicles.

12.4.9 Addition or adaptation of new construction services, product manufacturing, or addition of new DOT exposures.

12.4.10 Hazard Assessments and observations of employees in the work area, through audits, and behavior-based performance.

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12.4.11 Consideration of new requirements or compliance items required by customers based on per project basis.

12.5 Training

12.5.1 Table 1: Table 1 identifies the topics which are covered as part of the initial hire new employee orientation. Monthly classroom training depending on the nature of the employees work responsibilities will be scheduled as required. Table 2 identifies the required training for each individual job classification, annual updates, and any re-training.

Table 1
New Hire Training Content

Company Wide Required Training Topics (To be delivered to all divisions)
Disciplinary Action Including the Fire Five Program
Dress Code and Professional Conduct
Subcontractor Management
Cell Phone Policy
Electrical Awareness (GFCI, Excavation)
Review of required Work permits and Equipment Inspections
Personal Protective Equipment
Smoking Policy
Hearing Conservation
Confined Space Entry and the permitting process
Task Safety Analysis
Housekeeping
Site Specific Emergency Action Plans
Near Miss Reporting
Company Structure
Stop Work Authority
Company Vehicle Policy
Ladder safety and fall protection
Fire Extinguisher Use and Hot Work
Respiratory Protection
Hazard Communications including the GHS system
Back and Lifting Safety
Hazard Identification
Drug and Alcohol Awareness

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Injury and Illness Record Keeping
Manual Material Handling and Rigging
Powered Industrial Vehicle Certification
Mobile Equipment operation and aerial lifts
Flammable and Combustible Liquids

12.6 Safety Alerts

12.6.1 Table 2: Table 2 lists all Safety Alert topics that were developed to meet OSHA requirements as well as identifying and mitigating areas of hazard or risk.

Table 2:
Safety Alert Topics

Bloodborne Pathogens	Personal Protective Equipment
Electrical Awareness	Emergency Action (Field Employees)
Recordkeeping	Hazard Communication
Safety Programs	Lockout-Tagout- Tryout
Benzene Awareness	Ladder Safety
Aerial Lift	Silica Dust
Thermal Stress	Environmental Hazards
Drug and Alcohol Awareness	Spill Response
First Aid/ AED/ CPR	Housekeeping
Machine Guarding	Manual Material Handling (Safe Lifting)
Flammable Liquid: Storage and Handling	STOP Work
Flammable and Combustible Liquids	Hearing Protection
Hand and Power Tools	Confined Space
Fall Protection	Hazard Identification
Cell Phone Policy	Weather Procedures
Defensive Driving	Cold Safety
Spotter Safety	Heat Safety
Radius Machine Safety	Asbestos Awareness
Inspection Safety	Lead Awareness
Permit to Work System	Hexavalent Chromium Awareness
Grinder/ Chop Saw Safety	Safety Sign Usage


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Load Transportation	Walking Working Surfaces
Behavioral Based Safety	Winter Weather Driving
Abrasive Blasting	Slips, Trips and Falls
Mobile Equipment Safety	Work Place Violence
Powered Industrial Truck Safety	Struck by and Caught In-between
Near Miss Identification	One-Call
Cord Safety	First Aid Procedures for Eye Wash
Generator Safety	Methane Gas Protection
Accident Reporting	MSDSs
Trench Hazards	


Table 3:
Training Matrix

Additional training for identified hazards must be completed prior to employee exposure based upon a hazard assessment. Sample shown as each site must develop its own training matrix.

	Location	Frequency	Admin	Management	Craft
Blood Borne Pathogens	All	A	PRN	X	X
Confined Space	All	A		X	X
Defensive Driver Awareness Driving Safety	All	I	X	X	X
Electrical Safety	All	I		X	X
Emergency Response Plan	All	I	X	X	X
Fall Protection	All	A		X	X
Fire Extinguishers	All	A	X	X	X
First aid/ CPR	PRN	2	PRN	PRN	PRN
H2S	All	I		X	X
Hand and Power Tools	All	I		X	X
HAZCOM	All	I	X	X	X
Hearing Conservation	All	A	X	X	X
LOTO	All	I		X	X
JHA	All	I	X	X	X

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Ladder Safety	All	I		X	X
Personal Protective Equipment	All	I		X	X
Rigging Awareness	All	I		X	X
Scaffolding	All	I		X	X
Site Specific Orientation Plan	All	I	X	X	X
Supervisor Safety Training	All	PRN	PRN	X	PRN

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13.1. PURPOSE

1.1 Corporate Safety Team - The Corporate Safety Team shall ensure policies and practices are accurate, maintained and updated as necessary for continuous improvement and prevention of incidents. The Carbon America Safe Team (a group of personnel selected to the safety committee), shall review the policies and requirements in the Carbon America Environmental Health & Safety Manual (the Manual) and provide updates as necessary.

1.2 Safety Managers – This group shall ensure consistent application of the policies and procedures.

13.2. SCOPE

13.2.1. This procedure applies to all Carbon America sponsored projects.

13.3. RESPONSIBILITIES


13.3.1. Project Management Teams

13.3.1.1. Each Project Management Team will ensure proper planning, implementation and execution of the policies within the manual and support these efforts.

13.3.2. Safety Professionals

13.3.2.1. Each Safety Professional will be a resource and leader in the overall safety efforts.

13.3.3. Employees

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13.3.3.1. Each employee has a responsibility to ensure that their actions don't put themselves or those around them in harm's way while working. It is a condition of employment for all employees to conduct their work in a safe and healthful manner and follow the policies and requirements contained in the manual.

13.4. PROCEDURE

13.4.1. Revisions to the Manual may be required by Federal, State/Provincial or local law changes or updates. Manual changes may also be required following Company mandated reviews or changes in policy. Whenever updates are required, the Request for Change/Revision Form must be completed.

13.4.2. When a change form is received it will be evaluated for any impacts the revision will have, including, including, but not limited to, the following areas:

13.4.2.1. Training impacts

13.4.2.1.1. Identify whether revisions are necessary to current training or if new training must be developed.

13.4.2.1.2. Material and equipment

13.4.2.1.3. Identify if the revision requires the purchase of or use of new/different material or equipment (e.g. lockboxes).

13.4.2.1.4. Quality Assurance / Quality Control (QA/QC) the revision will affect QA/QC requirements.


13.4.2.1.5. Identify QA/QC SME for review of procedure change and feedback.

13.4.2.2. Personnel

13.4.2.2.1. Identify whether the revised procedure requires additional personnel to complete task/scope.

13.4.2.3. Implementation Plan

13.4.2.3.1. Identify means to implement procedural change.

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13.4.2.3.2. Identify potential barriers that may slow or halt implementation.

13.4.2.4. Other

13.4.2.4.1. Identify other issues/impacts that may affect revision to procedure.

13.4.3. The completed impact assessment will be reviewed and a determination will be made if approval from the Corporate Safety Team is needed.

13.4.4. If Corporate Safety Team approval is needed, the impact assessment shall be reviewed by the Corporate Safety Team. When Corporate Safety Team approval is received, a course of action for the Procedure revision, based on Corporate Safety Team comments/suggestions will be determined.

13.4.5. If Corporate Safety Team approval is not needed, the revision will proceed.

13.4.6. After the approval process has been completed, a draft procedure to be submitted for feedback to a review group that consists of members of the Carbon America Safety Team and Legal Department.

13.4.7. An implementation plan and executive summary will be developed for roll out of the revised procedure.


13.4.8. The implementation plan, executive summary and final draft procedure will be provided to the Corporate Safety Team for:

13.4.8.1. Final review of the procedure

13.4.8.2. Final review of the implementation plan

13.4.8.3. Entry into the Corporate safety manual


13.4.9. Projects shall update the project Site Specific Safety Plan (SSSP), if applicable, to reflect the new procedure.

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13.5. REFERENCE

13.5.1. Corporate Safety Manual Change

13.5.2. Procedure Revision Impact Assessment

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14.1.0 Purpose

14.1.1 The Planning Procedure provides a standardized process to effectively plan work tasks and to identify the work procedures and methods that impact the safety and productivity of workers. The safety components are built into the planning process to provide a system of communicating the safety issues associated with each task or operation. The end result is that each worker has a complete understanding of the assigned work and the resource requirements necessary to safely and efficiently perform that work.

14.2.0 Scope

14.2.1 This procedure applies to Carbon America projects. Each project is required to plan their work in accordance with the Procedures outlined in this policy.

14.3.0 Definitions

14.3.1 No definitions.


14.4.0 Responsibilities

14.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

14.5.0 Process

14.5.1 Site Specific Safety Plan

14.5.1.1 The Site Specific Safety Plan describes how the project will provide a safe and healthful working environment for our employees. All work performed will be in compliance with all applicable safety regulations, but more importantly will be performed with an attitude toward having a

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proactive safety process. A proactive safety process means that employees' safety is valued above all else and won't be compromised. The Plan is intended to be a working document that, although it is the foundation of the safety process, grows and improves as the project progresses. The Plan is made up of four key components;

14.5.1.1.1 Accident and Illness Prevention Policy

14.5.1.1.2 Safety Management

14.5.1.1.3 Safe Work Practices

14.5.1.1.4 Roles and Responsibilities

14.5.1.2 The Safety Manager, the Project Manager and the Project Safety Manager have primary responsibility for the development of the Site Specific Safety Plan. The Project Engineer as well as the Owner/Client may have input.

14.5.2 Master Schedule


14.5.2.1 The Master Schedule provides the Project Team with a visual representation of the overall building process that will be utilized on a specific project. It is the master plan that provides enough detail to illustrate what activities must be performed, by whom, and in what specific sequence. It defines that resources to be used, incremental milestones, and the critical path over the life cycle of the project. The project Master Schedule is developed by the Company per Operations Department.

14.5.2.1.1 Roles and Responsibilities:

14.5.2.1.1.1 The Project Manager and the Project Engineer have primary responsibility for the development of the Master Schedule. The discipline Superintendents and discipline Engineers may have input.

14.5.2.2 3-Month Look-Ahead

14.5.2.2.1 On longer-duration projects, a 3-Month Look-Ahead schedule should be used to help the Project Management Team to focus on safety concerns, long lead items, engineering deliverables, required subcontractors, construction equipment, and manpower requirements, etc.

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14.5.2.2.2 Roles and Responsibilities

5.2.2.2.1 The Project Manager and the Project Engineer have primary responsibility for the development of the 3-Month Look-Ahead. The Discipline Superintendents and discipline Engineers may have input.

14.5.2.3 6-Week Schedule

14.5.2.3.1 As activities in the Master Schedule approach the six-week window of time before the activity is to start, the Project Management Team needs to make a decision to commit to starting the activity in six weeks. The commitment means that the Project Management Team needs to make a decision to commit to starting the activity in six weeks. The commitment means that the Project Management Team will ensure that all resources to accomplish the activity are on-site. The goal is to never start an activity that we don't have all the tools, material, equipment, information, and resources to complete. Just as important, the Project Management Team makes the commitment to develop the detailed Safety, Quality, and Productivity plans specific to the activity.


14.5.2.3.2 Roles and Responsibilities

14.5.2.3.2.1 The Discipline Superintendent and Discipline Engineers have primary responsibility for the development of the 6-Week Schedule. The General Foreman and Foreman may have input.

14.5.2.4 Task Package

14.5.2.4.1 A Take Package is defined as the development and collection of information to execute a particular construction activity. This information will include the Safety Plan, Quality Plan, Execution Plan, required engineering drawings, RFIs, etc. the Task Package process is to ensure that the development and collection of information is done well ahead of time so that a week before the crew is to begin work, they have everything needed to complete the work with the highest level of Safety, Quality, and Productivity.

14.5.2.4.2 Roles and Responsibilities

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14.5.2.4.2.1 The Discipline Superintendent and Discipline Engineers have primary responsibility for the development of the Task Package. The General Foreman and Foreman may have input.

14.5.2.5 1-Week Schedule

14.5.2.5.1 As activities in the 6-Week Schedule approach the one-week window of time, activities will be listed on a 1-Week Schedule as more detailed “steps.” These steps will have already been identified when the Task Package was developed. The Safety Support Team needs to be actively involved so they can most effectively support the schedule and help plan JSAs, inspections and tests needed to complete the task. The written Safety Plan will be reviewed to ensure that all items are covered, including material and equipment. Before the work begins, a physical inspection of the work area must take place to make sure conditions have not changed (for example, access, egress, etc.).

14.5.2.5.2 Roles and Responsibilities

14.5.2.5.2.1 the General Foreman and Foreman have primary responsibility for development of the 1-Week Schedule. The Leadsperson may have input.

14.5.2.6 Crew Daily Task Plan

14.5.2.6.1 The Crew Daily Task Plan is the Crew Leader’s primary tool for planning the next day’s work. It is designed to:


14.5.2.6.1.1 Support the 1-Week Schedule in greater detail.

14.5.2.6.1.2 Identify specific work activities for the next day.

14.5.2.6.1.3 Assign duties to specific crew members.

14.5.2.6.1.4 Identify specific material, tools, and equipment needs.

14.5.2.6.1.5 Set and monitor goals.

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14.5.2.6.1.6 Identify potential Safety hazards and eliminate or control those hazards.

14.5.2.6.1.7 Identify Quality requirements and plan for inspections and tests.

14.5.2.6.2 The Crew Daily Task Plan is to be used at the beginning of the shift to communicate the plan for that day. Each member of the crew must completely understand what their assignment is and what the goals are as they pertain to Safety, Quality, and Productivity. Each Crew Daily Task Plan will be reviewed by the Crew Leader's Supervisor the day before.

14.5.2.6.3 Roles and Responsibilities

14.5.2.6.3.1 The Foreman and Leadsman have primary responsibility for the development of the Crew Daily Task Plan. The crew will have input and the Crew Leader's Supervisor will sign off on the plan.

14.5.2.7 Job Safety Analysis – JSA

14.5.2.7.1 The purpose of the JSA is to identify and address potential hazards in greater detail than the Crew Daily Task Plan. The JSA is performed immediately prior to the commencement of the task, to allow the user the most opportunity to observe actual conditions of the work scope and environment.


14.5.2.7.2 The JSA requires that each crew or subcontractor, working as a team, identify and address each step associated with the task that they are about to perform. Those basic steps are:

14.5.2.7.2.1 Break the task down and list each step in the order of occurrence.

14.5.2.7.2.2 Examine each step for hazards.

14.5.2.7.2.3 Evaluate the hazards and conduct a "what if" scenario for each step.

14.5.2.7.2.4 Implement safety procedures and protection measures.

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14.5.2.7.2.5 Review the Plan and get approval as conditions change.

14.5.2.7.3 JSA Process Expectations

14.5.2.7.3.1 Every employee must understand their individual role in the task to be completed and the hazards they may encounter. This is the first step in completing an assigned task!

14.5.2.7.3.2 A JSA must be completed for each task that a crew or individual is assigned. This means every project, every day, every task, and as conditions change.

14.5.2.7.3.3 The program should identify that hazards are classified, prioritized and addressed based on the risk associated with the task.

14.5.2.7.3.4 The JSA is completed where the work takes place, not in the office, not at the gangbox, not in the lunchroom, etc.

14.5.2.7.3.5 The JSA must be reviewed and signed by the Crew Supervisor before any assigned tasks start.


14.5.2.7.3.6 The JSA should demonstrate how identified hazards are addressed and mitigated. This can be accomplished by dedicated assignment, appropriate documentation of completion and implemented controls.

14.5.2.7.3.7 Ensure that the area is picked up and safe before they move on to the next task.

14.5.2.7.4 Roles and Responsibilities

14.5.2.7.4.1 The Crew assigned to a task is the group that has primary responsibility for the Job Safety Analysis – JSA. The Crew Supervisor must review and approve of the plan before the work begins.

14.5.2.7.4.2 Assist the crew to complete a JSA paying particular attention to identifying hazards in the area, not just the hazards associate with the task at hand.

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14.5.2.7.4.3 Make sure every member of the crew is involved in the JSA process.

14.5.2.7.4.4 Review, approve, and sign every JSA for every employee, every task. No exceptions.

14.5.2.7.4.5 Monitor the task and ensure the JSA is updated if the conditions change.

14.5.2.7.4.6 Assess JSAs for quality and detail and take coaching opportunities as they present themselves.

14.5.3 JSA Measurement Process / Assessments

14.5.3.1 Each project shall ensure that a process is in place to continually evaluate the planning process for improvement opportunities.

14.5.3.2 A specific assessment is required for the JSAs.

14.5.3.2.1 By measuring the process we can make changes before an accident or incident occurs.


14.5.3.2.2 By improving a Supervisor's ability to review the JSAs more effectively and to coach the crewmembers, the quality of the entire process will improve. As a Company, we can continually improve.

14.5.3.2.3 The assessment should ensure there is a review process in place to avoid creating new hazards derived from the corrective measures.

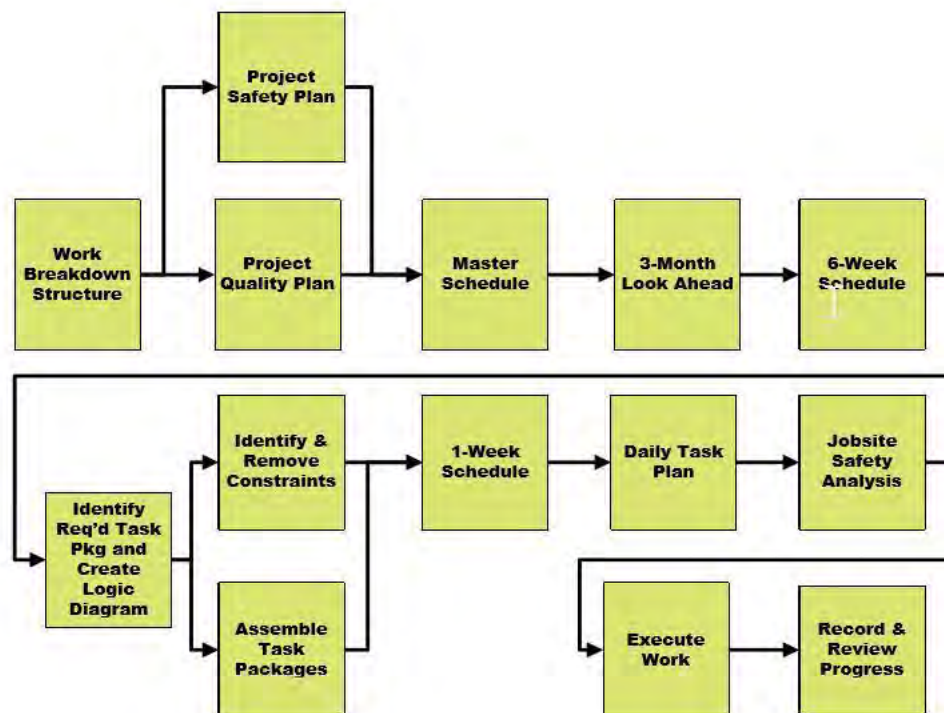
14.5.4 Training

14.5.4.1 All employees will receive an overview of Hazard Awareness and the JSA process in Orientation. They will receive "hands-on" training in the field with their crew every day. This training will be based on the best practices that are being used now and will be activity based with instructor and peer review. The activities will be developing JSAs in the field on actual tasks and scoring a series of JSAs that have been collected from projects.

14.5.4.2 The training should ensure that employees will be trained in the hazard identification process including the use and care of proper PPE.


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APPENDIX A – PLANNING FLOW CHART



14.6.0 References

14.6.1 None

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15	Documentation and Regulatory Compliance	0	05/10/2022	

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15.1.0 Purpose

15.1.1 Documentation is a basic component of a successful Safety Program, and is essential for compliance with federal, state, provincial and local regulatory agencies, as well as company regulations. Laws have been passed in every jurisdiction requiring employers to retain and produce records of various kinds.

15.1.2 Record retention varies, usually in the range of 3 to 5 years, but it can be as high as 40 years. In some cases, regulations simply specify that records be maintained for the duration of employment.

NOTE: Although Federal, State and Provincial law may require record retention for only a specific period, it is strongly recommended that the Corporate Safety Group be consulted before destroying any records.

15.2.0 Scope


15.2.1 The company will record and maintain all necessary forms and documentation as they pertain to our safety program, as well as all record of injuries and illnesses according to law.

15.3.0 Definitions

15.3.1 None.

15.4.0 Responsibilities

15.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

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15.5.0 Process

15.5.1 Accident and Injury Reports

15.5.1.1 This includes any incidents involving personal injury to an employee or damage to company property.

15.5.1.2 If you are involved in an automobile accident, we require that you:

15.5.1.2.1 Obtain all information relating to the accident in a professional manner, including the names and addresses of any witnesses

15.5.1.2.2 Do not negotiate the settlement of any claim, promise payment for any injury or damage, or admit liability


15.5.1.2.3 You must complete a written report for all accidents and injuries as soon as possible. Any damage to your vehicle, no matter how slight, must be noted on the accident report.

15.5.1.3 It is a requirement that each project knows and understands the specific recordkeeping requirement for the State, Province, County or facility that they are working in. For help with research and compliance regarding specific requirements, contact your District, Corporate Safety Department or Corporate Records Retention Department.

NOTE: Incidents in this context could include occurrences of injury, illness, fire, explosion, catastrophe, spill, collapse and any similar event that results in or could have resulted in significant personal injury to an employee or in damage to buildings, equipment or property.

6.0 References

6.1 None.

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16	Fatigue Management	0	05/10/2022	

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16.1.0 Purpose

16.1.1 The purpose of this document is to identify the safety procedures and requirements for fatigue management.

16.2.0 Scope

16.2.1 This procedure is applicable to all jobsites.

16.3.0 Definitions

16.3.1 Acute Fatigue: Fatigue from causes (e.g., restricted sleep, sustained wakefulness, task demands) occurring within the past 24 hours.


16.3.2 Circadian Variation in Alertness and Performance: Increases and decreases in alertness and cognitive/motor functioning caused by human physiological processes (e.g., body temperature, release of hormones) that vary on an approximately 24-hour cycle.

16.3.3 Cumulative Fatigue: Increase in fatigue over consecutive sleep-wake periods resulting from inadequate rest.

16.4.0 Responsibilities

16.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure. Also, will address limiting work hours and/or controlling job rotation schedules to help control worker fatigue/exhaustion.

16.5.0 Process

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16.5.1 General

16.5.1.1 A fatigue management procedure shall be provided to ensure all employees are attentive and alert to perform required tasks and duties.

16.5.2 Education and Training

16.5.2.1 Provide initial and recurring or annual education and training covering the causes, risks and potential consequences of fatigue. The material must cover the following elements:

16.5.2.1.1 Risks of fatigue impairment in the work environment.

16.5.2.1.2 Contributors to worker fatigue including circadian variations, sleep disorders, stress and work cycle changes.

16.5.2.1.3 Recognizing signs of fatigue and symptoms of sleep disorders.

16.5.2.1.4 Reporting fatigue to supervisor.

16.5.2.1.5 Sleep and alertness strategies.


16.5.3 Fatigue Assessments

16.5.3.1 Fatigue assessments are applicable to all employees under the following conditions. Work tasks to control fatigue need to be assessed:

16.5.3.1.1 For-cause: A fatigue assessment must be conducted in response to an observed condition of impaired individual alertness creating a reasonable suspicion that an individual is not fit to safely perform his or her duties.

16.5.3.1.2 Self-declaration: A fatigue assessment is to be conducted in response to an individual announcing to his or her supervisor that he or she is not fit to perform his or her duties safely.

16.5.3.1.3 Post-event: A fatigue assessment will be conducted in response to events that to be believed were fatigue related and required a drug and alcohol test.

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16.5.3.1.3.1 Employees must not chronically use over-the counter or prescription drugs to increase mental alertness. Employees should be discouraged from taking any substance known to increase fatigue in that employee, including fatigue that sets in after the effects of the drug wear off.

16.5.3.1.4 Follow-up: A fatigue assessment may be conducted as a reassessment of a previous for- cause or self-declared fatigue evaluation.

16.5.3.2 The fatigue assessment must address the following factors:

16.5.3.2.1 Acute fatigue as defined above.

16.5.3.2.2 Cumulative fatigue as described above.

16.5.3.2.3 Circadian variations in alertness and performance.


16.5.3.3 The safety manager will conduct a Fatigue Assessment.

16.5.3.3.1 Assess the ability to include ergonomic equipment to improve workstation conditions.

16.5.3.4 Assessment results will be documented in the employee's file.

16.6.0 References

16.6.1 None.

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17.1.0 Purpose

17.1.1 The company has implemented this policy to help ensure that employees are physically fit and capable to perform the job duties assigned to them on projects sponsored by Carbon America.

17.2.0 Scope

17.2.1 This program is intended to provide guidance as to the physical attributes required to perform work on Carbon America sponsored projects.

17.3.0 Definitions

17.3.1 None.

17.4.0 Responsibilities

17.4.1 Employer


17.4.1.1 Ensuring all employees are physically fit and capable to perform the job duties assigned

17.4.1.2 Training personnel to perform assigned tasks safely

17.4.1.3 Responding quickly to eliminate workplace hazards

17.4.1.4 Ensuring all equipment is kept in good repair

17.4.1.5 Ensuring employees follow safe job procedures

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17.4.1.6 Reviewing job hazard analysis whenever there is a significant change to any element of the job or there has been an injury or illness

17.4.2 Supervisor

17.4.2.1 Establishing and maintaining safe and healthful working conditions

17.4.2.2 Monitoring employee work behaviors using behavior-based safety tools to determine if they should be removed from the worksite

17.4.2.3 Ensuring employees are not impaired by illness or medication use

17.4.2.4 Setting good examples, instructing their employees, making sure they fully understand and follow safe procedures

17.4.3 Employee

17.4.3.1 Notifying their supervisors if they are fatigued to the point of not being able to perform their duties safely

17.4.3.2 Ensuring they are physically and mentally fit to perform their job functions safely; they must take responsibility for their own safety as well.

17.4.3.3 Notifying their supervisor if they are taking prescription or over-the counter medications


17.4.3.4 No employee is expected to undertake a job until he/she has received instructions on how to do it properly and safely, and is authorized to perform the job

17.4.3.5 No employee should undertake a job that appears to be unsafe

17.4.3.6 Employees are to report to a superior or designated individual all unsafe conditions encountered during work

17.4.3.7 Personal protective equipment must be used when and where required, and properly maintained

17.5.0 Process

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17.5.1 Training

17.5.1.1 It is the determination of the Company to ensure all employees will be properly trained for their assigned task. Before any employee starts a new assigned task the employee must receive specific training. Examples might include:

17.5.1.1.1 Forklift operation

17.5.1.1.2 Instrumentation

17.5.1.1.3 Heavy equipment operation

17.5.1.1.4 Scaffold building, etc.

17.5.2 Drug and Alcohol Testing

17.5.2.1 It is the policy of the Company that drug and alcohol testing for preemployment, post-accident, or random will be conducted by only a laboratory certified by the U.S. Department of Health and Humans Services (HHS) under the National Laboratory Certification Program (NLCP).


17.5.3 Testing Procedures – Pre-Employment

17.5.3.1 Any offer of employment is deemed conditional upon the potential employee having a negative test result for drugs.

17.5.3.2 Pre-employment Drug testing shall be scheduled by the hiring supervisor directly with the third-party service provider immediately upon acceptance by the candidate of a conditional offer of employment. Testing should be done in a location most likely to ensure timely receipt of the results. Preemployment test results will be reported by the Medical Review Officer.

17.5.4 Testing Procedures – Employees

17.5.4.1 Any person who requires an employee to be tested for Alcohol or Drugs must tell the employee beforehand why the test is being requested. Any employee who refuses a request to be tested is in breach of this

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policy and may be subject to disciplinary action that may include termination of employment.

17.5.4.2 When testing for either Alcohol or Drugs is to occur, the Company will direct the employee to a sample collection site designated by a third-party service provider and provide transportation to the site. At the Company discretion, a qualified technician may be brought to the worksite to conduct the testing.

17.5.5 Safe Work Practices

17.5.5.1 It is the determination of the Company that all employees will be informed of the safe work practices and procedures in the workplace. Examples might include:

17.5.5.1.1 Lockout/Tagout

17.5.5.1.2 Process Safety Management

17.5.5.1.3 Asbestos Awareness

17.5.5.1.4 Electrical safety, etc.

17.5.6 Prescription and Over-the-Counter Medications


17.5.6.1 It is the policy of the Company that all employees must notify their supervisor when taking any prescription or over-the-counter medication that could impair their ability to work safely. Over-the Counter medications such as allergy or cold and flu medications could also impair one's ability to perform safely and must be reported to their supervisor.

17.5.7 Employee Monitoring

17.5.7.1 To determine if an employee should be removed from the work site, the Company will monitor employee behaviors and activities based on the Behavior Based Safety Policy.

17.6.0 References

17.6.1 None.

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17.7.0 Attachment

Fitness for Duty Certification

Fitness for duty means that an individual's physical, mental and emotional state which enables the employee to perform the essential tasks of his or her work assignment in a manner which does NOT threaten the safety or health of oneself, co-workers, property, or the public at large.

Physical Requirements:

- Able to climb scaffolds and/or 40 feet of stairs and work from aerial lifts if required
 - Able to work in elevated temperature environments.
 - Possess the ability to lift 25 percent of personal body weight, not to exceed 50 pounds.
 - Ability to work in physically restricted and confined areas.
 - Able to walk to and from the worksite without assistance.
 - Other requirements as specifically requested to include and not limited to: Work in respiratory protection or other personal protective equipment (PPE) as required by owner or contractor's safety/medical guidelines.
 - Stand, walks, twist, reach, grasp, push, pull, climb, crouch, bend, stoop, kneel and crawl
- as required to access and perform work typically encountered in an industrial maintenance and construction environment.
- Additional physical requirements may be needed for specific job scope.


By signing I verify that I am able to meet these requirements:

Print Name:

Signature:

Phone Number.

Date:

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18	Safe Process	0	05/10/2022	

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05/10/2022	New Safety Manual	Hinz

18.1.0 Purpose

18.1.1 To describe the elements of the Company's Safe Process and the expectations required of key roles in the implementation and maintenance of the overall process.

18.2.0 Scope

18.2.1 This procedure is applicable to all jobsites.

18.3.0 Definitions

18.3.1 None.

18.4.0 Responsibilities


18.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

18.5.0 Process

18.5.1 Stop Work Policy

18.5.1.1 Stop work responsibility - Every employee has the responsibility and authority to stop work immediately, without fear of reprisal, when the employee believes:

18.5.1.1.1 The control of the health or safety risk is not clearly established or understood

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18.5.1.1.2 Conditions exist that pose a danger to the health and safety of workers or the public

18.5.1.1.3 Conditions exist, that if allowed to continue, could adversely affect the safe operation of, or could cause serious damage to, a facility

18.5.1.1.4 Conditions exist, that if allowed to continue, could result in the release of hazardous substances

18.5.1.2 Reporting unsafe conditions - All employees are expected to report any activity or condition which he/she believes is unsafe. Notification should be made to the supervisor or designee at the location where the activity or condition exists. Following notification, the responsible supervisor or management designee will resolve this issue. Follow these simple steps: stop, notify, correct, and resume.


18.5.1.3 Right to a safe workplace - It is the policy of the Company not to discriminate against any employee who reports a work-related fatality, injury, or illness, files a safety and health complaint, requests access to injury and illness records, or otherwise exercises any rights afforded by occupational safety and health laws. Any employee who reasonably believes that an activity or condition is unsafe is expected to stop or refuse work without fear of reprisal by management or coworkers and is entitled to have the safety concern addressed prior to participating in the work. No work will resume until all issues and concerns have been addressed.

18.5.1.4 Stop work resolution - If an employee or supervisor has a stop work issue that has not been resolved through the established procedures, immediately contact Company management.

18.5.1.5 All Stop Work reports will be reviewed by the project Safety Committee with a follow-up after a Stop Work Intervention has been initiated and closed.

18.5.1.6 All employees will be provided Stop Work Responsibility training before initial assignment.

18.5.2 Company's Safe Process Elements

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18.5.2.1 The Company Safe Process is made up of six core elements that are the foundation to our Safety Process:

18.5.2.1.1 Leadership defines our expectations to lead and support the processes.

18.5.2.1.2 Training outlines how we train and our expectations for training.

18.5.2.1.3 Employee Involvement provides opportunity for all employees to be engaged in our Company's Safe Processes through active participation.

18.5.2.1.4 Planning details the expectation that all employees have a role to play in planning the work activities.

18.5.2.1.5 Assessments define how we measure our overall Company's Safe Process.

18.5.2.1.6 Effective Solutions provide opportunity to identify system causes of incidents and the development of effective solutions to prevent recurrence.

18.5.3 Safe Element – Leadership

18.5.3.1 Management, at every level of the company, has a direct responsibility to provide a safe and healthy workplace for all employees.


18.5.3.2 Management shall ensure the Company's Safe Processes are implemented fully while providing an opportunity for continuous improvement in the processes.

18.5.3.3 Involvement and participation in the Company's Safe Processes will be measured and communicated to the organization.

18.5.3.4 Management will demonstrate visible Safety Leadership by:

18.5.3.4.1 Performing site walks

18.5.3.4.2 Identifying hazards

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18.5.3.4.3 Promptly correcting identified hazards and communicating results

18.5.3.5 Leadership in Incident Reviews

18.5.3.5.1 Supervisors and Managers shall use the Root Cause Analysis process as an opportunity to learn, and proactively encourage Near Miss and Incident Reporting.

18.5.3.5.2 Company Management shall review all investigations and ensure Effective Solutions were generated to prevent reoccurrence.

18.5.3.5.3 A monthly standard safety report will be used by the Company.

18.5.3.6 Tracking jobsite rates and trends of first aid accidents, with appropriate follow-up, is required on every project.

18.5.3.7 Recovery Plans must be considered by the Company Operations Manager for safety performance not meeting expectations.

18.5.4 Safe Element – Training

18.5.4.1 Employees at every Project will receive the prescribed Safety Training for their position.


18.5.4.1.1 Training shall be documented with an approved process by Corporate Training Department.

18.5.4.1.2 Training status, schedule and Training Plan shall be tracked, posted and readily available.

18.5.4.1.3 Training efforts will be supported by Corporate Training Department.

18.5.5 Safe Element - Employee Involvement

18.5.5.1 Every project shall implement and maintain a process or processes to assure that all employees are Involved in the Company's

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Safe process. Below are a few examples of what may be found on our projects.

18.5.5.1.1 Safety Committee's and Safety Walks- Getting the craft employees involved to see what the site management is looking at on the project.

18.5.5.1.2 Site Orientations- A great way to involve site craft employees to talk to the incoming craft employees about site conditions seen through the eyes of our craft personnel.

18.5.5.1.3 Stop Work Responsibility- A program designed to let all employees know they have the responsibility to stop work if they see someone doing something that may get them or someone else injured.

18.5.5.1.4 Safety Rodeo's- A process to let the craft choose the topics that are relevant to them and to lead the discussion of those topics.

18.5.5.1.5 Planning Process- Involving the craft in the planning process will ensure they are knowledgeable of their duties.

18.5.6 Safe Element – Planning

18.5.6.1 One of the primary tools for preventing injuries and incidents of all kinds is planning each element of the work.


8.5.6.2 Job and task planning are primarily the responsibility of supervision.

18.5.6.3 JSA's shall be used for identifying hazards for work being performed and will be utilized by every crew on every project, on every task and as conditions change.

18.5.7 Safe Element – Assessments

18.5.7.1 We can't improve what is not tracked- Through our assessments we will learn where we need to improve.

18.5.8 Safe Element - Effective Solutions

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18.5.8.1 Effective Solutions to prevent further occurrence through the use of an investigation tool such as the Root Cause Analysis (RCA) will be required for every Recordable Injury, Lost Time Injury, Injury/Incident with a high potential for loss of life and serious Near Miss accident. The Project Manager, Company Operations Manager or a Corporate Safety Committee member may also request an RCA be completed if appropriate, in nonrecordable incidents or property damage.

18.5.9 Escalation of High Risk Safety Issues

18.5.9.1 Issues that a Project considered high risk could include any combination of:

18.5.9.1.1 Frequency of incidents

18.5.9.1.2 Safe Processes not meeting Company expectations

18.5.9.1.3 No completion or improvement of action items after a cold eye review or safety assessment

18.5.9.1.4 The core supervision on a project is new to the company in association with other factors

18.5.9.1.5 Employee or client complaints


18.5.9.1.6 Regulatory agency citations

18.5.9.1.7 Quality, productivity or schedule issues that could lead to safety concerns

18.5.9.1.8 Any other concern deemed significant enough to warrant Executive Management involvement

18.5.9.2 Process to escalate

18.5.9.2.1 Any time a Company Executive identifies a trend, process failure or other signs that could lead to incidents or injuries the executive shall review their concerns with the Corporate Safety Committee. Upon determination or notification, the committee, shall:

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18.5.9.2.1.1 As soon as practical, notify the CEO, Company Managers and Safety Manager of the concern and any data that supports the concern or problem area.

18.5.9.2.1.2 Notification may be verbal or via e-mail, as long as a response is requested with a meeting time established.

18.5.9.2.1.3 Call a meeting within one week to address the concerns.

18.5.9.3 Actions to be considered by Senior Executives:

18.5.9.3.1 A written, senior level, action plan to address the issues

18.5.9.3.2 A Senior Safety Professional Assessment to determine the current health of the Safe Process and recommendations to improve

18.5.9.3.3 A Company-supported Safety Recovery Plan with specific actions and timeline to address the identified issues

18.5.9.3.4 A weekly, biweekly or monthly call-in communication between the Company Operations Manager and the site management to address the status of the Assessment and/or Recovery Plans with the Executive Team


18.5.9.3.5 A written weekly progress report on the recovery status from Site Management

18.5.9.3.6 Site visit by Executive Management (typically after an Assessment or Recovery Plan is in place) to review the site conditions and reinforce commitment and Company expectations

18.5.9.4 Tracking and Follow up

18.5.9.4.1 Sites that are classified as High Risk are required to have regular follow up and tracking of actions to improve until completed and processes are fully implemented

18.5.9.4.2 After actions are completed and documented, company

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management will monitor continued performance via both Leading and Lagging Indicators, which can include Quarterly Assessments, incident trends, Observation processes and other indicators to the health of the Safe Processes.

18.5.9.4.3 After sufficient improvement based on the opinion of the Corporate Safety Committee with continued good Safety Performance in Leading and Lagging Indicators, the High Risk designation may be suspended.

18.5.10 Safety Recovery Plan

18.5.10.1 A Safety Recovery Plan (SRP) is a written plan that describes in detail how a project or organization will improve their Safe Processes to protect employees and eliminate injuries within the work environment. The SRP will describe detailed and specific actions to be taken by various levels of leadership to improve Safe Processes and/or site conditions that are effective and measurable.

18.5.10.2 Requirements to implement a Safety Recovery Plan (SRP):

18.5.10.2.1 Any time that Senior Management believes a Project is not meeting safety expectations a Safety Recovery Plan may be requested.


18.5.10.2.2 As a guideline, an SRP should be considered or requested when a Project/District:

18.5.10.2.2.1 Incurs at an Incident Rate above a 1.0 or LTIR over 0.5

18.5.10.2.2.2 Has two or more significant incidents occur within 3 months

18.5.10.2.2.3 An assessment shows low participation in proactive safety processes (PBS, Near Miss, JSA, etc.)

18.5.10.2.2.4 The Safe Assessment is inconsistent with incident trends (too high or too low) and/or is without a clear action plan

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18.5.10.2.2.5 Demonstrates ineffective implementation of the Safe Processes based on site assessments

18.5.10.2.3 Steps to a Recovery Plan

18.5.10.2.3.1 Clearly define what the apparent problem or concern is and why an SRP is being requested.

18.5.10.2.3.2 Require an analysis of the problem. This is called a “Needs Analysis,” in which the processes are reviewed, and defects or gaps are identified and measured. This is critical to developing an effective Corrective Action Plan.

18.5.10.2.3.3 Complete the elements of the report and assign specific actions, responsible parties, as well as timelines for completion.

18.5.10.2.3.4 SRPs are to be submitted to the Company Managers and Safety Manager, for review and comment.

18.5.10.2.3.5 SRP is approved by the Company Managers and Safety Manager and progress tracked and status reported monthly until completion.


18.5.10.2.3.6 Best Practices or Effective Solutions are communicated across Company via Corporate Safety Committee, and the Senior Safety Professionals or the Continuous Improvement processes.

18.5.10.3 Key Elements of an SRP

18.5.10.3.1 Problem statement and facts

18.5.10.3.1.1 Describe what the problem is based on, factual data and measurements of the Safe Processes

18.5.10.3.2 The Analysis should be formatted around the Safe Process for consistency.

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18.5.10.3.2.1 Leadership Findings

18.5.10.3.2.2 Training

18.5.10.3.2.3 Employee Involvement


18.5.10.3.2.4 Planning of Assessments

18.5.10.3.2.5 Effective Solutions

18.5.10.3.3 Detail the specific steps that will be taken in each area to improve the processes and assign responsible persons, and a timeline for the completion of the actions.

18.6.0 References

18.6.1 None.

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19.1.0 Purpose

19.1.1 The company has implemented this policy to maintain ill or injured employees on the job and to return individuals with a disability to work soon as possible in order to best serve the employees that have a disability and to minimize liability and workers' compensation losses.

19.1.2 This program will provide works with modified duties or other practicable accommodation to help the worker return to meaningful work as quickly as medically possible and within the treatment provider's work restrictions.

19.2.0 Scope

19.2.1 This program is intended to accommodate employees, to the extent practicable, with modified work responsibilities until they are able to return to regular duties. It also is designed to reintegrate employees into the workplace, in modified duty capacities, who are unable to return their regular duties.


19.3.0 Definitions

19.3.1 None.

19.4.0 Responsibilities

19.4.1 Employer

19.4.1.1 Maintain a list of available jobs for employees working under specific restrictions on modified duty.

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19.4.1.2 Prioritize assigning modified duties that allows the worker to maintain a connection with their pre-injury job.

19.4.1.3 Ensure the modified duties are consistent with the health care provider's medical restrictions. It is the workers responsibility to ensure the modified work continues to adhere to the medical restrictions.

19.5.0 Process

19.5.1 Training

19.5.1.1 Training on this policy will be given to new employees as part of orientation, and will be available to all employees upon request.

19.5.1.2 The Company will provide this policy, the applicable forms, and a contact log of local health care providers before work begins, and use them with the employee and physician to record the return to work process.

19.5.2 Modified Work Program


19.5.2.1 When a worker is cleared to return to work, they will be assigned to work from the list of available jobs that follows the physician's work restrictions that will be provided to supervisors to ensure the modified work meets the physician's orders.

19.5.2.2 Modified work assignments at the Company will adhere to the following principles:

19.5.2.2.1 Productive: The work provided must contribute to the Company's Success

19.5.2.2.2 Safe: Any modified work assignment must not aggravate or threaten to reinjure the employee or present additional hazard to any coworker

19.5.2.2.3 Redintegrative: Modified work must help the employee in a transition back to pre-injury employment as far as possible and will respond to changes in the functional abilities of the worker as

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determined by the physician

19.5.2.3 If The Designated Safety Coordinator cannot provide an alternative duty assignment due to a lack of work, a danger to the health, safety, and welfare of the employee or fellow employees, or due to a legal restrictions preventing such an alternative duty assignment, it will be the responsibility of the employing department to provide alternative duty assignments.

19.5.2.4 The Company will make all appropriate accommodations to support an employee returning to modified duty work. These accommodations may include:

19.5.2.4.1 Shortened hours

19.5.2.4.2 More frequent breaks

19.5.2.4.3 Assistance from co-workers for specific tasks and sharing work Responsibilities


19.5.2.4.4 Workplace modifications and devices to assist in work

19.5.2.4.5 Temporary assignment changes and special project work

19.5.2.5 Employees who are offered temporary alternative duty assignments are expected to report for duty and to fulfill their alternative duty assignment during the period of time they are temporarily disabled as they would their regular position.

19.5.2.6 Temporary alternative duty means all periods of time when the employee's physician has determined that the injured employee may return to some form of restricted duty.

19.5.2.7 Temporary alternative duty assignment(s) continue until released by the treating physician; until the injured employee reaches maximum medical improvement; until a permanent restriction is assigned. Temporary alternative duty takes into account and accommodates those restrictions, which have been placed upon the injured employee by their treating

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physician.

19.5.2.8 As restrictions or limitations change during the recovery process, the supervisor will continue to modify the work environment to accommodate the employee. During this alternative duty assignment, the employee will continue to receive their normal rate of pay for the hours worked.

19.5.2.9 Once an employee has reached maximum medical improvement, they are responsible to report this to their supervisor. Upon reaching maximum medical improvement, the employee's medical condition must be assessed as to their permanent medical restrictions and their ability to perform the duties of the position to which they were hired. If the injured employee cannot return to their regular position, the Human Resources Department must find available alternative employment within the company.

19.5.3 Injury Response Procedure


19.5.3.1 The following procedures will be used whenever there is a workplace incident resulting in an employee injury or illness:

19.5.3.1.1 Make sure that the injured worker has had the appropriate first aid/ medical treatment.

19.5.3.1.2 If injury requires further attention, the onsite supervisor will provide transportation to the local medical center either by driving them or calling an ambulance. If transported by ambulance on site supervisor is to follow employee to clinic. The supervisor will stay and advocate on behalf of employee with assistance from the safety coordinator until the employee is released or the responsible company representative directs otherwise.

19.5.3.1.3 The on-site supervisor will report incident to safety coordinator as soon as possible.

19.5.3.1.4 The safety coordinator must report the incident to the Corporate Safety Manager immediately.

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19.5.3.1.5 The supervisor will ensure that the Company Modified Work Information Package is taken to the medical center.

19.5.3.1.6 The safety c coordinator will ensure that the attending physician understands the requirements of the company's' modified return to work program.

19.5.3.1.7 The supervisor will complete the information package and have the attending physician fill out a modified work plan. The modified work plan will be dependent on the severity of the injuries and the recommendation of the attending doctor.

19.5.3.1.8 The safety coordinator will complete the Incident/Accident Form, the Employers Workers' Compensation report, and notify the Workers Compensation Board (WCB).

19.5.3.1.9 All reports will be delivered to the Corporate Safety Manager as soon as possible.


19.5.4 Modified Work Procedures

19.5.4.1 Provide Information Package

19.5.4.1.1 When an injury occurs that requires medical treatment, the on-site supervisor will accompany injured employee taking with them an Information Package. The on-site supervisor and injured employee will work to with physician to complete package. The completed package should be sent immediately to the safety coordinator. The safety coordinator will now become the case coordinator working closely with Supervisor until case is closed.

19.5.4.2 Create a File

19.5.4.2.1 The safety coordinator will create a Workers' Compensation Board (WCB) file that will include all documents related to the claim, and identify the WCB case manager. This file will be kept separate from personnel files. The safety coordinator will review the documents from the information package and will develop a

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return-to-work plan.

19.5.4.2.2 The safety coordinator will maintain contact with the WCB Case Manager, at least every two weeks to obtain and document the condition of the injured employee; what the treatment or rehabilitation plan is, the likely date of a return-to-work and, identify any work restrictions. The amount and type of benefits provided to the injured employee should also be discussed.

19.5.4.3 Employee Communication

19.5.4.3.1 The Company is committed to ensuring that all injury claims are effectively managed in order to promote an early and safe return to-work. Communications will be maintained regularly with the injured employee, their families, health care providers, and Worker's Compensation Board. Physical Demands Analysis and job descriptions are required for modified work positions within the company.


19.5.4.3.2 If the employee is unable to return-to-work, the safety coordinator will contact the employee, at least once a week, to obtain and record information about the general condition of the employee, the nature of the treatment, what doctor they are seeing, and the date of all appointments.

19.5.4.3.3 The following procedures will be used to facilitate and track communication between the Company, the local health care provider, and employees.

19.5.4.3.3.1 If the worker remains unable to return to work, even on a temporary basis, he or she must call in at least weekly to report medical status, and update contact information as appropriate.

19.5.4.3.3.2 If there is any change to medical condition, the worker must inform the worker's compensation coordinator accordingly.

19.5.4.3.3.3 As recovery continues, the worker and/or

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supervisor will notify appropriate management to changes regarding the transitional work assignment. Changes must only be made with a common understanding between the employer, the worker, the physician, and the insurance carrier. Under no circumstances may a worker perform work that is outside of the functional abilities established by the treating physician.

19.5.4.3.3.4 If the employee faces restrictions that result in his or her permanent inability to perform the essential functions of his or her job, the Americans with Disabilities Act (ADA) and applicable laws will be applied to determine suitability for employment.

19.5.4.4 Determine Fitness to Return-to-Work

19.5.4.4.1 Prior to any return-to-work, whether to regular job duties or to modified work, the safety coordinator will obtain medical clearance from the treating physician.

19.5.4.5 Make Offer of Modified Work

19.5.4.5.1 The Company will present a written offer of modified work to the employee. This offer will state the following information (See Modified Work Offer Form):


19.5.4.5.1.1 Specific job duties to be performed

19.5.4.5.1.2 Pay rate - This will be the same rate of pay as their accident employment

19.5.4.5.1.3 Hours of employment

19.5.4.5.1.4 Length of placement - This will be stated and made clear to the employee

19.5.4.5.1.5 The offer will be signed by the employee and the supervisor, and will be forwarded to the WCB immediately

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19.5.4.6 Complete Performance Limits Agreement (Forms Section)

19.5.4.6.1 Employees must agree to perform duties within documented limits and follow physician orders.

19.5.4.7 Refusal of Offer

19.5.4.7.1 Any refusal by an employee to participate in the modified work program will be dealt with immediately. The safety coordinator will interview the employee, record the reasons for not participating, and inform the WC Case Manager immediately.

19.5.4.8 Monitor Return-to-Work


19.5.4.8.1 When an employee returns to work, whether on regular or on modified duties, the supervisor and the Case Coordinator will monitor the progress of the employee, and address any concerns immediately. This ensures that any problems or concerns that may arise can be addressed immediately. The safety coordinator is to follow-up daily during the first week of the return-to-work. This follow-up period can be increased depending on the extent of the injury and projected recovery date. Keep notes on any contact made with the employee during this time. Employees on modified work must follow all physician restrictions and or guidelines.

19.5.4.9 Return to Regular Duties

19.5.4.9.1 When medical clearance for return to regular duties is received, the Company will inform the WCB. The safety coordinator will continue to monitor the employee's return to regular duties.

19.5.4.10 Recordkeeping

19.5.4.10.1 The Company will maintain all written records: incident details; incident investigation records; injured employee communications on modified work; and where applicable, Workers Compensation and medical records.

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19.5.4.10.2 The Company will keep all forms and medical records of injured employees confidential in a locked file and only provide records when necessary.

19.5.5 FORMS

19.5.5.1 In order to ensure proper documentation of the Modified and Safe Return to Work program, the forms included in the company's' information package are defined and included here.

19.5.5.2 These forms may be duplicated for future use. The forms included in the package are:

19.5.5.2.1 First Aid Record form

19.5.5.2.2 Contact Log

19.5.5.2.3 Physicians Information Package

19.5.5.2.4 Physicians Modified Work form

19.5.5.2.5 Return to Work Plan

19.5.5.2.6 Modified Work Offer

19.5.5.2.7 Performance Limits Agreement


19.5.5.2.8 Modified Duty Agreement

19.5.5.2.9 Return to Work Progress Report

19.5.5.2.10 Return to Work Closure/Evaluation Report

19.6.0 References

19.6.1 None.

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1.0 Policy Statement

1.0.1 It is the policy of Carbon America, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

1.0.2 Carbon America will achieve the goal of providing a reasonable safe workplace and meet compliance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) through implementation of the elements provided within this written Hazard Communication Program.

1.1 Purpose

1.1.1 Prevent chemical related illness and injuries.


1.1.2 Ensure hazards with chemicals used at the jobsite or workplace are clearly communicated.

1.1.3 Effectively plan for non-routine use of hazardous chemicals.

1.1.4 Provide model for adequate Hazard Communication Training.

1.1.5 To inform employees of the contents of the OSHA Hazard Communication Program (29 CFR 1910.1200).

1.2 References

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1.2.1 29 CFR 1910.1200 Hazard Communications

1.3 General Requirements

1.4 Application

1.4.1 This written Hazard Communication Program applies to all employees involved in work operations with actual or potential exposure to hazardous chemicals and substances.

1.4.2 Sub-contractors shall also comply with requirements of this written program OR have their own company written program meeting at least the minimum requirements of the OSHA Hazard Communication standard (29 CFR 1910.1200).

1.5 Hazard Identification


1.5.1 A chemical inventory is maintained for each subsidiary and/or division of Carbon America. This chemical inventory is a list of the hazardous chemicals or products known to be present in the respective workplaces.

1.5.2 Carbon America relies on the hazard evaluation information provided by the manufacturer(s) of the hazardous chemicals and products identified on the manufacturer's Safety Data Sheet (SDS).

1.5.3 Non-Routine Tasks (i.e. cleaning tanks, confined space entry, etc.). Non-routine tasks will be evaluated on a case-by-case basis.

1.5.4 All non-routine tasks will be evaluated before the task commences to determine all hazards present. An evaluation will be conducted by the direct supervisor. The supervisor may require assistance from the Safety Director or field employees as needed.

1.5.5 Once the hazard determination is made, the direct supervisor and management will determine the necessary precautions needed to remove, eliminate or protect from the hazard (example: use of personal protective equipment) to safeguard the affected employees. In addition, management will provide specific safety training for affected employees and will document the training on an annual basis.

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1.6 Safety Data Sheets (SDS)

1.6.1 The Company will maintain or have access to an SDS for every hazardous chemical or product known to be present in the workplace.

1.6.2 Each SDS shall be in English (but may also be in other languages) and contain at least the following information:

1.6.2.1 Identification

1.6.2.2 Hazards(s) Identification

1.6.2.3 Composition/information on Ingredients

1.6.2.4 First-Aid Measures

1.6.2.5 Fire Fighting Measures

1.6.2.6 Accidental Release Measures

1.6.2.7 Handling and Storage

1.6.2.8 Exposure Controls/Personal Protection

1.6.2.9 Physical and Chemical Properties

1.6.2.10 Stability and Reactivity

1.6.2.11 Toxicological Information


1.6.2.12 Ecological information

1.6.2.13 Disposal Considerations

1.6.2.14 Transport Information

1.6.2.15 Regulatory Information

1.6.2.16 Other Information, Including Date of Preparation or Last Revision

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1.6.3 The Safety Data Sheets shall be readily available in the following locations;

1.6.3.1 Field Trailer Locations

1.6.3.2 Shop Locations

1.6.3.3 Office Locations

1.6.3.4 A master SDS list, copy of SDS(s), and replacement SDS can be obtained from the Safety Department by calling the Safety Department and your local Safety Representative.

1.6.4 SDS will be obtained from the manufacturer or the product distributor. The Safety Department periodically audits the field SDS binders to ensure that the binders maintain the most current SDS for chemicals found in the workplace at least annually. These audits include site audits and communication with division management and supervision.

1.6.5 As new chemicals are purchased/used in the workplace, the respective inventory lists will be updated and a search will verify that an SDS is available.

1.6.6 Newly acquired SDS sheets will be distributed to all affected employees.

1.7 Labels and other forms of warning

1.7.1 The chemical manufacturer, importer or distributor shall ensure that each container is labeled, marked or tagged with the following information:


1.7.1.1 Name, Address and Telephone Number

1.7.1.2 Product Identifier

1.7.1.3 Signal Word

1.7.1.4 Hazard Statement(s)

1.7.1.5 Precautionary Statement(s)

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1.7.1.6 Pictogram(s)

1.7.2 Carbon America will rely on the container labels provided by the manufacturer (provided that they meet minimum requirements as set forth by this written program).

1.7.3 Container labels shall not be removed or defaced. Containers shall be re-labeled if they become illegible.

1.7.4 If a hazardous chemical is transferred from a large container (i.e. 55-gal drum) to a secondary container (i.e. spray bottle), and the secondary container is not labeled by the manufacturer, a label containing the minimum required information as outlined in section 17.7.5 shall be attached.

1.7.5 The Hazard Material Information System®, or the NFPA diamond may be used to label secondary containers. Each system includes a hazard ranking that can be determined using the chemical or product's SDS – contact the Safety Department for assistance. (this will phase out eventually)

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1.7.6 Container labeling will be frequently audited at each workplace by company supervision (i.e. foreman, supervisor) and periodically audited by a representative of the Safety Department.

1.7.7 All hazardous chemical containers will be evaluated to ensure correct labeling is attached when shipment is received.

1.8 Training

1.8.1 All employees who work with or are potentially exposed to hazardous chemicals will receive initial training and any necessary retraining on the Hazard Communication Standard and the safe use of the hazardous chemicals found at their workplace. When a new hazard is introduced or a non-routine task identified, additional training will be provided.

1.8.2 Training Content.

1.8.2.1 The goal is to ensure employee comprehension and understanding including being aware that they are exposed to hazardous chemicals, knowing how to read and use labels and SDSs, and appropriately follow the associated protective measures. A program that uses audiovisual materials, classroom type training, or handouts will be utilized.

1.8.2.2 Summary of the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200);

1.8.2.3 Operations in the workplace that contain hazardous chemicals;

1.8.2.4 The location and availability of this written Hazard Communication Program, including the chemical inventory list(s), and corresponding Safety Data Sheets;


1.8.2.5 Detailed description of the labeling system (HMIS®);

1.8.2.6 Chemical and physical properties;

1.8.2.7 Physical and Health hazards;

1.8.2.8 Signs and symptoms of exposure; and,

1.8.2.9 Procedures to protect against the associated hazards.

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1.9 Training is provided at initial hire by the employee's immediate supervisor or a member of the Safety Department, and is reinforced intermittently during weekly safety talks.

1.10 The Safety Department will review employee training records and advise supervisors on training or retraining needs.

1.11 Annual safety training is conducted, during which employees are offered the opportunity to ask questions about any safety-related issues including Hazard Communication.

1.12 Multi-employer Workplace


1.12.1 When workers of other employers (whether affiliated with the Company, or not) will be working at the workplace, the following shall occur:

1.12.1.1 Provide other employer(s) with SDSs of chemical(s) used at the jobsite to which their employees may be exposed; and

1.12.1.2 Provide labeling and/or emergency and precautionary information regarding the chemical(s).

1.13 Additional Information

1.13.1 All employees, or their designated representatives, can obtain further information on this written program, the hazard communication standard, applicable SDSs, and chemical inventory lists from the Safety Department upon request.

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2.1.0 Policy Statement


- 2.1.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 2.1.2** Carbon America empowers all employees to take action and STOP WORK whenever unsafe conditions are present or possible. Each team member is accountable for his or her own safety and health as well as the safety and health of all others around them. **Safety - it's our culture.**

2.2.0 Purpose

- 2.2.1** To establish a proactive approach to incident prevention that focuses on "Safe Behaviors" and "At Risk Behaviors"- recognize and strengthen the safety culture by recognizing "Safe Behaviors" and eliminating "At Risk Behaviors"
- 2.2.2** The goal of the Safety Observations is to reduce the occurrence of "At Risk Behaviors" by modifying the behavior through observation, feedback, and positive interventions aimed at developing "Safe Behaviors".

2.3.0 General Requirements

2.3.1 Application

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2.3.1.1 This Safety Observation Program applies to all Carbon America employees.

2.3.1.2 Sub-contractors shall also comply with requirements of this Observation Program OR have their own company written program meeting at least the minimum requirements of this program.

2.4.0 Responsibilities

2.4.1 Managers and Directors

2.4.1.1 Managers must foster a culture that values prevention of events.

2.4.1.2 Managers must strengthen the integrity of defenses to prevent or mitigate the consequences.

2.4.1.3 Managers must preclude the development of error-likely situations.

2.4.1.4 Managers must create a learning environment that promotes continuous improvement.

2.4.2 Project Supervision and Employees

2.4.2.1 Recognize when and where at-risk behaviors occur.


2.4.2.2 Recognize unsafe conditions.

2.4.2.3 Recognize peer attitudes which may affect safety.

2.4.2.4 Take action to change at risk day-to-day behaviors and to prevent or mitigate error likely situations.

2.4.2.5 Have conversations about safe and at-risk behaviors that inspire and compel other employees to change their behaviors.

2.4.2.6 Take action to ensure unsafe conditions are timely corrected.

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2.5.0 Safety Observation Process

2.5.1 Employee Observations

- 2.5.1.1 All employees are subject to observations at any time.
- 2.5.1.2 Observations will be conducted by Carbon America employees and/or designees (third party professionals, client representatives, etc.) who meet the following requirements:
 - 2.5.1.3 Are experienced / knowledgeable of the safe work practices associated with the work activity.
 - 2.5.1.4 Have been trained in the Behavior Based Safety concepts as described in this program.
 - 2.5.1.5 Observations will be conducted in a professional and courteous manner.
 - 2.5.1.6 Observer(s) will approach the worker(s), introduce him/herself and explain that they will be observing the work activity.
 - 2.5.1.7 The observer(s) will explain to the worker(s) the basic Safety Observation process.
 - 2.5.1.8 The observer will complete the Safety Observation Checklist on Procore.

2.5.2 Intervention and Feedback


- 2.5.2.1 Deliver interventions with consideration of internal feelings and attitudes. Interventions can be pleasant or unpleasant, desirable or undesirable. The way the intervention and feedback process (coaching) can - increase or decrease feelings of empowerment, build or destroy trust, or cultivate or stifle a sense of teamwork or belonging.
 - 2.5.2.2 When an observation is complete, the observer(s) will meet with the observed to discuss the findings.
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- 2.5.2.2.1 First, the observer(s) will acknowledge the safe behavior witnessed and reinforce them with praise or reward.
- 2.5.2.2.2 Second the observer(s) will identify and describe any at-risk behavior(s) observed.
- 2.5.2.2.3 Third, the observer(s) will solicit an explanation as to what prompted the at-risk behavior(s). Note: The observer(s) must explain to the workers that names can remain anonymous, the intent is not to assign reprimands, and that the purpose of the discussion is to identify the root cause to the behaviors and together identify solutions to correct them.
- 2.5.2.2.4 Fourth, the observer(s) will explain the negative consequences associated with the at-risk behaviors. Additionally, the observer(s) will provide coaching on the targeted behavior.
- 2.5.2.2.5 Last, the observer(s) will repeat the positive consequences associated with the safe behaviors.
- 2.5.2.3 The observer(s) will complete the Safety Observation Checklist and note comments and discussions.
- 2.5.2.4 Completed Safety Observations will be forwarded to the project supervisors.

2.6.0 Training

- 2.6.1 All employees will be trained on the following elements:
 - 2.6.2 How to conduct an observation.
 - 2.6.3 What are “Safe” and “At-Risk” behaviors and what do they mean.
 - 2.6.4 How to complete the Safety Observation.
 - 2.6.5 How to give feedback after an observation and how to accept coaching from your peers.
-

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2.6.6 The contents of this written program.

2.7.0 Data Collection and Trend Analysis

2.7.1 Data Collection

2.7.1.1 All observations will be documented on the Safety Observation; observations will be submitted into Procore which will tally all scores to identify strengths (top “safe” categories) and areas for improvement (top “at-risk” categories).

2.7.1.2 The project Supervisor will forward the Safety Observations to the safety department where the scores will be added to company totals; total scores will be tallied where divisional strengths (top “safe” categories) and areas for improvement (top “at-risk” categories).

2.7.1.3 Trend Analysis using Accident Tracker.

2.7.1.4 The data collected during the observations will be used to identify:

2.7.1.4.1 Target Behavior. Trend analysis will indicate which behavior to target for intervention.

2.7.1.4.2 Intervention Focus. Focus efforts on the targeted behavior and measure the impact.


2.7.1.4.3 Formal Continuous Improvement Action Plans.

2.7.1.5 Continuous Improvement Action Plans will include:

2.7.1.5.1 Evaluation of unsafe behaviors from trend analysis and identify focus priorities.


2.7.1.5.2 Designate responsible persons and timeframes for goal completion.

2.7.1.5.3 Management involvement in benchmarking and status updates.

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2.8.0 Definitions

- 2.8.1 Behavior – The things that people actually do, not the things that they say they believe in.
- 2.8.2 “Safe Behavior” – the correct and safe way to perform any task or job; the right way to do things.
- 2.8.3 “At-Risk Behavior” – any action having an uncertain and potentially harmful outcome.

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3.1. PURPOSE

3.1.1 This document provides all Carbon America projects the guidelines, expectations, and resources associated with the application of fundamental Industrial Hygiene (IH) principles and practices; the anticipation, recognition, evaluation, and control of workplace hazards.

3.2. SCOPE

3.2.1. This document applies to all Carbon America projects, but shall be used in conjunction with project specific Industrial Hygiene plans to address in detail the specific hazards associated with each Carbon America project.

3.2.2. This document may not include reference to all hazards associated with projects or to all specific regulatory requirements, contractual obligations, or state/local laws that may pertain to specific hazardous substances, work environments, and/or work practices.


3.3. RESPONSIBILITIES

3.3.1. Corporate Industrial Hygienist / Safety Manager

3.3.1.1. Provide projects the information, training, and mentoring to properly apply the fundamental principles and practices of industrial hygiene to their worksite/workscape.

3.3.1.2. Review and update applicable safety manual policies, procedures, references, and resources as needed.

3.3.2. Site Management

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3.3.2.1. Participate in pre-job planning, work packages, and task package development to assure that the guidance of this procedure is implemented at the project.

3.3.2.2. Ensure the proper tools and equipment to perform workplace hazard assessment, exposure sampling, and verification of controls are onsite.

3.3.2.3. Implement and oversee policy compliance

3.3.3. Safety Manager

3.3.3.1. Coordinate with site management and ensure applicable policies are being implemented.

3.3.3.2. Ensure the tools and equipment needed to perform workplace hazard assessments, exposure sampling, and verification of controls are properly used, stored, and maintained.

3.3.3.3. Obtain the guidance, training, and mentoring needed from corporate resources to successfully anticipate, recognize, evaluate, and control workplace hazards at the project.


3.4. PROCEDURES

3.4.1. Site Specific Industrial Hygiene Plan Requirement

3.4.1.1. Prior to the commencement of work, as applicable, a specific review of the work scope and task shall be conducted and a monitoring/mitigation plan developed that addresses the anticipated hazards, recognizes the potential exposure groups, the evaluation of the hazards, and the control of those hazards for the project.

3.4.1.2. The plan shall incorporate the Carbon America policies as appropriate, owner, federal, state, and other regulatory agencies relative to the scope of work.

3.4.1.3. This plan shall address the overall administration of work activities, industrial hygiene practices, safety requirements, environmental standards, training requirements, monitoring and sampling procedures, emergency procedures, and protocols.

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3.4.1.4. Consideration shall also be given to subcontractors performing work under Keg's direction, and as applicable projects shall consider either flowing down Carbon America requirements OR they shall ensure that contractors have processes in place to similarly anticipate, recognize, evaluate, and control hazards for their work scope.

3.4.2. Anticipation of Hazards

3.4.2.1. Potential workplace hazards that may be reasonably ANTICIPATED for the work scope. ANTICIPATION means what is/are the hazard(s) of concern. These hazards fall into four main categories.

3.4.2.2. Physical Hazards—include things like noise, vibration, dusts/fibers from processes like sandblasting, insulation work, or environment, coal dust, heat/cold, UV radiation/light, improper lighting, etc..


3.4.2.3. Biological Hazards—include things like bloodborne pathogens, insects or vermin disease vectors, poisonous plants or animals, bacteria or viruses such as legionella or hanta. Legionella for example is a bacteria that can be found in water from chilling towers, HVAC systems, and sump areas.

3.4.2.4. Ergonomic/Physiological Hazards—may include hazards that overlap in other categories—includes things such as rotating or extended work shifts and circadian rhythm, material handling, repetitive motion injuries, heat and cold stress, consideration for work space access, etc..

3.4.2.5. Chemical Hazards—include things like weld fumes, organic vapors, paints, solvents, ammonia, hydrogen sulfide, radiation, acids or caustics, heavy metals, etc....The list below is an excerpt from OSHA 29 CFR 1926.55 and OSHA 29 CFR 1926 subpart Z of hazardous and toxic chemicals. Carbon America has specific policies on the chemicals with a “*”.

3.4.3. Recognition of Hazards

3.4.3.1. Anticipated hazards should be evaluated further and pre-job planning shall recognize and address the specific work tasks, processes, and similar exposure groups that may be associated with the anticipated hazards.

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3.4.3.2. Recognition of hazards focuses on who is exposed, where are they exposed, how are they exposed, when are they exposed.

3.4.3.3. Similar Exposure Groups, or SEGs, are designated based on the similar exposures the members of that group are expected to have. This may be as simple as selecting a given craft at a project and discussing the hazards associated with the craft. Examples of craft to consider as similar exposure groups include:

Capitol Personnel Maintenance Electricians Pipefitter Mechanics

Administrative Personnel Equipment Operators and Riggers Painters

Boilermakers Helpers Pipefitters

Civil—Laborers HVAC Technicians Plumbers

Civil—Equipment Operators Iron Workers Quality Control

Civil—Carpenters IT Personnel Rebar Crews

Civil—Concrete Work Mechanics Warehouse/Distribution

Chemical Loaders Pipe Fabricators Any other exposure groups

3.4.3.4. SEGs may also be grouped by hazard, such as grouping exposures to weld fume and hexavalent chromium by the three digit WOI. (See Hexavalent Chrome Procedure.)


3.4.3.5. It may be simplest to utilize the basic sample planning spreadsheet found on the corporate Industrial Hygiene SharePoint site to create a matrix of anticipated hazards and similar exposure groups.

3.4.3.6. This evaluation shall be part of the project's industrial hygiene plan and may also be addressed in work packages and task packages.

Acrolein

Aniline

Arsine

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*Asbestos

Bromine

*Benzene

Carbon monoxide

*Cadmium

Dimethylaniline

Dimethyl sulfate

Hydrogen cyanide

Hydrogen fluoride

Hydrogen selenide

*Hexavalent chrome

*Hydrogen sulfide

Hydrazine

*Lead

Methanol

Methyl bromide


Methyl chloride

Methylene biphenyl isocyanate

Nickel carbonyl

Nitrobenzene

Nitrogen oxides

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Nitro methane

Ozone

Phosgene

Phosphorus

Stibine

*Radioactive gases

Sulfur chloride

Boron trifluoride

Toluene diisocyanate

Vinyl chloride

Nitroglycerin

Projects should consult with the corporate industrial hygienist and district safety managers for guidance on this process as needed.


3.4.4. Evaluation of Hazards

3.4.4.1. Evaluation of hazards is required as part of pre-job planning and project execution. It further quantifies the hazards anticipated and the exposure groups recognized to determine what, if any, risk or exposure exists. Evaluation of hazards encompasses:

3.4.4.1.1. Risk assessment based on frequency of tasks, duration of exposures, other work to be performed,

3.4.4.1.2. Further review of applicable regulatory standards for specific sampling requirements and methods, required Personal Protective Equipment (PPE), and substance specific programs.

3.4.4.1.3. Review of historic company and industry exposure data to identify the most likely initial exposures and determine PPE and

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work practices needed.

3.4.4.1.4. Developing a plan for worker exposure sampling and conducting worker exposure sampling.

3.4.4.1.5. Coordinating with the corporate industrial hygienist, district safety managers, and analytical lab to obtain any needed sampling media and analytical services.

3.4.4.1.6. Evaluation of controls implemented for effectiveness and to document reduced exposures.

3.4.4.2. Projects shall plan for and have the tools available to perform hazard evaluations. Projects are expected to self-perform the majority of their worker exposure sampling under the guidance and direction of the corporate industrial hygienist and district safety managers. A further discussion of worker exposure sampling is included in sections below.

3.4.4.3. Any data collected/generated as part of evaluation of hazards and controls shall be documented at the project utilizing the forms and resources found on the corporate industrial hygiene SharePoint site.

3.4.5. Control of Hazards

3.4.5.1. Where hazards have been anticipated, recognized, and evaluated the projects shall plan for appropriate controls to mitigate those hazards. The project's industrial hygiene plan shall address to some degree the controls that the project plans on utilizing for the specific hazards present in their work scope.


3.4.5.2. Controls shall be considered implemented with consideration given first to specific regulatory requirements, and then to company or client procedures. Controls shall be implemented in this order:

3.4.5.2.1. Substitution/elimination of hazards

3.4.5.2.2. Engineered controls

3.4.5.2.3. Administrative controls and work practices

3.4.5.2.4. Personal protective equipment

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3.4.5.3. All controls implemented shall be evaluated to ensure that they are effective in protecting workers.

3.4.6. Evaluation of Hazards : Monitoring Equipment

3.4.6.1. Equipment utilized at projects shall have the appropriate approvals for the anticipated conditions of use, i.e. intrinsic safety, MSHA approvals, moisture or dust ratings, etc..

3.4.6.2. It is anticipated that most projects will need equipment to assess:

3.4.6.2.1. Multi-Gas Monitors—configured for the recognized present or potential atmospheric gases and confined space entry conditions. Typically can be configured for:

3.4.6.2.1.1. Oxygen


3.4.6.2.1.2. Lower Explosive Limit (LEL)—must be correct for MSHA vs. OSHA work sites

3.4.6.2.1.3. Toxic Gases such as hydrogen sulfide, sulfur dioxide, nitrogen dioxide, ammonia, chlorine, carbon monoxide, carbon dioxide, etc.. SENSOR availability varies by equipment manufacturer.

3.4.6.2.2. Photo-Ionizing-Detector (PID)—utilized for the detection and quantification of volatile organic compounds. Required for projects where exposures to compounds such as benzene, toluene, ethyl benzene, xylene or solvents like styrene, Methyl Ethyl Ketone (MEK), etc. may be encountered.

3.4.6.2.3. Sound Level Meter, Worker Noise Dosimeters, and Calibrator(s)—for work place sound mapping, and occupational noise exposure monitoring meeting regulatory requirements.

3.4.6.2.4. Employee air sampling pumps and primary calibration standard—such as a BIOS Dry Calibrator—to perform employee exposure monitoring for airborne hazards as part of baseline exposure determination and verification of controls as directed by regulatory requirements.

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3.4.6.2.5. Light meter—to ensure appropriate illumination levels per OSHA 29 CFR 1926.56; ANSI A11.1-1965, R1970 practices of industrial lighting or the newest revision; and/or company or client requirements.

3.4.6.2.6. Anemometer—to verify ventilation controls, determine airflow in confined and restricted spaces, etc.. Must be able to read in Feet Per Minute (FPM).

3.4.6.2.7. Environmental Monitor/WBGT—often combined with pocket anemometers the unit can provide data on temperature, atmospheric pressure, relative humidity, dew point, and worker thermal stress conditions. Required for verification of PPE controls, worker heat and cold stress evaluations, and some employee exposure sampling for gases and vapors.

3.4.6.2.8. Appropriate calibration gases, tubing, couplings, maintenance supplies, storage space, batteries, and other supplies for the equipment.

3.4.6.3. Projects shall ensure that the equipment needed to evaluate hazards are available at the project through a combination of:


3.4.6.3.1. Purchasing equipment and supplies under the direction of the corporate industrial hygienist or district safety managers.

3.4.6.3.2. Renting an appropriate number of industrial hygiene equipment kits from the equipment department and purchasing support supplies.

3.4.6.3.3. The kits are sized for projects with less than 300 employees and contain the minimum equipment needed for a project to perform sampling for airborne hazards, occupational noise, ventilation assessments, heat/cold stress monitoring, and environmental parameters such as temperature, atmospheric pressure, relative humidity, etc..

3.4.6.3.4. The kits do not have gas detection equipment or PID's which need to be considered separately by projects.

3.4.6.3.5. Renting an appropriate number of multi gas detection

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equipment, or PID's from the equipment department and purchasing support supplies.

3.4.6.3.6. As needed, renting equipment from third party vendors.

3.4.6.4. Any company employee using monitoring equipment must be trained in the proper use of the equipment and be competent to perform the sampling. Projects shall ensure that employees performing these services are trained and qualified to do so and shall identify the employees in the appropriate site specific documents.

3.4.6.5. Training and qualification shall be documented and readily available and shall be appropriate for the level of use/responsibility. For example attendants and entrants for confined spaces using multi gas meters need to know how to use the instruments and understand the alarms—but may not need to know all aspects of maintenance or calibration.


3.4.6.6. Projects shall ensure that the site specific industrial hygiene plan identifies the qualified person(s) who will calibrate, operate, and maintain monitoring instruments. They shall also ensure measures are in place such that:

3.4.6.6.1. Work involving potential exposure to hazardous materials will not be performed unless properly maintained and calibrated monitoring instruments are available for use.

4.6.7. Instruments will be calibrated and maintained in accordance with manufacturer's recommendations and National Institute of Standards and Technology (NIST) traceable calibration certificates are requested from third parties.

3.4.6.7.1. Some instruments such as noise sampling equipment or personal sampling pumps must be calibrated before and after each use with a primary calibration standard. These primary calibration standards require annual calibration from a third party, such as the original equipment manufacture or vender.

3.4.6.7.2. Some instruments require both pre/post use calibrations AND annual or periodic calibration and servicing from a third party such as the original equipment manufacture or vendor.

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3.4.6.7.3. Some instruments, such as multi gas monitors and PID's require a pre use "bump" test to verify function and response against a known calibration gas standard. These often require periodic "calibration" using the same calibration gas. These calibrations shall be conducted by the projects according to the manufacture recommendations or a minimum of once every three months. These instruments shall be serviced by a third party at appropriate intervals as coordinated with the equipment department or designated by the project management.

3.4.6.7.4. Instruments with fixed service lives shall be replaced as needed.


3.4.6.7.5. Projects shall ensure that copies of instrument calibration records are maintained on site for all instrument calibrations. In some instances this data may be found on applicable industrial hygiene sampling forms.

3.4.6.8. All instruments shall be function checked before and after each use. Instruments that fail pre and post use inspections or calibrations shall be removed from service and shall be either repaired or replaced. Basic repair/maintenance of equipment is expected to be the responsibility of the project to the degree to which they are trained/competent with the equipment.

3.4.6.9. Projects shall determine appropriate methods to ensure that all monitoring equipment at a project, rented or purchased, shall be properly used, stored, maintained. This should include measures for accountability for the condition of the equipment, accessories, and supplies. Outside of anticipated "wear" on the equipment from normal conditions of use, projects should hold equipment users accountable for damage or loss of equipment as a result of misuse or carelessness.

3.4.7. Evaluation of Hazards : Laboratory Testing

3.4.7.1. In some instances the industrial hygiene sampling procedures require the use of the sampling equipment, such as the air pumps, in combination with specialized sampling media to assess worker exposures.

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3.4.7.1.1. Examples of such hazards include total dusts and respirable dusts such as silica or coal, weld fumes, hexavalent chromium, specific organic compounds, some gases and vapors.

3.4.7.2. Only an accredited and certified laboratory shall be used to supply sampling media and to perform analytical services.

3.4.7.3. Carbon America has established SGS Galson Labs as the preferred provider for industrial hygiene analytical services. This lab is accredited and certified to perform industrial hygiene analytical services. In addition they do have some industrial hygiene sampling equipment for rent/purchase as needed.

3.4.7.4. SGS Galson labs sample analysis guide, pricing, and resources can be found at their website www.galsonlabs.com. They can also be reached at 1-888-432-5227.

3.4.7.5. Galson Labs will provide the sampling media required to evaluate certain hazards to projects free of charge. The price of the media is incorporated in the sample analysis fee that the projects pay after analysis. Projects should coordinate with procurement to establish a purchase order and point of contact at the labs for requesting media and analysis.


3.4.7.6. The corporate industrial hygienist and district safety managers will assist projects in identifying the media needed to perform sampling based on their identified hazards in their project industrial hygiene plan.

3.4.7.7. Galson labs will send a sample analysis request form/Chain of Custody with the media that must be filled out and returned to the lab with the media to be analyzed. Projects shall also include a copy of field sampling notes, as applicable, with the forms.

3.4.8. Evaluation of Hazards : Results, Records, and Notification

3.4.8.1. Projects may expect that results will be received from the lab in 5-7 business days.

3.4.8.2. Samples that show exposures above the action limit or PEL (Permissible Exposure Limit) shall be reviewed by the district safety

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manager. In some cases, a CIH (Certified Industrial Hygienist) review may be necessary with additional follow up testing.

3.4.8.3. Projects should be prepared to implement any additional regulatory requirements based on sampling conducted—such as respiratory protection program, hearing conservation program, or medical monitoring associated with substance specific standards.

3.4.8.4. Records of the testing results and notification must be readily available onsite and made part of the employee file for retention of length of employment plus 30 years.

3.4.8.5. Projects shall assign an individual to enter all exposure sampling data into the project's exposure tracking spreadsheet. A blank spreadsheet can be found and downloaded on the corporate Industrial Hygiene SharePoint site. This data will eventually be merged into a corporate spreadsheet to summarize historic exposure trends.

3.4.8.6. The project should establish a method to store the collected industrial hygiene data and field sampling notes in an organized and controlled manner. The data should be available to regulatory bodies, project management, and employee representatives upon request.


3.4.8.7. Employees shall be notified in writing of all test results and the communication shall be documented. A template letter may be used, or projects may develop their own format—as specified in their site specific industrial hygiene plan. The time frame a project has to provide written notification varies by regulatory standard, but as a general rule of thumb projects should provide this notification within 5 days of determining the employee's exposure.

3.4.8.8. Notification letters shall at a minimum address:

3.4.8.8.1. The date of the sample

3.4.8.8.2. The purpose of the sample collection

3.4.8.8.3. The employee tasks performed, PPE, and other relevant information

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3.4.8.8.4. The results of the sample and comparison to the applicable regulatory Permissible Exposure Limits (PEL)

3.4.8.8.5. Where exposures exceed action limits or PELs the letter shall also address corrective measures to be implemented, or that were implemented to reduce exposures.

3.4.9. Evaluation : Third Party Industrial Hygiene Services

3.4.9.1. It is the expectation that many of the anticipated and recognized hazards may be evaluated by projects with the use of resources available and guidance from the corporate industrial hygienist and safety managers.

3.4.9.2. When needed, the company has the ability to contract with outside services to perform evaluations and sampling for toxics and hazards. Consultant services may be contracted as need to perform gap analysis for projects or other special conditions as warrant.


3.4.9.3. Before contracting outside services, projects must make a good faith effort to perform the hazard assessment and to identify hazards present. This information shall be supplied to the third party along with a copy of the projects industrial hygiene plan, applicable company procedures, and sampling forms.

3.4.9.4. Any contracted third party industrial hygiene services shall be approved by the district safety manager and their scope of work clearly identified to ensure that appropriate sampling is conducted and that the provider has appropriate experience and certifications to perform sampling.

3.4.10. Controls : Substitution and Engineered

3.4.10.1. This section discusses a few common engineered controls often utilized at Carbon America projects. Other examples of engineered controls may fall under multiple company procedures and regulatory requirements.

3.4.10.2. Substitution of process materials or work practices can greatly reduce worker exposures and should be discussed during project planning. This may require discussion with multiple disciplines including

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engineering and quality control. Examples of effective substitution include: selection of abrasive blast media to reduce silica or heavy metal exposures, design of structures to limit welding in confined spaces, design of access scaffolding to eliminate awkward access on existing structures, selection of welding and cutting processes known to produce the lowest work exposures to heat, noise, and metal fumes—such as TIG instead of Stick welding.

3.4.10.3. Ventilation used to control worker exposures shall be implemented in accordance with applicable regulatory requirements to reduce employee exposures to gases, vapors, fumes, dusts, mists, etc.. Projects shall ensure that where ventilation is selected as a control measure they have documented the selection criteria.


3.4.10.3.1. Adequate ventilation requires a knowledge of the hazard, the size of the area to be ventilated, measurement of existing airflow, a target air exchanges per hour, and verification of ventilation airflow as set up.

3.4.10.3.2. Ventilation as a control must be measured, verified, and documented. Projects may use tools such as the anemometer and smoke test kits to perform such evaluations. The specific processes to be used at a project should be discussed in the site specific industrial hygiene plan.

3.4.10.4. Illumination used as a control for safe working conditions shall be implemented in accordance with applicable regulatory requirements. Many of the company's projects fall under the OSHA 29 CFR 1926.56 Illumination standard. MSHA references the OSHA regulation for lighting. Other standards may apply based on the work being performed or the hazards present—such as confined space entry or working in potentially explosive atmospheres.

3.4.10.5. Projects shall perform surveys, as needed, to establish and document appropriate illumination levels. Projects shall use the illumination survey form or an equivalent form as approved by the corporate industrial hygienist. These surveys shall be addressed in the site specific industrial hygiene plan.

3.4.10.5.1. Measurements shall be made in Foot-Candles

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3.4.10.6. Sound barriers used to limit or reduce worker exposures to occupational noise shall be evaluated and designed with consideration given to the level of reduction needed, the duration of the work project, the durability of the material, and the configuration needed. Projects shall consider such methods, and implement them as feasible, before relying on worker hearing protection.

3.4.10.7. Selection and evaluation of tools and equipment to perform tasks should give consideration to the potential for worker injury based on repetitive use, awkward postures, duration of tasks, and work conditions.

3.4.11. Controls : Administrative and Work Practices

3.4.11.1. Projects shall address specific administrative and work practice controls in their site industrial hygiene plans. Carbon America's safety manual contains many policies and procedures that incorporate work practices and administrative controls for various work conditions and for some specific substances in accordance with regulatory requirements.

3.4.11.2. Projects are responsible to ensure that the controls implemented for the anticipated, recognized, and evaluated hazards meet all applicable regulatory requirements, company policies, and/or client requirements.


3.4.12. Thermal Stress

3.4.12.1. Heat stress and cold stress, a.k.a. thermal stresses, are often controlled at projects through work practices and administrative means. Where projects have addressed this information in other work documents or task plans, the site specific industrial hygiene plan should provide a cross reference.

3.4.12.2. Projects should monitor and document work conditions in conjunction with their controls to verify controls are adequate and are properly implemented for conditions.

3.4.13. Hygiene

3.4.13.1. Housekeeping and hygiene are powerful controls to prevent and reduce potential work exposures. Ensure that consideration is given to the layout of the site, work to be performed, and methods to ensure that

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hazards to which employees may be exposed are kept out of lunch rooms, break areas, and personal vehicles.

3.4.13.2. Biological hazards that are vector borne by insects, rodents, or even other workers, can be effectively controlled and greatly reduced through active control methods and planning.

3.4.13.3. Projects should carefully consider the risks of using non-potable water for operations such as dust suppression or chilling coolers. Non-potable water mists may contain respirable hazards that have the potential to cause headache, nausea, fatigue, or chronic disease.

3.4.14. Hazardous Work Permits

3.4.14.1. The company will utilize the work permit systems of an owner unless otherwise directed.

3.4.14.2. As Low as Reasonably Achievable Policy


3.4.14.3. It is a policy of the company to maintain exposures to hazardous chemicals or biological agents at levels that are As Low As Reasonably Achievable (ALARA). ALARA is achieved through proper training of employees, adequate work procedures, adequate engineering controls, good personal hygiene practices, and when required, use of protective equipment. Each individual working in a restricted area is required to adhere to established ALARA rules, regulations, and concepts.

3.4.14.4. A worker may not be exposed to a substance at a concentration exceeding its ceiling limit at any time.

3.4.15. Training

3.4.15.1. Projects shall ensure that employees are provided adequate training for all of the hazards identified in their site industrial hygiene program.

3.4.15.2. Employee training requirements are incorporated across several Carbon America policies and procedures in the safety manual and projects shall ensure workers have sufficient understanding of these to safely perform assigned work tasks.

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3.4.15.2.1. Where a specific substance or hazard is not specifically addressed in those documents, projects shall ensure that training includes the following elements:

3.4.15.2.2. The workers training should also include additional site specific information relevant to the hazards anticipated and safe work conditions—this may include evacuation protocols, rescue plans, medical monitoring, and further direction and training on hazard recognition, evaluation, and controls.

3.4.15.3. Employees who will be responsible for implementing hazard controls shall have the training required to competently perform those tasks.

3.4.15.4. Employees who are asked to participate in employee exposure sampling/monitoring shall be provided a basic training and overview of:

3.4.15.4.1. The monitoring process

3.4.15.4.2. The purpose of the monitoring


3.4.15.4.3. Proper use/placement of the equipment on the employee to ensure accurate and compliant sampling

3.4.15.4.4. Notification and discussion of their sampling results.

3.4.15.5. Employees exposed to chemical hazards shall have training meeting the requirements of the hazard communication standard and in the scope of industrial hygiene these employees shall be able to:

3.4.15.5.1. Demonstrate and understanding of the material covered in the material Safety Data Sheets, and demonstrate an understanding/ability to safely use, handle and/or transport the material as it applies to their work scope;

3.4.15.5.2. They should know what the permissible levels of exposure are, what the levels of exposure are anticipated to be for their work tasks, how to use any monitoring equipment they are responsible for, and the response for alarm conditions they need to know to safely perform their work scope;

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3.4.15.5.3. As applicable, these employees shall also be able to demonstrate an understanding of the purpose and proper use of any implemented exposure controls.

3.4.16. Controls : Personal Protective Equipment (PPE)

3.4.16.1. Personal protective equipment is to be considered the last line of defense for protecting workers against workplace hazards. Carbon America's safety manual addresses the selection and use of PPE in its personal protective equipment procedure and in various other substance specific standards, and its respiratory protection program and hearing conservation program.

3.4.16.2. Projects shall ensure the requirements of these procedures are met in documenting the hazard and conditions for which PPE was selected. At a minimum projects should ensure that for the hazard identified in their site industrial hygiene plan, they have either included specifics for the use of PPE for the identified hazard OR a reference to where those instructions may be found. Those specifics should include:

3.4.16.2.1. Proper usage conditions


3.4.16.2.2. Disposal considerations

3.4.16.2.3. Additional work practice consideration—such as when additional PPE or work conditions may trigger heat stress concerns

3.4.17. Industrial Hygiene Program Review

3.4.17.1. Projects shall be expected to incorporate the fundamentals of industrial hygiene into their planning and execution of work. A periodic evaluation or baseline of a project's implementation of industrial hygiene will be performed following the principles outlined by the American Industrial Hygiene Association's program audit publication.

3.4.17.2. The lines of inquiry can be found on the corporate industrial hygiene SharePoint site.

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3.4.17.3. The frequency of evaluations at a project will be driven by the size and duration of the project.

3.4.17.4. Evaluations may be conducted by the corporate industrial hygienist, safety manager, or their designees.

3.5. REFERENCE

3.5.1. OSHA 29 CFR 1926 subpart Z – Toxic and Hazardous Substances

3.5.2. OSHA 29 CFR 1926.55 – Gases, Vapors, Fumes, Dusts, and Mists

3.5.3. OSHA 29 CFR 1926.59 – Hazard Communication

3.5.4. OSHA 29 CFR 1926.56 - Illumination

3.5.5. Asbestos Procedure

3.5.6. Lead Procedure

3.5.7. Cadmium Procedure

3.5.8. Hexavalent Chrome Procedure

3.5.9. Hydrogen Sulfide Procedure

3.5.10. Silica Procedure

3.5.11. Benzene Procedure

3.5.12. Radiation Safety Procedure


3.5.13. Respiratory Protection Program

3.5.14. Hearing Conservation Program


3.5.15. Bloodborne Pathogens Procedure

3.5.16. Subcontractor Safety Procedure

3.5.17. Industrial Hygiene SharePoint site

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3.5.18. Galson Labs - www.galsonlabs.com, 1-888-432-5227

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4	Incident Investigations		0	05/10/2022

REVIEW LOG:

Date	Purpose for review	Person
05/10/2022	New Safety Manual	Hinz

4.1.0 Introduction

4.1.1 This Incident Investigation Procedure outlines the necessary steps to understand and learn from safety incidents. Additionally, the information gathered is essential to Carbon America's ability to comply with legislative requirements pertaining to occupational illness, injury, and reporting requirements.

4.1.2 This procedure applies to all Carbon America sponsored projects.

4.2.0 Definitions

4.2.1 None


4.3.0 Responsibilities

4.3.1 When an incident occurs the responsible Superintendent must initiate an investigation and notify appropriate individuals as identified within this section. However, the Project Manager is ultimately responsible for the appropriate notifications, investigation and submittal of necessary documents within the required timeframes.

4.3.2 The Project Manager will notify the next in command after any incident resulting in injury, near-miss, or equipment damage.

4.3.3 The Project Safety Manager will notify the Company Safety Manager as soon as possible after the situation has stabilized.

4.3.4 The Project Equipment Manager will notify the Company Equipment Manager of any equipment damage or equipment incidents.

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4.3.5 The Superintendent in direct charge of the operation shall gather all required information at the direction of the Project Safety Manager or their designee. The Superintendent is responsible for ensuring the completion of the initial investigation. The final investigation shall be reviewed by the Craft Superintendent, Project Safety Manager, Project Equipment Manager (for equipment damage), Construction and Project Managers prior to submittal to senior company management.

4.3.6 All incidents shall be entered into the designated system of incident collection within 24 hours of the incident, unless permission is given by the Company Safety Manager.

4.4.0 Process

4.4.1 All incidents must be reported immediately to Foreman, Superintendent, and Safety Department regardless of how minor. Failure to comply with this process can result in disciplinary action, up to and including termination.


4.4.2 All first aid, recordable injuries, near miss, report only, and damaged equipment incidents involving a Company, contractor employee, or third party will require specific documents to be completed and submitted to the designated system of incident collection and Safety Manager within 24 hours.

4.4.3 In addition to the timely completion and submittal of the required documents, the Project Manager has the responsibility to also ensure that the OSHA 301 and 300A Forms are completed as necessary.

4.4.4 Forms to aid reporting process:

4.4.4.1 While not mandatory, a Superintendent Incident Investigation Form may be used during the information gathering portion of an incident investigation.

4.4.4.2 In the event that a work-related injury/illness requires the care of a physician, it will be necessary to submit specific documentation to the company's insurance provider.

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1	Abrasive Blasting/ Sandblasting	0	05/11/2022	

REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

1.1.0 Purpose:

1.1.1 To establish procedures outlining the safety requirements for abrasive blasting to protect Carbon America employees and Subcontractors.

1.2.0 Scope:

1.2.1 This procedure applies to all employees and subcontractors working within Carbon America controlled worksites. This Abrasive Blasting Procedure covers the minimum requirements to perform abrasive blasting.

1.3.0 Introduction:


1.3.1 Abrasive blasting is primarily used for surface preparation of metal surfaces to prepare them to accept a coating or lining. This procedure covers the safety requirements pertaining to mechanical precautions, personal protective equipment, housekeeping and sanitation, administrative dust control methods, and respiratory protection.

1.4.0 Program:


1.4.1 Mechanical Precautions & Procedures:

1.4.1.1 Machines and hoses should be inspected frequently and all parts showing excessive wear should be repaired or replaced.

1.4.1.2 Nozzles should be externally attached to the hose by a fitting, which will prevent accidental disengagement.

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- 1.4.1.3 The blast cleaning nozzle will have an operating valve that is held open manually. Additionally, the nozzle will have a support device so that it can be mounted for storage when not being used.
 - 1.4.1.4 Lengths of hose should be joined by external metallic connectors. The connectors shall have pin-clips to prevent disengagement. Anti-whip arresters may be used between each connector.
 - 1.4.1.5 All Bull Hoses, from the compressor to the abrasive blast pot, shall have pin- clips and anti-whip arresters on each end.
 - 1.4.1.6 A remote control "deadman" valve must be provided. Electric deadmen shall be low voltage (12 volt DC) and have continuous wire or plug connections provided.
 - 1.4.1.7 In abrasive blasting situations where flammable or explosive dust mixtures may be present, construction of equipment and any exhaust system, including all electric wiring, will conform to *American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961)*, as well as 1926 Subpart S (i.e. underground construction).
 - 1.4.1.8 Prior to operation where flammable or explosive dust mixtures may exist, confirm that the blast nozzle is bonded and grounded to prevent the buildup of static charges.
 - 1.4.1.9 Where flammable or explosive dust mixtures may be present, confirm that the abrasive blasting enclosure, ducts and the dust collector are constructed with loose panels or explosion venting areas, located on sides away from any occupied area. These areas will provide pressure relief in the event of an explosion. This is in accordance with principles
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explained in the *National Fire Protection Association Explosion Venting Guide*, NFPA 68-1954.


- 1.4.1.10 Compressed air can only be used for cleaning objects and materials when the pressure is reduced to less than 30 p.s.i. and effective chip guarding and personal protective equipment are utilized.
- 1.4.1.11 At no time will compressed air be used for cleaning clothes while being worn or directly applied to any part of the body.
- 1.4.1.12 Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations shall not exceed the limits specified in the "Threshold Limit Values of Airborne Contaminants - 1970" of the American Conference of Governmental Industrial Hygienists.

1.5.0 Personal Protective Equipment:

- 1.5.1 Operators should be equipped with heavy canvas or leather gloves and aprons. Safety shoes will also be worn.
- 1.5.2 Eye, face, hearing and respiratory protection shall be supplied to all personnel working.
- 1.5.3 Precautions will be taken to protect personnel in the blasting zone including the blasting operator from excessive noise exposure by supplying and requiring the use of earplugs or muffs.
- 1.5.4 Vortex tubes that cool the air supply to the blasters hood will be considered depending on season and exposure of the employee to heat sources.

1.6.0 Housekeeping and Sanitation:

- 1.6.1 Good housekeeping practices should be followed in abrasive blasting operation to prevent slips, trips, and falls.
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1.6.2 A facility should be available for blasters to wash before eating and after blasting operations.

1.6.3 Do not allow dust to accumulate on the floor or ledges outside of an abrasive- blasting enclosure. Clean up dust spills in a prompt and consistent manner. Keep walkways and aisles clear of abrasive blasting product such as steel shot or any other material that could cause a slipping hazard.

1.7.0 Administrative Dust Control Methods:

1.7.1 Isolation

1.7.1.1 As most of the blasting as possible should be done in a specified Location, a blasting zone (where dust is visible) should be established and marked off with signs around the perimeter of the area such as:

CAUTION
Abrasive Blasting Area, Eye and Ear Protection and
Respirators Must Be Worn In This Area.

1.7.1.2 Blasting should not be done when wind direction and velocity carry visible dust to people unprotected by proper respirators.


1.7.2 Enclosure:

1.7.2.1 Blasting of small objects should be done in an enclosure which is designed to specifically reduce the dust hazards.

1.8.0 Respiratory Protection:

1.8.1 All use of respirators or other respiratory protective equipment will be in accordance with the Carbon America's written Respiratory Protection Program.

1.8.2 No employee will don or attempt to use a respirator unless he or she has undergone proper medical evaluation; has been fit tested; trained in the proper selection, use, maintenance and storage of the specific respirator; and is individually authorized by Carbon America for wearing a respirator in the scope and course of work.

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1.8.3 During construction and pipeline maintenance operations overall, and abrasive blasting specifically as per this program, special safety and health considerations will be given whenever hazardous dusts, fumes, mists, vapors, gases or other substances either exist or are produced in the course of work.

1.8.4 Concentrations of any such exposure will not exceed the limits specified in 1926.55(a) OSHA.

1.8.5 When ventilation is used as an engineering control method, the system shall be installed and operated in accordance with these same OSHA requirements.

1.8.6 Apron and dust collar, properly fitted and properly worn, shall be used by all persons blasting. In addition to the hood, blasters should also wear a disposable respirator when working in a high dust concentration. This would provide protection when the blasting operation has ceased and the blaster is removing the air supplied equipment or when merely taking a break.


1.8.7 Abrasive-blasting hoods shall be worn by all abrasive-blasting operators

1.8.7.1 At all times,

1.8.7.2 When working inside of blast-clean rooms,

1.8.7.3 When using silica sand in manual blasting operations where the nozzle and blast are not physically separated from the operator in an exhaust ventilated enclosure,

1.8.7.4 Where concentrations of toxic dust dispersed by the abrasive blasting may exceed the limits set in paragraph 1919.93 OSHA and the nozzle and blast are not physically separated from the operator in an exhaust-ventilated enclosure.

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1.8.7.5 In situations where the abrasives and the surface coatings on the materials blasted become shattered and pulverized during blasting operations, the dust formed by this work will contain particles of a size that can be breathed (respirable size). Consequently, consideration must be given to the composition and toxicity of these dust sources when evaluating potential health hazards of the work.

1.8.7.6 Concentration of respirable dust or fume in the abrasive blasting operator's breathing zone will be kept below Permissible Exposure Limits as required by OSHA. The same consideration will be given regarding exposure of any other worker in the area to this respirable dust.

1.8.7.7 Particulate filter respirators, commonly referred to as dust-filter respirators, properly fitted, may be used for short, intermittent, or occasional dust exposure such as clean-up, dumping of dust collectors, or unloading shipments of sand at a receiving point, when it is not feasible to control the dust by enclosure, exhaust ventilation, or other means. Respirators used shall be certified for protection against the specific type of dust.

1.8.7.8 Dust-filter respirators may be used to protect the operator of outside abrasive-blasting operations where non-silica abrasives are used on materials having low toxicities.


1.8.7.9 Dust-filter respirators shall not be used for continuous protection where silica sand is used as the blasting abrasive, or toxic materials are blasted.

1.8.8 Maintenance

1.8.8.1 Respirators should be cleaned daily. This can be accomplished by use of vacuum or water.

1.8.8.2 Respirators should be kept in maximum operating condition at all times.

1.8.8.3 After their daily cleaning, respirators and hoods should be kept and hung in an upright position to prevent sand spilling inside.

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1.8.8.4 Air Supply and Air Compressors for Abrasive Blasting Hoods

1.8.8.5 Air supply shall be free of harmful quantities of dust, mists or noxious gases, and shall meet Grade D requirements. The use and quality of supplied air will be in accordance with 29 CFR 1910.134(i).


1.8.8.6 The air from the regular compressed air line of a compressor unit may be used for the abrasive-blasting hood if:

1.8.8.6.1 A trap and carbon filter system (with in-line CO monitor alarm) is installed that will remove oil, water particulate and odor and is regularly maintained. A record of the maintenance of these filters should be kept.

1.8.8.6.2 A pressure reducing diaphragm or valve is installed to reduce the pressure to requirements of the particular type of abrasive blasting respirator.

1.8.8.6.3 An automatic control is provided to either sound an alarm or shut down the compressor in case of overheating.

1.8.8.6.4 Periodic checks should be made to ensure that the worker is not being exposed to amounts of carbon monoxide >10 ppm.

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2.1 Policy Statement

- 2.1.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 2.1.2** Carbon America will comply with the OSHA **Asbestos Standard**, 29 CFR 1910.1001 and 29 CFR 1926.1101, through implementation of this written program.


2.2 Purpose

- 2.2.1** To protect employees on jobsites from hazards associated with asbestos through hazard identification and avoidance.
- 2.2.2** To provide guidelines when potential asbestos containing materials are encountered
- 2.2.3** To provide training to increase education and knowledge on asbestos hazards.

2.3 References

- 2.3.1** 29 CFR 1910.1001 OSHA Standard for Asbestos Exposure
- 2.3.2** 29 CFR 1926.1101 Construction Work Practices

2.4 General Requirements

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2.4.1 Management

2.4.1.1 Ensure employees are not exposed to friable asbestos and no RK employee disturbs any asbestos containing materials.

2.4.1.2 Ensure asbestos exposures are quantified and monitoring is conducted when required.

2.4.1.3 Ensure asbestos abatement activities are conducted in accordance with the procedures described in this program.

2.4.2 This document applies to all Carbon America employees and subcontractors not designated as Asbestos Abatement Contractors and Asbestos Abatement Contractors


2.4.3 Asbestos Awareness Training is required for employees whose work activities may contact Asbestos Containing Material (ACM) or Presumed Asbestos Containing Material (PACM) but do not disturb the ACM or PACM during their work activities.

2.4.4 Asbestos materials are used in the manufacture of heat-resistant clothing, automotive brake and clutch linings, and a variety of building materials including insulation, soundproofing, floor tiles, roofing felts, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos is also present in pipe and boiler insulation materials, pipeline wrap and in sprayed-on materials located on beams, in crawlspaces, and between walls.

2.4.5 Friable means that the material can be crumbled with hand pressure and is therefore likely to emit fibers.

2.4.6 The fibrous or fluffy sprayed-on materials used for fireproofing, insulation, or sound proofing are considered to be friable, and they readily release airborne fibers if disturbed.

2.4.7 Materials such as vinyl-asbestos floor tile or roofing felts are considered non-friable and generally do not emit airborne fibers unless subjected to sanding or sawing operations.

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2.4.8 Asbestos-cement pipe or sheet can emit airborne fibers if the materials are cut, abraded or sawed, or if they are broken during demolition operations.

2.4.9 Exposure to asbestos has been shown to cause lung cancer, asbestosis, mesothelioma, and cancer of the stomach and colon.

2.4.10 Signs and labels shall identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that Asbestos Containing Material (ACM) and/or Presumed Asbestos Containing Material (PACM) will not be disturbed. The employer shall ensure that employees working in and adjacent to regulated areas comprehend the warning signs.

2.4.11 If employees working immediately adjacent to a Class I asbestos jobs are exposed to asbestos due to the inadequate containment of such job they shall be removed from the area until the enclosure breach is repaired.

2.5 Permissible exposure limits (PELS).


2.5.1 Time-weighted average limit (TWA). No employee may be exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA).

2.5.2 Excursion limit. No employee may be exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes.

2.6 Multi-employer worksites.

2.6.1 On multi-employer worksites, an employer performing work requiring the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.

2.6.2 Asbestos hazards at a multi-employer work site shall be abated by the contractor who created or controls the source of asbestos contamination. For example, if there is a significant breach of an

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enclosure containing Class I work, the employer responsible for erecting the enclosure shall repair the breach immediately.

2.6.3 In addition, all employers of employees exposed to asbestos hazards shall comply with applicable protective provisions to protect their employees. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of such job, their employer shall either remove the employees from the area until the enclosure breach is repaired; or perform an initial exposure assessment.


2.6.4 All employers of employees working adjacent to regulated areas established by another employer on a multi-employer work-site, shall take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to such adjacent areas.

2.6.5 All general contractors on a construction project which includes work covered by this standard shall be deemed to exercise general supervisory authority over the work covered by this standard, even though the general contractor is not qualified to serve as the asbestos "competent person" as defined. As supervisor of the entire project, the general contractor shall ascertain whether the asbestos contractor is in compliance with this standard, and shall require such contractor to come into compliance with this standard when necessary.

2.7 Protective clothing.

2.7.1 Protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings shall be provided for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit, or for which a required negative exposure assessment is not produced, or for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet of TSI or surfacing ACM and PACM. When provided, employees are required to wear the protective clothing.

2.7.2 Laundering.

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2.7.2.1 Laundering of contaminated clothing shall be done so as to prevent the release of airborne asbestos in excess of the TWA or excursion limit.

2.7.2.2 When contaminated clothing is given to another person (or facility) for laundering, such person (or facility) shall be notified of the relevant requirements of OSHA standard 1926.1101.

2.7.3 Contaminated clothing. Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and be appropriately labeled.

2.7.4 Inspection of protective clothing. The competent person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced.

2.8 Training

2.8.1 Initial Training

2.8.1.1 Employees will receive training at the time of hire

2.8.1.2 The training will include:

2.8.1.2.1 Health effects of asbestos exposure

2.8.1.2.2 Potential areas where asbestos is found


2.8.1.2.3 What asbestos looks like

2.8.1.2.4 What to do if you feel a material contains asbestos

2.8.1.2.5 Materials that contain ACM

2.8.1.2.6 General information

2.8.1.2.7 Precautions outlined in this written program.

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2.8.1.2.8 Recognition of ACM/PACM damage, and reporting actions.

2.8.2 Annual Training

2.8.2.1 Employees will receive annual awareness training.

2.9 Definitions

2.9.1 ASBESTOS– Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that has been chemically treated and/or altered. Asbestos also includes presumed asbestos containing materials (PACM).

2.9.2 ABATEMENT– to enclose, repair, encapsulate, or remove ACM/PACM from any structure or equipment and dispose of it as asbestos-containing waste.


2.9.3 ACM– Asbestos Containing Material (any material with more than 1% asbestos).

2.9.4 ENCAPSULATION– Dressing (coating) asbestos material with a bonding agent that penetrates the material and hardens and prevents the release of asbestos dust (e.g., Serpiflex).

2.9.5 FIBER– A particulate form of asbestos, five (9) micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

2.9.6 FRIABLE– Asbestos-containing materials capable of releasing airborne asbestos fibers by applying hand pressure (crumbling).

2.9.7 PACM– Presumed Asbestos Containing Material. Materials that are presumed to contain asbestos until proven otherwise by laboratory analysis. (For example, TSI, surfacing material, and vinyl or asphaltic flooring material found in buildings constructed before 1981).

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3.1 Policy Statement

3.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

3.2 Purpose

3.2.1 To protect employees and subcontractors on jobsites from the hazards associated with benzene through hazard identification and avoidance.

3.3 References

3.3.1 29 CFR 1910.1028

3.3.2 29 CFR 1926.1128


3.4 General Requirements

3.4.1 The following are possible locations where employees may be exposed to Benzene:

3.4.1.1 Natural gas fracturing sites

3.4.1.2 Tank gauging (tanks at producing, pipeline & refining operations)

3.4.1.3 Field maintenance

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3.4.1.4 Coke ovens batteries

3.4.1.5 Confined space entry of water trucks for maintenance and cleaning

3.4.1.6 Motor fuels, gasoline, and oil.

3.4.2 Characteristics of Benzene:

3.4.2.1 Benzene is toxic, colorless, has an aromatic odor, is not soluble in water and is flammable.

3.4.3 Effects of overexposure to Benzene:

3.4.3.1 Short term effects of overexposure may include: irritation of eyes, nose and skin, breathlessness, irritability, euphoria, headache, dizziness, or nausea.

3.4.3.2 Long term effects may result in blood disorders such as leukemia and anemia.

3.4.4 Personal Protective Equipment. Boots, gloves, sleeves, aprons, eye and face protection are required in areas with potential overexposure.


3.4.5 Benzene liquid is highly flammable and vapors may form explosive mixtures in air.

3.4.5.1 Fire extinguishers must be readily available.

3.4.5.2 Smoking is prohibited in areas where Benzene is used or stored.

3.4.5.3 Employees shall be trained on Owner's and host companies contingency plan provisions. Employees must be informed where benzene is used in host facility and aware of additional site safety rules.

3.5 Exposure Limits

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3.5.1 The employer shall establish a regulated area wherever the airborne concentration of benzene exceeds or can reasonably be expected to exceed the permissible exposure limits, either the 8-hour time weighted average exposure of 1 ppm or the short-term exposure limit of 5 ppm for 15 minutes.

3.5.2 Access to regulated areas shall be limited to authorized persons.

3.5.3 Regulated areas shall be determined from the rest of the workplace in any manner that minimizes the number of employees exposed to benzene within the regulated area.

3.6 Monitoring


3.6.1 Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's average exposure to airborne benzene.

3.6.2 Representative 8-hour TWA employee exposures shall be determined on the basis of one sample or samples representing the full shift exposure for each job classification in each work area.

3.6.3 Determinations of compliance with the STEL shall be made from 15-minute employee breathing zone samples measured at operations where there is reason to believe exposures are high, such as where tanks are opened, filled, unloaded or gauged; where containers or process equipment are opened and where benzene is used for cleaning or as a solvent in an uncontrolled situation. The employer may use objective data, such as measurements from brief period measuring devices, to determine where STEL monitoring is needed.

3.6.4 Except for initial monitoring, where the employer can document that one shift will consistently have higher employee exposures for an operation, the employer shall only be required to determine representative employee exposure for that operation during the shift on which the highest exposure is expected.

3.6.5 Initial monitoring.

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3.6.5.1 Each employer who has a place of employment shall monitor each of these workplaces and work operations to determine accurately the airborne concentrations of benzene to which employees may be exposed.

3.6.5.2 The initial monitoring required shall be completed by 60 days after the effective date of this standard or within 30 days of the introduction of benzene into the workplace. Where the employer has monitored within one year prior to the effective date and the monitoring satisfies all other requirements of this section, the employer may rely on such earlier monitoring results to satisfy the requirements of this section.

3.6.6 Periodic monitoring and monitoring frequency.

3.6.6.1 If the monitoring reveals employee exposure at or above the action level but at or below the TWA, Carbon America shall repeat such monitoring for each such employee at least every year.


3.6.6.2 If the monitoring reveals employee exposure above the TWA, Carbon America shall repeat such monitoring for each such employee at least every six (6) months.

3.6.6.3 Carbon America may alter the monitoring schedule from every six months to annually for any employee for whom two consecutive measurements taken at least 7 days apart indicate that the employee exposure has decreased to the TWA or below, but is at or above the action level.

3.6.6.4 Monitoring for the STEL shall be repeated as necessary to evaluate exposures of employees subject to short term exposures.

3.6.7 Termination of monitoring.

3.6.7.1 If the initial monitoring reveals employee exposure to be below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by means of additional exposure or reason to believe there is a change in the exposure.

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3.6.7.2 If the periodic monitoring reveals that employee exposures, as indicated by at least two consecutive measurements taken at least 7 days apart, are below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by means of additional exposure or reason to believe there is a change in the exposure.

3.7 Definitions

3.7.1 *Action level* means an airborne concentration of benzene of 0.5 ppm calculated as an 8-hour time-weighted average.

3.7.2 *Authorized person* means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring and measuring procedures, or any other person authorized by the Act or regulations issued under the Act.

3.7.3 *Benzene* (C₆H₆) (CAS Registry No. 71-43-2) means liquefied or gaseous benzene. It includes benzene contained in liquid mixtures and the benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene contained in solid materials.


3.7.4 *Bulk wholesale storage facility* means a bulk terminal or bulk plant where fuel is stored prior to its delivery to wholesale customers.

3.7.5 *Container* means any barrel, bottle, can, cylinder, drum, reaction vessel, storage tank, or the like, but does not include piping systems.

3.7.6 *Day* means any part of a calendar day.

3.7.7 *Emergency* means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which may or does result in an unexpected significant release of benzene.

3.7.8 *Employee exposure* means exposure to airborne benzene which would occur if the employee were not using respiratory protective equipment.

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3.7.9 *Regulated area* means any area where airborne concentrations of benzene exceed or can reasonably be expected to exceed, the permissible exposure limits, either the 8-hour time weighted average exposure of 1 ppm or the short-term exposure limit of 5 ppm for 15 minutes.

3.7.10 *Vapor control system* means any equipment used for containing the total vapors displaced during the loading of gasoline, motor fuel or other fuel tank trucks and the displacing of these vapors through a vapor processing system or balancing the vapor with the storage tank. This equipment also includes systems containing the vapors displaced from the storage tank during the unloading of the tank truck which balance the vapors back to the tank truck.

3.8 Training

3.8.1 Initial Training

3.8.1.1 Employees and subcontractors will undergo awareness training the initial training will include:

3.8.1.1.1 Exposure effects both long and short term.

3.8.1.1.2 Locations of probable exposure

3.8.1.1.3 Hazard Identification


3.8.1.1.4 Hazard Avoidance

3.8.1.1.5 Exposure Monitoring

3.8.1.1.6 PPE

3.8.2 Annual Training

3.8.2.1 Employees will undergo annual refresher training on all of the elements provided in the initial training

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4.0 Policy Statement

- 4.0.1** It is the policy of Carbon America, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 4.0.2** Carbon America will comply with the OSHA ***Bloodborne Pathogens*** standard, 29 CFR 1910.1030 and through implementation of this written program.


4.1 Purpose

- 4.1.1** It is the intent of Carbon America to eliminate or minimize all hazards associated with occupational exposure to bloodborne pathogens (blood or other potentially infectious materials) by the means set forth in this plan. A copy of this plan is available to employees upon request.
- 4.1.2** To designate voluntary first responders to control incidents and exposure to bloodborne pathogens.

4.2 References

- 4.2.1** 29 CFR 1910.1030 Bloodborne pathogens.
- 4.2.2** 29 CFR 1910.1020 Access to employee and medical records.

4.3 General Requirements

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4.3.1 Application

4.3.2 This plan provides precautions necessary for employees to use when occupationally exposed to blood, body fluids, and other potentially infectious materials. These materials may cause such diseases as Hepatitis B (HBV) and Human Immunodeficiency Virus (HIV). All employees that have the responsibility of administering first-aid and CPR are required to attend training on bloodborne pathogens, and are provided the option to receive the Hepatitis B vaccination prior to accepting duties that may expose the individual to potentially infectious materials.

4.3.3 Subcontractors on the project are required to follow and abide by the content of this plan.

4.3.4 Exposure assessment is made without regard to personal protective equipment.

4.3.5 Implementation of the Bloodborne Pathogen Exposure Control Plan is the responsibility of the Field Supervisor with consultation from the Safety Director.

4.3.6 The Field Supervisors are the only employees required to administer First Aid and/or CPR as a part of their duties. These are the only construction site employees with occupational exposure.


4.4 Work Practice Controls

4.4.1 The primary method to reduce occupational exposure will be to do the following:

4.4.2 Isolate or contain the hazard.

4.4.3 Use disposal puncture-resistant containers that are closeable and leak proof on the sides and bottom and properly labeled with the BIOHAZARD symbol, for used needles, blades, implements of treatment, and/or other regulated waste (blood or other potentially infectious materials in a liquid or semi liquid state).

4.4.4 Use containers/bags that are closeable and leak proof on the sides and bottom and properly labeled with the BIOHAZARD symbol, for regulated

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waste (blood or other potentially infectious materials in a liquid or semi liquid state).

4.4.5 Containers/bags must be easily accessible, kept upright, replaced routinely, and not allowed to be overfilled.

4.4.6 When containers of regulated waste are moved, the containers must be securely closed to prevent spillage or leakage.

4.4.7 Use appropriate personal protective equipment.

4.4.8 Limit access to potential exposure areas.

4.4.9 Have available germicide hand wipes or hand washing facilities with soap and running water.

4.4.10 Storage or consumption of food, drink, tobacco, etc., or the application of contact lenses, cosmetics, lotions, or chapping balm is prohibited in areas of potential occupational exposure.

4.4.11 Universal Precautions shall be utilized by treating all body fluids and potentially contaminated materials as infected (and always using appropriate personal protective equipment).


4.5 Personal Protective Equipment (PPE)

4.5.1 Employees will routinely use appropriate PPE during patient contact, handling of bodily fluids, or whenever there is a potential occupational exposure. Appropriate PPE means equipment that does not permit blood or other potentially infectious material to contact, pass through, or be absorbed onto the employee's skin, eyes, mouth, or other mucous membranes; examples of Biohazard PPE: surgical type gloves, apron, face shield, eye protection.

4.5.2 Biohazard PPE will be provided at no cost to employees.

4.5.3 PPE will be removed prior to leaving the work area, and placed in a biohazard container.

4.5.4 Disposable gloves (rubber or latex surgical type) must be properly worn whenever there is a potential exposure. Gloves shall be changed between

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each patient, and hands and other skin surfaces will be washed immediately after gloves are removed.

4.5.5 To prevent exposure of the mouth, eyes, and nose, surgical masks and protective eye wear will be worn during procedures that may result in exposure.

4.5.6 When an employee's clothes come in contact with blood or other potentially infectious materials, those clothes must be removed and treated as a biohazard.

4.5.7 Protective mouthpieces shall be available where the need for mouth-to-mouth resuscitating may arise.

4.6 Housekeeping Guidelines


4.6.1 Implements of treatment, pails, bins, containers, or similar receptacles (including protective coverings and work surfaces), must be cleaned and decontaminated after each contact with blood or other potentially infectious material.

4.6.2 Broken glassware in the treatment area must be picked up with a dust pan and broom/brush and not by hand. The broken glass must be put in a puncture-resistant container.

4.6.3 All items and spills must be cleaned with a germicide or sodium hypochlorite (a 1:10 dilution of household bleach).

4.7 Vaccination, Post-exposure Evaluation, and Follow-Up

4.7.1 Carbon America and each subcontractor shall select a licensed health care professional (HCP) to administer the HBV and provide post-exposure medical evaluation and follow up. Employees that test negative for HBV antibodies shall be offered the HBV series (three shots over a 6 month period). Employees that decline the vaccination must sign a waiver; however, if the employee later chooses to be inoculated, he/she may do so at no cost. The signed waiver shall be placed in the employee's confidential medical file. Employees should note that the HBV vaccination is effective if received within 7 days after exposure.

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4.7.2 Post-exposure Evaluation and Follow-up--The selected HCP shall provide post-exposure evaluation and follow-up to employees who report an exposure incident. This evaluation shall:

4.7.2.1 Document the routes of entry and circumstances surrounding the exposure;

4.7.2.2 Identify the source individual, if feasible;

4.7.2.3 Test the source individual's blood, if consented to;

4.7.2.4 Provide post-exposure medical treatment and evaluation of reported illnesses;

4.7.2.5 Offer HBV vaccination series to exposed employees;

4.7.2.6 Provide counseling; and

4.7.2.7 Provide written opinion in accordance with OSHA standard 29 CFR1910.1030(f)(5).

4.7.2.8 Includes the healthcare professional's written opinion for whether a Hepatitis B vaccination is indicated for an employee and if one was received.


4.7.2.9 Includes the healthcare professional's opinion for post-exposure evaluation and follow-up.

4.7.2.10 A note that the employee has been informed of results of the evaluation.

4.7.2.11 A note that the employee has been informed about any conditions resulting from exposure to blood or OPIM which require further evaluation or treatment.

4.7.2.12 Other findings or diagnoses shall remain confidential and not in the written report.

4.7.2.13 The written opinion shall be provided to the employee by the employer within 15 days of the completed evaluation.

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4.7.2.14 Information Provided to the HCP – Carbon America shall provide the HCP who administers the HBV vaccine or post-exposure evaluation and follow-up, the following information:

4.7.2.15 A copy of OSHA’s Bloodborne Pathogen Standard.

4.7.2.16 A copy of the Exposure Incident Evaluation (described below).

4.7.2.17 All relevant medical records in the employer’s possession.

4.8 Exposure Incident Evaluation

4.8.1 Exposure incidents must be reported immediately to the exposed employee’s supervisor and the Carbon America Safety Director.

4.8.2 The following information is to be included in the Exposure Incident Evaluation:

4.8.2.1 The name and social security number of the employee.

4.8.2.2 All Hepatitis B vaccination records and medical reports.

4.8.2.3 Copies of medical exams, tests, and follow-ups.

4.8.2.4 A copy of the HCP’s written opinion where applicable.

4.8.2.5 A copy of information provided to the HCP.


4.9 Recordkeeping.

4.9.1 An accurate record for each employee with occupational exposure in accordance with CFR 1910.1020 shall be maintained for at least the duration of employment plus 30 years. Records shall be made available to employees.

4.10 Training

4.10.1 The illustration below represents labels and signs that serve as warnings of infectious materials.



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4.10.2 Carbon America employees with potential occupational exposure shall be provided training at the time of initial assignment & annual thereafter.

4.10.3 Training for all employees should be provided within 1 year of their previous training.

4.10.4 Training records must include the dates and consent of training sessions, the name(s) and qualifications of the person(s) conducting the training, and the names and job titles of attendees.

4.10.5 Training records must be kept for 3 years.

Attachment 1 Waiver of Hepatitis B Vaccination

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Attachment 1

Waiver of Hepatitis B Vaccination

I, _____, understand that due to my potential occupational exposure to blood or other potentially infectious materials, may be at risk of acquiring the Hepatitis B Virus (HBV) infection. I have been given the opportunity to be vaccinated with the Hepatitis B vaccine at no charge to myself. However, I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If, in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with the Hepatitis B vaccine, I understand that I can, upon request, receive the vaccination series at no charge to me.

Employee Signature Date: _____

Witness Signature Date: _____

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5.1.0 Policy Statement

- 5.1.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. Herein after referred to as the “Company.” It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 5.1.2** Carbon America will comply with the OSHA **Confined Space** standard, 29 CFR 1910.146 and 29 CFR 1926.1200, through implementation of this written program.

5.2 Purpose

- 5.1.3** The purpose of this written program is to provide guidelines, requirements, and procedures that will ensure employee safety when conducting work inside or near confined spaces or permit required confined spaces (as defined within this written program).
- 5.1.4** This document applies to all Carbon America employees, visitors, and contractors who are assigned to work inside or near confined spaces or permit required confined spaces (as defined within this written program).
- 5.1.5** All spaces shall be evaluated to determine the hazards associated and whether a permit is required for entry activity.

5.3 References

- 5.3.1** 29 CFR 1910.146 & 1926.1200 Permit Required Confined Spaces
- 5.3.2** 29 CFR 1910.146 & 1926.1200 Safety Training and Education
- 5.3.3** API Recommended Practice 54

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5.3.4 ANSI Z117.1-1995 Safety Requirements for Confined Spaces

5.4 General Requirements

5.4.1 Responsibilities

5.4.1.1 Management

5.4.1.2 Ensure compliance with this written program and 29 CFR 1910.146 and or CFR 1926.1200.

5.4.1.3 Provide Company employees with necessary equipment to work inside confined spaces.

5.4.1.4 Provide support to entry supervisors with regard to site-specific/space-specific task planning, which includes work to be performed, entry procedures, hazard analysis, and hazard control.

5.4.1.5 Assist supervision in coordinating emergency reporting and response (rescue) protocol.

5.4.1.6 Shall document all gas-monitoring equipment calibrated and bump tested per the manufacturer's direction.

5.4.2 Entry Supervisor

5.4.2.1 Evaluate the work to be done and review the potential hazards (In most cases this requires the involvement of a customer/owner representative – See **Attachment 1**.

5.4.2.2 Determine safety procedures, personal protective devices, and rescue equipment required before a job in a confined space begins and tasks are authorized.

5.4.2.3 Ensure all confined spaces are labeled with appropriate signage and confirm all employees are properly notified of confined spaces prior to performing any work on/near any confined space.

5.4.2.4 Perform non-entry atmospheric testing of the permit required confined space with calibrated instrument prior to employee entry to determine a hazardous atmosphere does not exist (see definition section). Should concerns remain as to the


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presence of contaminants, additional sampling is to be performed. Control methods shall be implemented for hazardous atmospheres that cannot be eliminated.

- 5.4.2.5 Ensure that all process piping, mechanical or electrical equipment, etc., have been disconnected, purged, blanked off or locked and tagged out as required.
- 5.4.2.6 Assign qualified employees (entrants) to perform work in a confined space.
- 5.4.2.7 Assign an attendant to monitor the confined space.
- 5.4.2.8 Ensure that the assigned confined space entrants and attendant(s) are familiar with the requirements of the entry permit, have been trained and are familiar with work to be performed, entry procedures, potential hazards and emergency response procedures.
- 5.4.2.9 Verify that rescue means and reporting protocol, specific to each confined space, have been established.
- 5.4.2.10 Verifies that all confined space entry permit requirements have been fulfilled by signing the permit only when all acceptable entry conditions have been met and prior to authorizing entry of personnel into the space.
- 5.4.2.11 Direct entrants to exit space if they recognize danger signs and symptoms.
- 5.4.2.12 Complete and sign the Confined Space Entry Permit (**Attachment 1**) listing any safety precautions, communication and personal protective equipment, or other entry requirements for the entrants and attendant. (Reference specific written entry procedures for confined space provided by the customer).
- 5.4.2.13 Ensure the permit is posted at the entrance to the confined space.

5.4.3 Confined Space Attendant

- 5.4.3.1 Follow all requirements noted on the confined space entry permit.

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- 5.4.3.2 Track workers inside the space using the authorized entrant log (**Attachment 1**).
- 5.4.3.3 Control the area surrounding the space to prevent unauthorized entry and other activities near the space, which may endanger entrants.
- 5.4.3.4 Observe the activities and provide external assistance to entrants. The attendant will have no other duties, which may take his/her attention away from the work or require him/her to leave the vicinity of the confined space at any time while entrants are in the space.
- 5.4.3.5 Shall maintain, at a minimum, audible contact with entrants in the confined space. Visual contact is preferred.
- 5.4.3.6 Is NEVER to leave his/her post while an entrant is inside a permit required confined space.
- 5.4.3.7 Continuously monitor the air inside the space (from outside the space) and document the atmospheric conditions on the entry permit. The attendant is never to enter the confined space.
- 5.4.3.8 Follow instructions given by his/her entry supervisor (and instructions provided on the issued confined space entry permit) in the method for contacting rescue personnel in the event of an emergency.
- 5.4.3.9 Order entrants to immediately evacuate the space, if hazards that may compromise the safety of the entrants are identified.
- 5.4.3.10 Direct entrants to exit the space when danger signs or symptoms are recognized.
- 5.4.3.11 When practicable, each confined space will have a separate dedicated attendant. If more than one confined space is to be monitored by a single attendant, means and procedures that will be used to enable the attendant to respond to emergencies in one or more permit spaces without distraction from the attendant's responsibilities shall be established.

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5.4.3.12 Will NEVER enter the confined space to attempt rescue of entrants.

5.4.4 Authorized Entrant

5.4.4.1 Follow all entry requirements and only perform work tasks that are identified on the confined space entry permit, utilizing only the equipment and/or chemicals authorized for use.

5.4.4.2 Will wear all required personal protective equipment and personal air monitoring devices as identified on the entry permit or required by the entry supervisor.

5.4.4.3 Prior to entry, know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of any possible exposures.

5.4.4.4 Keep in communication with the assigned attendant as necessary to enable him/her to monitor status and alert entrants in the event that an evacuation of the space is required.

5.4.4.5 Will leave the space immediately when notified by the attendant or entry supervisor, or if monitoring equipment alarms sound, ventilation malfunctions or becomes inoperative, warning signs or symptoms of exposure is felt, or any other unanticipated dangerous situation develops.

5.4.5 Customers of Carbon America that request services involving entry into confined space areas should provide Carbon America with a confined space hazard assessment. If the customer does not have confined space hazard assessment(s) available, it is the responsibility of the Carbon America entry supervisor to complete a confined space hazard assessment form (**Attachment 1**) with a designated customer representative BEFORE authorizing entry. From this, the entry supervisor and customer representative shall determine if the space is Permit Required or Non-Permit Required.

5.4.6 If the space is classified as a Non-Permit Required Confined Space, the customer representative and entry supervisor will determine what safety devices, procedures, and protective equipment are required – a confined space entry permit is still required.

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- 5.4.7** A permit-required confined space may be reclassified as a non-permit required confined space under the following procedures:
- 5.4.8** If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.
- 5.4.9** If it is necessary to enter the permit space to eliminate hazards or confirm there is no presence of a hazard, the entry shall follow permit required confined space entry requirements. If testing and inspection demonstrate the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated. NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination.
- 5.4.10** The entry supervisor shall document the basis for determining all hazards in a permit space have been eliminated or effectively controlled. Documentation shall include the basis for the determination, date, location of space, and signature of person making the determination – see Attachment 1. The certification shall be made available to each employee entering the space.
- 5.4.11** Provisions and procedures shall be in place for pedestrian, vehicle and other barriers (as necessary) to protect entrants from external hazards.
- 5.4.12** If hazards arise within a space that has been declassified to a non-permit space, each employee shall exit the space. The entry supervisor shall reevaluate the space and determine whether it must be reclassified as a permit space.
- 5.4.13** When multiple employers have employees working in the same space, coordinating provisions and procedures shall be established so that employees of one employer do not endanger the employees of any other employer.

5.5 Permit Required Confined Space Requirements

- 5.5.1** Only personnel who have been trained and are knowledgeable of the requirements of this procedure will be permitted to be an entry supervisor, authorized entrant or an attendant in a confined space entry.

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5.5.2 Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for the following conditions in the order given:

Oxygen content between.....19.5% - 23.5%

Flammable gases and vapors..... Less than 10% of LEL

Carbon Monoxide.....Less than 50 PPM

Other Toxic Contaminants

5.5.3 Conditions that differ from those given above are considered hazardous atmospheric conditions, and may not exist within the space when an employee enters. For spaces with hazardous atmospheric conditions that cannot be eliminated, additional precautions such as ventilation or respiratory protection shall be implemented to control the hazard prior to entry.

5.5.4 Entry procedures shall be readily available to all personnel involved in confined space entry work. These procedures shall be updated and/or revised accordingly when confined space entry conditions change or when new confined spaces are identified.

5.5.5 Authorized entrants may be required to wear 4-gas monitoring device equipped with an audible alarm to warn of potentially unsafe or oxygen-deficient atmosphere. Instruction regarding the operation of the equipment and other precautions will be given prior to use in the confined space.

5.5.6 There shall be a formal rescue plan that should be available on site before any confined space entry. The rescue plan shall address the handling of confined space entry emergencies.

5.5.7 Smoking in confined spaces is prohibited at all times.

5.5.8 Hand-held lights and other illumination shall be equipped with guards to prevent employee contact with the bulb and must be properly grounded.

5.5.9 Electrical equipment taken into confined space areas shall be positively grounded, double insulated and protected by ground fault circuit interruption protection. Battery-operated equipment can also be used.

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5.5.10 If flammable or combustible liquids were contained previously within the space, explosion-proof electrical equipment and tools will be used. All electrical equipment shall be effectively grounded.

5.5.11 Compressed gas cylinders, except cylinders used for self-contained breathing apparatus, shall not be taken into a confined space.

5.5.12 Manhole and floor type entrance openings with covers removed are to be protected to prevent falls of individuals into the space. Fall protection equipment and/or measures shall be taken for entry into confined spaces with fall-related hazards.

5.5.13 Should monitoring a complete space be infeasible because of size (exp. reactor core) or is part of a continuous system (exp. sewer), pre-entry testing shall be conducted to the extent feasible before entry is authorized. If entry is authorized, entry conditions shall be continuously monitored in the area where authorized entrants are working.

5.6 Confined Space Entry Permit Procedure

5.6.1 See **Attachment1** for a blank Confined Space Entry Permit.

5.6.2 A Confined Space Entry Permit must be issued and appropriately completed prior to the entry of any authorized personnel into a permit required confined space.

5.6.3 In most cases the owner will issue the permits and the entry supervisors will verify the information; however, trained entry supervisors may also issue the permit. Note: When visiting customer locations, Company employees shall comply with requirements governed by the respective owners, provided that they meet or exceed the requirements provided herein.

5.6.4 All affected employees will participate in the completion of the confined space entry permit.

5.6.5 The confined space entry permit is valid only for the performance of the work indicated, the entrants and attendants identified, and for the location and time specified (one shift maximum). The validation period can extend beyond the end of the normal shift if the work scope doesn't change and the same personnel are assigned to the task. NOTE: Properly trained and knowledgeable entrants and attendants can exchange roles during entry.

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- 5.6.6** The contents of any flammable, combustible or other hazardous materials usually stored in the confined space shall be removed; all sources of ignition shall be removed within acceptable limits prior to entry. For spaces with hazardous atmospheric conditions that cannot be eliminated, additional precautions such as ventilation or respiratory protection shall be implemented to control the hazard prior to entry.
- 5.6.7** Non-entry air samples taken prior to employee entry are recorded by the attendant or entry supervisor on the Confined Space Entry Permit. The entry supervisor and attendant shall confirm levels are within acceptable limits before entry.
- 5.6.8** Should air monitoring determine a hazardous atmosphere, the entry supervisor shall follow ventilation requirements to eliminate hazards before authorizing work.
- 5.6.9** Any concerns or previously unidentified hazards encountered during entry work must be immediately reported to the entry supervisor.
- 5.6.10** If a hazardous atmosphere is detected during entry by unprotected employees:
- 5.6.11** Each employee shall leave the space immediately;
- 5.6.12** The space shall be evaluated to determine how the hazardous atmosphere developed;
- 5.6.13** Measures shall be implemented to protect employees from the hazardous atmosphere; and,
- 5.6.14** A new entry permit will be completed, before any subsequent entry takes place.
- 5.6.15** The confined space entry permit is to be voided if work in the space does not start within thirty (30) minutes after the atmospheric tests are performed, if significant changes within the confined space atmosphere occur or the scope of work to be performed changes.
- 5.6.16** If work lapses or is interrupted (for example, all workers leave the space) for any period of time during the shift, acceptable entry conditions must be verified prior to re-entry of confined space.
- 5.6.17** The confined space entry permit will be posted at the confined space entrance and only removed by the entry supervisor or permit issuer

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(owner) at the completion of the job or the end of the shift, whichever is first.

5.6.18 The individual removing the confined space entry permit shall date, record the time and initial the permit in the upper right hand corner, which cancels the permit.

5.6.19 Copies of canceled confined space entry permits will be maintained by the Company for a period of one (1) year. These permits will be used to conduct a documented annual program review.

5.7 Ventilation

5.7.1 Permit required confined spaces shall have air monitoring conducted prior to authorizing entry. Should a hazardous atmosphere exist, no employee may enter the space until ventilation reduces hazards to the acceptable entry conditions or other controls are implemented.

5.7.2 Should continuous forced air ventilation be used:

5.7.3 An employee may not enter the space until the ventilation has eliminated or effectively controlled the hazardous atmosphere.

5.7.4 The ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have exited.

5.7.5 The air supply shall be from a clean source and may not increase the hazards in the space.

5.7.6 The atmosphere within the space shall be continuously monitored to ensure that the forced air ventilation is preventing an accumulation of a hazardous atmosphere.

5.7.7 Ventilation equipment shall not introduce a hazard. For example, in a space with a flammable atmosphere, the ventilation equipment shall be intrinsically safe.

5.7.8 Ventilation will be required for all hot work operations (i.e. welding, cutting or grinding).

5.7.9 Compressed air is not to be used for ventilation purposes unless in conjunction with an approved air mover unit. Never use pure oxygen to ventilate a confined space.

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5.7.10 Vehicles must not be left running near confined space work or near air-moving equipment being used for confined space ventilation.

5.7.11 Should ventilation equipment be interrupted or fail to operate, authorized entrants must exit immediately and may not re-enter until adequate ventilation is restored and the space is retested.

5.8 Rescue and Emergency Services

5.8.1 The Company shall evaluate the designated rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified. Note: For example, 1910.34 Respiratory Protection, requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection equipment in work areas described as Immediately Dangerous to Life or Health (IDLH) atmospheres.

5.8.2 The Company shall inform the rescuers of the hazards associated with each specific permit space being entered.

5.8.3 The Company shall evaluate and confirm that the rescue service's ability and proficiency with rescue-related tasks and equipment for each specific permit space being entered. Employees designated to provide permit space rescue and emergency services shall receive the following:


5.8.4 Personal Protective Equipment and training on its use, needed to conduct permit space rescues safely.

5.8.5 Training to perform assigned rescue duties.

5.8.6 Training in basic first aid and cardiopulmonary resuscitation (CPR).

5.8.7 Periodic rescue drills and practice, at least every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or form representative permit spaces.

5.8.8 Non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements:

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5.8.9 Each entrant shall 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 entrants head, or at another point, from which the entrant can be removed from the space. Wristlets can be used in lieu of the chest or full body harness if they are the safest and most effective method.

5.8.10 The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as necessary.

5.9 Training

5.9.1 All employees involved with confined space entry shall be trained on the elements of this program at the following times:

5.9.2 At the beginning of employment or when first assigned duties given by this program;

5.9.3 When there is a change in the employee's assigned duties;

5.9.4 When there is a change in the permit space itself; or

5.9.5 When there is reason to believe there are inadequacies in the employee's understanding of this program.

5.9.6 All employees involved with permit required confined space entry shall be trained on the work to be performed, entry procedures, potential hazards, testing equipment, and emergency procedures specific to EACH permit space BEFORE duties are assigned.

5.9.7 A record that training has been accomplished shall be maintained including employee name, trainer signature/initials, and dates of training. Training records must be made available to employees and their authorized representative.

5.10 Definitions

Acceptable Entry Conditions - Conditions (both atmospheric and physical) that must exist in a permit space to allow personnel entry and ensure that individuals can safely work within the space to accomplish the required task.

Atmospheric Testing/Monitoring Device - A calibrated analyzing instrument that directly reads the levels of oxygen, combustible gas, and

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specific toxic gases (for example, carbon monoxide, hydrogen sulfide, etc.). This device is equipped with an audible alarm that will activate to warn personnel of an unsafe atmosphere. In every permit required confined space entry, monitoring equipment is to be utilized for pre-entry atmospheric checks.

Attendant - An authorized and trained individual stationed outside the confined space who monitors the activities of the authorized entrants and internal and external conditions while work is being performed inside the space.

Confined Space - A space that meets all of the following conditions:


1. Is large enough and so configured that an individual can bodily enter and perform assigned work; AND
2. Has limited or restricted means for entry or exit (examples would be storage tanks, boilers, manholes, silos, pits and degreaser tanks); AND
3. Is not designed for continuous employee occupancy.

Confined Space Entry Permit - A document that is to be completed in full prior to personnel entering and performing work in a permit-required confined space. This permit is initiated by the entry supervisor or customer representative for Company personnel who have job tasks in the space. Other contractor personnel are to complete and post their own entry permits for their personnel work tasks. NOTE: Entry supervisors are not responsible for the employees of other contractors who may also be working in the space. The work scope of other contractors shall be considered when determining potential hazards in a permit required confined space.

Confined Space Hazard Assessment/Evaluation - An in-depth evaluation of a confined space conducted by the owner or entry supervisor to identify hazards (both atmospheric and physical) so a written entry procedure can be developed for use in preparing the Confined Space Entry Permit.

Hot Work Permit - An authorization document issued by the owner for personnel to perform welding or cutting operations outside of designated areas.

ENTRANT(S) - Any authorized and trained individual who enters a confined space for any purpose. Entry is defined as breaking the plane of the confined space access opening with any part of the body.

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Entry Supervisor - An authorized and trained individual responsible for determining if acceptable entry conditions are present at a permit space where an entry is planned, for authorizing entry, overseeing entry operations and for terminating entry as required.

Flammable Atmosphere - Two conditions can make an atmosphere flammable:

1. The oxygen in the air (above 23.5%), and
2. A flammable gas, vapor, mist, or dust in the proper mixture or in the "flammable range."

Flammable Range - Flammable limits are the lowest and highest percentages, by volume, of fuel gas to air at one atmosphere that will burn. The difference between the two limits is the flammable range.

1. When the amount of fuel is too little for a self-sustaining reaction, the mixture is said to be too lean. It is below the lower flammable limit or lower explosive limit (LFL or LEL).
2. When the fuel is plentiful, there is an inadequacy of oxygen or the mixture is too rich. It is above the upper explosive limit (UEL).
3. Flammable or explosive atmospheres can possess hazardous gases, vapors, or mists present at a concentration greater than ten percent (10%) of their lower explosive level (LEL). For dusts, this may be approximated as a condition in which the dust obscures vision at five (5) feet or less.

Hazardous Atmosphere - An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, serious injury, or acute illness due to:

1. An oxygen concentration below 19.5% or above 23.5%.
2. Flammable gas, vapor, or mist in excess of 10% of the lower explosive limit (LEL).
3. An airborne combustible dust at a concentration that meets or exceeds its LEL.
4. Atmospheric concentration of any substance for which a dose or a permissible limit is published in OSHA's Part 1910 Subpart G or Subpart Z and that could result in employee exposure above the permissible exposure limit.

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5. Other atmospheric conditions recognized as immediately dangerous to life or health (IDLH).

Inerting - The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. This procedure produces an IDLH oxygen-deficient atmosphere.

Immediately Dangerous to Life or Health (IDLH) - Any condition that poses an immediate or delayed threat to life that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a confined space.

NON-Permit Required Confined Space (NPRCS) - means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. If it is necessary to enter a space to eliminate the hazards for classification as a NPRCS, that initial entry will be done as a PRCS entry.

Oxygen-Deficient Atmosphere - An atmosphere containing less than 19.5% oxygen by volume. NOTE: The oxygen level in a confined space can decrease because of work being done, such as welding, cutting, brazing or chemical use (solvents, paints, etc.).

Oxygen-Enriched Atmosphere - Is an atmosphere containing more than 23.5% oxygen by volume. An oxygen-enriched atmosphere will cause combustible materials such as clothing and hair to burn violently if ignited. Oxygen must never be used to ventilate a confined space.

Permissible Exposure Limits (PELs), Ceiling Limits and Short-Term Exposure Limits (STELs) - The airborne concentration of a substance above which exposure is not legally permitted. PELs are an 8 hour time-weighted average exposure value. Short-Term Exposure Limits are based on 15 minutes exposure and Ceiling Limits are concentrations not to-be exceeded at any time.

Permit Issuer - For the purpose of the Confined Space Entry Program, a permit issuer is an individual who is fully trained in confined space hazard recognition and analysis and related air monitoring equipment and can competently complete information required on CSE Permits. In most cases the owner is the permit issuer, however, the entry supervisor may also issue confined space entry permits if approved by the owner.

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Permit-Required Confined Spaces (PRCS) - Is a confined space that meets one or more of the following conditions:

1. Contains or has the potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant (e.g. liquid or granular).
3. 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.
4. Contains any other recognized serious health or safety hazard (e.g., radiation, noise, electricity, fall hazards, moving machinery parts, etc.).

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

Threshold Limit Value (TLV) - Airborne concentrations of substances that represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. TLV's are published by the American Conference of Governmental Industrial Hygienists (ACGIH).

Review attachment 2 to help determine confined space criteria i.e. Permit Required Confined Space and Non-Permit Required Confined Space.

Attachment 1 Confined Space Entry Permit

Attachment 2 Appendix A, Permit – Required Confined Space Decision Flow Chart

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Confined Space Entry Permit

☐ Permit Required ☐ Non Permit Required / this must be completed for all confined space entries

Applicability: This permit establishes that all hazards have been identified and controlled and it lists the confined space (CS) entry supervisor, authorized entrants, attendants, and rescue team (as required). For more information, see the Carbon America Confined Space Entry Procedures.

Instructions: This form must be signed by the CS entry supervisor (Section 6) before entry and it must be kept at the entrance to the CS during the entry. Once the work is completed, the CS entry supervisor must close the permit by signing Section 7 and sending it to the Safety department and kept on file for the jobsite.

1. Permit Conditions / Hazard Assessment

Reason for entry:		Entry date:
		Permit expiration (date and time):
Evaluate if new hazards will be created by the planned work		
<input type="checkbox"/> No	Confined Space Entry Permit Yes	Will any activities that could create a hazard be conducted inside the confined space, such as welding or line? If yes specify and list plans to manage the hazard:
<input type="checkbox"/> No	<input type="checkbox"/> Yes	Will any chemicals that could create a hazard be brought into the space? Examples include solvents and : yes specify and list plans to manage the hazard:
<input type="checkbox"/> No	<input type="checkbox"/> Yes	Are there any conditions in or around this space that could adversely affect anyone who enters it? If yes specify and list plans to manage the hazard:
Entrant / training date (CS training is good for 1 year, First Aid/CPR/AED good for 2 years):		
Entrant / training date (CS training is good for 1 year, First Aid/CPR/AED good for 2 years):		
Entrant / training date (CS training is good for 1 year, First Aid/CPR/AED good for 2 years):		
Attendant / training date (CS training is good for 1 year, First Aid/CPR/AED good for 2 years):		
Supervisor / training date (CS training is good for 1 year, First Aid/CPR/AED good for 2 years):		
See the confined space inventory for the following information		
Jobsite address / job number:		
Description:		Location:
Known and potential hazards:		
Rescue Procedures:		Rescue Team:

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2. Requirements Checklist *(check all that apply)*

<input type="checkbox"/> Safety has been notified of CS work	<input type="checkbox"/> GC/Client has been notified of CS work notified	<input type="checkbox"/> Fire Department has been notified
Non-entry rescue equipment		
<input type="checkbox"/> Full body harness	<input type="checkbox"/> Tripod / hoist	<input type="checkbox"/> Lifeline
<input type="checkbox"/> Warning signs with contact info	<input type="checkbox"/> Barricades	Gloves: <input type="checkbox"/> Leather <input type="checkbox"/> Impervious <input type="checkbox"/> Chemical resistant
<input type="checkbox"/> Ladder	<input type="checkbox"/> Lighting	<input type="checkbox"/> Other:
<input type="checkbox"/> Fall protection equipment		Face / eye protection: <input type="checkbox"/> Face shield <input type="checkbox"/> Goggles <input type="checkbox"/> Other:
<input type="checkbox"/> Natural Ventilation	<input type="checkbox"/> Mechanical Ventilation	<input type="checkbox"/> Footwear
<input type="checkbox"/> Fire extinguisher		<input type="checkbox"/> Coveralls
<input type="checkbox"/> Smoke Eater (welding fumes)		<input type="checkbox"/> Head protection
<input type="checkbox"/> Air purifying respirator: specify cartridge type:		<input type="checkbox"/> Rubber boots / waders for water work
<input type="checkbox"/> Other:		<input type="checkbox"/> Long sleeve clothing
		<input type="checkbox"/> Other:

3. Pre-entry Checklist *(check the conditions that apply)*

<input type="checkbox"/> Verify adequate confined space, First Aid/CPR/AED training	Control of hazardous energy:
<input type="checkbox"/> Pre-entry briefing on specific hazards and control methods	<input type="checkbox"/> Lockout / tagout (electrical, steam, mechanical, stored energy, etc.)
<input type="checkbox"/> Notify subcontractors of permit and hazard conditions	<input type="checkbox"/> Electrical hazards reviewed
<input type="checkbox"/> Non-entry rescue and procedure in place	<input type="checkbox"/> Other:
<input type="checkbox"/> Notify affected departments and persons of service interruption	Communication: <input type="checkbox"/> Radio <input type="checkbox"/> Hand signals <input type="checkbox"/> Verbal <input type="checkbox"/> Flashlights
<input type="checkbox"/> LOTO applied and/or lines blocked or blinded	Weather: <input type="checkbox"/> Outdoor Conditions _____ <input type="checkbox"/> Indoor work
<input type="checkbox"/> Drain space	Ventilation Modification: <input type="checkbox"/> Natural <input type="checkbox"/> Mechanical
<input type="checkbox"/> Other:	<input type="checkbox"/> Other:

4. Personnel Entry and Exit Record *(to be completed before 1st entry, after breaks, lunch or if the space has been inactive)*

	Attendant name:	Entrant name:	Entrant name:	Entrant name:	Entrant name:	Entrant name:
Time in						
Time out						
Time in						
Time out						
Notes:						

5. Air Monitoring Results *(to be completed before 1st entry, after breaks, lunch or if the space has been inactive)*



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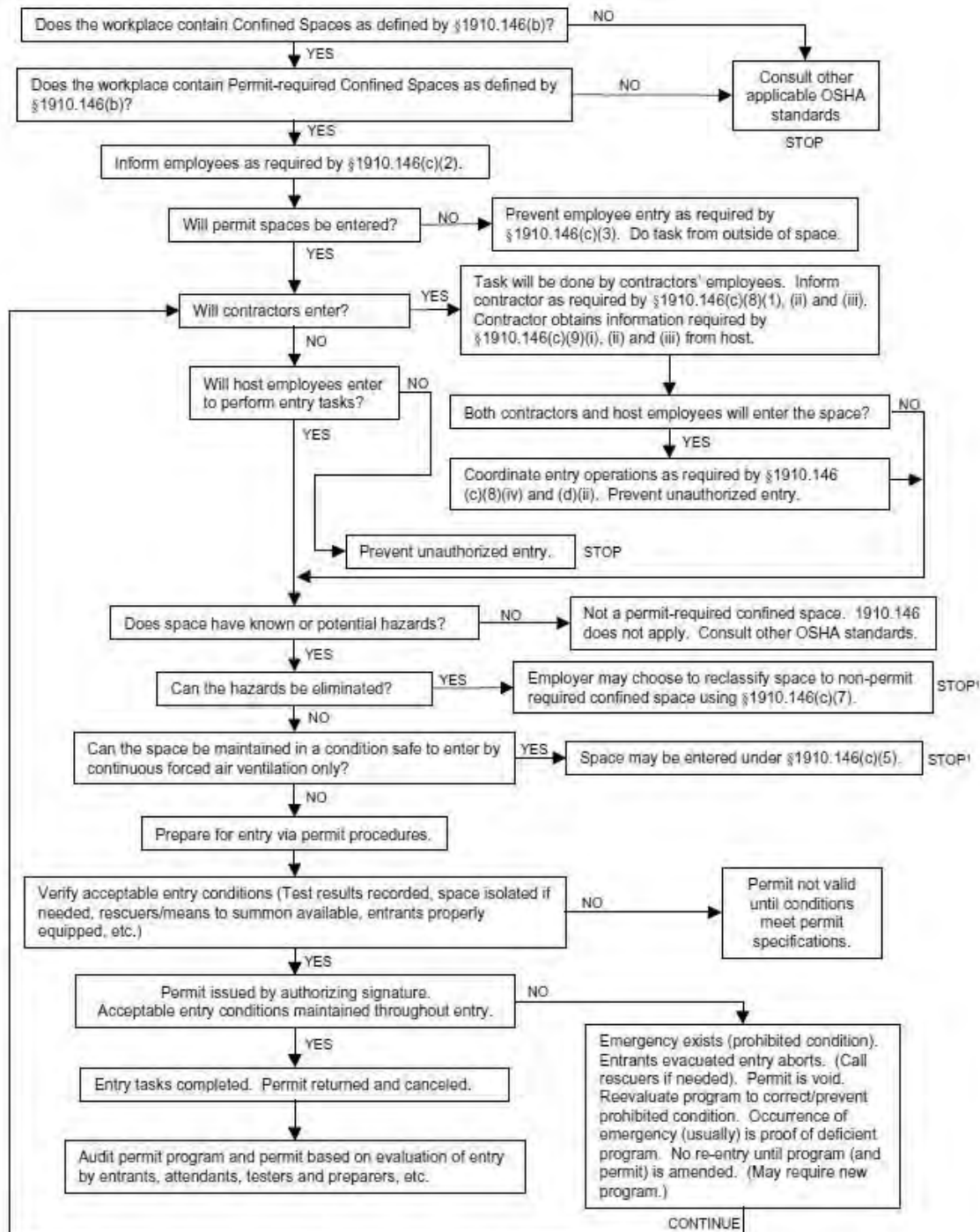
8. Emergency Services Access Plan


Draw and Designate a map specific for emergency services (where FD will park to respond, the path they will take to access the confined space area, and any additional information necessary for emergency service rescue)

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Attachment 2

Appendix A, Permit-required Confined Space Decision Flow Chart



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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

6.1 Purpose:

The purpose of the Carbon America Electrical Program is to address electrical safety requirements that are necessary to protect our employees during the course of construction. It is the foundation for both the Control of Hazardous Energy Program and the Electrical Arc Safety Program. Adherence to the standards set forth is of paramount importance to the safety of our employees.

6.2 Overall Program Responsibility and Authorship:


SAFETY PROFESSIONAL is solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. SAFETY PROFESSIONAL is the sole person authorized to amend these instructions and is authorized to halt any operation of the facility where there is danger of serious personal injury.

6.3 Scope:

This program applies to the installation of both temporary and permanent equipment used to provide electric power and light at the jobsite.

6.4 Training:

All employees are required to be trained in electrical safety and the following program and adhere to the requirements set forth hereafter. Carbon America's electrical safety training program includes all the elements required in Carbon

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America's Arc Flash and protection training program, Carbon America's electrical safety requirements, and Carbon America's LOTO requirements. Safety training records will be kept for the duration of each employees' employment. All employees are considered competent and capable of executing required steps once trained in the Carbon America Electrical Safety Program and safe work practices.

6.5 Requirements & General Safe Work Rules (for additional safety work requirements see the Carbon America Arc Flash Program):

- 6.5.1** All electrical conductors and equipment shall be approved.
- 6.5.2** Under all circumstances, employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
- 6.5.3** Where portable ladders are needed they shall have non-conductive side rails.
- 6.5.4** Conductive items of jewelry or clothing shall not be worn unless they are rendered non-conductive by covering, wrapping or other insulating means.

6.6 Examination, Installation and Use of Equipment

- 6.6.1** *Examination* – Carbon America will ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined on the basis of the following considerations:
 - 6.6.1.1** Suitability for installation and use in conformity with the provisions of this program. Suitability of equipment for an identified purpose may be evidenced by listing, labeling or certifications for that identified purpose.
-

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6.6.1.2 Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided.

6.6.1.3 Electrical insulation.

6.6.1.4 Heating effects under conditions of use.

6.6.1.5 Arcing effects.

6.6.1.6 Classification by type, size, voltage, current capacity, specific use.

6.6.1.7 Other factors which contribute to the practical safeguarding of employees using or likely to come in contact with the equipment.


6.6.2 *Installation and Use* – Listed, labeled or certified equipment shall be installed and used in accordance with instructions included in the listing, labeling or certification.

6.6.3 *Interrupting Rating* – Equipment intended to break current shall have an interrupting rating at system voltage sufficient for the current that must be interrupted.

6.7 Mounting and Cooling of Equipment

6.7.1 *Mounting* – Electric equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster or similar materials shall not be used.

6.7.2 *Cooling* – Electrical equipment which depends upon the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room air flow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top

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surfaces and adjacent surfaces shall be provided to dissipate rising warm air. Electrical equipment provided with ventilating openings shall be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

6.7.3 *Splices* – Conductors shall be spliced or joined with splicing devices designed for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be so spliced or joined as to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device designed for the purpose.

6.7.4 *Arcing Parts* – Parts of electric equipment which in ordinary operation produce arcs, sparks, flames or molten metal shall be enclosed or separated and isolated from all combustible material.

6.7.5 *Marking* – Electrical equipment shall not be used unless the manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified is placed on the equipment and unless other markings are provided giving voltage, current, wattage, or other ratings as necessary. The marking shall be of sufficient durability to withstand the environment involved.

6.7.6 *Identification of disconnecting means and circuits* - Each disconnecting means required for motors and appliances shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. Each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is

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evident. These markings shall be of sufficient durability to withstand the environment involved.


6.7.7 *600 Volts, nominal, or less* – This paragraph applies to equipment operating at 600 volts, nominal, or less.

6.7.8 *Working space about electric equipment* – Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.

6.7.9 *Working Clearances* – Except as required or permitted elsewhere in this program, the dimension of the working space in the direction of access to live parts operating at 600 volts or less and likely to require examination, adjustment, servicing, or maintenance while alive shall not be less than indicated in Table K-1. In addition to the dimensions shown in Table K

6.7.9.1 workspace shall not be less than 30 inches (762 mm) wide in front of the electric equipment. Distances shall be measured from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. Walls constructed of concrete, brick, or tile are considered to be grounded. Working space is not required in back of assemblies such as dead-front switchboards or motor control centers where there are no renewable or adjustable parts such as fuses or switches on the back and where all connections are accessible from locations other than the back.

TABLE K-1 - Working Clearances


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Minimum clear distance for Nominal voltage to ground Conditions			
	(A)	B	C
	Feet (2)	Feet (2)	Feet (2)
0-150	3	3	3
151-600	3	3 ½	4

Footnote (1) Conditions (a), (b), and (c) are as follows: [a] Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts. [b] Exposed live parts on one side and grounded parts on the other side. [c] Exposed live parts on both sides of the workplace [not guarded as provided in Condition (a)] with the operator between.

Footnote (2) Note: For International System of Units (SI): one foot=0.3048m.


6.7.9.2 *Clear Spaces* – Working space required by this program shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be guarded. Where applicable, vehicular and mechanical equipment should maintain at least 3' clearance from guarded electrical equipment and a minimum of 10' clearance for unguarded.

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- 6.7.9.3** *Access and Entrance to Working Space* - At least one entrance shall be provided to give access to the working space about electric equipment.
- 6.7.9.4** *Front Working Space* – Where there are live parts normally exposed on the front of switchboards or motor control centers, the working space in front of such equipment shall not be less than 3 feet (914 mm).
- 6.7.9.5** *Headroom* – The minimum headroom of working spaces about service equipment, switchboards, panelboards or motor control centers shall be 6 feet 3 inches (1.91 m).

6.8 Guarding of Live Parts

- 6.8.1** Except as required or permitted elsewhere in this program, live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by cabinets or other forms of enclosures, or by any of the following means:
 - 6.8.1.1** By location in a room, vault, or similar enclosure that is accessible only to qualified persons.
 - 6.8.1.2** Protective shields, protective barriers or insulating materials as necessary shall be used when working in confined or enclosed work spaces where electrical hazards may exist.
 - 6.8.1.3** By partitions or screens so arranged that only qualified persons will have access to the space within reach of the live parts. Any openings in such partitions or screens shall be so sized and located that persons are not likely to come into
-

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accidental contact with the live parts or to bring conducting objects into contact with them.

6.8.1.4 By location on a balcony, gallery or platform so elevated and arranged as to exclude unqualified persons.

6.8.1.5 By elevation of 8 feet (2.44m) or more above the floor or other working surface and so installed as to exclude unqualified persons.


6.8.1.6 In locations where electric equipment would be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage.

6.8.1.7 Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. All unqualified persons are required to maintain a clearance distance of at least 10'; for 50kV plus 4" for every additional 10kV.

6.8.1.8 Over 600 volts, nominal.

6.8.1.9 *General* – Conductors and equipment used on circuits exceeding 600 volts, nominal, shall comply with all applicable provisions of this section and with the following provisions which supplement or modify those requirements.

6.8.1.10 *Enclosure for electrical installations* - Electrical installations in a vault, room, closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by lock and key or other equivalent means, are considered to be accessible to qualified persons only. A wall, screen, or fence less than 8 feet (2.44 m) in height is not considered adequate to prevent access unless it has other features that provide a

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degree of isolation equivalent to an 8-foot (2.44-m) fence.

The entrances to all buildings, rooms or enclosures containing exposed live parts or exposed conductors operating at over 600 volts, nominal, shall be kept locked or shall be under the observation of a qualified person at all times.

6.8.1.11 *Installations accessible to qualified persons only* - Electrical installations having exposed live parts shall be accessible to qualified persons only and shall comply with the applicable provisions of this section.

6.8.1.12 *Installations accessible to unqualified persons* - Electrical installations that are open to unqualified persons shall be made with metal-enclosed equipment or shall be enclosed in a vault or in an area, access to which is controlled by a lock. Metal-enclosed switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. If equipment is exposed to physical damage from vehicular traffic, guards shall be provided to prevent such damage. Ventilating or similar openings in metal-enclosed equipment shall be designed so that foreign objects inserted through these openings will be deflected from energized parts.


6.8.1.13 *Workspace about equipment* - Sufficient space shall be provided and maintained about electric equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear workspace shall not be less than 6 feet 6

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inches (1.98 m) high (measured vertically from the floor or platform), or less than 3 feet (914 mm) wide (measured parallel to the equipment). The depth shall be as required in Table K-2. The workspace shall be adequate to permit at least a 90-degree opening of doors or hinged panels.

6.8.1.14 *Working Space* - The minimum clear working space in front of electric equipment such as switchboards, control panels, switches, circuit breakers, motor controllers, relays, and similar equipment shall not be less than specified in Table K-2 unless otherwise specified in this program. Distances shall be measured from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. However, working space is not required in back of equipment such as deadfront switchboards or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on de-energized parts on the back of enclosed equipment, a minimum working space of 30 inches (762 mm) horizontally shall be provided. De-energized equipment or parts should always be treated as live.

TABLE K-2 - Minimum Depth of Clear Working Space in Front of Electric Equipment Conditions (1)
Nominal voltage to ground

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	(a)	(b)	(c)
	Feet (2)	Feet (2)	Feet (2)
601 to 2,500	3	4	5
2,501 to 9,000	4	5	6
9,001 to 25,000	5	6	9
25,001 to 75 KV	6	8	10
Above 75KV	8	10	12

Footnote(1) Conditions (a), (b), and (c) are as follows:

Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating materials. Insulated wire or insulated bus bars operating at not over 300 volts are not considered live parts.

Exposed live parts on one side and grounded parts on the other side. Walls constructed of concrete, brick, or tile are considered to be grounded surfaces.

Exposed live parts on both sides of the workspace [not guarded as provided in Condition (a)] with the operator between.

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Footnote(2) NOTE: For SI units: one foot=0.3048 m.

- i. *Lighting outlets and points of control* - The lighting outlets shall be so arranged that persons changing lamps or making repairs on the lighting system will not be endangered by live parts or other equipment. The points of control shall be so located that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.
- ii. *Elevation of unguarded live parts* – Unguarded live parts above working space shall be maintained at elevations not less than specified in table K-3.

TABLE K-3- Elevation of Underground Energized Parts Above Working Space	
Nominal voltage between phases – Minimum Elevation	
601-7,500	8 feet 6 inches
7,501-35,000	9 feet
Over 35KV	9 feet +0.37 inches per KV above 35 kV

Footnote(1) NOTE: For SI units: one inch=25.4 mm; one foot=0.3048 m.

- iii. *Entrance and access to workspace* - At least one entrance not less than 24 inches (610 mm) wide and 6 feet 6 inches (1.98 m) high shall be provided to give access to
-

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the working space about electric equipment. On switchboard and control panels exceeding 48 inches (1.22 m) in width, there shall be one entrance at each end of such board where practicable. Where bare energized parts at any voltage or insulated energized parts above 600 volts are located adjacent to such entrance, they shall be guarded.

6.9 Wiring Design and Protection:

Identification of Conductors – A conductor used as a grounded conductor shall be identifiable and distinguishable from all other conductors. A conductor used as an equipment grounding conductor shall be identifiable and distinguishable from all other conductors.


Polarity of Connections – No grounded conductor shall be attached to any terminal or lead so as to reverse designated polarity.

Use of Ground Terminals & Devices – A grounding terminal or grounding-type device on a receptacle, cord connector or attachment plug shall not be used for purposes other than grounding.

6.10 Branch Circuits

6.10.1 Ground-Fault Protection

6.10.1.1 General – Carbon America will use either ground fault circuit interrupters or the assured equipment grounding conductor program to protect our employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.


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6.10.1.2 *Ground-Fault Circuit Interrupters* – All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit interrupters.

6.10.1.3 *Assured Equipment Grounding Conductor Program* – Carbon America

6.10.1.3.1 an established assured equipment grounding conductor program on construction sites covering all cord sets, receptacles which are not a part of the building or structure, and equipment connected by cord and plug which are available for use or used by employees.

6.10.1.3.2 Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage. Equipment found damaged or defective shall not be used until repaired.

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6.10.1.3.3 The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure and cord-and plug-connected equipment required to be grounded:

6.10.1.3.4 All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.

6.10.1.3.5 Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

6.10.2 All required tests shall be performed:

6.10.2.1 Before first use:


6.10.2.2 Before equipment is returned to service following any repairs;

6.10.2.3 Before equipment is used after any incident which can be reasonably suspected to have caused damage;

6.10.2.4 At intervals not to exceed 3 months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.

6.10.2.5 Any equipment which has not met these requirements shall be removed from service.

6.10.2.6 Tests performed as required in this program shall be recorded. This test record shall identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test and shall indicate the last date it was tested or the interval for which it was tested. This record shall be kept by

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means of logs and color coding, and shall be maintained until replaced by a more current record. The record shall be made available on the jobsite for inspection by the Safety Director and any affected employee.


6.10.3 Outlet Devices – *Outlet devices shall have an ampere rating not less than the load to be served and shall comply with the following:*

6.10.3.1 Single Receptacles – A single receptacle installed on an individual branch circuit shall have an ampere rating of not less than that of the branch circuit.

6.10.3.2 Two or More Receptacles – Where connected to a branch circuit supplying two or more receptacles or outlets, receptacle ratings shall conform to the values listed in Table K-4.

6.10.3.3 Receptacles Used for the Connection of Motors – The rating of an attachment plug or receptacle used for cord- and plug-connection of a motor to a branch circuit shall not exceed 15 amperes at 125 volts or 10 amperes at 250 volts if individual overload protection is omitted.

TABLE K-4- Receptacle Ratings for Various Size Circuits	
Receptacle Circuit Rating Amperes- Rating Amperes	
15	Not over 15
20	15 or 20
30	30

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40	40 or 50
50	50

6.11 Outside Conductors and Lamps

6.11.1 600 volts, nominal, or less.

6.11.2 *Conductors on Poles* – Conductors supported on poles shall provide a horizontal climbing space not less than the following

6.11.2.1 Power conductors below communication conductors-30 inches (762 mm).

6.11.2.2 Power conductors alone or above communication conductors: 300 volts or less-24 inches (610 mm); more than 300 volts-30 inches (762 mm).


6.11.2.3 Communication conductors below power conductors: with power conductors 300 volts or less-24 inches (610 mm); more than 300 volts-30 inches (762 mm).

6.11.3 *Clearance from Ground* – Open conductors shall conform to the following minimum clearances:

6.11.3.1 10 feet (3.05 m)-above finished grade, sidewalks, or from any platform or projection from which they might be reached.

6.11.3.2 12 feet (3.66 m)-over areas subject to vehicular traffic other than truck traffic.

6.11.3.3 15 feet (4.57 m)-over areas that are subject to truck traffic.

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6.11.3.4 18 feet (5.49 m)-over public streets, alleys, roads, and driveways.

6.11.4 *Clearance from Building Openings* – Conductors shall have a clearance of at least 3 feet (914 mm) from windows, doors, fire escapes, or similar locations. Conductors run above the top level of a window are considered to be out of reach from that window and, therefore, do not have to be 3 feet (914 mm) away.


6.11.5 *Clearance Over Roofs* – Conductors above roof space accessible to employees on foot shall have a clearance from the highest point of the roof surface of not less than 8 feet (2.44 m) vertical clearance for insulated conductors, not less than 10 feet (3.05 m) vertical or diagonal clearance for covered conductors, and not less than 15 feet (4.57 m) for bare conductors, except that:

6.11.5.1 Where the roof space is also accessible to vehicular traffic, the vertical clearance shall not be less than 18 feet (5.49 m), or

6.11.5.2 Where the roof space is not normally accessible to employees on foot, fully insulated conductors shall have a vertical or diagonal clearance of not less than 3 feet (914 mm), or

6.11.5.3 Where the voltage between conductors is 300 volts or less and the roof has a slope of not less than 4 inches (102 mm) in 12 inches (305 mm), the clearance from roofs shall be at least 3 feet (914 mm), or

6.11.5.4 Where the voltage between conductors is 300 volts or less and the conductors do not pass over more than 4 feet (1.22 m) of the overhang portion of the roof and they are terminated at a through-the-roof raceway or support, the clearance from roofs shall be at least 18 inches (457 mm).

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6.11.6 Location or Outdoor Lamps – Lamps for outdoor lighting shall be located below all live conductors, transformers, or other electric equipment, unless such equipment is controlled by a disconnecting means that can be locked in the open position or unless adequate clearances or other safeguards are provided for relamping operations.

6.12 Services

6.12.1 Disconnecting Means

6.12.1.1 General – Means shall be provided to disconnect all conductors in a building or other structure from the service-entrance conductors. The disconnecting means shall plainly indicate whether it is in the open or closed position and shall be installed at a readily accessible location nearest the point of entrance of the service-entrance conductors.

6.12.1.2 Simultaneous Opening of Poles – Each service disconnecting means shall simultaneously disconnect all ungrounded conductors.


6.12.1.3 Services Over 600 Volts, Nominal – The following additional requirements apply to services over 600 volts, nominal.

6.12.1.4 Guarding – Service-entrance conductors installed as open wires shall be guarded to make them accessible only to qualified persons.

6.12.1.5 Warning Signs – Signs warning of high voltage shall be posted where unauthorized employees might come in contact with live parts.

6.13 Overcurrent Protection

6.13.1 600 Volts, Nominal, or Less – The following requirements apply to overcurrent protection of circuits rated 600 volts, nominal, or less.

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6.13.2 *Protection of Conductors and Equipment* – Conductors and equipment shall be protected from overcurrent in accordance with their ability to safely conduct current. Conductors shall have sufficient ampacity to carry the load.

6.13.3 *Grounded Conductors* – Except for motor-running overload protection, overcurrent devices shall not interrupt the continuity of the grounded conductor unless all conductors of the circuit are opened simultaneously.

6.13.4 *Disconnection of Fuses and Thermal Cutouts* – Except for devices provided for current-limiting on the supply side of the service disconnecting means, all cartridge fuses which are accessible to other than qualified persons and all fuses and thermal cutouts on circuits over 150 volts to ground shall be provided with disconnecting means. This disconnecting means shall be installed so that the fuse or thermal cutout can be disconnected from its supply without disrupting service to equipment and circuits unrelated to those protected by the overcurrent device.

6.13.5 *Location in or on Premises* – Overcurrent devices shall be readily accessible. Overcurrent devices shall not be located where they could create an employee safety hazard by being exposed to physical damage or located in the vicinity of easily ignitable material.

6.13.6 *Arcing or Suddenly Moving Parts* – Fuses and circuit breakers shall be so located or shielded that employees will not be burned or otherwise injured by their operation.

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6.14 Circuit Breakers

6.14.1 Circuit breakers shall clearly indicate whether they are in the open (off) or closed (on) position.

6.14.2 Where circuit breaker handles on switchboards are operated vertically rather than horizontally or rotationally, the up position of the handle shall be the closed (on) position.

6.14.3 If used as switches in 120-volt, fluorescent lighting circuits, circuit breakers shall be marked "SWD".

6.14.4 *Over 600 Volts, Nominal* – Feeders and branch circuits over 600 volts, nominal, shall have short-circuit protection.

6.14.5 Grounding


6.14.6 *Systems to be Grounded* – The following systems which supply premises wiring shall be grounded:

6.14.6.1 *Three-Wire DC Systems* – All 3-wire DC systems shall have their neutral conductor grounded.

6.14.6.2 *Two-Wire DC Systems* – Two-wire DC systems operating at over 50 volts through 300 volts between conductors shall be grounded unless they are rectifier-derived from an AC system.

6.14.6.3 *AC Circuits, Less than 50 Volts* – AC circuits of less than 50 volts shall be grounded if they are installed as overhead conductors outside of buildings or if they are supplied by transformers and the transformer primary supply system is ungrounded or exceeds 150 volts to ground.

6.14.6.4 *AC Systems, 50 Volts to 1,000 Volts* – AC systems of 50 volts to 1000 volts shall be grounded under any of the following conditions:

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6.14.6.4.1 If the system can be so grounded that the maximum voltage to ground on the ungrounded conductors does not exceed 150 volts;

6.14.6.4.2 If the system is nominally rated 480Y/277 volt, 3-phase, 4-wire in which the neutral is used as a circuit conductor;

6.14.6.4.3 If the system is nominally rated 240/120 volt, 3-phase, 4-wire in which the midpoint of one phase is used as a circuit conductor; or

6.14.6.4.4 If a service conductor is uninsulated.

6.14.6.5 Qualified employees must adhere to the approach distances in Table S5:

TABLE S5

Voltage range (phase to phase) | Minimum approach distance

300V and less| Avoid Contact

Over 300V, not over 750V| 1 ft. 0 in. (30.5 cm).

Over 750V, not over 2kV| 1 ft. 6 in. (46 cm).

Over 2kV, not over 15kV| 2 ft. 0 in. (61 cm).


Over 15kV, not over 37kV| 3 ft. 0 in. (91 cm).

Over 37kV, not over 87.5kV| 3 ft. 6 in. (107 cm).

Over 87.5kV, not over 121kV| 4 ft. 0 in. (122 cm).

Over 121kV, not over 140kV| 4 ft. 6 in. (137 cm).

6.14.6.6 *Exceptions* – AC systems of 50 volts to 1000 volts are not required to be grounded if the system is separately derived and is supplied by a transformer that has a primary voltage

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rating less than 1000 volts, provided all of the following conditions are met:

- 6.14.6.6.1** The system is used exclusively for control circuits,
- 6.14.6.6.2** The conditions of maintenance and supervision assure that only qualified persons will service the installation,
- 6.14.6.6.3** Continuity of control power is required, and
- 6.14.6.6.4** Ground detectors are installed on the control system.


6.15 Portable and Vehicle-Mounted Generators

6.15.1 *Portable Generators* - Under the following conditions, the frame of a portable generator need not be grounded and may serve as the grounding electrode for a system supplied by the generator:

- 6.15.1.1** The generator supplies only equipment mounted on the generator and/or cord- and plug-connected equipment through receptacles mounted on the generator, and
- 6.15.1.2** The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.

6.15.2 *Vehicle-Mounted Generators* – Under the following conditions the frame of a vehicle may serve as the grounding electrode for a system supplied by a generator located on the vehicle:

- 6.15.2.1** The frame of the generator is bonded to the vehicle frame, and
 - 6.15.2.2** The generator supplies only equipment located on the vehicle and/or cord- and plug-connected equipment through receptacles mounted on the vehicle or on the generator, and
 - 6.15.2.3** The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame, and
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6.15.2.4 The system complies with all other provisions of this section.

6.15.3 *Neutral Conductor Bonding* – A neutral conductor shall be bonded to the generator frame if the generator is a component of a separately derived system. No other conductor need be bonded to the generator frame.

6.15.4 *Conductors to be Grounded* – For AC premises wiring systems the identified conductor shall be grounded.

6.16 Grounded Connections


6.16.1 *Grounded System* – For a grounded system, a grounding electrode conductor shall be used to connect both the equipment grounding conductor and the grounded circuit conductor to the grounding electrode. Both the equipment grounding conductor and the grounding electrode conductor shall be connected to the grounded circuit conductor on the supply side of the service disconnecting means, or on the supply side of the system disconnecting means or overcurrent devices if the system is separately derived.

6.16.2 *Ungrounded Systems* – For an ungrounded service-supplied system, the equipment grounding conductor shall be connected to the grounding electrode conductor at the service equipment. For an ungrounded separately derived system, the equipment grounding conductor shall be connected to the grounding electrode conductor at, or ahead of, the system disconnecting means or overcurrent devices.

6.16.3 *Grounding Path* – The path to ground from circuits, equipment, and enclosures shall be permanent and continuous.

6.17 Supports, Enclosures and Equipment to be Grounded

6.17.1 *Supports and Enclosures for Conductors* – Metal cable trays, metal raceways, and metal enclosures for conductors shall be grounded, except that:

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6.17.1.1 Metal enclosures such as sleeves that are used to protect cable assemblies from physical damage need not be grounded; and

6.17.1.2 Metal enclosures for conductors added to existing installations of open wire, knob-and-tube wiring, and nonmetallic-sheathed cable need not be grounded if all of the following conditions are met:

6.17.1.2.1Runs are less than 25 feet (7.62 m);

6.17.1.2.2Enclosures are free from probable contact with ground, grounded metal, metal laths, or other conductive materials; and

6.17.1.2.3Enclosures are guarded against employee contact.

6.17.2 *Service Equipment Enclosures* – Metal enclosures for service equipment shall be grounded.

6.17.3 *Fixed Equipment* – Exposed noncurrent-carrying metal parts of fixed equipment which may become energized shall be grounded under any of the following conditions:

6.17.3.1 If within 8 feet (2.44 m) vertically or 5 feet (1.52 m) horizontally of ground or grounded metal objects and subject to employee contact.


6.17.3.2 If located in a wet or damp location and subject to employee contact.

6.17.3.3 If in electrical contact with metal.

6.17.3.4 If in a hazardous (classified) location.

6.17.3.5 If supplied by a metal-clad, metal-sheathed, or grounded metal raceway wiring method.

6.17.3.6 If equipment operates with any terminal at over 150 volts to ground; however, the following need not be grounded:

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6.17.3.6.1 Enclosures for switches or circuit breakers used for other than service equipment and accessible to qualified persons only;

6.17.3.6.2 Metal frames of electrically heated appliances which are permanently and effectively insulated from ground; and

6.17.3.6.3 The cases of distribution apparatus such as transformers and capacitors mounted on wooden poles at a height exceeding 8 feet (2.44 m) above ground or grade level.

6.17.4 *Equipment Connected by Cord & Plug* – Under any of the conditions described in this section, exposed noncurrent-carrying metal parts of cord- and plug-connected equipment which may become energized shall be grounded:

6.17.4.1 If in a hazardous (classified) location.

6.17.4.2 If operated at over 150 volts to ground, except for guarded motors and metal frames of electrically heated appliances if the appliance frames are permanently and effectively insulated from ground.

6.17.4.3 Hand held motor-operated tools;


6.17.4.4 Cord- and plug-connected equipment used in damp or wet locations or by employees standing on the ground or on metal floors or working inside of metal tanks or boilers;

6.17.4.5 Portable and mobile X-ray and associated equipment;

6.17.4.6 Tools likely to be used in wet and/or conductive locations;

6.17.4.7 Portable hand lamps.

6.17.4.8 Tools likely to be used in wet and/or conductive locations need not be grounded if supplied through an isolating transformer with an ungrounded secondary of not over 50 volts. Listed or

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labeled portable tools and appliances protected by a system of double insulation, or its equivalent, need not be grounded. If such a system is employed, the equipment shall be distinctively marked to indicate that the tool or appliance utilizes a system of double insulation.


6.17.5 Nonelectrical Equipment – The metal parts of the following nonelectrical equipment shall be grounded: Frames and tracks of electrically operated cranes; frames of nonelectrically driven elevator cars to which electric conductors are attached; hand-operated metal shifting ropes or cables of electric elevators, and metal partitions, grill work, and similar metal enclosures around equipment of over 1kV between conductors.

6.18 Methods of Grounding Equipment

6.18.1 With Circuit Conductors – Noncurrent-carrying metal parts of fixed equipment, if required to be grounded by this program, shall be grounded by an equipment grounding conductor which is contained within the same raceway, cable, or cord, or runs with or encloses the circuit conductors. For DC circuits only, the equipment grounding conductor may be run separately from the circuit conductors.

6.18.2 Grounding Conductor – A conductor used for grounding fixed or movable equipment shall have capacity to conduct safely any fault current which may be imposed on it.

6.18.3 Equipment Considered Effectively Grounded – Electric equipment is considered to be effectively grounded if it is secured to, and in electrical contact with, a metal rack or structure that is provided for its support and the metal rack or structure is grounded by the method specified for the noncurrent-carrying metal parts of fixed equipment. Metal car frames supported by metal hoisting cables attached to or running over metal

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sheaves or drums of grounded elevator machines are also considered to be effectively grounded.

6.18.4 Bonding – If bonding conductors are used to assure electrical continuity, they shall have the capacity to conduct any fault current which may be imposed.

6.18.5 Made Electrodes – If made electrodes are used, they shall be free from nonconductive coatings, such as paint or enamel; and, if practicable, they shall be embedded below permanent moisture level. A single electrode consisting of a rod, pipe or plate which has a resistance to ground greater than 25 ohms shall be augmented by one additional electrode installed no closer than 6 feet (1.83 m) to the first electrode.


6.19 Grounding of Systems and Circuits or 1,000 Volts and Over (High Voltage)

6.19.1 General – If high voltage systems are grounded, they shall comply with all applicable provisions of paragraphs of this section.

6.19.2 Grounding of Systems Supplying Portable or Mobile Equipment – Systems supplying portable or mobile high voltage equipment, other than substations installed on a temporary basis, shall comply with the following:

6.19.2.1 Portable and mobile high voltage equipment shall be supplied from a system having its neutral grounded through an impedance. If a delta-connected high voltage system is used to supply the equipment, a system neutral shall be derived.

6.19.2.2 Exposed noncurrent-carrying metal parts of portable and mobile equipment shall be connected by an equipment grounding conductor to the point at which the system neutral impedance is grounded.

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6.19.2.3 Ground-fault detection and relaying shall be provided to automatically de-energize any high voltage system component which has developed a ground fault. The continuity of the equipment grounding conductor shall be continuously monitored so as to de-energize automatically the high voltage feeder to the portable equipment upon loss of continuity of the equipment grounding conductor.

6.19.2.4 The grounding electrode to which the portable or mobile equipment system neutral impedance is connected shall be isolated from and separated in the ground by at least 20 feet (6.1 m) from any other system or equipment grounding electrode, and there shall be no direct connection between the grounding electrodes, such as buried pipe, fence or like objects.

6.19.3 *Grounding of Equipment* – All noncurrent-carrying metal parts of portable equipment and fixed equipment including their associated fences, housings, enclosures, and supporting structures shall be grounded. However, equipment which is guarded by location and isolated from ground need not be grounded. Additionally, pole-mounted distribution apparatus at a height exceeding 8 feet (2.44 m) above ground or grade level need not be grounded.

6.20 Wiring Methods, Components and Equipment:

6.20.1 *Electrical Continuity of Metal Raceways and Enclosures* – Metal raceways, cable armor, and other metal enclosures for conductors shall be metallically joined together into a continuous electric conductor and shall be so connected to all boxes, fittings, and cabinets as to provide effective electrical continuity.

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6.20.2 Wiring in Ducts – No wiring systems of any type shall be installed in ducts used to transport dust, loose stock or flammable vapors. No wiring system of any type shall be installed in any duct used for vapor removal or in any shaft containing only such ducts.

6.21 Temporary Wiring

6.21.1 Temporary wiring shall be removed immediately upon completion of construction or the purpose for which the wiring was installed.


6.21.2 General Requirements for Temporary Wiring

6.21.2.1 Feeders shall originate in a distribution center. The conductors shall be run as multiconductor cord or cable assemblies or within raceways; or, where not subject to physical damage, they may be run as open conductors on insulators not more than 10 feet (3.05 m) apart.

6.21.2.2 Branch circuits shall originate in a power outlet or panelboard. Conductors shall be run as multiconductor cord or cable assemblies or open conductors, or shall be run in raceways.

6.21.2.3 All conductors shall be protected by overcurrent devices at their ampacity. Runs of open conductors shall be located where the conductors will not be subject to physical damage, and the conductors shall be fastened at intervals not exceeding 10 feet (3.05 m). No branch-circuit conductors shall be laid on the floor. Each branch circuit that supplies receptacles or fixed equipment shall contain a separate equipment grounding conductor if the branch circuit is run as open conductors.

6.21.2.4 Receptacles shall be of the grounding type. Unless installed in a complete metallic raceway, each branch circuit shall contain a separate equipment grounding conductor, and all receptacles

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shall be electrically connected to the grounding conductor.

Receptacles for uses other than temporary lighting shall not be installed on branch circuits which supply temporary lighting.

Receptacles shall not be connected to the same ungrounded conductor of multiwire circuits which supply temporary lighting.

6.21.2.5 Disconnecting switches or plug connectors shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit.

6.21.2.6 All lamps for general illumination shall be protected from accidental contact or breakage. Metal-case sockets shall be grounded.

6.21.2.7 Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this means of suspension.


6.21.2.8 Portable electric lighting used in wet and/or other conductive locations, as for example, drums, tanks, and vessels, shall be operated at 12 volts or less. However, 120-volt lights may be used if protected by a ground-fault circuit interrupter.

6.21.2.9 A box shall be used wherever a change is made to a raceway system or a cable system which is metal clad or metal sheathed.

6.21.2.10 Flexible cords and cables shall be protected from damage.

Sharp corners and projections shall be avoided. Flexible cords and cables may pass through doorways or other pinch points, if protection is provided to avoid damage.

6.21.2.11 Extension cord sets used with portable electric tools and appliances shall be of three-wire type and shall be designed for

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hard or extra-hard usage. Flexible cords used with temporary and portable lights shall be designed for hard or extra-hard usage.

NOTE: The National Electrical Code, ANSI/NFPA 70, in Article 400, Table 400-4, lists various types of flexible cords, some of which are noted as being designed for hard or extra-hard usage. Examples of these types of flexible cords include hard service cord (types S, ST, SO, STO) and junior hard service cord (types SJ, SJO, SJT, SJTO).


6.21.3 Guarding – For temporary wiring over 600 volts, nominal, fencing, barriers, or other effective means shall be provided to prevent access of other than authorized and qualified personnel.

6.21.4 Cabinets, Boxes and Fittings

6.21.5 Conductors Entering Boxes, Cabinets or Fittings – Conductors entering boxes, cabinets, or fittings shall be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall also be effectively closed.


6.21.6 Covers and Canopies – All pull boxes, junction boxes, and fittings shall be provided with covers. If metal covers are used, they shall be grounded. In energized installations each outlet box shall have a cover, faceplate, or fixture canopy. Covers of outlet boxes having holes through which flexible cord pendants pass shall be provided with bushings designed for the purpose or shall have smooth, well-rounded surfaces on which the cords may bear.

6.21.7 Pull and Junction Boxes for Systems Over 600 Volts, Nominal – In addition to other requirements in this section for pull and junction boxes,

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the following shall apply to these boxes for systems over 600 volts, nominal:

- 6.21.7.1** *Complete Enclosure* – Boxes shall provide a complete enclosure for the contained conductors or cables.
- 6.21.7.2** *Covers* – Boxes shall be closed by covers securely fastened in place. Underground box covers that weigh over 100 pounds (43.6 kg) meet this requirement. Covers for boxes shall be permanently marked "HIGH VOLTAGE." The marking shall be on the outside of the box cover and shall be readily visible and legible.
- 6.21.7.3** *Knife Switches* – Single-throw knife switches shall be so connected that the blades are dead when the switch is in the open position. Single-throw knife switches shall be so placed that gravity will not tend to close them. Single-throw knife switches approved for use in the inverted position shall be provided with a locking device that will ensure that the blades remain in the open position when so set. Double-throw knife switches may be mounted so that the throw will be either vertical or horizontal. However, if the throw is vertical, a locking device shall be provided to ensure that the blades remain in the open position when so set.
- 6.21.7.4** *Switchboards & Panelboards* – Switchboards that have any exposed live parts shall be located in permanently dry locations and accessible only to qualified persons. Panelboards shall be mounted in cabinets, cutout boxes, or enclosures designed for the purpose and shall be dead front. However, panelboards other than the dead front externally-operable type are permitted

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where accessible only to qualified persons. Exposed blades of knife switches shall be dead when open.

6.21.7.5 *Enclosures for Damp or Wet Locations*

6.21.7.6 *Cabinets, Fittings & Boxes* – Cabinets, cutout boxes, fittings, boxes, and panelboard enclosures in damp or wet locations shall be installed so as to prevent moisture or water from entering and accumulating within the enclosures. In wet locations the enclosures shall be weatherproof.

6.21.7.7 *Switches and Circuit Breakers* – Switches, circuit breakers, and switchboards installed in wet locations shall be enclosed in weatherproof enclosures.

6.21.7.8 *Conductors for General Wiring* – All conductors used for general wiring shall be insulated unless otherwise permitted in this program. The conductor insulation shall be of a type that is suitable for the voltage, operating temperature, and location of use. Insulated conductors shall be distinguishable by appropriate color or other means as being grounded conductors, ungrounded conductors, or equipment grounding conductors.

6.22 Flexible Cords & Cables


6.22.1 Use of Flexible Cords & Cables:

6.22.1.1 *Permitted Uses* – Flexible cords and cables shall be suitable for conditions of use and location. Flexible cords and cables shall be used only for:

6.22.1.1.1 Pendants;

6.22.1.1.2 Wiring of Fixtures;

6.22.1.1.3 Connection of portable lamps or appliances;

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6.22.1.1.4 Elevator cables;

6.22.1.1.5 Wiring of cranes and hoists;

6.22.1.1.6 Connection of stationary equipment to facilitate their frequent interchange;

6.22.1.1.7 Prevention of the transmission of noise or vibration; or

6.22.1.1.8 Appliances where the fastening means and mechanical connections are designed to permit removal for maintenance and repair.

6.22.1.2 *Prohibited Uses* – Flexible cords and cables shall not be used:

6.22.1.2.1 As a substitute for the fixed wiring of a structure;

6.22.1.2.2 Where run through holes in walls, ceilings or floors;

6.22.1.2.3 Where run through doorways, windows or similar openings (except as permitted);

6.22.1.2.4 Where attached to building surfaces; or


6.22.1.2.5 Where concealed behind building walls, ceilings or floors.

6.23 Identification, Splices and Terminations

6.23.1 *Identification* – A conductor of a flexible cord or cable that is used as a grounded conductor or an equipment grounding conductor shall be distinguishable from other conductors.

6.23.2 *Marking* – Type SJ, SJO, SJT, SJTO, S, SO, ST and STO cords shall not be used unless durably marked on the surface with the type designation, size and number of conductors.

6.23.3 *Splices* – Flexible cords shall be used only in continuous lengths without splice or tap. Hard service flexible cords No. 12 or larger may be repaired if spliced so that the splice retains the insulation, outer sheath properties and usage characteristics of the cord being spliced.

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6.23.4 Strain Relief – Flexible cords shall be connected to devices and fittings so that strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.

6.23.5 Cords Passing Through Hole – Flexible cords and cables shall be protected by bushings or fittings where passing through holes in covers, outlet boxes or similar enclosures.


6.23.6 Portable Cables Over 600 Volts, Nominal – Multiconductor portable cable for use in supplying power to portable or mobile equipment at over 600 volts, nominal, shall consist of No. 8 or larger conductors employing flexible stranding. Cables operated at over 2000 volts shall be shielded for the purpose of confining the voltage stresses to the insulation. Grounding conductors shall be provided. Connectors for these cables shall be of a locking type with provisions to prevent their opening or closing while energized. Strain relief shall be provided at connections and terminations. Portable cables shall not be operated with splices unless the splices are of the permanent molded, vulcanized or other equivalent type. Termination enclosures shall be marked with a high voltage hazard warning, and terminations shall be accessible only to authorized and qualified personnel.

6.24 Fixture Wires

6.24.1 General – Fixture wires shall be suitable for the voltage, temperature and location of use. A fixture wire which is used as a grounded conductor shall be identified.

6.24.2 Uses Permitted – Fixture wires may be used:

6.24.2.1 For installation in lighting, fixtures and in similar equipment where enclosed or protected and not subject to bending or twisting in use; or

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6.24.2.2 For connecting lighting fixtures to the branch-circuit conductors supplying the fixtures.

6.24.3 *Uses Not Permitted* – Fixture wires shall not be used as branch-circuit conductors except as permitted for Class 1 power-limited circuits.

6.25 Equipment for General Use

6.25.1 Lighting Fixtures, Lampholders, Lamps and Receptacles

6.25.1.1 *Live Parts* – Fixtures, lampholders, lamps, rosettes and receptacles shall have no live parts normally exposed to employee contact. However, rosettes and cleat-type lampholders and receptacles located at least 8 feet (2.44 m) above the floor may have exposed parts.


6.25.1.2 *Support* – Fixtures, lampholders, rosettes, and receptacles shall be securely supported. A fixture that weighs more than 6 pounds (2.72 kg) or exceeds 16 inches (406 mm) in any dimension shall not be supported by the screw shell of a lampholder.

6.25.1.3 *Portable Lamps* – Portable lamps shall be wired with flexible cord and an attachment plug of the polarized or grounding type. If the portable lamp uses an Edison-based lampholder, the grounded conductor shall be identified and attached to the screw shell and the identified blade of the attachment plug. In addition, portable handlamps shall comply with the following:

6.25.1.3.1 Metal Shell, paperlined lampholders shall not be used;

6.25.1.3.2 Handlamps shall be equipped with a handle of molded composition or other insulating material;

6.25.1.3.3 Handlamps shall be equipped with a substantial guard attached to the lampholder or handle;

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6.25.1.3.4 Metallic guards shall be grounded by the means of an equipment grounding conductor run within the power supply cord.

6.25.1.4 *Lampholders* – Lampholders of the screw-shell type shall be installed for use as lampholders only. Lampholders installed in wet or damp locations shall be of the weatherproof type.

6.25.1.5 *Fixtures* – Fixtures installed in wet or damp locations shall be identified for the purpose and shall be installed so that water cannot enter or accumulate in wireways, lampholders or other electrical parts.


6.25.2 Receptacles, Cord Connectors and Attachment Plugs (Caps)

6.25.2.1 *Configuration* – Receptacles, cord connectors, and attachment plugs shall be constructed so that no receptacle or cord connector will accept an attachment plug with a different voltage or current rating than that for which the device is intended. However, a 20-ampere T-slot receptacle or cord connector may accept a 15-ampere attachment plug of the same voltage rating. Receptacles connected to circuits having different voltages, frequencies, or types of current (ac or dc) on the same premises shall be of such design that the attachment plugs used on these circuits are not interchangeable.

6.25.2.2 *Damp and Wet Locations* – A receptacle installed in a wet or damp location shall be designed for the location.

6.26 Appliances

6.26.1 *Live Parts* – Appliances, other than those in which the current-carrying parts at high temperatures are necessarily exposed, shall have no live parts normally exposed to employee contact.

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6.26.2 Disconnecting Means – A means shall be provided to disconnect each appliance.

6.26.3 Rating – Each appliance shall be marked with its rating in volts and amperes or volts and watts.

6.26.4 Motors – This paragraph applies to motors, motor circuits and controllers.

6.26.5 In Sight From – If specified that one piece of equipment shall be “in sight from” another piece of equipment, one shall be visible and not more than 50 feet (15.2 m) from the other.

6.27 Disconnecting Means


6.27.1 A disconnecting means shall be located in sight from the controller location. The controller disconnecting means for motor branch circuits over 600 volts, nominal, may be out of sight of the controller, if the controller is marked with a warning label giving the location and identification of the disconnecting means which is to be locked in the open position.

6.27.2 The disconnecting means shall disconnect the motor and the controller from all ungrounded supply conductors and shall be so designed that no pole can be operated independently.

6.27.3 If a motor and the driven machinery are not in sight from the controller location, the installation shall comply with one of the following conditions:

6.27.3.1 The controller disconnecting means shall be capable of being locked in the open position.

6.27.3.2 A manually operable switch that will disconnect the motor from its source of supply shall be placed in sight from the motor location.

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6.27.3.3 The disconnecting means shall plainly indicate whether it is in the open (off) or closed (on) position.

6.27.3.4 The disconnecting means shall be readily accessible. If more than one disconnect is provided for the same equipment, only one need be readily accessible.

6.27.4 An individual disconnecting means shall be provided for each motor, but a single disconnecting means may be used for a group of motors under any one of the following conditions:


6.27.4.1 If a number of motors drive special parts of a single machine or piece of apparatus, such as a metal or woodworking machine, crane or hoist;

6.27.4.2 If a group of motors is under the protection of one set of branch-circuit protective devices; or

6.27.4.3 If a group of motors is in a single room in sight from the location of the disconnecting means.

6.27.5 *Motor Overload, Short-Circuit and Ground-Fault Protection* - Motors, motor-control apparatus, and motor branch-circuit conductors shall be protected against overheating due to motor overloads or failure to start, and against short-circuits or ground faults. These provisions do not require overload protection that will stop a motor where a shutdown is likely to introduce additional or increased hazards, as in the case of fire pumps, or where continued operation of a motor is necessary for a safe shutdown of equipment or process and motor overload sensing devices are connected to a supervised alarm.

6.28 Protection of Live Parts-All Voltages

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6.28.1 Stationary motors having commutators, collectors, and brush rigging located inside of motor end brackets and not conductively connected to supply circuits operating at more than 150 volts to ground need not have such parts guarded. Exposed live parts of motors and controllers operating at 50 volts or more between terminals shall be guarded against accidental contact by any of the following:

6.28.1.1 By installation in a room or enclosure that is accessible only to qualified persons;

6.28.1.2 By installation on a balcony, gallery or platform, so elevated and arranged as to exclude unqualified persons; or

6.28.1.3 By elevation 8 feet (2.44 m) or more above the floor.

6.28.2 Where live parts of motors or controllers operating at over 150 volts to ground are guarded against accidental contact only by location, and where adjustment or other attendance may be necessary during the operation of the apparatus, insulating mats or platforms shall be provided so that the attendant cannot readily touch live parts unless standing on the mats or platforms.


6.29 Transformers

6.29.1 *Application* – The following paragraphs cover the installation of all transformers, except:

6.29.1.1 Current transformers;

6.29.1.2 Dry-type transformers installed as a component part of other apparatus;

6.29.1.3 Transformers which are an integral part of an X-ray, high frequency or electrostatic-coating apparatus;

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6.29.1.4 Transformers used with Class 2 and Class 3 circuits, sign and outline lighting, electric discharge lighting and power-limited fire-protective signaling circuits.

6.29.2 *Operating Voltage* – The operating voltage of exposed live parts of transformer installations shall be indicated by warning signs or visible markings on the equipment or structure.

6.29.3 *Transformers Over 35 kV* – Dry-type, high fire point liquid-insulated, and askarel-insulated transformers installed indoors and rated over 35 kV shall be in a vault.

6.29.4 *Oil-Insulated Transformers* – If they present a fire hazard to employees, oil insulated transformers installed indoors shall be in a vault.

6.29.5 *Fire Protection* – Combustible material, combustible buildings and parts of buildings, fire escapes and door and window openings shall be safeguarded from fires which may originate in oil-insulated transformers attached to or adjacent to a building or combustible material.


6.29.6 *Transformer Vaults* – Transformer vaults shall be constructed so as to contain fire and combustible liquids within the vault and to prevent unauthorized access. Locks and latches shall be so arranged that a vault door can be readily opened from the inside.

6.29.7 *Pipes and Ducts* – Any pipe or duct system foreign to the vault installation shall not enter or pass through a transformer vault.

6.29.8 *Material Storage* – Materials shall not be stored in transformer vaults.

6.30 Capacitors

6.30.1 *Drainage of Stored Charge* – All capacitors, except surge capacitors or capacitors included as a component part of other apparatus, shall be provided with an automatic means of draining the stored charge and

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maintaining the discharged state after the capacitor is disconnected from its source of supply.

6.30.2 Over 600 Volts – Capacitors rated over 600 volts, nominal, shall comply with the following additional requirements:

6.30.2.1 Isolating or disconnecting switches (with no interrupting rating) shall be interlocked with the load interrupting device or shall be provided with prominently displayed caution signs to prevent switching load current.

6.30.3 For series capacitors the proper switching shall be assured by use of at least one of the following:

6.30.3.1 Mechanically sequenced isolating and bypass switches;

6.30.3.2 Interlocks; or

6.30.3.3 Switching procedure prominently displayed at the switching location.

6.31 Batteries:


6.31.1 Batteries of the unsealed type shall be located in enclosures with outside vents or in well ventilated rooms and shall be arranged so as to prevent the escape of fumes, gases or electrolyte spray into other areas.

6.31.2 Ventilation shall be provided to ensure diffusion of the gases from the battery and to prevent the accumulation of an explosive mixture.

6.31.3 Racks and trays shall be substantial and shall be treated to make them resistant to the electrolyte.

6.31.4 Floors shall be of acid resistant construction unless protected from acid accumulation.

6.31.5 Face shields, aprons and rubber gloves shall be provided for workers handling acids or batteries.

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6.31.6 Facilities for quick drenching of the eyes and body shall be provide within 25 feet (7.62 m) or battery handling areas.

6.31.7 Facilities shall be provided for flushing and neutralizing spilled electrolyte and for fire protection.

a. Charging

- a. Battery charging installations shall be located in areas designated for that purpose.
- b. Charging apparatus shall be protected from damage by trucks.
- c. When batteries are being charged, the vent caps shall be kept in place to avoid electrolyte spray. Vent caps shall be maintained in functioning condition.

6.32 Safety Related Work Practices:

6.32.1 **Refer to Carbon America Control of Hazardous Energy (LOTO) and Electrical Arc Safety programs contained in this manual.**


6.33 Definitions:

6.33.1 *Accepted* – An installation is “accepted” if it has been inspected and found to be safe by a qualified testing laboratory.

6.33.2 *Accessible* (as applied to wiring methods) – Capable of being removed or exposed without damaging the building structure or finish, or not permanently closed in by the structure or finish of the building. (See “**concealed**” and “**exposed**”)

6.33.3 *Accessible* (as applied to equipment) – Admitting close approach; not guarded by locked doors, elevation or other effective means. (See “**Readily accessible**”)

6.33.4 *Ampacity* – The current in amperes a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

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6.33.5 Appliances – Utilization equipment, generally other than industrial, normally built in standardized sizes or types, which is installed or connected as a unit to perform one or more functions.

6.33.6 Approved – Acceptable under OSHA regulations.

6.33.7 Askarel – A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media. Askarels of various compositional types are used. Under arcing conditions the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases depending upon the askarel type.


6.33.8 Attachment Plug (Plug Cap) (Cap) - A device which, by insertion in a receptacle, establishes connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

6.33.9 Automatic – Self-acting, operating by its own mechanism when actuated by some impersonal influence, as for example, a change in current strength, pressure, temperature or mechanical configuration.

6.33.10 Bonding – The permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

6.33.11 Bonding Jumper – A reliable conductor to assure the required electrical conductivity between metal parts required to be electrically connected.

6.33.12 Branch circuit – The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

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6.33.13 Building – A structure which stands alone or which is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

6.33.14 Cabinet – An enclosure designed either for surface or flush mounting, and provided with a frame, mat or trim in which a swinging door or doors are or may be hung.

6.33.15 Certified – Equipment is “certified” if it:


6.33.15.1 Has been tested and found by a qualified testing laboratory to meet applicable test standards or to be safe for use in a specified manner, and

6.33.15.2 Is of a kind whose production is periodically inspected by a qualified testing laboratory. Certified equipment must bear a label, tag or other record of certification.

6.33.16 Circuit Breaker (600 volts nominal, or less) – A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without injury to itself when properly applied within its rating.

6.33.17 Circuit Breaker (Over 600 volts nominal) – A switching device capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time, and breaking currents under specified abnormal circuit conditions, such as those of short circuit.

6.33.18 Class I Locations – Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

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6.33.18.1 *Class I, Division 1* – A Class I, Division 1 location is a location:

6.33.18.2 In which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions; or


6.33.18.3 In which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or

6.33.18.4 In which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

NOTE: This classification usually includes locations where volatile flammable liquids or liquefied flammable gases are transferred from one container to another; interiors of spray booths and areas in the vicinity of spraying and painting operations where volatile flammable solvents are used; locations containing open tanks or vats of volatile flammable liquids; drying rooms or compartments for the evaporation of flammable solvents; inadequately ventilated pump rooms for flammable gas or for volatile flammable liquids; and all other locations where ignitable concentrations of flammable vapors or gases are likely to occur in the course of normal operations.

6.33.19 *Class I, Division 2* – A Class I, Division 2 location is a location:

6.33.19.1 In which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only

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in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or

6.33.19.2 In which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or

6.33.19.3 That is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

NOTE: This classification usually includes locations where volatile flammable liquids or flammable gases or vapors are used, but which would become hazardous only in case of an accident or of some unusual operating condition. The quantity of flammable material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that merit consideration in determining the classification and extent of each location.

Piping without valves, checks, meters, and similar devices would not ordinarily introduce a hazardous condition even though used for flammable liquids or gases. Locations used for the storage of flammable liquids or of liquefied or compressed gases in sealed containers would not normally be considered hazardous unless also subject to other hazardous conditions.

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Electrical conduits and their associated enclosures separated from process fluids by a single seal or barrier are classed as a Division 2 location if the outside of the conduit and enclosures is a nonhazardous location.

6.34 Class II Locations – Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:


6.34.1 Class II, Division 1 – A Class II, Division 1 location is a location:

- 6.34.1.1** In which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or
- 6.34.1.2** Where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or
- 6.34.1.3** In which combustible dusts of an electrically conductive nature may be present.

NOTE: Dusts containing magnesium or aluminum are particularly hazardous and the use of extreme caution is necessary to avoid ignition and explosion.

6.34.2 Class II, Division 2 – A Class II, Division 2 location is a location in which:

- 6.34.2.1** Combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with

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the normal operation of electrical equipment or other apparatus;
or


6.34.2.2 Dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment, and dust accumulations resulting therefrom may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

NOTE: This classification includes locations where dangerous concentrations of suspended dust would not be likely but where dust accumulations might form on or in the vicinity of electric equipment. These areas may contain equipment from which appreciable quantities of dust would escape under abnormal operating conditions or be adjacent to a Class II Division 1 location, as described above, into which an explosive or ignitable concentration of dust may be put into suspension under abnormal operating conditions.

6.35 *Class III Locations* - Class III locations are those that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class 111 locations include the following:

6.35.1 *Class III, Division 1* - A Class III, Division 1 location is a location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.

NOTE: Easily ignitable fibers and flyings include rayon, cotton (including cotton linters and cotton waste), sisal or henequen, istle, jute, hemp, tow, cocoa fiber, oakum, baled waste kapok, Spanish moss, excelsior, sawdust, woodchips, and other material of similar nature.

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6.35.2 Class III, Division 2 - A Class III, Division 2 location is a location in which easily ignitable fibers are stored or handled, except in process of manufacture.

6.36 Collector Ring – A collector ring is an assembly of slip rings for transferring electrical energy from a stationary to a rotating member.

6.37 Concealed - Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them. [See "**Accessible**. (As applied to wiring methods.)"]

6.38 Conductor Bare – A conductor having no covering or electrical insulation whatsoever.

6.39 Conductor Covered - A conductor encased within material of composition or thickness that is not recognized as electrical insulation.


6.40 Conductor Insulated - A conductor encased within material of composition and thickness that is recognized as electrical insulation.

6.41 Controller - A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

6.42 Cutout (Over 600 volts, nominal) - An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link), or may act as the disconnecting blade by the inclusion of a nonfusible member.

6.43 Cutout Box - An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box proper. (See "**Cabinet**.")

6.44 Dead Front - Without live parts exposed to a person on the operating side of the equipment.

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6.45 Device - A unit of an electrical system which is intended to carry but not utilize electric energy.

6.46 Disconnecting Means - A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

6.47 Disconnecting (or Isolating) Switch (Over 600 volts, nominal) - A mechanical switching device used for isolating a circuit or equipment from a source of power.


6.48 Enclosed - Surrounded by a case, housing, fence or walls which will prevent persons from accidentally contacting energized parts.

6.49 Enclosure - The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts, or to protect the equipment from physical damage.


6.50 Equipment - A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like, used as a part of, or in connection with, an electrical installation.

6.51 Explosion-Proof Apparatus - Apparatus enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor which may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and which operates at such an external temperature that it will not ignite a surrounding flammable atmosphere.

6.52 Exposed (As applied to live parts) - Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts not suitably guarded, isolated, or insulated. (See "**Accessible**" and "**Concealed**.")

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- 6.53 Exposed (As applied to wiring methods)** - On or attached to the surface or behind panels designed to allow access. [See "**Accessible**. (As applied to wiring methods.)"]
- 6.54 Exposed (for the purposes of § 1926.408(d), Communications systems)** - Where the circuit is in such a position that in case of failure of supports or insulation, contact with another circuit may result.
- 6.55 Externally Operable** - Capable of being operated without exposing the operator to contact with live parts.
- 6.56 Feeder** - All circuit conductors between the service equipment, or the generator switchboard of an isolated plant, and the final branch-circuit overcurrent device.
- 6.57 Festoon Lighting** - A string of outdoor lights suspended between two points more than 15 feet (4.57 m) apart.
- 6.58 Fitting** - An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.
- 6.59 Fuse (Over 600 volts, nominal)** - An overcurrent protective device with a circuit opening fusible part that is heated and severed by the passage of overcurrent through it. A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.
- 6.60 Ground** - A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.
- 6.61 Grounded** - Connected to earth or to some conducting body that serves in place of the earth.
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6.62 *Grounded, Effectively (Over 600 volts, nominal)* - Permanently connected to earth through a ground connection of sufficiently low impedance and having sufficient ampacity that ground fault current which may occur cannot build up to voltages dangerous to personnel.

6.63 *Grounded Conductor* – A system or circuit conductor that is intentionally grounded.


6.64 *Grounding Conductor* - A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.

6.65 *Grounding Conductor, Equipment* - The conductor used to connect the noncurrent-carrying metal parts of equipment, raceways, and other enclosures to the system grounded conductor and/or the grounding electrode conductor at the service equipment or at the source of a separately derived system.


6.66 *Grounding Electrode Conductor* - The conductor used to connect the grounding electrode to the equipment grounding conductor and/or to the grounded conductor of the circuit at the service equipment or at the source of a separately derived system.

6.67 *Ground-Fault Circuit Interrupter* - A device for the protection of personnel that functions to deenergize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.


6.68 *Guarded* - Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach to a point of danger or contact by persons or objects.

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- 6.69** *Hoistway* - Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.
- 6.70** *Identified (conductors or terminals)* - Identified, as used in reference to a conductor or its terminal, means that such conductor or terminal can be recognized as grounded.
- 6.71** *Identified (for the use)* - Recognized as suitable for the specific purpose, function, use, environment, application, etc. where described as a requirement in this standard. Suitability of equipment for a specific purpose, environment, or application is determined by a qualified testing laboratory where such identification includes labeling or listing.
- 6.72** *Interrupter Switch (Over 600 volts, nominal)* - A switch capable of making, carrying, and interrupting specified currents.
- 6.73** *Intrinsically Safe Equipment and Associated Wiring* - Equipment and associated wiring in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable, under certain prescribed test conditions, of causing ignition of a mixture of flammable or combustible material in air in its most easily ignitable concentration.
- 6.74** *Isolated* – Not readily accessible to persons unless special means for access are used.
- 6.75** *Isolated Power System* - A system comprising an isolating transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors.
- 6.76** *Labeled* - Equipment or materials to which has been attached a label, symbol or other identifying mark of a qualified testing laboratory which indicates compliance with appropriate standards or performance in a specified manner.
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- 6.77** *Lighting Outlet* - An outlet intended for the direct connection of a lampholder, a lighting fixture, or a pendant cord terminating in a lampholder.
- 6.78** *Listed* - Equipment or materials included in a list published by a qualified testing laboratory whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.
- 6.79** *Location (Damp)* - Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements.
- 6.80** *Location (Dry)* - A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.
- 6.81** *Location (Wet)* - Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as locations exposed to weather and unprotected.
- 6.82** *Mobile X-Ray* - X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled.
- 6.83** *Motor Control Center* - An assembly of one or more enclosed sections having a common power bus and principally containing motor control units.
- 6.84** *Outlet* - A point on the wiring system at which current is taken to supply utilization equipment.
- 6.85** *Overcurrent* - Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload (see definition), short circuit, or ground fault. A current in excess of rating may be
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accommodated by certain equipment and conductors for a given set of conditions. Hence the rules for overcurrent protection are specific for particular situations.

- 6.86** *Overload* - Operation of equipment in excess of normal, full load rating, or of a conductor in excess of rated ampacity which, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload. (See "**Overcurrent.**")
- 6.87** *Panelboard* - A single panel or group of panel units designed for assembly in the form of a single panel; including buses, automatic overcurrent devices, and with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall or partition and accessible only from the front. (See "Switchboard.")
- 6.88** *Power Outlet* - An enclosed assembly which may include receptacles, circuit breakers, fuseholders, fused switches, buses and watt-hour meter mounting means; intended to serve as a means for distributing power required to operate mobile or temporarily installed equipment.
- 6.89** *Premises Wiring System* - That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all of its associated hardware, fittings, and wiring devices, both permanently and temporarily installed, which extends from the load end of the service drop, or load end of the service lateral conductors to the outlet(s). Such wiring does not include wiring internal to appliances, fixtures, motors, controllers, motor control centers, and similar equipment.
- 6.90** *Qualified Person* - One familiar with the construction and operation of the equipment and the hazards involved.
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6.91 *Qualified Testing Laboratory* - A properly equipped and staffed testing laboratory which has capabilities for and which provides the following services:

6.91.1 Experimental testing for safety of specified items of equipment and materials referred to in this standard to determine compliance with appropriate test standards or performance in a specified manner;

6.91.2 Inspecting the run of such items of equipment and materials at factories for product evaluation to assure compliance with the test standards;


6.91.3 Service-value determinations through field inspections to monitor the proper use of labels on products and with authority for recall of the label in the event a hazardous product is installed;

6.91.4 Employing a controlled procedure for identifying the listed and/or labeled equipment or materials tested; and


6.91.5 Rendering creditable reports or findings that are objective and without bias of the tests and test methods employed.

6.92 *Raceway* - A channel designed expressly for holding wires, cables, or busbars. Raceways may be of metal or insulating material, and the term includes rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible metal conduit, flexible metallic tubing, flexible metal conduit, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, wireways, and busways.

6.93 *Readily Accessible* - Capable of being reached quickly for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc. (See "**Accessible**.")

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- 6.94** *Receptacle* - A receptacle is a contact device installed at the outlet for the connection of a single attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is a single device containing two or more receptacles.
- 6.95** *Receptacle Outlet* – An outlet where one or more receptacles are installed.
- 6.96** *Remote-Control Circuit* - Any electric circuit that controls any other circuit through a relay or an equivalent device.
- 6.97** *Sealable Equipment* - Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure. The equipment may or may not be operable without opening the enclosure.
- 6.98** *Separately Derived System* - A premises wiring system whose power is derived from generator, transformer, or converter windings and has no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system.
- 6.99** *Service* - The conductors and equipment for delivering energy from the electricity supply system to the wiring system of the premises served.
- 6.100** *Service Conductors* - The supply conductors that extend from the street main or from transformers to the service equipment of the premises supplied.
- 6.101** *Service Drop* - The overhead service conductors from the last pole or other aerial support to and including the splices, if any, connecting to the service-entrance conductors at the building or other structure.
- 6.102** *Service-Entrance Conductors, Overhead System* - The service conductors between the terminals of the service equipment and a point usually
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outside the building, clear of building walls, where joined by tap or splice to the service drop.

6.103 Service-Entrance Conductors, Underground System - The service conductors between the terminals of the service equipment and the point of connection to the service lateral. Where service equipment is located outside the building walls, there may be no service-entrance conductors, or they may be entirely outside the building.

6.104 Service Equipment - The necessary equipment, usually consisting of a circuit breaker or switch and fuses, and their accessories, located near the point of entrance of supply conductors to a building or other structure, or an otherwise defined area, and intended to constitute the main control and means of cutoff of the supply.

6.105 Service Raceway - The raceway that encloses the service-entrance conductors.


6.106 Signaling Circuit - Any electric circuit that energizes signaling equipment.

6.107 Switchboard - A large single panel, frame, or assembly of panels which have switches, buses, instruments, overcurrent and other protective devices mounted on the face or back or both. Switchboards are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. (See "**Panelboard**.")

6.108 Switches

6.108.1 General Use Switch - A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage.

6.108.2 General Use Snap Switch - A form of general-use switch so constructed that it can be installed in flush device boxes or on outlet

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box covers, or otherwise used in conjunction with wiring systems recognized by this program.

6.108.3 *Isolating Switch* - A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

6.108.4 *Motor-Circuit Switch* - A switch, rated in horsepower, capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

6.109 *Switching Devices (Over 600 volts, nominal)* - Devices designed to close and/or open one or more electric circuits. Included in this category are circuit breakers, cutouts, disconnecting (or isolating) switches, disconnecting means, and interrupter switches.


6.110 *Transportable X-Ray* - X-ray equipment installed in a vehicle or that may readily be disassembled for transport in a vehicle.

6.111 *Utilization Equipment* - Utilization equipment means equipment which utilizes electric energy for mechanical, chemical, heating, lighting, or similar useful purpose.

6.112 *Utilization System* - A utilization system is a system which provides electric power and light for employee workplaces, and includes the premises wiring system and utilization equipment.

6.113 *Ventilated* - Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

6.114 *Volatile Flammable Liquid* - A flammable liquid having a flash point below 38 degrees C (100 degrees F) or whose temperature is above its flash point, or a Class II combustible liquid having a vapor

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pressure not exceeding 40 psia (276 kPa) at 38 deg. C (100 deg. F) whose temperature is above its flash point.


6.115 *Voltage (Of a Circuit)* - The greatest root-mean-square (effective) difference of potential between any two conductors of the circuit concerned.

6.116 *Voltage, Nominal* - A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (as 120/240, 480Y/277, 600, etc.). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

6.117 *Voltage to Ground* - For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

6.118 *Watertight* - So constructed that moisture will not enter the enclosure.

6.119 *Weatherproof* - So constructed or protected that exposure to the weather will not interfere with successful operation. Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

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7.1.0 Policy Statement

7.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. Herein referred to as the “Company.” It is also policy to maintain and actively support a comprehensive employee safety and health program.


7.1.2 Carbon America will comply with OSHA standard 1910.38, **Employee Emergency Plans and Fire Prevention Plans** through implementation of this written program. Carbon America field supervision will pre-plan evacuation routes and procedures to ensure the safety of employees in case of emergency. When visiting client facilities, employees shall comply with requirements governed by the respective owners.

7.2.0 Purpose

7.2.1 The purpose of this program is to provide guidelines and procedures for emergency response and fire prevention and to comply with OSHA 29 CFR 1910.38 Employee Emergency Plans and Fire Prevention Plans.

7.3.0 Guidelines and procedures are provided for the following:

7.3.1 Facility Evacuation

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7.3.2 Fire

7.3.3 Chemical Spills

7.3.4 Bomb Threats/ Workplace Violence

7.3.5 Serious Accident/ Injury

7.3.6 Effectively plan emergency situations.

7.3.7 Provide a model for adequate and effective Emergency Action training.

7.3.8 To inform employees of the contents of the OSHA standard 29 CFR 1910.38 Employee Emergency Plans and Fire Prevention Plans.

7.4.0 This plan applies to all Carbon America employees and visitors. When visiting client facilities, employees shall comply with requirements governed by the respective owners.

7.5.0 Sub-contractors of Carbon America shall also comply with requirements of this written program OR have their own written program meeting at least the minimum requirements of the OSHA standard 29 CFR 1910.38 Employee Emergency Plans and Fire Prevention Plans.

7.6.0 References

7.6.1.1 29 CFR 1910.38 Emergency Action Plans


7.6.1.2 29 CFR 1910.39 Fire Prevention Plans

7.6.1.3 29 CFR 1926.32 Employee Emergency Action Plans

7.7.0 General Requirements

7.7.1 Management Responsibilities

7.7.2 Coordinate emergency response efforts for each work location, including evacuating personnel and minimizing property loss.

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7.7.3 Responsible for oversight of health and safety during incidents exceeding a minor incident.

7.7.4 Transport injured employees to and from each medical visit if non-emergency transportation is needed.

7.7.5 Coordinates the activities of employees with outside agencies such as Fire Dept., HazMat Team, Police Dept., Medical Services, and Utility companies.

7.7.6 Ensure that in areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.

7.7.7 Keep records of activities during all stages of the emergency.

7.7.8 In the event of a fire, explosion, or material release, which would threaten human health outside the facility, or if a spill has reached surface water, immediately notify the National Response Center at the 24-hour number 1-800-424-8802 and provide the following information:

7.7.8.1 Name – Company

7.7.8.2 Date, Time, and type of incident. (i.e. spill, fire, etc.)

7.7.8.3 Quantity and type of hazardous material or hazardous waste involved in the incident. (if applicable)


7.7.8.4 Extent of injuries, if any.

7.7.8.5 Estimated quantity of recovered materials, if any.

7.7.8.6 If outside agencies are involved, assist them with hazard information.

7.8.0 Supervisor (General Foreman, Lead Foreman, Foreman)

7.8.1 Review hazard information with employees for hazardous materials involved.

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7.8.2 Ensure all personnel leave the area or building as per alarm or instructions and keep employees from entering areas during incidents.

7.8.3 Prior to leaving the building, check rooms and other enclosed areas for employees.

7.8.4 Upon reaching the designated employee assembly area (specific to the location), account for all personnel.

7.8.5 Assist any person who may be handicapped and may need assistance in leaving the building.

7.8.6 Ensure all employees are trained on the emergency procedures specific to the work location.

7.8.7 Ensure all employees are trained on fire extinguishers and other emergency equipment specific to the location.

7.8.8 Report ALL accidents, including damages to company owned equipment, private property, motor vehicles and all injuries sustained on the job, regardless of nature or severity, to the onsite or area Safety Representative.

7.9.0 Employees


7.9.1 Comply with all applicable requirements of this written Emergency Action Program.

7.9.2 Report all emergency incidents to their supervisor immediately.

7.10.0 Evacuation

7.10.1 An evacuation plan including a primary and secondary escape routes shall be established at all Carbon America work locations. Additionally, a method for notifying employees of an evacuation shall be established (i.e. emergency notification system).

7.10.2 Employees shall be alerted via the location's emergency notification system.

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7.10.3 Employees are instructed to remain in the designated assembly area until a head count is completed, and a supervisor communicates any necessary information concerning the incident.

7.10.4 The preferred means of reporting fires and other emergencies is by contacting a supervisor, who will contact the necessary parties. When visiting a client location, Carbon America employees shall comply with requirements governed by the respective owners.

7.10.5 Employees should assist in the safe and orderly evacuation of other employees, visitors, etc.

7.10.6 Procedures shall be developed for each job in which it will be necessary for employees to remain to operate critical plant operations before they evacuate.

7.10.7 Site emergency plans, emergency phone numbers, and maps shall be completed and given to site supervisors prior to work. **See attached 'Emergency Services Locator'.**

7.10.8 Carbon America office emergency evacuation routes are posted in all buildings. **See attached 'Emergency Action Plan'**


7.11.0 Fire

7.11.1 Office Locations: When an employee observes a fire, the employee shall activate the alarm at the nearest pull box or call the designated emergency phone number. When visiting a client location, Carbon America employees shall comply with requirements governed by the respective owners.

7.11.2 Field Locations: When an employee observes a fire, the employee shall notify other crew members and (if a large fire) call the area's designated emergency phone number.

7.11.3 Employees shall be trained in the types of fires and respective fire extinguishers used to extinguish those fires. Fire extinguisher training will occur initially upon hire and annually thereafter.

7.11.4 Fire extinguisher training shall include:

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7.11.4.1 Types of fires that the employee may encounter.

7.11.4.2 Types of fire extinguishers.

7.11.4.3 How to identify types of fire extinguishers.

7.11.4.4 Inspection procedures. (monthly and annual)

7.11.4.5 Proper use of a portable fire extinguisher (P.A.S.S.)

7.11.5 Fire extinguishers shall be of approved design, inspected, and certified.

7.11.6 If the employee is trained to use a fire extinguisher, he/she may attempt to extinguish the fire when in its incipient stage (beginning stage) to prevent the fire from spreading to other areas. Employees are trained that this is only done if it can be accomplished without risking his/ her safety. Fire extinguishers are for voluntary use only.

7.11.7 If the fire is extinguished, the employee will notify their supervisor. The supervisor will inform the fire department to evaluate the specific location of the fire to ensure it is completely out.

7.11.8 If the fire is not extinguished, the employee shall evacuate and notify their supervisor. The supervisor will inform the fire department of the specific location of the fire.


7.12.0 Chemical Spills

7.12.1 Incidental chemical spills and releases will be responded to as follows:

7.12.1.1 When an employee observes a spill or release, he/she shall stop work and notify his/her supervisor of the incident. Employees are encouraged to contain the spill, if it can be done without putting him/herself in danger.

7.12.1.2 If an employee observes a spill or release, which he/she cannot safely contain, the employee shall:

7.12.1.3 Evacuate the area and immediately notify his/her supervisor.

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7.12.1.4 The supervisor shall keep other employees from entering the spill or release area.

7.12.2 Large scale spills that reach the drain will be responded to as follows:

7.12.2.1 Evacuate the area.

7.12.2.2 The supervisor will be notified.

7.12.2.3 The supervisor then notifies the local HAZMAT team via the local emergency response system (9-1-1).

7.13.0 Bomb Threats

7.13.1 If an employee receives a written bomb threat, the employee shall notify their supervisor immediately and avoid unnecessary handling of the note, envelope, packaging, etc.

7.13.2 If an employee receives a bomb threat via telephone, the employee shall do the following:

7.13.2.1 Do not hang up phone.

7.13.2.2 Get all information: location, size, appearance, time the bomb will explode, etc.


7.13.2.3 Alert another staff member to call the Phone Company to attempt a trace on the call. (Dial "9-1-1" for Emergency Dispatch)

7.13.2.4 Get the caller to talk as long as possible.

7.13.2.5 Notify their supervisor of the threat, who will call the Police Department & request assistance and make a decision concerning evacuation.

7.14.0 Work Place Violence

7.14.1 If workplace violence occurs, the following action shall be taken:

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7.14.1.1 If a verbal, non-physical confrontation occurs, the Supervisor will be notified of the situation immediately and disciplinary action taken.

7.14.1.2 If an unarmed physical confrontation occurs, the Supervisor will be notified of the situation immediately and disciplinary action taken.

7.14.1.3 If an armed physical confrontation occurs, the site will be evacuated and the Supervisor will notify Authorities of the situation immediately.

7.15.0 Serious Accident

7.15.1 Employees responding to a serious accident shall:

7.15.1.1 Check the scene.

7.15.1.2 Call the proper authorities (9-1-1, Emergency Response).

7.15.1.3 Care for the victim (voluntary first responders). Employees may only perform first aid and rescue activities for which they have been trained.


7.15.1.4 De-energize any machines, equipment, or power sources that may pose a problem to those assisting the victim.

7.15.1.5 Control the area directly surrounding the place of the accident as to prevent interference for EMS personnel or other technicians, i.e. maintenance shutting down equipment.

7.15.1.6 Identify all employees involved.

7.15.2 Items used to prevent the spread of Bloodborne Pathogens can be found in the First-Aid Kits.

7.15.3 Company policy requires that ALL accidents, including damages to company owned equipment, private property, motor vehicles and all injuries sustained on the job, regardless of nature or severity, must be reported to your onsite or area Safety Representative.

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7.15.4 Once EMS technicians have finished attending to the victim, any areas contaminated with blood or tissue must be cleaning with blood-borne pathogen solution (10% bleach and water) and all materials used for cleanup must be disposed of in “Biohazard” bags. Clean up may only be performed by trained personnel as per the Company Bloodborne Pathogens Program.

7.15.5 Falsifying an incident report is grounds for immediate termination and could result in criminal prosecution.

7.16.0 First Aid

7.16.1 Carbon America will insure the availability of medical personnel for advice and consultation on matters of occupational health.

7.16.2 Provisions shall be made prior to commencement of each project for prompt medical attention in case of serious injury.


7.16.3 In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite (within 3-4 minutes), which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the American Red Cross, or equivalent training shall be available at the worksite to render first aid.

7.16.4 First aid supplies shall be readily accessible on each job site. Supplies must consist of appropriate items for field conditions and work environment.

7.16.5 The contents of the first aid kit will be in weather-proof containers and inspected at least weekly on each job to ensure that the expended items are replaced.

7.16.6 Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, shall be readily accessible.

7.16.7 Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

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7.17.0 Training

7.17.1 Office Locations: Employees shall be trained to assist in the safe and orderly emergency evacuation of employees, accident reporting procedures, and use of fire extinguishers. Several office employees maintain First Aid, CPR, and AED training.

7.17.2 Field Locations: Employees shall be trained on the elements of this Emergency Response Program, accident reporting procedures, and use of fire extinguishers. Typically, there will be at least two persons trained in First Aid and CPR at each job site location.

7.17.3 This emergency response plan will be reviewed with employees at initial hire and when the employee's responsibilities / designated actions under the plan change. A copy of this program is available for employee review upon request.

7.17.4 Additional information regarding emergency action plans and employee roles can be obtained by contacting the Field Supervisor or Safety Department.

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8.1 Policy Statement


- 8.1.1** It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 8.1.2** Carbon America will comply with the OSHA ***Excavation Standard***, 29 CFR 1926.651, through implementation of this written program.

8.2 Purpose

- 8.2.1** To ensure safe work associated with excavation activity.
- 8.2.2** The purpose of this program is to provide guidelines, restrictions and procedures for working in or around trenches/ excavations. This guideline applies to all Carbon America facilities and employees except where superseded by more stringent local standards or client requirements.
- 8.2.3** To comply with OSHA standard 29 CFR 1926.651.

8.3 References

- 8.3.1** American Society for Testing and Materials, Standard D2488, "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure)".
- 8.3.2** 29 CFR 1926 Subpart P Excavations

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8.4 Responsibilities

8.4.1 Safety Manager

8.4.1.1 The Manager of Safety is responsible for implementation and control of this program. Audits of this program should occur yearly and reflect any changes made to this program.

8.4.1.2 Provide adequate training for Competent Persons which meets or exceeds the OSHA standard. Provide awareness level training for all Carbon America employees who will be entering/ working in the trench/ excavations.

8.4.2 Competent Person/ Supervisor

8.4.2.1 The Competent Person shall determine whether or not the excavation constitutes a permit-required confined space. A daily inspection of the excavation site shall be performed to assess the current conditions, following which the Competent Person shall declare the excavation safe for employees to enter at the beginning of each shift. The Competent Person is also responsible for ensuring the following tasks are accomplished:


8.4.2.2 Hazards associated with excavations are identified and mitigated prior to beginning work.

8.4.2.3 Determine the classification of the soil in each layer of the excavation and determine the level of employee protection required as outlined in this written program.

8.4.2.4 Perform air quality tests for excavations deeper than four (4) feet to establish that there is adequate oxygen and no toxic gases and vapors present.

8.4.2.5 The design and construction of the excavation support system be performed by a trained competent person.

8.4.2.6 Obtain a licensed, professional engineer's assistance when an excavation is deeper than twenty (20) feet.

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8.4.2.7 Determine the Emergency Rescue Services needed for each excavation and arrange for rescue services to be "on call". All members of the excavation team shall be informed of the proper method for summoning emergency help.

8.4.3 Employees

8.4.3.1 Employees shall be familiar with the Competent Person for the excavation by name and by sight and shall enter the excavation only after the Competent Person has given approval. Employees shall report any of the following conditions to the Competent Person immediately:

8.4.3.1.1 Water accumulation in the trench/ excavation

8.4.3.1.2 Cracks in sidewalls

8.4.3.1.3 Sloughing of sidewall material

8.4.3.1.4 Changes in air quality in the excavation


8.4.3.2 Assist in the identification of the trained Emergency Rescue Team. This will be completed by contacting local authorities on location and scope of work being performed

8.4.3.3 Surface encumbrances. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

8.5 Underground installations

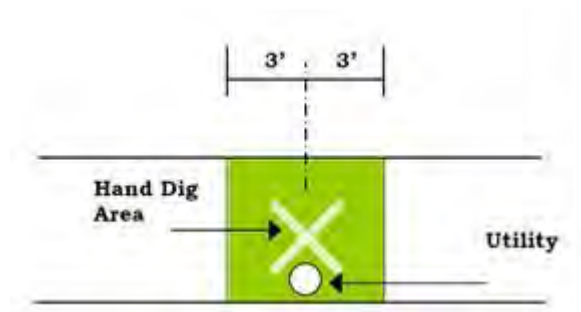
8.5.1 Underground utility identification/Damage Prevention

8.5.1.1 Prior to the start of any excavation "Dig Safe" must be contacted. Dig Safe requires 72 hours advanced notice before performing "a locate". Before calling for "a locate", the excavation area must be pre-marked with paint, stakes, or flags. For more details on utility locate services contact the safety department. An independent locator contractor may be required to provide the "locates" where Dig Safe cannot. Dig safe will provide a confirmation number. This number must be recorded on the excavating utility permit.

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8.5.1.2 Before excavating operations begin, potholing for the utilities will take place. Potholing is performed to verify the location and depth of the utility lines. Potholing will be done using hand labor or a Vacuum truck (if available). Equipment can be used in conjunction with hand labor to remove hand-loosened material only. **NOTE:** Utilities typically identified by locate services have a three-foot safe zone. In other words, the utility should be within a three-foot zone of either side of the markings.

8.5.1.3 The superintendent of the operation will maintain a minimum clearance of 36 inches between a marked and unexposed underground facility and the cutting edge or point of any power operated excavating or earth moving equipment. If excavation is required within 36 inches horizontally of any marking, the



excavation will be performed with extreme care utilizing hand tools or vacuum excavation techniques only.

8.5.1.4 Utility owners will not guarantee the depth of a utility; therefore, the superintendent will use the same excavation techniques vertically as horizontally, unless a utility owner informs us that we can use a different technique.


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8.5.2 Potholing Procedure

- 8.5.2.1 Potholing will be performed to locate the utility. The utility **must** be found prior to the start of excavation operations.
- 8.5.2.2 The soil must be excavated in 6" lifts (approximately) by hand to verify that no utilities are present. Then the equipment can be used to excavate the material in that lift. If utilities are located, then the utilities must be exposed by hand. The proper tools that can be used for handwork are shovels and pry bars (or other tools of this nature). At no time should a pickaxe or other similar tools be used.
- 8.5.2.3 Once identified, all utilities will be marked with stakes and ribbon. When offset markings are necessary, the information will be clearly noted on the stake. Make sure all personnel are aware of the location of the utilities in the area. **DO NOT ASSUME THAT THE UTILITY WILL CONTINUE ON THE SAME LINE AND GRADE.**
- 8.5.2.4 If any damage occurs to any line, contact the Project Manager and Superintendent immediately.

8.5.3 Underground Utility Pothole Spacing and Frequency

- 8.5.3.1 The following spacing and frequency requirements will be followed on all projects. Any deviation from this procedure will require approval from the Safety Department.
- 8.5.3.2 Life threatening utilities such as gas and electrical services will be exposed through the entire length of the excavation. Gas and electric lines within 25 feet of your work area will be potholed and marked every 25 feet to verify that the line has not changed directions. Gas and electric lines outside the 25 feet of the work zone will be potholed at least once on each end of the limits of the excavation to verify Underground Service Alert and the utility plans.
- 8.5.3.3 Under no circumstance will gas and or electric lines be potholed with an excavator unless said lines are properly

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locked out, purged and verified inactive and safe. Vacuum-Truck or light hand digging will be used for these utilities.

8.5.4 Communications Lines


- 8.5.4.1 Fiber-optic lines will be potholed every 25 feet within the work area. Telephone/Cable lines will be potholed every 50 feet within the work area.

8.5.5 Other Utilities

- 8.5.5.1 Will be potholed every 25 feet for lines less than 8" in diameter.
- 8.5.5.2 Will be potholed every 50 feet for lines 8" through 24" in diameter.
- 8.5.5.3 Will be potholed every 100 feet for lines greater than 24" in diameter?
- 8.5.5.4 At least two (2) potholes must be obtained for each utility within the work zone regardless of how small the work area is.

8.5.6 Utilities in Roadways

- 8.5.6.1 Utilities that are located within the roadway will be potholed.
- 8.5.6.2 Street plates will be obtained to cover a pothole when there is live traffic on the roadway.
- 8.5.6.3 For roadway work not scheduled to be excavated in the current operation, an asphalt patch will be placed over the pothole. This will be done after all pothole information has been recorded and the pothole has been offset using stakes and ribbon.
- 8.5.6.4 Once all potholing has been completed excavation can begin. However, always keep an eye out for unknown utilities.
- 8.5.6.5 If during the course of excavation, a utility has been exposed, it is our responsibility to inspect and support these facilities prior to backfilling. If damage of any kind is discovered, or any

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suspicion of damage exists, call the utility engineer (or responsible superintendent) so documentation can take place. The utility engineer (or responsible superintendent) will then notify the utility owner.


- 8.5.6.6** While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

8.6 Access and egress.

8.6.1 Structural ramps.

- 8.6.1.1** Structural ramps that are used solely by employees as a means of access or egress from excavations and for crossing excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design. All of the OSHA standards apply to these surfaces, and at minimum they require standard guardrails, Midrails, and toeboards to be installed.
- 8.6.1.2** Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.
- 8.6.1.3** Structural members used for ramps and runways shall be of uniform thickness.
- 8.6.1.4** Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- 8.6.1.5** Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

- 8.6.2** Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that

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are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

8.6.3 Exposure to vehicular traffic. Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

8.6.4 Exposure to falling loads. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.


8.6.5 Warning system for mobile equipment. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

8.7 Hazardous atmospheres.

8.7.1 Testing and controls. To prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

8.7.1.1 Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

8.7.1.2 Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen, or more than 23.5% oxygen and other hazardous

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atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

8.7.1.3 Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower flammable limit of the gas.

8.7.1.4 When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.


8.7.2 Emergency rescue equipment.

8.7.2.1 Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

8.7.2.2 Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

8.8 Protection from hazards associated with water accumulation.

8.8.1 Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

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8.8.2 If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

8.8.3 If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

8.9 Stability of adjacent structures.

8.9.1 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

8.9.2 Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:


8.9.2.1 A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

8.9.2.2 The excavation is in stable rock; or

8.9.2.3 A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

8.9.2.4 A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

8.9.2.5 Sidewalks, pavements and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

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8.10 Protection of employees from loose rock or soil.

8.10.1 Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

8.10.2 Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

8.11 Protection of employees in excavations.

8.11.1 Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with this written program (and OSHA standard 1926.652) except when:

8.11.1.1 Excavations are made entirely in stable rock; or


8.11.1.2 Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

8.11.1.3 All work in the excavation shall stop until necessary precautions are taken to safeguard personnel.

8.11.1.4 Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

8.11.2 Design of sloping and benching systems.

8.11.2.1 The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or

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his designee and shall be in accordance with the requirements as specified.

8.11.2.2 Option (1) - Allowable configurations and slopes.

8.11.2.3 Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

8.11.2.4 Slopes shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this subpart.

8.11.2.5 Option (2) - Determination of slopes and configurations using Attachments 1 and 2. Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in Attachments 1 and 2.

8.11.2.6 Option (3) - Designs using other tabulated data.


8.11.2.7 Designs of sloping or benching systems shall be selected from and in accordance with tabulated data, such as tables and charts.

8.11.2.8 The tabulated data shall be in written form and shall include all of the following:

8.11.2.8.1 Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

8.11.2.8.2 Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

8.11.2.8.3 Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

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8.11.2.9 At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

8.11.2.10 Option (4) - Design by a registered professional engineer.

8.11.2.11 Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

8.11.2.12 Designs shall be in written form and shall include at least the following:

8.11.2.12.1 The magnitude of the slopes that were determined to be safe for the particular project;

8.11.2.12.2 The configurations that were determined to be safe for the particular project;

8.11.2.12.3 The identity of the registered professional engineer approving the design.


8.11.2.13 At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

8.11.3 Design of support systems, shield systems, and other protective systems.

8.11.3.1 Designs of support systems, shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of this written program.

8.11.3.2 Option (1) - Designs using Attachments 1, 2 and 3.

8.11.3.3 Option (2) - Designs Using Manufacturer's Tabulated Data.

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8.11.3.4 Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

8.11.3.5 Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

8.11.3.6 Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

8.11.3.7 Option (3) - Designs using other tabulated data.

8.11.3.8 Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.


8.11.3.9 The tabulated data shall be in written form and include all of the following:

8.11.3.9.1 Identification of the parameters that affect the selection of a protective system drawn from such data;

8.11.3.9.2 Identification of the limits of use of the data;

8.11.3.9.3 Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

8.11.3.10 At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the

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jobsite, but a copy of the data shall be made available to the Secretary upon request.

8.11.3.11 Option (4) - Design by a registered professional engineer.

8.11.3.12 Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

8.11.3.13 Designs shall be in written form and shall include the following:

8.11.3.13.1 A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and'

8.11.3.13.2 The identity of the registered professional engineer approving the design.


8.11.3.14 At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

8.12 Materials and equipment

8.12.1 Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

8.12.2 Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

8.12.3 When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.


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8.13 Installation and removal of support

- 8.13.1 Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.
- 8.13.2 Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
- 8.13.3 Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.
- 8.13.4 Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
- 8.13.5 Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.
- 8.13.6 Backfilling shall progress together with the removal of support systems from excavations.

8.14 Additional requirements for support systems for trench excavations.

- 8.14.1 Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.
- 8.14.2 Installation of a support system shall be closely coordinated with the excavation of trenches.
- 8.14.3 Sloping and benching systems. Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are

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adequately protected from the hazard of falling, rolling, or sliding material or equipment.

8.15 Shield systems.

8.15.1 Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

8.15.2 Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

8.15.3 Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.


8.15.4 Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

8.15.5 Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

8.16 Inspections.

8.16.1 Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

8.16.2 Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

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8.17 Fall Protection

8.17.1 Guardrails or other effective barriers shall be provided where walking/working surfaces are 6 feet (1.8 m) or more above lower levels.

8.17.2 Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

8.18 Training

8.18.1 Awareness Level Training. All employees shall receive training on the hazards and methods to avoid/control those hazards associated with excavations.

8.18.2 Affected Persons Training. Employees associated with excavation activity shall be trained on the following:

8.18.2.1 Associated hazards and methods of control;

8.18.2.2 Soil types and methods to identify;

8.18.2.3 Potential atmospheric hazards and methods to detect;

8.18.2.4 Cave in protective systems (sloping, shoring, benching, shielding);

8.18.2.5 Safe access / egress;

8.18.2.6 Underground facility protection laws.


8.18.2.7 PPE selection and limitations

8.18.2.8 Requirements of the emergency plan

8.18.2.9 How to sound an alarm in the event of an emergency


8.18.2.10 Potholing techniques and utility markings

8.18.3 A record of training shall be maintained.

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8.19 Definitions

- 8.19.1** Accepted engineering practices- means those requirements which are compatible with standards of practice required by a registered professional engineer.
- 8.19.2** Aluminum Hydraulic Shoring- means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.
- 8.19.3** Bell-bottom pier hole- means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.
- 8.19.4** Benching (Benching system)- means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- 8.19.5** Cave-in-means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
- 8.19.6** 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 authorization to take prompt corrective measures to eliminate them.
- 8.19.7** Cross braces- mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.
- 8.19.8** Excavation- means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- 8.19.9** "Faces" or "sides"- means the vertical or inclined earth surfaces formed as a result of excavation work.

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8.19.10 Failure- means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

8.19.11 Hazardous atmosphere- means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

8.19.12 Kickout- means the accidental release or failure of a cross brace.


8.19.13 Protective system- means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

8.19.14 Ramp- means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

8.19.15 Registered Professional Engineer- means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

8.19.16 Sheeting- means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

8.19.17 Shield (Shield system)- means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

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8.19.18 Shoring (Shoring system)- means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

8.19.19 Sides- See "Faces."

8.19.20 Sloping (Sloping system)- means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.


8.19.21 Stable rock- means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

8.19.22 Structural ramp- means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

8.19.23 Support system- means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

8.19.24 Tabulated data- means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

8.19.25 Trench- (Trench excavation)" means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

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8.19.26 Trench box.- See "Shield.

8.19.27 Trench shield.- See "Shield."

8.19.28 Uprights- means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

8.19.29 Wales- means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

Attachment 1 - Table 1- OSHA Allowable Slope per Soil Classification Table

Attachment 2 - Examples of Sloping, Benching and Shielding

Attachment 3 - Examples of Aluminum Hydraulic Shoring for Trenches

Attachment 4 - Alternatives to Timber Shoring


Attachment 5 – Soil Testing Methods

Attachment 6 - Daily Excavation Permit

Attachment 7 – Excavation Checklist

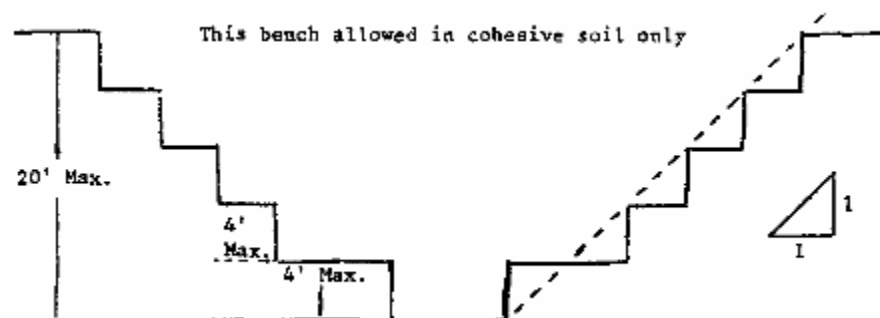
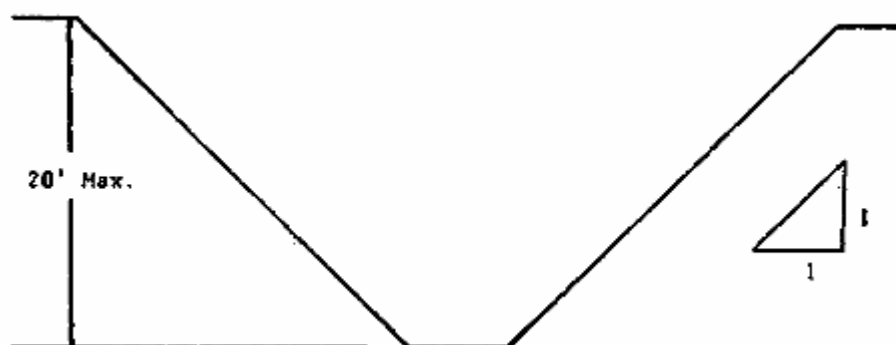
Attachment 1


Soil Classification	Maximum Allowable Slope
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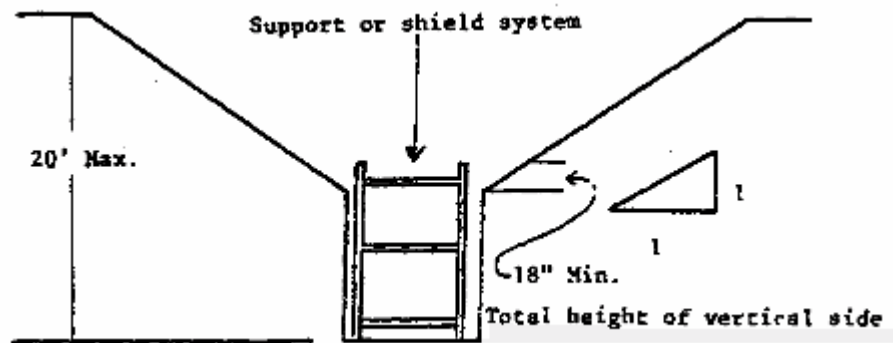
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Stable Rock	Vertical	90 degrees
Type A	3/4:1	53 degrees
Type B	1:1	45 degrees
Type C	1 1/2:1	34 degrees

Attachment 2



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ATTACHMENT 3

FIGURE NO. 1

VERTICAL ALUMINUM
HYDRAULIC SHORING
(SPOT BRACING)

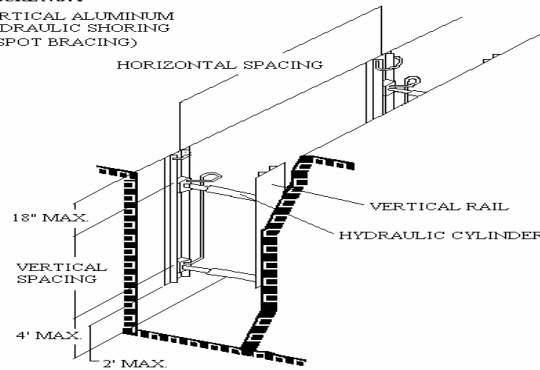


FIGURE NO. 3

VERTICAL ALUMINUM
HYDRAULIC SHORING
(STACKED)

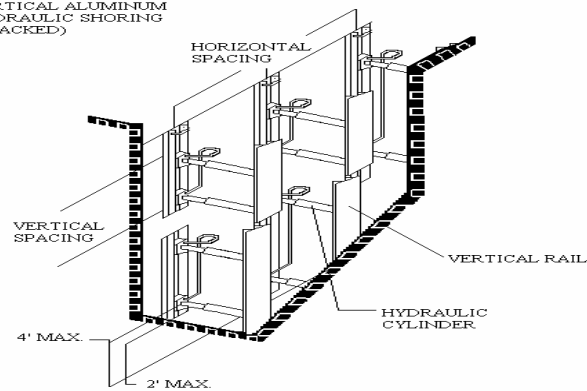
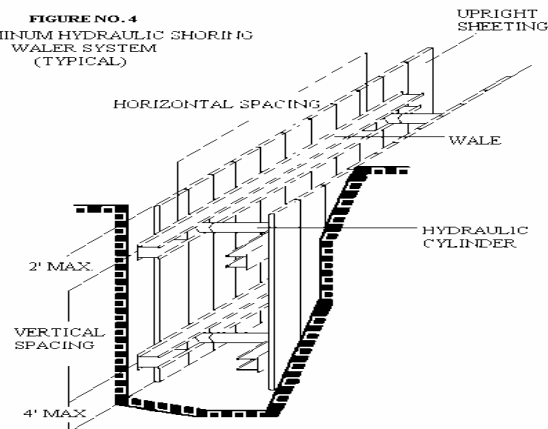



FIGURE NO. 4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEM
(TYPICAL)



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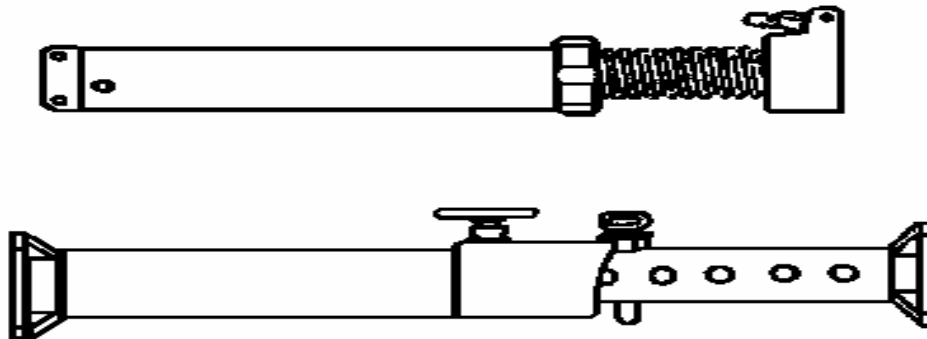


Figure 2. Pneumatic/hydraulic Shoring

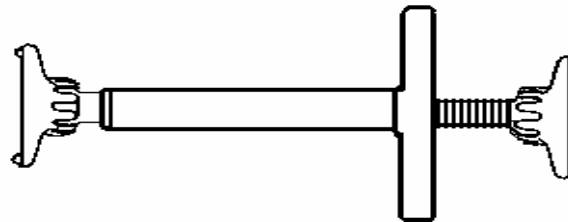


Figure 3. Trench Jacks (Screw Jacks)

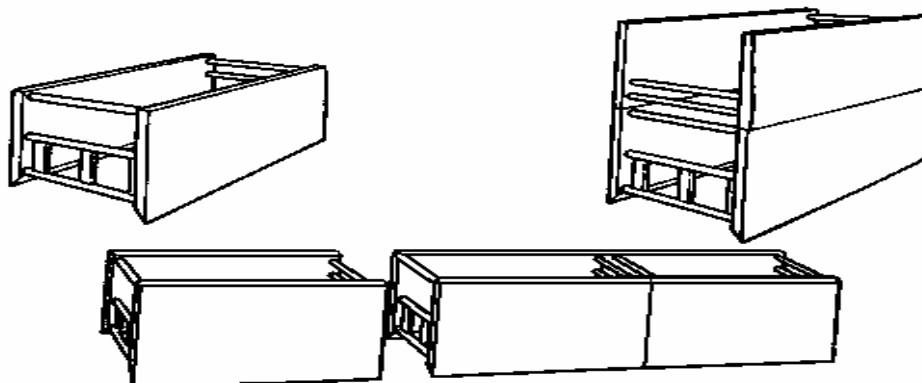



Figure 4. Trench Shields

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Attachment 5

(a) Scope and application –

(1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist.

Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.


"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

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"Plastic" means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

"Submerged soil" means soil which is underwater or is free seeping.

"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- (i) The soil is fissured; or
- (ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (iii) The soil has been previously disturbed; or
- (iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (v) The material is subject to other factors that would require it to be classified as a less stable material.


"Type B" means:

- (i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- (ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (v) Dry rock that is not stable; or
- (vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" means:

- (i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- (ii) Granular soils including gravel, sand, and loamy sand; or
- (iii) Submerged soil or soil from which water is freely seeping; or
- (iv) Submerged rock that is not stable, or
- (v) Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb

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penetration tests, and other methods.

"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements –

(1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) 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 tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) Acceptable visual and manual tests. –

(1) Visual tests. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.


(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

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(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.


(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

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9.1 Policy Statement

9.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

9.1.2 Carbon America will comply with the OSHA ***Housekeeping*** standard, 29 CFR 1926.25, 29 CFR 1926.403, 29 CFR 1910.22, 29 CFR 1910.176, and 29 CFR 1910.303, through implementation of this written program.

9.2 Purpose

9.2.1 To reduce workplace accidents and injuries by identifying and correcting general egress problems, housekeeping issues; slipping, tripping, electrical, and fire hazards.

9.3 References


9.3.1 29 CFR 1910.22, General Requirements (Walking Working Surfaces)

9.3.2 29 CFR 1910.176 General Material Handling

9.3.3 29 CFR 1910.303 General Electrical Requirements

9.3.4 29 CFR 1926.25 Housekeeping

9.3.5 29 CFR 1926.403 Electrical Safety

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9.3.6 NFPA 70 National Electric Code

9.3.7 NFPA 101 National Fire Protection Association Life Safety Code

9.4 General Requirements

9.4.1 Responsibilities

9.4.1.1 Safety Manager

9.4.1.1.1 Shall review this written program at least annually and update as required to address new housekeeping issues in the work place and evolving site conditions.

9.4.1.1.2 Ensure the requirements of this written program are in accordance with the standards and requirements of the hazard identification and maintenance process.

9.4.1.1.3 Monitor housekeeping practices using a walk-through inspection program periodically at both facilities and all pertinent construction sites when applicable in accordance with the Good Housekeeping guidelines.


9.4.1.2 Supervisors/Foreman

9.4.1.2.1 Ensure the requirements of this written program are adequately addressed during the course of work all of phases.

9.4.1.2.2 Monitor housekeeping practices using a walk-through inspection weekly on their respective job sites weekly.

9.4.1.2.3 Ensure any housekeeping issues are adequately addressed and corrected by employees during the course of daily work.

9.4.1.2.4 Ensure that housekeeping deficiencies are corrected immediately upon discovery.

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9.4.1.2.5 Ensure that employees are advised of and follow the requirements of the Good Housekeeping guidelines during all applicable phase of the job.

9.4.1.3 Employees

9.4.1.3.1 Ensure the requirements of this written program are adequately addressed during every job function and daily.

9.4.1.3.2 Correct any housekeeping issues in a timely fashion ensuring any housekeeping related hazards are corrected in a timely fashion.

9.4.1.3.3 Keep their workplaces clean and store tools and other items in appropriate or designated places.

9.4.1.3.4 Report all housekeeping problems or deficiencies, to their direct supervisor/foreman for correction.

9.4.1.3.5 Be familiar and comply with all applicable requirements of the good housekeeping guidelines for particular areas of work.

9.5 Procedure


9.5.1 General Requirements. Each Employee shall:

9.5.1.1 Maintain his/her work area in a clean, orderly, and sanitary condition.


9.5.1.2 Notify appropriate personnel for the cleanup of chemical spills as soon as possible if a hazardous chemical is released which the employee has not received adequate training to contain.

9.5.1.3 Maintain at his/her workstation an adequate number of trash receptacles to hold the day's debris/refuse.

9.5.1.4 Store work tools and material properly when not in use, or following periods of extended periods of time, such as during breaks for lunch and overnight.

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- 9.5.1.5 Keep stairways, hallways, passageways/aisles, and access to emergency equipment and/or exits dry and not obstructed in any fashion, including material storage, equipment, telephone or other wiring.
 - 9.5.1.6 Do not store combustible material such as paper, wooden boxes, pallets, etc. under stairwells or in hallways. Hallways and aisleways shall be kept free of boxes and materials so that exits or normal paths of travel will not be blocked.
 - 9.5.1.7 Store materials only in appropriate cabinets or designated storage areas adequate to contain the contents.
 - 9.5.1.8 Do not use mechanical and electrical equipment rooms, hallways, or lofts as general storage areas. Storage of frequently used spare parts and tools in these areas are permitted.
 - 9.5.1.9 Arrange stored materials to prevent tipping, falling, collapsing, rolling, or spreading.
 - 9.5.1.10 Remove from work areas and put into proper storage any item not required for extended periods.
 - 9.5.1.11 Periodically sweep shavings from around equipment such as drill presses, latches, or presses by using a broom and a dustpan.
 - 9.5.1.12 Do not block walking surfaces of elevated working platforms, such as scaffolds, with tools or materials that are not being used.
 - 9.5.1.13 Straighten or remove rugs and mats that do not lie flat on the floor.
 - 9.5.1.14 Return tools to their storage places after using them.
 - 9.5.1.15 Use caution signs or cones to barricade slippery areas such as freshly mopped floors.
-

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9.5.1.16 Do not store anything in a manner that blocks access to electrical panels.

9.5.2 Office Furniture and Equipment Requirements

9.5.2.1 Office furniture, equipment, and electrical appliances should be arranged to obtain maximum safety and use of installed facilities, such as overhead lighting, wall outlets, telephones, and other services.

9.5.2.2 The minimum width of exit passages shall in no case be less than 28 inches. (Note: other requirements may apply that may require this minimum width to be increased under specific conditions).

9.5.2.3 Office arrangement shall allow easy egress under emergency conditions.


9.5.2.4 Wastebaskets, briefcases, or other objects should be placed where they are not a tripping hazard.

9.5.2.5 Tripping hazards from electrical cords, telephone outlets, or other protrusions on the floor shall be avoided by arrangement of furniture or other means.

9.5.2.6 Floors shall be free of loose tiles, projections, and loose objects that create a tripping hazard. If these conditions are present, employees should report these conditions to their supervisor/foreman, or the safety director for resolution.

9.5.2.7 Carpeting shall be in good condition and not badly worn or torn. If the latter conditions are present, employees should report these conditions to their direct supervisor/Foreman for resolution.

9.5.2.8 Work Surfaces such as shop benches shall be kept tidy and free of chemical storage. Waste materials in these areas shall be collected and disposed of as soon as possible or during the course of work.

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9.5.2.9 Food and Drinks must not be taken into hazardous areas such as the paint shop or other areas with a designated electrical or chemical hazard. Eating, Drinking and application of cosmetics are prohibited in these areas.

9.5.2.10 All secondary containers must be clearly labeled and readily identifiable. Any use of secondary containers must be labeled prior to extended periods of storage including during periods of lunch, overnight, or any other situation where the secondary container is not in the direct control of the employee who filled the container.

9.5.2.11 Chemical shall never be stored on the floor, except in closed-door cabinets suitable for the material to be stored. Large bottles (2.5 liters or larger) should not be stored above the bench top or other working surface 33 inches or more in height.

9.5.2.12 Stored items or equipment shall not project beyond the front edge of the shelf or work surface.


9.5.2.13 Stored items or equipment shall not block access to the fire extinguishers, safety equipment, electrical panels, or other emergency items.

9.5.3 Construction Housekeeping Requirements

9.5.3.1 During the course of construction, alteration, or repairs, forms and scraps lumber with protruding nails, and all other debris shall be removed from work areas, passageways, and stairs, in and around buildings or other structures.

9.5.3.2 Combustible scrap and debris shall be removed at regular intervals during the course of construction. Safe means shall be provided to facilitate such removal.

9.5.3.3 Containers shall be provided for collecting and separating waste, trash, oily and used rags, and other refuse in accordance with the general waste management program. Containers used for garbage shall be equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

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9.5.3.3.1 Employees shall avoid the storage of anything that will block free access to excavations and trenches or paths around other hazardous areas under construction that require egress and access in emergencies.

9.5.3.4 Useable materials shall be stacked or piled neatly, in manner that does not obstruct emergency egress, or create an additional hazard to employees required to retrieve material in these areas.

9.5.3.5 Oily or combustible rags shall be stored in an approved metal container.

9.5.3.6 Collection and disposal of hazardous material and hazardous waste shall be done in accordance to the general waste program.

9.5.3.7 All exposed rebar or other impalement hazards present on the site should be capped by an approved safety cap rated for impalement protection or bent at an angle to effectively remove the impalement hazard. Mushroom caps are not acceptable for this purpose as they only prevent angled or minor contact with rebar. Employees which elect to bend rebar shall ensure a tripping hazard is not created in these areas.


9.5.3.8 Remove from the work area any items not being used (e.g., tools, hoses, cords, chains, and hooks) and store them in their proper place on a regular basis.

9.5.3.9 Keep lavatory and toilets (sanitary or portable) clean and sanitary with the necessary soap and paper products.

9.5.3.10 Never allow rubbish or debris to fall free from any level of the project. If required chutes or other means of prevention shall be provided.

9.5.3.11 Never dispose of any waste in storm or sanitary sewers.

9.5.3.12 Keep materials at least 2 meters (5 ft.) from openings, roof edges, excavations or trenches.

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9.5.3.13 Keep hoses, power cords, welding leads, etc. from being routed in heavily travelled walkways or areas.

9.5.3.14 Ensure structural openings are covered or protected appropriately (e.g. sumps, shafts, floor openings, etc.)

9.5.3.15 Post signs prohibiting smoking, open flames and other ignition sources in areas where flammable and explosive materials are stored or used.

9.5.3.16 Store and chain all compressed gas cylinders in an upright position.

9.5.3.17 Ensure loose or scrap material that may be blown off by high winds is properly secured.

9.5.3.18 Ensure empty cement bags and other dust-producing materials are removed from the worksite at a regular interval.

9.5.3.19 If required ensure drip pans are used to collect oils and fluids.

9.5.3.20 Control muddy areas using fill, gravel, boards, plywood or other means.

9.5.3.21 Ensure adequate lighting is provided for all employees during low light conditions, and during times of night operation.


9.5.3.22 Ensure all spoil piles from excavations and trenches are kept at least 3 feet back from any open sided excavation.

9.6 Training

9.6.1 Initial Training


9.6.1.1 There are no special training requirements for this written program.

9.6.1.2 Training elements of this written program will be incorporated into other training modules as required to address all elements of the Good Housekeeping guidelines.

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9.6.2 Periodic Training

- 9.6.2.1** Employees will be periodically updated on the new requirements of this written program.
- 9.6.2.2** Employees will receive training following deviation to the policies and procedures as outlined in this written program on a case-by-case basis.

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10.1 Policy Statement

10.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

10.2 Purpose

10.2.1 To ensure a minimum level of fire safety and protection for all Carbon America Sites.

10.2.2 To Comply with OSHA 1910.157 ***Portable Fire Extinguisher Standard***

10.2.3 To provide initial and annual employee training on the safe principles of fire extinguisher use, placement, inspection requirements, and fire prevention.


10.3 References

10.3.1 OSHA 1910.157 Portable Fire Extinguisher Standard

10.3.2 OSHA 1926.150 Fire Protection


10.3.3 NFPA 10 Portable Fire Extinguishers Standard

10.4 Responsibilities

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10.4.1 Management Responsibilities

- 10.4.1.1** Provide portable fire extinguishers, mount and locate, and identify them so they are readily assessable to employee without subjecting employee to possible injury.
 - 10.4.1.2** Ensure only approved fire extinguishers are present on job sites and in facilities. Approved extinguishers could include the requirements identified by owner clients or other operator requirements when Carbon America employees are working as subcontractors.
 - 10.4.1.3** Ensure that any extinguishers using tetrachloride, or chlorobromomethane and not present, or immediately removed from job sites and facilities.
 - 10.4.1.4** Ensure that all fire extinguishers are maintained in a fully charged and operable state.
 - 10.4.1.5** Ensure that all portable fire extinguishers are kept in their designated locations in a “ready state”
 - 10.4.1.6** Ensure removal from service any extinguishers that require inversion for operation.
 - 10.4.1.7** Provide and select portable fire extinguishers for employee use based on the hazards present, and the size and degree of the anticipated workplace/site fire which would require the selected extinguishers use.
 - 10.4.1.8** Provide prompt replace extinguishers upon discharge after an outbreak of fire.
 - 10.4.1.9** Ensure that a licensed 3rd party fire protection company annually inspects and tests all company portable fire extinguishers.
 - 10.4.1.10** Ensure that all employees as designated on the companies Emergency Action Plan complete the initial annual required fire protection training as outlined in this written program.
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10.4.1.11 Ensure all employees are informed of any changes to the location of fire protection equipment.

10.4.1.12 Ensure all fire extinguishers are mounted no higher and no lower than 42 inches from the floor.

10.4.2 Supervisor/ Employee Responsibilities

10.4.2.1 Use fire extinguishers for their intended purpose, and only at the time of an outbreak of an incipient stage fire.

10.4.2.2 Ensure monthly visual inspections are performed using the criteria as outlined in this written program for any extinguishers under the employees direct control or for any extinguisher located in the employees company vehicle or heavy equipment operated daily.

10.4.2.3 Ensure the correct type of extinguisher is selected based on the fuel source of the fire.

10.4.2.4 Fight only incipient stage fires, and utilize the “Stop Work” authority if directed to fight a fire to which the employee perceives to be a risk to their personal safety.

10.4.2.5 Report any outbreak of fire, or extinguisher use to the safety director immediately to ensure replacement fire protection is acquired, and to investigate the cause of the outbreak.


10.4.2.6 Ensure fire extinguishers are free of defects and readily assessable at all times.

10.4.3 Safety Department Responsibilities

10.4.3.1 Review and update this program at least annually.

10.4.3.2 Assess any deficiencies in fire protection and ensure the deficiencies are adequately addressed. This includes both facilities and site-specific fire protection management.

10.4.3.3 Update the training requirements as new equipment is purchased, changes occur to the emergency action plan, or

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the regulatory requirements regarding fire protection change.

10.4.3.4 Record and maintain training records for each employee as required in this written program.

10.4.3.5 Audit monthly and annual fire extinguisher inspections to ensure conformance with this written program.

10.4.3.6 Notify management, supervision and employees of any changes to fire equipment, or the Emergency Action Plan.

10.5 Selection and distribution

10.5.1 Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of hazard which would affect their use.

10.5.2 Distribute class A fire extinguishers so that if an outbreak of fire was to occur, the maximum travel distance for employees to an extinguisher would be 75 feet or less.


10.5.3 Distribute class B fire extinguishers so that if an outbreak of fire was to occur, the maximum travel distance for employee to an extinguisher would be 50 feet.

10.5.4 Distribute class C fire extinguishers so that if an outbreak of fire was to occur, the maximum travel distance would be no greater than 50 feet.

10.5.5 Ensure that all fire extinguishers are properly labeled as required by NFPA 10 requirements.

10.6 Inspection and Testing

10.6.1 Employees are required to perform monthly visual inspections of fire equipment located in their direct control, including but not limited to, company vehicles, machinery, and shop facilities.

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10.6.2 Monthly inspections should be documented via the inspection tags on the relative equipment.

10.6.3 All Fire Extinguishers are subject to the following tests:

10.6.3.1 Monthly Visual Testing. Including examination of the superstructure, gauge, hose and inversion test to unsettle the dry chemical composition of ABC, or dry chemical extinguishers.

10.6.4 3rd Party annual testing. Outside fire protection services will be used for these inspections, and any defective equipment will be replaced at their discretion. Removal from service may include:

10.6.4.1 Defective hydrostatic testing

10.6.4.2 Inoperable gauge

10.6.4.3 General damage

10.6.4.4 Missing labeling or inspection tags

10.6.4.5 Out of service life requirements as stated by the manufacturer.

10.7 Training


10.7.1 Initial Training and Annual Required Refresher Training

10.7.2 Employees will be trained on all of the following components at least annually and at the time of initial hire before being assigned duties that involve the use of fire extinguishers:

10.7.2.1 General fire principles including the components of the fire tetrahedron.

10.7.2.2 Fire prevention practices not limited to fuel/combustible storage and handling requirements.

10.7.2.3 Carbon America Hot Work Policy and procedures including how to complete the permit process.

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10.7.2.4 Hazards involved with fighting incipient stage fires.

10.7.2.5 Fire extinguisher selection principles based on fuel material present, and classification.

10.7.2.6 Fire Extinguisher Use and Safe Practices.

10.7.2.7 Testing and inspection methods for fire extinguishers including monthly visual inspection requirements.

10.7.2.8 OSHA Standard Requirements for Fire Protection not limited to employer and employee responsibilities under the standard.

10.7.2.9 Fire extinguisher locations.

10.7.3 Retraining before the annual requirements may be required based on changes to company policies or the following criteria:

10.7.3.1 Change in job assignment.

10.7.3.2 Changes in machines that have a potential to create a difference fire hazard, or potential for additional exposure


10.7.3.3 Following a change to company procedures related to fire prevention, or following a change in the Carbon America's Emergency Action Plan.

10.7.3.4 The Carbon America has reason to believe that there has been deviation from, or inadequacies in the employee's knowledge regarding the elements of this written program

10.7.3.5 Training will be documented and records for each employee will be retained for the duration of employment.

10.8 Definitions

10.8.1 Class A- fire means a fire involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

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10.8.2 Class B fire- means a fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

10.8.3 Class C fire- means a fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

10.8.4 Dry chemical- means an extinguishing agent composed of very small particles of chemicals such as, but not limited to, sodium bicarbonate, potassium bicarbonate, urea-based potassium bicarbonate, potassium chloride, or mono-ammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.


10.8.5 Extinguisher classification- means the letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective.

10.8.6 Incipient stage fire- means a fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

10.8.7 Inspection- means a visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of a fire.

10.8.8 Maintenance- means the performance of services on fire protection equipment and systems to assure that they will perform as expected in the event of a fire. Maintenance differs from inspection in that maintenance requires the checking of internal fittings, devices and agent supplies.

10.8.9 Training- means the process of making proficient through instruction and hands-on practice in the operation of equipment, including respiratory protection equipment, that is expected to be used and in the performance of assigned duties.

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11.1 Policy Statement

11.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

11.2 Purpose

11.2.1 The purpose of the Hearing Conservation Program is designed to reduce employee exposure to noise by means of equipment modification, hearing protectors, and employee training. This program applies to all Carbon America facilities or client requirements.

11.3 References


11.3.1 OSHA 1910.95(c) Hearing Conservation Program

11.3.2 OSHA 1926.101 Hearing Protection

11.4 General Requirements

11.4.1 Implementation

11.4.1.1 A hearing conservation program shall be implemented for all employees exposed to noise levels of 85 dBa or greater as a time-weighted average (TWA) of eight hours. Proper

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fitting PPE will be provided at no cost to the affected employees. Implementation will include the following:

11.4.1.2 Affected employees noise exposure will be measured when information indicates that any employee's exposure may equal or exceed an 8-hour time weighted average of 85 decibels (dBa). These measurements will be repeated whenever a change in production, process, equipment, or controls increases noise exposure to the extent that additional employees may be exposed or hearing protectors being used by employees may become inadequate.

11.4.1.3 Noise exposure measurements of activities suspected of producing noise levels greater than 85 (dBa) will be monitored.

11.4.1.3.1 Noise levels are to be monitored with a dosimeter during an average eight-hour day.

11.4.1.3.2 Those employees whose noise exposure is equal to or greater than 85 dBa as an eight-hour TWA shall be notified in writing of the monitoring results.


11.4.1.3.3 All employees exposed at 85 dBa or greater shall undergo yearly audiometric examination.

11.5 Audiometric Testing Guidelines

11.5.1 Employee testing shall be performed by a technician certified by the council for Accreditation on Occupational Hearing Conservation.

11.5.2 Employees will be notified of testing by Carbon America. Employees must have 14 hours of non-exposure to workplace noise prior to testing.

11.5.3 Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine whether a Standard Threshold Shift (STS) has occurred. Note: After base line audiogram has been established, all employees will be retested

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within 6 months of their first expose to compare to the baseline.
This test will be considered their first annual test.

11.5.4 If a STS has occurred, the employee shall be retested within 30 days and the retest shall be considered the annual audiogram.

11.5.5 If the STS is still present after the retest, the employee shall be informed in writing within 21 days and referred to an otolaryngologist after a complete examination.

11.5.6 If a physician determines an STS exists, the employee shall be refitted with hearing protectors, trained in their use and care and required to wear them.

11.6 Hearing Protection

11.6.1 All employees are provided with hearing protectors at no cost to the employee.


11.6.2 Hearing protection is required of all Carbon America employees or contractor employees entering an area or completing a job task that has been identified as being at or above 85 dBA.

11.6.3 Hearing Protection is required of all employees who have experienced an STS when entering an area or performing a job task at 85 dBA or greater.

11.6.4 Hearing protection types made available to employees will include disposable earplugs, canal caps, and earmuffs from two different manufacturers. The requirements of these hearing protectors and their attenuation factors will be selected based on the specific noise environment that they are exposed to.

11.6.5 Plain cotton or hearing aids/ devices are not acceptable protective devices. If an employee, who wears hearing aids / devices, has a hearing disability or total hearing loss, that employee must wear a form of hearing protection (example: earmuffs over the hearing aid) along with any aiding device when entering an area or performing work at or above 85 dBA.

11.7 Training

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11.7.1 Annual training shall be provided for Carbon America employees who are placed in the Hearing Conservation Program and training shall be updated to be consistent with any applicable changes in PPE required for that particular application. This training program will emphasize:

11.7.1.1 The OSHA Noise Standard with examples of specific areas within the work area where hearing protection is required.

11.7.1.2 Effects of sound and the damages it does to the hearing process.

11.7.1.3 Dangers of excessive exposure and examples of both on and off the job noise.

11.7.1.4 Methods to decrease sound exposure both on and off the job.

11.7.1.5 Warning signs of hearing loss.

11.7.1.6 Effective methods of hearing protection (plugs, muffs, limited exposure).

11.7.1.7 Proper fitting of, use of, and caring for hearing protectors.


11.7.1.8 Advantages, disadvantages, and attenuation factor of various styles of hearing protection.

11.7.1.9 Purpose and procedure for audiometric testing.

11.7.2 The Safety Department will be responsible for the development, scheduling, and delivery of training mandated by the OSHA regulations.

11.8 Recordkeeping

11.8.1 Carbon America will maintain accurate records for all noise level surveys and employee exposures. Employee's baseline/ annual audiograms and any other records will be retained in a separate file

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in the Sr. Safety Managers office for the duration of employment plus 30 years after termination.

11.8.2 Records will be provided to employees, former employees, or designated representatives thereof, upon written request to Carbon America.

11.9 Definitions

11.9.1 Audiogram- A chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function or frequency.

11.9.2 Audiometric Testing- Tests performed using an instrument that presents measured sound frequencies and levels to the ear and records the responses made by the person being tested.

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12.1 Purpose

12.1.1 The purpose of this program is to establish requirements for the use and handling of materials that expose employees to cadmium and/or hexavalent chromium.

12.2 Scope

12.2.1 This program covers all employees.

12.3 Key Responsibilities

12.3.1 Managers/Supervisors


12.3.1.1 Shall ensure that all employees are aware of the proper work procedures for cadmium and hexavalent chromium

12.3.1.2 Shall ensure that initial training is conducted for all new employees and that retraining is conducted when employee behaviors suggest that retraining is warranted.

12.3.1.3 As part of the JHA and other hazard evaluation processes, identifies and evaluates chromium or cadmium hazards and potential exposures during planning and the conduct of work.

12.3.1.4 Reviews and approves the Task-Specific Safety Analysis.

12.3.1.5 As necessary, quantitatively determines the presence of chromium or cadmium in materials, substrates, and other

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media. This may involve the collection of samples for analysis by a qualified laboratory or field testing using acceptable test methods.

12.3.1.6 Provides results of any chromium or cadmium survey to management/supervision, along with information regarding hazard potential and control measures. As appropriate, makes recommendations to management/supervision to maintain, modify, upgrade, or downgrade controls accordingly.

12.3.1.7 Takes prompt corrective measures (or supports any Competent Person in this role) to eliminate hazards; such as recommending to management/supervision to implement or modify engineering, administrative, work practice, and personal protection (including respiratory protection) controls.


12.3.1.8 Conducts periodic exposure assessment.

12.3.1.9 As appropriate, assists management/supervision in ensuring that workers have the necessary training and medical surveillance based upon the activity and hazard.

12.3.1.10 Ensures that medical monitoring is conducted in accordance with 29 CFR 1926.1126 (for chromium) or 29 CFR 1926.1127 (for cadmium) including imposition of work restrictions where appropriate and reviewing results of medical monitoring.

12.3.1.11 In evaluating chromium or cadmium hazards and specifying controls for a job, (a) utilizes reliable historical exposure monitoring data generated for other similar operations or activities, (b) utilizes objective data, and/or (c) plans and conducts initial monitoring to determine exposures and assess the effectiveness of hazard controls.

12.3.1.12 Conducts initial and periodic exposure monitoring in accordance with National Institute for Occupational Safety

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and Health (NIOSH)/OSHA methods if lacking historical or objective data.

12.3.1.13 Maintains effective records of jobs monitored, so that a historical database can be used to specify controls and eliminate unnecessary and redundant monitoring for future activities.

12.3.1.14 Supports project management/supervision in responding to exposures above the PEL when workers were not adequately protected.

12.3.1.15 As appropriate, participates in pre-job and daily worker briefings regarding task-specific chromium or cadmium hazards and controls, work practices/plans (such as JHAs), and other applicable information, including any changes that are made to controls or to the work practices or plans.

12.3.2 Employees

12.3.2.1 Shall follow all requirements regarding the safe work procedures for cadmium and hexavalent chromium.


12.4 Cadmium Procedure

12.4.1 Compliance Program

12.4.1.1 A written compliance program shall be implemented when the PEL for cadmium is exceeded at a work site.

12.4.1.2 The following areas shall be addressed within the site compliance program and to ensure emergency plans are in place should a release of cadmium occur:

12.4.1.2.1 Potential exposure determination including a description of each operation where cadmium is omitted, machinery use, material processed, controls in place, crew size, employee job responsibilities and maintenance practices.

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12.4.1.2.2 Air monitoring data or developing a justification for not conducting monitoring based on previous monitoring/historical data or objective data.

12.4.1.2.3 Engineering controls including the specific means that will be employed to meet compliance.

12.4.1.2.4 A report of technology considered in meeting the PEL.

12.4.1.2.5 A detailed schedule of implementation.

12.4.1.2.6 Consideration of respiratory protection.

12.4.1.2.7 A documented, written plan for dealing with emergency situations involving a substantial release of cadmium.

12.5 Work practice program.


12.5.1 Other relevant information such as protective clothing, housekeeping, hygiene areas and practices (including consideration of shower facilities), consideration of medical surveillance, training and recordkeeping.

12.5.2 The written program must be reviewed and updated annually or more often to reflect significant changes in the compliance status for Carbon America.

12.5.3 The program shall be provided for examination and copying upon request of affected employees, their representatives or OSHA officials.

12.5.4 Maintenance procedures while working on ventilation systems and changing of filters will be established. Procedures shall be developed and implemented to minimize employee exposure to cadmium when maintenance of ventilation systems and changing of filters. Examples include:

12.5.4.1 Proper use of PPE

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12.5.4.2 use of HEPA filtered vacuums

12.5.4.3 wet sweeping or other methods to minimize the likelihood of exposure to chromium.

12.5.5 No compressed air shall be used to remove chromium from any surface. Cleaning equipment must be handled in a manner that minimizes the reentry of chromium into the workplace.

12.5.6 Construction work activities that result in exposure to chromium or cadmium may include, but are not limited to, the following:

12.5.6.1 Demolition or salvage of structures where chromium or cadmium, or materials containing chromium or cadmium, are present.

12.5.6.2 Removal or encapsulation of materials containing chromium or cadmium.

12.5.6.3 New construction, alteration, repair, or renovation of structures and substrates that contain chromium or cadmium.

12.5.6.4 Installation of products containing chromium or cadmium.

12.5.6.5 Working with/around Portland cement (in powder or dust form – chromium only).

12.5.6.6 Torch-cutting chromium/cadmium containing paints.


12.5.6.7 Transportation, disposal, storage, or containment of chromium or cadmium, or materials containing chromium or cadmium.

12.5.6.8 Maintenance operations associated with construction activities.

12.5.6.9 Welding, cutting, burning, or grinding stainless steel, chromium-/cadmium-containing alloy steel, and chromium/cadmium containing alloys.

12.5.7 Note!!! Exposure to chromium (especially hexavalent chromium) has also occurred when the welding rod or wire in use contains chromium.

12.5.8 The permissible exposure limit (PEL) for cadmium and hexavalent chromium is five (5) micrograms calculated as an 8-hour time-weighted average over a work shift. The action level (AL) of 2.5 micrograms triggers the following requirements:

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12.5.8.1 Pre-job planning includes, as needed, a thorough identification of chromium or cadmium materials. Identification may include the product name, a Safety Data Sheet (SDS) with the SDS number (if available) or a sample content analysis. Sampling data includes location, sampling method, sampling dates, laboratory identification, and analytical method.

12.5.9 If documentation is not feasible or has been determined by the project engineer to be unavailable or unreliable, chromium or cadmium content sufficient to exceed the action level for chromium or cadmium is assumed.

12.5.10 Results of bulk sampling, calculations of potential chromium or cadmium exposure, and other data that demonstrate compliance with this practice (as well as the pertinent standards) are attached to the work package.

12.5.11 Where chromium or cadmium exposure above the action level is suspected, and in the absence of monitoring data, interim protective measures are established that are equal to or greater than the assumed exposure level.

12.6 Hexavalent Chromium Procedure


12.6.1 Welding, Cutting, and Grinding

12.6.1.1 Certain welding and cutting activities have been shown to expose the welder/cutter, and potentially helpers, to hexavalent chromium above the action level when exhaust ventilation is not used. The activities have included the following:

12.6.1.1.1 Shielded metal arc welding, Gas metal arc welding

12.6.1.1.2 Flux cored arc welding, Sub arc welding

12.6.1.1.3 Torch cutting through chromate-containing paints, grinding chromium-containing metals.

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12.6.1.2 The types of metal involved have been stainless steel, chromium-containing alloy steel, and chromium-containing nonferrous alloys. Exposure has also occurred when the welding rod or wire in use contains chromium, and exhaust ventilation is not used.


12.6.1.3 Therefore, exhaust ventilation is always prescribed as a control measure when activities with the materials mentioned above are in use unless historical personal monitoring data performed when similar materials, using similar methods, under similar environmental conditions are used shows conclusively that the welder/cutter and helper (if applicable) are not exposed above the action level without regard to respiratory protection.

12.6.1.4 Practices and procedures shall ensure that no employee is exposed to hexavalent chromium in excess of the permissible exposure level which is 5 micrograms per cubic meter of air based on an 8 hour Time Weighted Average.

12.6.2 Plasma and Air Arc Cutting and Gouging

12.6.2.1 Plasma and air arc cutting and gouging operations have been shown to expose the worker and helpers within 10 feet of the work to levels of hexavalent chromium above the permissible exposure limit (PEL) under most circumstances and conditions. Exhaust ventilation and respiratory protection (at least a half-face, tight-fitting respirator with a HEPA filter/cartridge) are always prescribed as control measures when activities with the materials mentioned above are in use; a higher level of respiratory protection may be prescribed, depending on conditions.

12.6.2.2 Note!!! Each discrete task must begin with ventilation and respiratory protection control measures in place. Respiratory protection may be downgraded only upon conclusive results of breathing zone monitoring of the employee(s) involved in each discrete task showing exposure to be less than 50 percent of the protection factor of the respirator relative to the concentration and PEL of

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hexavalent chromium. Respiratory protection may be eliminated only upon conclusive results of breathing-zone monitoring of the employee(s) involved in each discrete task showing exposure to be less than the PEL as an 8-hour time-weighted average.

12.6.3 Additional controls may also be appropriate to be in compliance with 29 CFR 1926.1126, depending on the results of evaluations of the materials to be used, environmental conditions, length of the work process/activity, etc.

12.6.4 Employees who are exposed at or above the action level 30 days or more per year are enrolled in a medical surveillance program.

12.6.5 Personal hygiene is very important while working with chromium or cadmium products. To avoid accidental ingestion of chromium or cadmium, employees wash thoroughly (regardless of other controls) prior to eating, chewing, smoking, or drinking.


12.7 Practices

12.7.1 Carbon America management/supervision supported by safety professional(s), the medical contractor and training providers conducts the following basic steps to control exposure to chromium or cadmium:

12.7.1.1 Determine the types of projects, activities, and operations that could involve chromium or cadmium, or chromium or cadmium-containing materials. For those jobs, conduct hazard identification as part of the work design, planning, and control process.

12.7.1.2 If chromium or cadmium materials are involved, ensure that project safety (for chromium) or a competent person (for cadmium) conducts a hazard evaluation to determine the potential exposure and to recommend initial controls.

12.7.1.3 Develop and implement a Task-Specific Safety when exposure is or is likely to be above the PEL. The JHA (or equal) addresses the scope of work activities; provides

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initial exposure assessment; and prescribes exposure controls, air-monitoring requirements, work practices, personal protective equipment and additional information as required.

12.7.1.4 Incorporate recommendations from project safety for chromium or cadmium hazard control measures into any JHA and work control documents.

12.8 Exposure Monitoring

12.8.1 Monitoring or measuring of employee exposure shall be conducted at least every 6 months if the initial monitoring shows employee exposure. Air monitoring will be performed at the beginning of each job task. If exposure monitoring results indicate exposure is above the PEL Carbon America. must include in the written notification to employees the corrective action being taken to reduce exposure to or below the PEL.

12.8.2 Notify each affected employee, in writing, of the results of monitoring within five (5) working days.


12.8.3 Air monitoring for chromium or cadmium may be waived provided the following conditions are met:

12.8.3.1 Monitoring has been performed in the last 12 months.

12.8.3.2 Data from historical monitoring originates from work operations that closely resemble the planned work operations.

12.8.3.3 Workplace and environmental conditions (such as indoors or outdoors, temperature, wind speed, ventilation, and space configuration) are similar to those when the monitoring was performed.

12.8.4 The processes, types of material, control methods and work practices are similar.

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12.8.5 Justification for waving initial monitoring shall be included in the Task-Specific Safety Analysis or equal. Employees involved are briefed regarding the existence of such data.

12.9 Surveillance

12.9.1 Medical surveillance shall be provided when an employee experiences signs or symptoms of the adverse health effects of Hexavalent Chromium (dermatitis, asthma, bronchitis, etc). Medical evaluations will be provided at no cost to employees. Examinations will be performed by or under the supervision of a physician or other licensed health care professional.

12.10 Facilities

12.10.1 Carbon America must provide change rooms for decontamination and ensure facilities prevent cross-contamination. Washing facilities shall be readily accessible for removing chromium from the skin. Workers must wash their hands and face or any other potentially exposed skin before eating, drinking or smoking.


12.11 Regulated Areas

12.11.1 Regulated areas shall be established when exposure to an employee is or is expected to be in excess of the PEL. Regulated areas shall be marked with warning signs to alert employees and access is restricted to authorized persons only.

12.12 Controls

12.12.1 If the exposure level is above the PEL for 30 days or more then engineering controls and work practices shall be provided to reduce exposure to the lowest feasible level. If employees can demonstrate that such controls are not feasible Carbon America. shall use engineering and or work controls to reduce employee exposure to the lowest levels achievable and shall supplement them by the use of required respiratory protection.

12.13 Recordkeeping

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12.13.1 Carbon America is required to maintain and make available an accurate record of all employee exposure monitoring, medical surveillance and training records.

12.13.2 Respiratory Protection & PPE

12.13.3 The appropriate respirator shall be used when engineering controls and work practices cannot reduce employee exposure during work operations where engineering controls and work practices are not feasible and emergencies. Respirators shall be provided in accordance with 1910.134 (Respiratory Protection) (see Carbon America Respiratory Protection Program). Specific requirements contained within 1926.1127 (Cadmium) regarding respiratory protection shall also be followed including:

12.13.3.1 Providing employees with full face piece respirators when they experience eye irritation.


12.13.3.2 Providing HEPA filters for powered and non-powered air-purifying respirators.

12.13.3.3 Providing a powered air-purifying respirator instead of a negative-pressure respirator when an employee entitled to a respirator chooses to use this type of respirator and such a respirator will provide adequate protection to the employee.

12.13.3.4 PPE will be provided when there is a hazard from skin or eye contact and employees are required to use the PPE. Gloves, aprons, coveralls, goggles, foot covers and other as needed PPE shall be provided at no cost to the employee and will be removed at the end of the work shift. Carbon America must clean, launder and replace all protective clothing as needed.

12.14 Housekeeping

12.14.1 All surfaces shall be maintained as free as practicable of chromium. All spills and releases of chromium shall be cleaned promptly with approved procedures including use of HEPA filtered vacuums as the

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primary method, dry or wet sweeping or other methods to minimize the likelihood of exposure to chromium.

12.14.2 No compressed air shall be used to remove chromium from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air or no alternative method is feasible.

12.14.3 Cleaning equipment must be handled in a manner that minimizes the reentry of chromium into the workplace.

12.15 Training

12.15.1 Carbon America shall provide appropriate types of training for employees who are potentially exposed to chromium or cadmium prior to their initial assignment and annually thereafter. Carbon America. will assure employee participation and maintain a record of the training contents. This training includes:


12.15.1.1 Hazard communication training for potentially exposed employees.

12.15.1.2 Training specified by the applicable chromium or cadmium standard for workers exposed at the action level for any one day, or who are exposed to chromium or cadmium compounds that are skin irritants.

12.15.1.3 Respirator training if respirators are to be used.


12.15.1.4 Provide information to workers regarding task-specific chromium or cadmium hazards and control methods, the JSA, work practices, medical surveillance and other applicable information, including any changes that are made to these controls.

12.15.1.5 Provide training annually, as appropriate, to workers who continue to have exposure to chromium or cadmium at or above the action level on any one day.

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12.15.1.6 All training will be recorded and include the identity of the employee trained, the signature of the person who conducted the training and the date of the training.

12.15.1.7 Training records must be kept for one year.

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13.1 Policy Statement

13.1.1 It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

13.1.2 Carbon America will comply with the OSHA **Portable Ladder and fixed ladder** standards, 29 CFR 1910.25, 29 CFR 1910.27 and 29 CFR 1926.Subpart X Ladders and Stairways, through implementation of this written program.

13.1.3 This Program applies to all Carbon America Employee and Subcontractors.

13.2 Purpose

13.2.1 The purpose of this procedure is to establish the minimum safety requirements for the inspection, care and use of portable ladders on the jobsite.

13.3 References


13.3.1 29 CFR 1910.25

13.3.2 29 CFR 1910.27

13.3.3 29 CFR 1926.1050

13.3.4 29 CFR 1926.1051

13.3.5 29 CFR 1926.1053

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13.4 General Requirements

13.4.1 Responsibilities

13.4.1.1 Management

13.4.1.1.1 The Project Manager/Supervisor is responsible for field implementation and enforcement of this program.

13.4.1.1.2 The Safety Department is responsible for monitoring compliance with this program.

13.4.1.2 Employees

13.4.1.2.1 Responsible for daily ladders inspections

13.4.1.2.2 Ensure every effort is made to not intentionally use a defective ladder for any purpose.

13.4.1.2.3 Ensure defective ladders are tagged out after failing and inspection

13.5 Inspection

13.5.1 All portable ladders shall be inspected prior to use. Inspections shall include the following items at a minimum:


13.5.1.1 All parts shall be free from sharp edges, splinters, burrs, cracks, or visible defects.

13.5.1.2 Steps and rungs are in place, intact, and free from grease or oil, have slip resistant surfaces and are firmly attached.

13.5.1.3 Support braces, bolts and screws are in place and tight.

13.5.1.4 Spreaders or other locking devices are in place and operable.

13.5.1.5 Safety feet are in place and operable.

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13.5.1.6 Additional auxiliary equipment such as stand-off supports or leg leveling devices are properly attached and operable.

13.5.1.7 Proper ladder rating labels are attached and in readable condition.

13.5.1.8 Ladders having defects shall be properly marked (red zip tie and Carbon America Lock Out Tag) and taken out of service

13.5.2 If a ladder tips over or is struck, additional inspections shall be performed to include the following items:

13.5.2.1 Inspect for side rail cracks, chips, or splinters.

13.5.2.2 Inspect for step damage.

13.5.2.3 Inspect all rung-to-side rail connections.

13.5.2.4 Check rivets and other fastening devices for shear.

13.6 Care of Ladders

13.6.1 Ladders shall be maintained in good useable condition at all times.


13.6.2 Ladders shall be stored in a location where the ladder is protected from damage and does not create an additional hazard.

13.6.3 Ladders shall be properly secured when in storage to prevent the ladder from becoming an additional hazard.

13.7 General Guidelines

13.7.1 Wooden ladders shall not be painted so as to obscure a defect in the wood; only a clear, nonconductive finish shall be used.

13.7.2 All ladders shall be inspected frequently and regularly. Ladders with weakened, broken, or missing steps; broken side rails; or other defects shall be tagged and removed from service.

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13.7.3 Ladders and scaffolds shall be sufficiently strong for their intended use (correct load capacity).

13.7.4 Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced, when the ladder is in position for use.

13.7.5 Portable metal ladders shall not be used in the vicinity of energized electrical circuits. (Exception: Such ladders may be used in specialized work, such as high voltage substations, where nonconductive ladders might present a greater hazard. These ladders shall be properly marked.)

13.7.6 Ladders shall not be placed in front of a door that opens toward the ladder, unless the door is open, locked, or guarded and signage is used to alert others of the hazard.

13.7.7 When ascending or descending ladders, employees shall have both hands free and shall face the ladder.

13.7.8 Only one employee shall work from a ladder at one time (except for hook type ladders). If two employees are required, a second ladder shall be used.

13.7.9 Ladders shall be used for their intended purpose; ladders shall not be used as scaffold platforms.

13.7.10 Boxes, chairs, etc., shall not be used as ladders.


13.7.11 Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height.

13.7.12 Employees shall not use a ladder until they have been properly trained in its use.

13.7.13 A ladder inspection must be performed by a designated competent person. If the ladder fails, it shall be tagged tag until repairs are made or discarded.

13.8 Straight Ladders

13.8.1 Portable straight ladders shall not be used without nonskid bases.

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13.8.2 The ladder shall be placed so that the distance between the bottom of the ladder and the supporting point is approximately one-fourth of the ladder length between supports (4:1 ratio).

13.8.3 Straight ladders shall not be climbed beyond the third step from the top.

13.8.4 When working from a portable ladder, the ladder must be securely placed, held, tied, or otherwise made secure to prevent slipping or falling.

13.8.5 When dismounting from a ladder at an elevated position (as at a roof), the employee shall ensure that the ladder side rails extend at least 3 feet above the dismount position, or that grab bars are present.

13.8.6 Employees shall wear a body harness and lanyard, and tie off to a secure anchor whenever both hands must be used for the job or are exposed to a fall in excess of 6 feet.

13.8.7 Ladders shall not be spliced together to form a longer ladder.

13.8.8 A ladder shall not be placed against an unsafe support.

13.8.9 Employees climbing a ladder with a fall exposure greater than 24 feet shall be protected by an approved cage, ladder climbing device, or by the use of a body harness, lanyard, life-line system.


13.8.10 Never move, shift or extend a ladder while it is occupied.

13.8.11 Maintain 3 points of contact while ascending, descending, or working from a ladder.

13.8.12 On two section extension ladders, the minimum overlap for the two section in use shall be as follows:

13.8.12.1 Ladder Overlap Table

Size of Ladder	Overlap (feet)
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Up to and including 36'	3'
Over 36' up to and including 48'	4'
Over 48' up to and including 60'	5'

13.9 Step Ladders


13.9.1 The top two steps shall not be used.

13.9.2 Step ladder legs shall be fully spread and the spreading bars locked in place.

13.9.3 Step ladders shall not be used as straight ladders.

13.9.4 Always face the ladder when ascending and descending.

13.9.5 When an employee is working on a step ladder over 6 feet high, the employee shall use a body harness and lanyard attached to a substantial anchor.

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14.1 Policy Statement

14.1.1 It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

14.1.2 Carbon America will comply with the OSHA **Lead** standard, 29 CFR 1910.1025 and 29 CFR 1926.62, through implementation of this written program.


14.2 Purpose

14.2.1 To protect employees on jobsites from hazards associated with lead through hazard identification and avoidance.

14.2.2 This section applies to all construction work where an employee may be occupationally exposed to lead. Construction work is defined as work for construction, alteration and/or repair, including painting and decorating. It includes but is not limited to the following:

14.2.2.1 Demolition or salvage of structures where lead or materials containing lead are present;

14.2.2.2 Removal or encapsulation of materials containing lead;

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14.2.2.3 New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;

14.2.2.4 Installation of products containing lead;

14.2.2.5 Lead contamination/emergency cleanup;

14.2.2.6 Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and

14.2.2.7 Maintenance operations associated with the construction activities described in this paragraph.

14.3 References

14.3.1 29 CFR 1910.1025

14.3.2 29 CFR 1926.62


14.4 General Requirements

14.4.1 Permissible exposure limit.

14.4.1.1 No employee may be exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 ug/m(3)) averaged over an 8-hour period.

14.4.1.2 If an employee is exposed to lead for more than 8 hours in any work day the employees' allowable exposure, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Allowable employee exposure (in ug/m(3)) = 400 divided by hours worked in the day.

14.4.1.3 When respirators are used to limit employee and all the requirements of this program have been met, employee exposure may be considered to be at the level provided by the protection factor of the respirator for those periods the respirator is worn. Those periods may be averaged with

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exposure levels during periods when respirators are not worn to determine the employee's daily TWA exposure.

14.4.1.4 At no time during the initial assessment and during the monitoring phases shall an employee disturb lead containing material without following the appropriate safe work practices.

14.4.1.5 When working on multi-contractor worksites, your employees shall be protected from exposure. If employees working immediately adjacent to a lead abatement activity are exposed to lead due to the inadequate containment of such job, their employer shall either remove the employees from the area until the enclosure breach is repaired or perform an initial exposure assessment.

14.4.2 Exposure assessment

14.4.2.1 Workplaces or operations covered by this standard shall initially determine if any employee may be exposed to lead at or above the action level.


14.4.2.2 Employee exposure is that exposure which would occur if the employee were not using a respirator.

14.4.2.3 Where monitoring is required under this section, personal samples shall be collected that are representative of a full shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure level.

14.4.2.4 Full shift personal samples shall be representative of the monitored employee's regular, daily exposure to lead.

14.4.3 Protection of employees during assessment of exposure.

14.4.3.1 Where lead is present, until an employee exposure assessment is complete and documents that the employee performing any of the listed tasks is not exposed above the PEL, the employer shall treat the employee as if the employee were exposed above the PEL, and not in excess

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of ten (10) times the PEL, and shall implement employee protective measures.

14.4.3.2 Where lead containing coatings or paint are present: Manual demolition of structures (e.g, dry wall), manual scraping, manual sanding, heat gun applications, and power tool cleaning with dust collection systems;

14.5 Spray painting with lead-based paints or coatings


14.5.1 Where lead is present, until an employee exposure assessment is complete and documents that the employee performing any of the listed tasks is not exposed in excess of 500 ug/m(3), the employer shall treat the employee as if the employee were exposed to lead in excess of 500 ug/m(3) and shall implement employee protective measures. Where the assessment establishes that the employee is exposed to levels of lead below 500 ug/m(3), the exposed employee will be provided the appropriate respirator prescribed for such use at such lower exposures.

14.6 Using lead containing mortar, or lead burning

14.6.1 Where lead containing coatings or paint present; rivet busting; power tool cleaning without dust collection systems; clean up activities where dry expendable abrasives are used; and abrasive blasting enclosures movement and removal.

14.6.2 Where lead is present, until an employee exposure assessment is complete and documents that the employee performing any of the listed tasks is not exposed to lead in excess of 2,500 ug/m(3) (50 x PEL), the employer shall treat the employee as if the employee were exposed to lead in excess of 2,500 ug/m(3) and shall implement employee protective measures. Where the employer does establish that the employee is exposed to levels of lead below 2,500 ug/m(3), the employer may provide the exposed employee with the appropriate respirator prescribed for use at such lower exposures. Interim protection as described in this paragraph is required where lead containing coatings or paint are present on structures when performing:

14.6.2.1 Abrasive blasting

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14.6.2.2 Welding

14.6.2.3 Cutting and

14.6.2.4 Torch burning

14.6.3 Until an employee exposure assessment is complete and determines actual employee exposure, the employer shall provide to employees performing the tasks described above with interim protection as follows:

14.6.3.1 Appropriate respiratory protection.

14.6.3.2 Appropriate Personal protective clothing and equipment.

14.6.3.3 Hand wash facilities.

14.6.3.4 Biological monitoring to consist of blood sampling and analysis for lead and zinc protoporphyrin levels, and

14.6.3.5 Training on the elements of this Written program and the provisions covered in OSHA 29 CFR 1926.62 and

14.6.3.6 Training on the elements of this written program and the provisions covered in OSHA 29 CFR 1910.1025.


14.7 Basis of initial determination.

14.7.1 Employee exposures and shall be based on initial determinations of employee exposure monitoring results and any of the following, relevant considerations:

14.7.1.1 Any information, observations, or calculations which would indicate employee exposure to lead;

14.7.1.2 Any previous measurements of airborne lead; and

14.7.1.3 Any employee complaints of symptoms which may be attributable to exposure to lead.

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14.7.2 Monitoring for the initial determination where performed may be limited to a representative sample of the exposed employees who the employer reasonably believes are exposed to the greatest airborne concentrations of lead in the workplace.

14.7.3 Where the employer has previously monitored for lead exposures, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of this program if the sampling and analytical methods meet the accuracy and confidence levels as described herein.

14.7.4 Where the employer has objective data, demonstrating that a particular product or material containing lead or a specific process, operation or activity involving lead cannot result in employee exposure to lead at or above the action level during processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.


14.7.5 The employer shall establish and maintain an accurate record documenting the nature and relevancy of objective data, where used in assessing employee exposure in lieu of exposure monitoring.

14.7.6 Objective data is not permitted to be used for initial exposure assessments.

14.8 Positive initial determination and initial monitoring.

14.8.1 Where a determination shows the possibility of any employee exposure at or above the action level the employer shall conduct monitoring which is representative of the exposure for each employee in the workplace who is exposed to lead.

14.8.2 Where the employer has previously monitored for lead exposure, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's

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current operations, the employer may rely on such earlier monitoring results.

14.9 Negative initial determination.

14.9.1 Where a determination is made that no employee is exposed to airborne concentrations of lead at or above the action level the employer shall make a written record of such determination.


14.9.2 The record shall include shall include the date of determination, location within the worksite, and the name and social security number of each employee monitored.

14.10 Frequency.

14.10.1 If the initial determination reveals employee exposure to be below the action level further exposure determination need not be repeated except as otherwise specified in this written program.

14.10.2 If the initial determination or subsequent determination reveals employee exposure to be at or above the action level but at or below the PEL the employer shall perform monitoring in accordance with this paragraph at least every 6 months. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring for that employee except as otherwise provided in this written program.

14.10.3 If the initial determination reveals that employee exposure is above the PEL the employer shall perform monitoring quarterly. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are at or below the PEL but at or above the action level at which time the employer shall repeat monitoring for that employee at the frequency specified, except as otherwise provided in this written program. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring for that employee except as otherwise provided in this written program.

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14.10.4 Additional exposure assessments. Whenever there has been a change of equipment, process, control, personnel or a new task has been initiated that may result in additional employees being exposed to lead at or above the action level or may result in employees already exposed at or above the action level being exposed above the PEL, the employer shall conduct additional monitoring in accordance with this paragraph.

14.11 Employee notification

14.11.1 The employer must, as soon as possible but no later than 5 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to employees.

14.11.2 Whenever the results indicate that the representative employee exposure, without regard to respirators, is at or above the PEL the employer shall include in the written notice a statement that the employees exposure was at or above that level and a description of the corrective action taken or to be taken to reduce exposure to below that level.


14.12 Accuracy of measurement.

14.12.1 The employer shall use a method of monitoring and analysis which has an accuracy (to a confidence level of 95 percent) of not less than plus or minus 25 percent for airborne concentrations of lead equal to or greater than 30 ug/m(3).

14.13 Methods of Compliance

14.13.1 Engineering and work practice controls.

14.13.1.1 The employer shall implement engineering and work practice controls, including administrative controls, to reduce and maintain employee exposure to lead to or below the permissible exposure limit to the extent that such controls are feasible.

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14.13.1.2 Wherever all feasible engineering and work practices controls that can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limit , the employer shall nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them by the use of respiratory protection.

14.14 Compliance Program

14.14.1 Prior to commencement of the job each employer shall establish and implement a written site-specific compliance program.

14.14.2 Written plans for these compliance programs shall include at least the following:

14.14.2.1 A description of each activity in which lead is emitted; e.g. equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices;

14.14.2.2 A description of the specific means that will be employed to achieve compliance and, where engineering controls are required engineering plans and studies used to determine methods selected for controlling exposure to lead;

14.14.2.3 A report of the technology considered in meeting the PEL;


14.14.2.4 Air monitoring data which documents the source of lead emissions;

14.14.2.5 A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.;

14.14.2.6 A work practice program;

14.14.2.7 An administrative control schedule, if applicable;

14.14.2.8 A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure to lead and with respect to

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responsibility for compliance with this section as set-forth in OSHA 29 CFR 1926.16.

14.14.3 Other relevant information.

14.14.4 The compliance program shall provide for frequent and regular inspections of job sites, materials, and equipment to be made by a competent person.

14.14.5 Written programs shall be submitted upon request to any affected employee or authorized employee representatives, to the Assistant Secretary and the Director, and shall be available at the worksite for examination and copying by the Assistant Secretary and the Director.

14.14.6 Written programs must be revised and updated at least annually to reflect the current status of the program.

14.14.7 Mechanical ventilation. When ventilation is used to control lead exposure, the employer shall evaluate the mechanical performance of the system in controlling exposure as necessary to maintain its effectiveness.

14.14.8 Administrative controls. If administrative controls are used as a means of reducing employees TWA exposure to lead, the employer shall establish and implement a job rotation schedule which includes:


14.14.8.1 Name or identification number of each affected employee;

14.14.8.2 Duration and exposure levels at each job or work station where each affected employee is located; and

14.14.8.3 Any other information which may be useful in assessing the reliability of administrative controls to reduce exposure to lead.

14.14.9 The employer shall ensure that, to the extent relevant, employees follow good work practices such as described in 1926.62 Appendix B.

14.15 Respiratory Protection.

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14.15.1 For employees who use respirators required by this section, the Carbon America must provide each employee an appropriate respirator that complies with the requirements of this paragraph. Respirators must be used during:

14.15.1.1 Periods when an employee's exposure to lead exceeds the PEL.

14.15.1.2 Work operations for which engineering and work-practice controls are not sufficient to reduce employee exposures to or below the PEL.

14.15.1.3 Periods when an employee requests a respirator.

14.15.1.4 Periods when respirators are required to provide interim protection of employees while they perform the operations specified in this program.

14.16 Protective work clothing and equipment.

14.16.1 "Provision and use". Where an employee is exposed to lead above the PEL without regard to the use of respirators, where employees are exposed to lead compounds which may cause skin or eye irritation (e.g. lead arsenate, lead azide), and as interim protection for employees performing tasks as specified this program, the employer shall provide at no cost to the employee and assure that the employee uses appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments such as, but not limited to:


14.16.1.1 Coveralls or similar full-body work clothing;

14.16.1.2 Gloves, hats, and shoes or disposable shoe coverlets; and

14.16.1.3 Face shields, vented goggles, or other appropriate protective equipment which complies with 1910.133 of this chapter.

14.17 Cleaning and replacement.

14.17.1 The employer shall provide protective clothing in a clean and dry condition at least weekly, and daily to employees whose exposure

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levels without regard to a respirator are over 200 ug/m(3) of lead as an 8-hour TWA.

14.17.2 The employer shall provide for the cleaning, laundering, and disposal of protective clothing and equipment.

14.17.3 The employer shall repair or replace required protective clothing and equipment as needed to maintain their effectiveness.

14.17.4 The employer shall assure that all protective clothing is removed at the completion of a work shift only in change areas provided for that purpose.

14.17.5 The employer shall assure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area which prevents dispersion of lead outside the container.

14.17.6 The employer shall inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.


14.17.7 The employer shall assure that the containers of contaminated protective clothing and equipment are labeled as follows:

14.17.7.1 Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state, or federal regulations.

14.17.8 The employer shall prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means which disperses lead into the air.

14.18 Housekeeping

14.18.1 All surfaces shall be maintained as free as practicable of accumulations of lead.

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14.18.2 Clean-up of floors and other surfaces where lead accumulates shall wherever possible, be cleaned by vacuuming or other methods that minimize the likelihood of lead becoming airborne.

14.18.3 Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other equally effective methods have been tried and found not to be effective.

14.18.4 Where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters and used and emptied in a manner which minimizes the reentry of lead into the workplace.

14.18.5 Compressed air shall not be used to remove lead from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

14.19 Hygiene facilities and practices.

14.19.1 The employer shall assure that in areas where employees are exposed to lead above the PEL without regard to the use of respirators, food or beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied.


14.19.2 Change areas.

14.19.2.1 The employer shall provide clean change areas for employees whose airborne exposure to lead is above the PEL, and as interim protection for employees performing tasks, without regard to the use of respirators.

14.19.2.2 The employer shall assure that change areas are equipped with separate storage facilities for protective work clothing and equipment and for street clothes which prevent cross-contamination.

14.19.2.3 The employer shall assure that employees do not leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift.

14.19.3 Showers.

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14.19.3.1 The employer shall provide shower facilities, where feasible, for use by employees whose airborne exposure to lead is above the PEL.

14.19.3.2 The employer shall assure, where shower facilities are available, that employees shower at the end of the work shift and shall provide an adequate supply of cleansing agents and towels for use by affected employees.

14.19.4 Eating facilities.

14.19.4.1 The employer shall provide lunchroom facilities or eating areas for employees whose airborne exposure to lead is above the PEL, without regard to the use of respirators.

14.19.4.2 The employer shall assure that lunchroom facilities or eating areas are as free as practicable from lead contamination and are readily accessible to employees.


14.19.4.3 The employer shall assure that employees whose airborne exposure to lead is above the PEL, without regard to the use of a respirator, wash their hands and face prior to eating, drinking, smoking or applying cosmetics.

14.19.4.4 The employer shall assure that employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, downdraft booth, or other cleaning method that limits dispersion of lead dust.

14.19.5 Hand Washing facilities.

14.19.5.1 The employer shall provide adequate handwashing facilities for use by employees exposed to lead in accordance with 29 CFR 1926.51(f).

14.19.5.2 Where showers are not provided the employer shall assure that employees wash their hands and face at the end of the work-shift.

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14.20 Medical Surveillance

14.20.1 The employer shall make available initial medical surveillance to employees occupationally exposed on any day to lead at or above the action level. Initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels.

14.20.2 The employer shall institute a medical surveillance program for all employees who are or may be exposed by the employer at or above the action level for more than 30 days in any consecutive 12 months;

14.20.3 The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician.


14.20.4 The employer shall make available the required medical surveillance including multiple physician review without cost to employees and at a reasonable time and place.

14.20.5 Biological monitoring.

14.20.5.1 Blood lead and ZPP level sampling and analysis. The employer shall make available biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels to each affected employee on the following schedule:

14.20.5.1.1 For each employee exposed at or above the PEL, at least every 2 months for the first 6 months and every 6 months thereafter;

14.20.5.1.2 For each employee exposed at or above the PEL, whose last blood sampling and analysis indicated a blood lead level at or above 40 ug/dl, at least every two months. This frequency shall continue until two consecutive blood samples and analyses indicate a blood lead level below 40 ug/dl; and

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14.20.5.1.3 For each employee who is removed from exposure to lead due to an elevated blood lead level at least monthly during the removal period.

14.20.5.1.4 Follow-up blood sampling tests. Whenever the results of a blood lead level test indicate that an employee's blood lead level exceeds the numerical criterion for medical removal, the employer shall provide a second (follow-up) blood sampling test within two weeks after the employer receives the results of the first blood sampling test.

14.20.5.1.5 Accuracy of blood lead level sampling and analysis. Blood lead level sampling and analysis provided pursuant to this section shall have an accuracy (to a confidence level of 95 percent) within plus or minus 15 percent or 6 ug/dl, whichever is greater, and shall be conducted by a laboratory approved by OSHA.

14.20.6 Employee notification.


14.20.6.1 Within five working days after the receipt of biological monitoring results, the employer shall notify each employee in writing of his or her blood lead level; and

14.20.6.2 the employer shall notify each employee whose blood lead level exceeds 40 ug/dl that the standard requires temporary medical removal with Medical Removal Protection benefits when an employee's blood lead level exceeds the numerical criterion for medical removal.

14.20.7 Medical examinations and consultations.

14.20.7.1 Frequency. The employer shall make available medical examinations and consultations to each employee exposed at or above the PEL on the following schedule:

14.20.7.1.1 At least annually for each employee for whom a blood sampling test conducted at any time during

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the preceding 12 months indicated a blood lead level at or above 40 ug/dl;

14.20.7.1.2 As soon as possible, upon notification by an employee either that the employee has developed signs or symptoms commonly associated with lead intoxication, that the employee desires medical advice concerning the effects of current or past exposure to lead on the employee's ability to procreate a healthy child, that the employee is pregnant, or that the employee has demonstrated difficulty in breathing during a respirator fitting test or during use; and


14.20.7.1.3 As medically appropriate for each employee either removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited pursuant to a final medical determination.

14.20.7.2 Content. The content of medical examinations made available shall be determined by an examining physician and, if requested by an employee, shall include pregnancy testing or laboratory evaluation of male fertility. Medical examinations shall include the following elements:

14.20.7.2.1 A detailed work history and a medical history, with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking, hygiene), and past gastrointestinal, hematologic, renal, cardiovascular, reproductive and neurological problems;

14.20.7.2.2 A thorough physical examination, with particular attention to teeth, gums, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems. Pulmonary status should be evaluated if respiratory protection will be used;

14.20.7.2.3 A blood pressure measurement;

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14.20.8 A blood sample and analysis which determines:

14.20.8.1 Blood lead level;

14.20.8.2 Hemoglobin and hematocrit determinations, red cell indices, and examination of peripheral smear morphology;

14.20.8.3 Zinc protoporphyrin;

14.20.8.4 Blood urea nitrogen; and,

14.20.8.5 Serum creatinine;

14.20.8.6 A routine urinalysis with microscopic examination; and

14.20.8.7 Any laboratory or other test relevant to lead exposure which the examining physician deems necessary by sound medical practice.


14.20.9 Multiple physician review mechanism.

14.20.9.1 If the employer selects the initial physician who conducts any medical examination or consultation provided to an employee under this section, the employee may designate a second physician:

14.20.9.1.1 To review any findings, determinations or recommendations of the initial physician; and

14.20.9.1.2 To conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.

14.20.9.2 The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for, the multiple physician review mechanism upon the employee doing the following within fifteen (15) days after receipt of the foregoing

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notification, or receipt of the initial physician's written opinion, whichever is later:

14.20.9.2.1 The employee informing the employer that he or she intends to seek a second medical opinion, and

14.20.9.2.2 The employee initiating steps to make an appointment with a second physician.

14.20.9.3 If the findings, determinations or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.

14.20.9.4 If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee through their respective physicians shall designate a third physician:


14.20.9.4.1 To review any findings, determinations or recommendations of the prior physicians; and

14.20.9.4.2 To conduct such examinations, consultations, laboratory tests and discussions with the prior physicians as the third physician deems necessary to resolve the disagreement of the prior physicians.

14.20.9.5 The employer shall act consistent with the findings, determinations and recommendations of the third physician, unless the employer and the employee reach an agreement which is otherwise consistent with the recommendations of at least one of the three physicians.

14.20.9.6 Information provided to examining and consulting physicians.

14.20.9.7 The employer shall provide an initial physician conducting a medical examination or consultation under this section with the following information:

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14.20.9.7.1 A copy of this regulation for lead including all Appendices;

14.20.9.7.2 A description of the affected employee's duties as they relate to the employee's exposure;

14.20.9.7.3 The employee's exposure level or anticipated exposure level to lead and to any other toxic substance (if applicable);

14.20.9.7.4 A description of any personal protective equipment used or to be used;

14.20.9.7.5 Prior blood lead determinations; and

14.20.9.7.6 All prior written medical opinions concerning the employee in the employer's possession or control.


14.20.9.8 The employer shall provide the foregoing information to a second or third physician conducting a medical examination or consultation under this section upon request either by the second or third physician, or by the employee.

14.20.10 Written medical opinions.

14.20.10.1 The employer shall obtain and furnish the employee with a copy of a written medical opinion from each examining or consulting physician which contains only the following information:

14.20.10.1.1 The physician's opinion as to whether the employee has any detected medical condition which would place the employee at increased risk of material impairment of the employee's health from exposure to lead;

14.20.10.1.2 The physician's opinion as to whether the employee has any detected medical condition which would place the employee at increased risk of

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material impairment of the employee's health from exposure to lead;

14.20.10.1.3 Any recommended special protective measures to be provided to the employee, or limitations to be placed upon the employee's exposure to lead;

14.20.10.1.4 Any recommended limitation upon the employee's use of respirators, including a determination of whether the employee can wear a powered air purifying respirator if a physician determines that the employee cannot wear a negative pressure respirator; and

14.20.10.1.5 The results of the blood lead determinations.


14.20.10.2 The employer shall instruct each examining and consulting physician to:

14.20.10.2.1 Not reveal either in the written opinion or orally, or in any other means of communication with the employer, findings, including laboratory results, or diagnoses unrelated to an employee's occupational exposure to lead; and

14.20.10.2.2 Advise the employee of any medical condition, occupational or non-occupational, which dictates further medical examination or treatment.

14.20.10.2.3 Alternate physician determination mechanisms. The employer and an employee or authorized employee representative may agree upon the use of any alternate physician determination mechanism in lieu of the multiple physician review mechanism so long as the alternate mechanism is as expeditious and protective as the requirements contained in this paragraph.

14.21 Chelation.

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14.21.1 The employer shall assure that any person whom he retains, employs, supervises or controls does not engage in prophylactic chelation of any employee at any time.

14.21.2 If therapeutic or diagnostic chelation is to be performed by any person, the employer shall assure that it be done under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring and that the employee is notified in writing prior to its occurrence.

14.22 Medical removal protection

14.22.1 Temporary medical removal and return of an employee


14.22.1.1 Temporary removal due to elevated blood lead level. The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that a periodic and a follow-up blood sampling test conducted pursuant to this section indicate that the employee's blood lead level is at or above 50 ug/dl; and,

14.22.2 Temporary removal due to a final medical determination.

14.22.2.1 The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that a final medical determination results in a medical finding, determination, or opinion that the employee has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead.

14.22.2.2 For the purposes of this section, the phrase "final medical determination" means the written medical opinion on the employees' health status by the examining physician or, where relevant, the outcome of the multiple physician review mechanism or alternate medical determination mechanism used pursuant to the medical surveillance provisions of this section.

14.22.2.3 Where a final medical determination results in any recommended special protective measures for an employee, or limitations on an employee's exposure to lead, the

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employer shall implement and act consistent with the recommendation.

14.22.3 Return of the employee to former job status.

14.22.3.1 The employer shall return an employee to his or her former job status:


14.22.3.1.1 For an employee removed due to a blood lead level at or above 50 ug/dl when two consecutive blood sampling tests indicate that the employee's blood lead level is at or below 40 ug/dl;

14.22.3.1.2 For an employee removed due to a final medical determination, when a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead.

14.22.3.2 For the purposes of this section, the requirement that an employer return an employee to his or her former job status is not intended to expand upon or restrict any rights an employee has or would have had, absent temporary medical removal, to a specific job classification or position under the terms of a collective bargaining agreement.

14.22.3.3 Removal of other employee special protective measure or limitations. The employer shall remove any limitations placed on an employee or end any special protective measures provided to an employee pursuant to a final medical determination when a subsequent final medical determination indicates that the limitations or special protective measures are no longer necessary.

14.22.3.4 Employer options pending a final medical determination. Where the multiple physician review mechanism, or alternate medical determination mechanism used pursuant to the medical surveillance provisions of this section, has not yet

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resulted in a final medical determination with respect to an employee, the employer shall act as follows:

14.22.3.4.1 Removal. The employer may remove the employee from exposure to lead, provide special protective measures to the employee, or place limitations upon the employee, consistent with the medical findings, determinations, or recommendations of any of the physicians who have reviewed the employee's health status.

14.22.3.5 Return. The employer may return the employee to his or her former job status, end any special protective measures provided to the employee, and remove any limitations placed upon the employee, consistent with the medical findings, determinations, or recommendations of any of the physicians who have reviewed the employee's health status, with two exceptions.


14.22.3.6 If the initial removal, special protection, or limitation of the employee resulted from a final medical determination which differed from the findings, determinations, or recommendations of the initial physician or;

14.22.3.7 If the employee has been on removal status for the preceding eighteen months due to an elevated blood lead level, then the employer shall await a final medical determination.

14.23 Medical removal protection benefits

14.23.1 Provision of medical removal protection benefits. The employer shall provide an employee up to eighteen (18) months of medical removal protection benefits on each occasion that an employee is removed from exposure to lead or otherwise limited pursuant to this section.

14.23.2 Definition of medical removal protection benefits. For the purposes of this section, the requirement that an employer provide medical removal protection benefits means that, as long as the job the employee was removed from continues, the employer shall maintain

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the total normal earnings, seniority and other employment rights and benefits of an employee, including the employee's right to his or her former job status as though the employee had not been medically removed from the employee's job or otherwise medically limited.

14.23.3 Follow-up medical surveillance during the period of employee removal or limitation. During the period of time that an employee is medically removed from his or her job or otherwise medically limited, the employer may condition the provision of medical removal protection benefits upon the employee's participation in follow-up medical surveillance made available pursuant to this section.


14.23.4 Workers' compensation claims. If a removed employee files a claim for workers' compensation payments for a lead-related disability, then the employer shall continue to provide medical removal protection benefits pending disposition of the claim. To the extent that an award is made to the employee for earnings lost during the period of removal, the employer's medical removal protection obligation shall be reduced by such amount. The employer shall receive no credit for workers' compensation payments received by the employee for treatment-related expenses.

14.23.5 Other credits. The employer's obligation to provide medical removal protection benefits to a removed employee shall be reduced to the extent that the employee receives compensation for earnings lost during the period of removal either from a publicly or employer-funded compensation program, or receives income from employment with another employer made possible by virtue of the employee's removal.

14.23.6 Voluntary removal or restriction of an employee. Where an employer, although not required by this section to do so, removes an employee from exposure to lead or otherwise places limitations on an employee due to the effects of lead exposure on the employee's medical condition, the employer shall provide medical removal protection benefits to the employee.


14.24 Employee information and Training.

14.24.1 Information concerning lead hazards shall be communicated to affected employees according to the requirements of OSHA's Hazard

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Communication Standard for the construction industry, 29 CFR 1926.59. Information will include, but not be limited to the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training. In addition, the following requirements apply:

- 14.24.1.1** Each employee who is subject to exposure to lead at or above the action level on any day, or who is subject to exposure to lead compounds which may cause skin or eye irritation (e.g., lead arsenate, lead azide), shall be trained in accordance with the requirements of this program.
 - 14.24.2** Training shall be provided to affected employees prior to the time of job assignment.
 - 14.24.3** Training shall be conducted at least annually for each employee who is subject to lead exposure at or above the action level on any day.
 - 14.24.4** Training program. Each employee shall be trained in the following:
 - 14.24.4.1** The content of 29 CFR 1926.62 and its appendices;
 - 14.24.4.2** The specific nature of the operations which could result in exposure to lead above the action level.
 - 14.24.5** The purpose, proper selection, fitting, use, and limitations of respirators.
 - 14.24.6** The purpose and a description of the medical surveillance program, and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for employees who are pregnant).
 - 14.24.7** The engineering controls and work practices associated with the employee's job assignment including training of employees to follow relevant good work practices.
 - 14.24.8** The contents of any compliance plan in effect.
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14.24.9 Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician.

14.24.10 The employee's right of access to records under Carbon America 35.0.

14.24.11 Access to information and training materials.

14.24.12 The employer shall make readily available to all affected employees a copy of 29 CFR 1926.62 and its appendices.

14.24.13 The employer shall provide, upon request, all materials relating to the employee information and training program to affected employees and their designated representatives, and to the Assistant Secretary and the Director.

14.24.14 Training records including the name of the person conducting the training, date, and persons trained shall be kept on file.


14.25 Signs

14.25.1 The employer may use signs required by other statutes, regulations or ordinances in addition to, or in combination with, signs required by this paragraph.

14.25.2 The employer shall assure that no statement appears on or near any sign required by this paragraph which contradicts or detracts from the meaning of the required sign.

14.25.3 The employer shall post the following warning signs in each work area where an employees exposure to lead is above the PEL.

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

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14.25.4 The employer shall assure that signs required by this paragraph are illuminated and cleaned as necessary so that the legend is readily visible.

14.26 Recordkeeping.

14.26.1 Exposure assessment.

14.26.2 The employer shall establish and maintain an accurate record of all monitoring and other data used in conducting employee exposure assessments as required in paragraph (d) of this section.

14.26.3 Exposure monitoring records shall include:

14.26.3.1 The date(s), number, duration, location and results of each of the samples taken if any, including a description of the sampling procedure used to determine representative employee exposure where applicable;

14.26.3.2 A description of the sampling and analytical methods used and evidence of their accuracy;

14.26.3.3 The type of respiratory protective devices worn, if any;

14.26.3.4 Name, social security number, and job classification of the employee monitored and of all other employees whose exposure the measurement is intended to represent; and


14.26.3.5 The environmental variables that could affect the measurement of employee exposure.

14.26.4 The employer shall maintain monitoring and other exposure assessment records in accordance with the Carbon America 35.0 Access to Employee Records.

14.27 Medical Surveillance

14.27.1 The employer shall establish and maintain an accurate record for each employee subject to medical surveillance.

14.27.2 This record shall include:

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14.27.2.1 The name, social security number, and description of the duties of the employee;

14.27.2.2 A copy of the physician's written opinions;

14.27.2.3 Results of any airborne exposure monitoring done on or for that employee and provided to the physician; and

14.27.2.4 Any employee medical complaints related to exposure to lead.

14.27.3 The employer shall keep, or assure that the examining physician keeps, the following medical records:

14.27.3.1 A copy of the medical examination results including medical and work history;

14.27.3.2 A description of the laboratory procedures and a copy of any standards or guidelines used to interpret the test results or references to that information;

14.27.3.3 A copy of the results of biological monitoring.

14.27.4 The employer shall maintain or assure that the physician maintains medical records in accordance with the provisions of Carbon America 35.0 Access to Employee Records.


14.28 **Medical removals.**

14.28.1 The employer shall establish and maintain an accurate record for each employee removed from current exposure to lead.

14.28.2 Each record shall include:

14.28.2.1 The name and social security number of the employee;

14.28.2.2 The date of each occasion that the employee was removed from current exposure to lead as well as the corresponding date on which the employee was returned to his or her former job status;

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14.28.2.3 A brief explanation of how each removal was or is being accomplished; and

14.28.2.4 A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level.

14.28.3 The employer shall maintain each medical removal record for at least the duration of an employee's employment.

14.29 **Objective data for exemption from requirement for initial monitoring.**

14.29.1 For purposes of this section, objective data are information demonstrating that a particular product or material containing lead or a specific process, operation, or activity involving lead cannot release dust or fumes in concentrations at or above the action level under any expected conditions of use. Objective data can be obtained from an industry-wide study or from laboratory product test results from manufacturers of lead containing products or materials. The data the employer uses from an industry-wide survey must be obtained under workplace conditions closely resembling the processes, types of material, control methods, work practices and environmental conditions in the employer's current operations.


14.29.2 The employer shall maintain the record of the objective data relied upon for at least 30 years.

14.30 **Availability.**

14.30.1 The employer shall make available upon request all records required to be maintained to affected employees, former employees, and their designated representatives, and to the Assistant Secretary and the Director for examination and copying.

14.31 **Transfer of records.**

14.31.1 Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained.

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14.31.2 Whenever the employer ceases to do business and there is no successor employer to receive and retain the records required to be maintained by this section for the prescribed period, these records shall be transmitted to the Director.

14.31.3 At the expiration of the retention period for the records required to be maintained, the employer shall notify the Director at least 3 months prior to the disposal of such records and shall transmit those records to the Director if requested within the period.

14.31.4 The employer shall also comply with any additional requirements involving transfer of records set forth in Carbon America 35.0 Access to Employee Records.

14.32 Observation of monitoring.

14.32.1 Employee observation. Carbon America shall provide affected employees, subcontractors, or the designated representatives an opportunity to observe any monitoring of employee exposure to lead conducted pursuant to paragraph (d) of this section.

14.33 Observation procedures


14.33.1 Whenever observation of the monitoring of employee exposure to lead requires entry into an area where the use of respirators, protective clothing or equipment is required, the employer shall provide the observer with and assure the use of such respirators, clothing and equipment, and shall require the observer to comply with all other applicable safety and health procedures.

14.33.2 Without interfering with the monitoring, observers shall be entitled to:

14.33.2.1 Receive an explanation of the measurement procedures;

14.33.2.2 Observe all steps related to the monitoring of lead performed at the place of exposure; and

14.33.2.3 Record the results obtained or receive copies of the results when returned by the laboratory.

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14.34 Appendices

14.34.1 The information contained in the appendices to this section is not intended by itself, to create any additional obligations not otherwise imposed by this standard nor detract from any existing obligation.

14.35 Definitions

14.35.1 Action level - means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 ug/m(3)) calculated as an 8-hour time-weighted average (TWA).

14.35.2 Assistant Secretary- means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

14.35.3 Competent person- means one who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.


14.35.4 Director- means the Director, National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

14.35.5 Lead- means metallic lead, all inorganic lead compounds, and organic lead soaps. Excluded from this definition are all other organic lead compounds.

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Attachment 1

1926.62 Appendix A

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This appendix summarizes key provisions of the interim final standard for lead in construction that you as a worker should become familiar with.

I. Permissible Exposure Limit (PEL) - Paragraph (C)

The standard sets a permissible exposure limit (PEL) of 50 micrograms of lead per cubic meter of air (50 ug/m(3)), averaged over an 8-hour workday which is referred to as a time-weighted average (TWA). This is the highest level of lead in air to which you may be permissibly exposed over an 8-hour workday. However, since this is an 8-hour average, short exposures above the PEL are permitted so long as for each 8-hour work day your average exposure does not exceed this level. This interim final standard, however, takes into account the fact that your daily exposure to lead can extend beyond a typical 8-hour workday as the result of overtime or other alterations in your work schedule. To deal with this situation, the standard contains a formula which reduces your permissible exposure when you are exposed more than 8 hours. For example, if you are exposed to lead for 10 hours a day, the maximum permitted average exposure would be 40 ug/m(3).


II. Exposure Assessment - Paragraph (D)

If lead is present in your workplace in any quantity, your employer is required to make an initial determination of whether any employee's exposure to lead exceeds the action level (30 ug/m(3) averaged over an 8-hour day). Employee exposure is that exposure which would occur if the employee were not using a respirator. This initial determination requires your employer to monitor workers' exposures unless he or she has objective data which can demonstrate conclusively that no employee will be exposed to lead in excess of the action level. Where objective data is used in lieu of actual monitoring the employer must establish and maintain an accurate record, documenting its relevancy in assessing exposure levels for current job conditions. If such objective data is available, the employer need proceed no further on employee exposure assessment until such time that conditions have changed and the determination is no longer valid.

Objective data may be compiled from various sources, e.g., insurance companies and trade associations and information from suppliers or exposure data collected from similar operations. Objective data may also comprise previously - collected sampling data including area monitoring. If it cannot be determined through using objective data that worker exposure is less than the action level, your employer must conduct monitoring or must rely on relevant previous personal sampling, if available. Where monitoring is required for the initial determination, it may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past 12 months, he or she may use these results, provided they are applicable to the same employee tasks and exposure conditions and meet the requirements for accuracy as specified in the standard. As with objective data, if such results are relied upon for the initial determination, your employer must establish and maintain a record as to the relevancy of such data to current job conditions.

If there have been any employee complaints of symptoms which may be attributable to exposure to lead or if there is any other information or observations which would indicate employee exposure to lead, this must also be considered as part of the initial determination.

If this initial determination shows that a reasonable possibility exists that any employee may be exposed, without regard to respirators, over the action level, your employer must set up an air monitoring program to determine the exposure level representative of each employee exposed to lead at your workplace. In carrying out this air

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monitoring program, your employer is not required to monitor the exposure of every employee, but he or she must monitor a representative number of employees and job types. Enough sampling must be done to enable each employee's exposure level to be reasonably represent full shift exposure. In addition, these air samples must be taken under conditions which represent each employee's regular, daily exposure to lead. Sampling performed in the past 12 months may be used to determine exposures above the action level if such sampling was conducted during work activities essentially similar to present work conditions.

The standard lists certain tasks which may likely result in exposures to lead in excess of the PEL and, in some cases, exposures in excess of 50 times the PEL. If you are performing any of these tasks, your employer must provide you with appropriate respiratory protection, protective clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until such time that an exposure assessment is conducted which demonstrates that your exposure level is below the PEL.


If you are exposed to lead and air sampling is performed, your employer is required to notify you in writing within 5 working days of the air monitoring results which represent your exposure. If the results indicate that your exposure exceeds the PEL (without regard to your use of a respirator), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that has been taken or will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring, at least every six months if your exposure is at or over the action level but below the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least 7 days apart, are at or below the action level. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer must continue monitoring for you at this frequency until 2 consecutive measurements, taken at least 7 days apart, are below the PEL but above the action level, at which time your employer must repeat monitoring of your exposure every six months and may discontinue monitoring only after your exposure drops to or below the action level. However, whenever there is a change of equipment, process, control, or personnel or a new type of job is added at your workplace which may result in new or additional exposure to lead, your employer must perform additional monitoring.

III. Methods of Compliance - Paragraph (E)

Your employer is required to assure that no employee is exposed to lead in excess of the PEL as an 8-hour TWA. The interim final standard for lead in construction requires employers to institute engineering and work practice controls including administrative controls to the extent feasible to reduce employee exposure to lead. Where such controls are feasible but not adequate to reduce exposures below the PEL they must be used nonetheless to reduce exposures to the lowest level that can be accomplished by these means and then supplemented with appropriate respiratory protection.

Your employer is required to develop and implement a written compliance program prior to the commencement of any job where employee exposures may reach the PEL as an 8-hour TWA. The interim final standard identifies the various elements that must be included in the plan. For example, employers are required to include a description of operations in which lead is emitted, detailing other relevant information about the operation such as the type of equipment used, the type of material involved, employee job responsibilities, operating procedures and maintenance practices. In addition, your employer's compliance plan must specify the means that will be used to achieve compliance and, where engineering controls are required, include any engineering plans or studies that have been used to select the control methods. If administrative controls involving job rotation are used to reduce

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employee exposure to lead, the job rotation schedule must be included in the compliance plan. The plan must also detail the type of protective clothing and equipment, including respirators, housekeeping and hygiene practices that will be used to protect you from the adverse effects of exposure to lead.

The written compliance program must be made available, upon request, to affected employees and their designated representatives, the Assistant Secretary and the Director.

Finally, the plan must be reviewed and updated at least every 6 months to assure it reflects the current status in exposure control.


IV. Respiratory Protection - Paragraph (F)

Your employer is required to provide and assure your use of respirators when your exposure to lead is not controlled below the PEL by other means. The employer must pay the cost of the respirator. Whenever you request one, your employer is also required to provide you a respirator even if your air exposure level is not above the PEL. You might desire a respirator when, for example, you have received medical advice that your lead absorption should be decreased. Or, you may intend to have children in the near future, and want to reduce the level of lead in your body to minimize adverse reproductive effects. While respirators are the least satisfactory means of controlling your exposure, they are capable of providing significant protection if properly chosen, fitted, worn, cleaned, maintained, and replaced when they stop providing adequate protection.

Your employer is required to select respirators from the types listed in Table I of the Respiratory Protection section of the standard. Any respirator chosen must be approved by the Mine Safety and Health Administration (MSHA) or the National Institute for Occupational Safety and Health (NIOSH). This respirator selection table will enable your employer to choose a type of respirator which will give you a proper amount of protection based on your airborne lead exposure. Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace. For example, a powered air purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge or canister to clean the air, and a power source which continuously blows filtered air into your breathing zone. Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The standard provides that you can obtain a PAPR upon request.

Your employer must also start a Respiratory Protection Program. This program must include written procedures for the proper selection, use, cleaning, storage, and maintenance of respirators.

Your employer is required to select respirators from the types listed in Table I of the Respiratory Protection section of the standard (Sec. 1926.62 (f)). Any respirator chosen must be approved by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 42 CFR part 84. This respirator selection table will enable your employer to choose a type of respirator that will give you a proper amount of protection based on your airborne lead exposure. Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace. For example, a powered air-purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge, or canister to clean the air, and a power source that continuously blows filtered air into your breathing zone. Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The

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standard provides that you can obtain a PAPR upon request.

You must also receive from your employer proper training in the use of respirators. Your employer is required to teach you how to wear a respirator, to know why it is needed, and to understand its limitations.

Your employer must ensure that your respirator facepiece fits properly. Proper fit of a respirator facepiece is critical to your protection from airborne lead. Obtaining a proper fit on each employee may require your employer to make available several different types of respirator masks. To ensure that your respirator fits properly and that facepiece leakage is minimal, your employer must give you either a qualitative or quantitative fit test as specified in Appendix A of the Respiratory Protection standard located at 29 CFR 1910.134.

The standard provides that if your respirator uses filter elements, you must be given an opportunity to change the filter elements whenever an increase in breathing resistance is detected. You also must be permitted to periodically leave your work area to wash your face and respirator facepiece whenever necessary to prevent skin irritation. If you ever have difficulty in breathing during a fit test or while using a respirator, your employer must make a medical examination available to you to determine whether you can safely wear a respirator. The result of this examination may be to give you a positive pressure respirator (which reduces breathing resistance) or to provide alternative means of protection.

V. Protective Work Clothing and Equipment - Paragraph (G)


If you are exposed to lead above the PEL as an 8-hour TWA, without regard to your use of a respirator, or if you are exposed to lead compounds such as lead arsenate or lead azide which can cause skin and eye irritation, your employer must provide you with protective work clothing and equipment appropriate for the hazard. If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 ug/m³. Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets, and face shields or vented goggles. Your employer is required to provide all such equipment at no cost to you. In addition, your employer is responsible for providing repairs and replacement as necessary, and also is responsible for the cleaning, laundering or disposal of protective clothing and equipment.

The interim final standard requires that your employer assure that you follow good work practices when you are working in areas where your exposure to lead may exceed the PEL. With respect to protective clothing and equipment, where appropriate, the following procedures should be observed prior to beginning work:

1. Change into work clothing and shoe covers in the clean section of the designated changing areas;
2. Use work garments of appropriate protective gear, including respirators before entering the work area; and
3. Store any clothing not worn under protective clothing in the designated changing area.

Workers should follow these procedures upon leaving the work area:

1. HEPA vacuum heavily contaminated protective work clothing while it is still being worn. At no time may lead be removed from protective clothing by any means which result in uncontrolled dispersal of lead into the air;

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2. Remove shoe covers and leave them in the work area;
3. Remove protective clothing and gear in the dirty area of the designated changing area. Remove protective coveralls by carefully rolling down the garment to reduce exposure to dust.
4. Remove respirators last; and
5. Wash hands and face.

Workers should follow these procedures upon finishing work for the day (in addition to procedures described above):

1. Where applicable, place disposal coveralls and shoe covers with the abatement waste;
2. Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room.
3. Clean protective gear, including respirators, according to standard procedures;
4. Wash hands and face again. If showers are available, take a shower and wash hair. If shower facilities are not available at the work site, shower immediately at home and wash hair.


VI. Housekeeping - Paragraph (H)

Your employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. Vacuuming is the preferred method of meeting this requirement, and the use of compressed air to clean floors and other surfaces is generally prohibited unless removal with compressed air is done in conjunction with ventilation systems designed to contain dispersal of the lead dust. Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be used equipped with a special filter called a high-efficiency particulate air (HEPA) filter and emptied in a manner which minimizes the reentry of lead into the workplace.

VII. Hygiene Facilities and Practices - Paragraph (I)

The standard requires that hand washing facilities be provided where occupational exposure to lead occurs. In addition, change areas, showers (where feasible), and lunchrooms or eating areas are to be made available to workers exposed to lead above the PEL. Your employer must assure that except in these facilities, food and beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied, where airborne exposures are above the PEL. Change rooms provided by your employer must be equipped with separate storage facilities for your protective clothing and equipment and street clothes to avoid cross-contamination. After showering, no required protective clothing or equipment worn during the shift may be worn home. It is important that contaminated clothing or equipment be removed in change areas and not be worn home or you will extend your exposure and expose your family since lead from your clothing can accumulate in your house, car, etc.

Lunchrooms or eating areas may not be entered with protective clothing or equipment unless surface dust has

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been removed by vacuuming, downdraft booth, or other cleaning method. Finally, workers exposed above the PEL must wash both their hands and faces prior to eating, drinking, smoking or applying cosmetics.

All of the facilities and hygiene practices just discussed are essential to minimize additional sources of lead absorption from inhalation or ingestion of lead that may accumulate on you, your clothes, or your possessions. Strict compliance with these provisions can virtually eliminate several sources of lead exposure which significantly contribute to excessive lead absorption.


VIII. Medical surveillance - Paragraph (J)

The medical surveillance program is part of the standard's comprehensive approach to the prevention of lead-related disease. Its purpose is to supplement the main thrust of the standard which is aimed at minimizing airborne concentrations of lead and sources of ingestion. Only medical surveillance can determine if the other provisions of the standard have effectively protected you as an individual. Compliance with the standard's provision will protect most workers from the adverse effects of lead exposure, but may not be satisfactory to protect individual workers (1) who have high body burdens of lead acquired over past years, (2) who have additional uncontrolled sources of non-occupational lead exposure, (3) who exhibit unusual variations in lead absorption rates, or (4) who have specific non-work related medical conditions which could be aggravated by lead exposure (e.g., renal disease, anemia). In addition, control systems may fail, or hygiene and respirator programs may be inadequate. Periodic medical surveillance of individual workers will help detect those failures. Medical surveillance will also be important to protect your reproductive ability - regardless of whether you are a man or woman.

All medical surveillance required by the interim final standard must be performed by or under the supervision of a licensed physician. The employer must provide required medical surveillance without cost to employees and at a reasonable time and place. The standard's medical surveillance program has two parts -- periodic biological monitoring and medical examinations. Your employer's obligation to offer you medical surveillance is triggered by the results of the air monitoring program. Full medical surveillance must be made available to all employees who are or may be exposed to lead in excess of the action level for more than 30 days a year and whose blood lead level exceeds 40 ug/dl. Initial medical surveillance consisting of blood sampling and analysis for lead and zinc protoporphyrin must be provided to all employees exposed at any time (1 day) above the action level.

Biological monitoring under the standard must be provided at least every 2 months for the first 6 months and every 6 months thereafter until your blood lead level is below 40 ug/dl. A zinc protoporphyrin (ZPP) test is a very useful blood test which measures an adverse metabolic effect of lead on your body and is therefore an indicator of lead toxicity.

If your BLL exceeds 40 ug/dl the monitoring frequency must be increased from every 6 months to at least every 2 months and not reduced until two consecutive BLLs indicate a blood lead level below 40 ug/dl. Each time your BLL is determined to be over 40 ug/dl, your employer must notify you of this in writing within five working days of his or her receipt of the test results. The employer must also inform you that the standard requires temporary medical removal with economic protection when your BLL exceeds 50 ug/dl. (See Discussion of Medical Removal Protection - Paragraph (k).) Anytime your BLL exceeds 50 ug/dl your employer must make available to you within two weeks of receipt of these test results a second follow-up BLL test to confirm your BLL. If the two tests both exceed 50 ug/dl, and you are temporarily removed, then your employer must make successive BLL tests available to you on a monthly basis during the period of your removal.

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Medical examinations beyond the initial one must be made available on an annual basis if your blood lead level exceeds 40 ug/dl at any time during the preceding year and you are being exposed above the airborne action level of 30 ug/m(3) for 30 or more days per year. The initial examination will provide information to establish a baseline to which subsequent data can be compared.


An initial medical examination to consist of blood sampling and analysis for lead and zinc protoporphyrin must also be made available (prior to assignment) for each employee being assigned for the first time to an area where the airborne concentration of lead equals or exceeds the action level at any time. In addition, a medical examination or consultation must be made available as soon as possible if you notify your employer that you are experiencing signs or symptoms commonly associated with lead poisoning or that you have difficulty breathing while wearing a respirator or during a respirator fit test. You must also be provided a medical examination or consultation if you notify your employer that you desire medical advice concerning the effects of current or past exposure to lead on your ability to procreate a healthy child.

Finally, appropriate follow-up medical examinations or consultations may also be provided for employees who have been temporarily removed from exposure under the medical removal protection provisions of the standard. (See Part IX, below.)

The standard specifies the minimum content of pre-assignment and annual medical examinations. The content of other types of medical examinations and consultations is left up to the sound discretion of the examining physician. Pre-assignment and annual medical examinations must include (1) a detailed work history and medical history; (2) a thorough physical examination, including an evaluation of your pulmonary status if you will be required to use a respirator; (3) a blood pressure measurement; and (4) a series of laboratory tests designed to check your blood chemistry and your kidney function. In addition, at any time upon your request, a laboratory evaluation of male fertility will be made (microscopic examination of a sperm sample), or a pregnancy test will be given.

The standard does not require that you participate in any of the medical procedures, tests, etc. which your employer is required to make available to you. Medical surveillance can, however, play a very important role in protecting your health. You are strongly encouraged, therefore, to participate in a meaningful fashion. The standard contains a multiple physician review mechanism which will give you a chance to have a physician of your choice directly participate in the medical surveillance program. If you are dissatisfied with an examination by a physician chosen by your employer, you can select a second physician to conduct an independent analysis. The two doctors would attempt to resolve any differences of opinion, and select a third physician to resolve any firm dispute. Generally your employer will choose the physician who conducts medical surveillance under the lead standard - unless you and your employer can agree on the choice of a physician or physicians. Some companies and unions have agreed in advance, for example, to use certain independent medical laboratories or panels of physicians. Any of these arrangements are acceptable so long as required medical surveillance is made available to workers.

The standard requires your employer to provide certain information to a physician to aid in his or her examination of you. This information includes (1) the standard and its appendices, (2) a description of your duties as they relate to occupational lead exposure, (3) your exposure level or anticipated exposure level, (4) a description of any personal protective equipment you wear, (5) prior blood lead level results, and (6) prior written medical opinions concerning you that the employer has. After a medical examination or consultation the physician must prepare a

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written report which must contain (1) the physician's opinion as to whether you have any medical condition which places you at increased risk of material impairment to health from exposure to lead, (2) any recommended special protective measures to be provided to you, (3) any blood lead level determinations, and (4) any recommended limitation on your use of respirators. This last element must include a determination of whether you can wear a powered air purifying respirator (PAPR) if you are found unable to wear a negative pressure respirator.


The medical surveillance program of the interim lead standard may at some point in time serve to notify certain workers that they have acquired a disease or other adverse medical condition as a result of occupational lead exposure. If this is true, these workers might have legal rights to compensation from public agencies, their employers, firms that supply hazardous products to their employers, or other persons. Some states have laws, including worker compensation laws, that disallow a worker who learns of a job - related health impairment to sue, unless the worker sues within a short period of time after learning of the impairment. (This period of time may be a matter of months or years.) An attorney can be consulted about these possibilities. It should be stressed that OSHA is in no way trying to either encourage or discourage claims or lawsuits. However, since results of the standard's medical surveillance program can significantly affect the legal remedies of a worker who has acquired a job - related disease or impairment, it is proper for OSHA to make you aware of this.

The medical surveillance section of the standard also contains provisions dealing with chelation. Chelation is the use of certain drugs (administered in pill form or injected into the body) to reduce the amount of lead absorbed in body tissues. Experience accumulated by the medical and scientific communities has largely confirmed the effectiveness of this type of therapy for the treatment of very severe lead poisoning. On the other hand, it has also been established that there can be a long list of extremely harmful side effects associated with the use of chelating agents. The medical community has balanced the advantages and disadvantages resulting from the use of chelating agents in various circumstances and has established when the use of these agents is acceptable. The standard includes these accepted limitations due to a history of abuse of chelation therapy by some lead companies. The most widely used chelating agents are calcium disodium EDTA, (Ca Na₂ EDTA), Calcium Disodium Versenate (Versenate), and d-penicillamine (penicillamine or Cupramine).

The standard prohibits "prophylactic chelation" of any employee by any person the employer retains, supervises or controls. "Prophylactic chelation" is the routine use of chelating or similarly acting drugs to prevent elevated blood levels in workers who are occupationally exposed to lead, or the use of these drugs to routinely lower blood lead levels to predesignated concentrations believed to be "safe". It should be emphasized that where an employer takes a worker who has no symptoms of lead poisoning and has chelation carried out by a physician (either inside or outside of a hospital) solely to reduce the worker's blood lead level, that will generally be considered prophylactic chelation. The use of a hospital and a physician does not mean that prophylactic chelation is not being performed. Routine chelation to prevent increased or reduce current blood lead levels is unacceptable whatever the setting.

The standard allows the use of "therapeutic" or "diagnostic" chelation if administered under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Therapeutic chelation responds to severe lead poisoning where there are marked symptoms. Diagnostic chelation involved giving a patient a dose of the drug then collecting all urine excreted for some period of time as an aid to the diagnosis of lead poisoning.

In cases where the examining physician determines that chelation is appropriate, you must be notified in writing of this fact before such treatment. This will inform you of a potentially harmful treatment, and allow you to obtain a

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second opinion.

IX. Medical Removal Protection - Paragraph (K)

Excessive lead absorption subjects you to increased risk of disease. Medical removal protection (MRP) is a means of protecting you when, for whatever reasons, other methods, such as engineering controls, work practices, and respirators, have failed to provide the protection you need. MRP involves the temporary removal of a worker from his or her regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other employment rights or benefits. The purpose of this program is to cease further lead absorption and allow your body to naturally excrete lead which has previously been absorbed. Temporary medical removal can result from an elevated blood lead level, or a medical opinion. For up to 18 months, or for as long as the job the employee was removed from lasts, protection is provided as a result of either form of removal. The vast majority of removed workers, however, will return to their former jobs long before this eighteen month period expires.


You may also be removed from exposure even if your blood lead level is below 50 ug/dl if a final medical determination indicates that you temporarily need reduced lead exposure for medical reasons. If the physician who is implementing your employers medical program makes a final written opinion recommending your removal or other special protective measures, your employer must implement the physician's recommendation. If you are removed in this manner, you may only be returned when the doctor indicates that it is safe for you to do so.

The standard does not give specific instructions dealing with what an employer must do with a removed worker. Your job assignment upon removal is a matter for you, your employer and your union (if any) to work out consistent with existing procedures for job assignments. Each removal must be accomplished in a manner consistent with existing collective bargaining relationships. Your employer is given broad discretion to implement temporary removals so long as no attempt is made to override existing agreements. Similarly, a removed worker is provided no right to veto an employer's choice which satisfies the standard.

In most cases, employers will likely transfer removed employees to other jobs with sufficiently low lead exposure. Alternatively, a worker's hours may be reduced so that the time weighted average exposure is reduced, or he or she may be temporarily laid off if no other alternative is feasible.

In all of these situation, MRP benefits must be provided during the period of removal - i.e., you continue to receive the same earnings, seniority, and other rights and benefits you would have had if you had not been removed. Earnings includes more than just your base wage; it includes overtime, shift differentials, incentives, and other compensation you would have earned if you had not been removed. During the period of removal you must also be provided with appropriate follow-up medical surveillance. If you were removed because your blood lead level was too high, you must be provided with a monthly blood test. If a medical opinion caused your removal, you must be provided medical tests or examinations that the doctor believes to be appropriate. If you do not participate in this follow up medical surveillance, you may lose your eligibility for MRP benefits.

When you are medically eligible to return to your former job, your employer must return you to your "former job status." This means that you are entitled to the position, wages, benefits, etc., you would have had if you had not been removed. If you would still be in your old job if no removal had occurred that is where you go back. If not, you are returned consistent with whatever job assignment discretion your employer would have had if no removal had occurred. MRP only seeks to maintain your rights, not expand them or diminish them.

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If you are removed under MRP and you are also eligible for worker compensation or other compensation for lost wages, your employer's MRP benefits obligation is reduced by the amount that you actually receive from these other sources. This is also true if you obtain other employment during the time you are laid off with MRP benefits.

The standard also covers situations where an employer voluntarily removes a worker from exposure to lead due to the effects of lead on the employee's medical condition, even though the standard does not require removal. In these situations MRP benefits must still be provided as though the standard required removal. Finally, it is important to note that in all cases where removal is required, respirators cannot be used as a substitute. Respirators may be used before removal becomes necessary, but not as an alternative to a transfer to a low exposure job, or to a lay-off with MRP benefits.

X. Employee Information and Training - Paragraph (L)

Your employer is required to provide an information and training program for all employees exposed to lead above the action level or who may suffer skin or eye irritation from lead compounds such as lead arsenate or lead azide. The program must train these employees regarding the specific hazards associated with their work environment, protective measures which can be taken, including the contents of any compliance plan in effect, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. All employees must be trained prior to initial assignment to areas where there is a possibility of exposure over the action level .

This training program must also be provided at least annually thereafter unless further exposure above the action level will not occur.

XI. Signs - Paragraph (M)


The standard requires that the following warning sign be posted in work areas where the exposure to lead exceeds the PEL:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

These signs are to be posted and maintained in a manner which assures that the legend is readily visible.

XII. Recordkeeping - Paragraph (N)

Your employer is required to keep all records of exposure monitoring for airborne lead. These records must include the name and job classification of employees measured, details of the sampling and analytical techniques, the results of this sampling, and the type of respiratory protection being worn by the person sampled. Such records are to be retained for at least 30 years. Your employer is also required to keep all records of biological monitoring and medical examination results. These records must include the names of the employees, the physician's written opinion, and a copy of the results of the examination. Medical records must be preserved and maintained for the duration of employment plus 30 years. However, if the employee's duration of employment is less than one year, the employer need not retain that employee's medical records beyond the period of employment if they are provided to the employee upon termination of employment.

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Recordkeeping is also required if you are temporarily removed from your job under the medical removal protection program. This record must include your name and social security number, the date of your removal and return, how the removal was or is being accomplished, and whether or not the reason for the removal was an elevated blood lead level. Your employer is required to keep each medical removal record only for as long as the duration of an employee's employment.

The standard requires that if you request to see or copy environmental monitoring, blood lead level monitoring, or medical removal records, they must be made available to you or to a representative that you authorize. Your union also has access to these records. Medical records other than BLL's must also be provided upon request to you, to your physician or to any other person whom you may specifically designate. Your union does not have access to your personal medical records unless you authorize their access.


XIII. Observation of Monitoring - Paragraph (O)

When air monitoring for lead is performed at your workplace as required by this standard, your employer must allow you or someone you designate to act as an observer of the monitoring. Observers are entitled to an explanation of the measurement procedure, and to record the results obtained. Since results will not normally be available at the time of the monitoring, observers are entitled to record or receive the results of the monitoring when returned by the laboratory. Your employer is required to provide the observer with any personal protective devices required to be worn by employees working in the area that is being monitored. The employer must require the observer to wear all such equipment and to comply with all other applicable safety and health procedures.

XIV. For Additional Information

A. A copy of the interim standard for lead in construction can be obtained free of charge by calling or writing the OSHA Office of Publications, room N-3101, United States Department of Labor, Washington, D.C. 20210: Telephone (202) 219-4667.

B. Additional information about the standard, its enforcement, and your employer's compliance can be obtained from the nearest OSHA Area Office listed in your telephone directory under United States Government/Department of Labor.

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REVIEW LOG:

Date	Purpose for review	Person
05/10/2022	New Safety Manual	Hinz

15.1.0 Policy Statement

15.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.


15.1.2 Carbon America will comply with the OSHA **Control of Hazardous Energy (lockout/Tagout/tryout)** standard, 29 CFR 1910.147 & 1926.417 through implementation of this written program, which establishes procedures for protecting its workers from the hazards related to the unexpected energizing of machines, equipment, electrical circuits or uncontrolled release of energy.

15.2 Purpose

15.2.1 To prevent injury to an employee or employees from the unexpected energizing of machines, equipment, or electrical circuits under maintenance, service or repair.

15.2.2 To prevent injury resulting from the uncontrolled release of hazardous energy. For example: electrical, mechanical, hydraulic, pneumatic, chemical, thermal, stored/residual, or other energy.

15.2.3 To comply with the provisions of OSHA standard 29 CFR 1910.147 & 1926.417

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15.3 References

15.3.1 29 CFR 1910.147 Control of Hazardous Energy (Lockout / Tagout)

15.3.2 29 CFR 1910 Subpart S Electrical

15.3.3 29 CFR 1926.417 Lockout and Tagging of Circuits

15.3.4 29 CFR 1926.702 Requirements for equipment and tools

15.3.5 NFPA 70E Chapter 1 Article 120 Establishing an Electrically Safe Work Condition

15.4 General Requirements

15.4.1 Responsibilities

15.4.1.1 Management

15.4.1.1.1 Ensure employees are provided with the necessary equipment to successfully lock out the equipment to be serviced.


15.4.1.1.2 Ensure periodic reviews, at least annually, of this written program are conducted.

15.4.1.1.3 Ensure periodic audits, at least annually, of employees utilizing the procedures are conducted. If deviations or inadequacies are identified, management will take necessary action to correct.

15.4.1.1.4 Ensure an adequate level of training is provided for all employees covered by this program.

15.4.1.1.5 Ensure employee involvement in the lockout/tagout/tryout process.

15.4.1.1.6 Ensure an investigation is conducted for all incidents involving lockout/tagout/tryout activity. Causes and deficiencies should be identified and corrective actions implemented to prevent recurrence.

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15.4.1.2 Supervisors

15.4.1.2.1 Ensure the procedures found within this program are being followed through periodic audits and discipline.

15.4.1.2.2 Ensure that all employees covered by this program have access to and review this written program.

15.4.1.3 Employees

15.4.1.3.1 Employees shall comply with the procedures stated in this program.

15.4.1.3.2 Employees shall not by-pass any system or procedure intended to protect them from the unexpected energizing of machines, equipment, or electrical circuits under maintenance, service or repair.

15.4.2 Hazardous Energy Control Requirements


15.4.2.1 Each authorized employee will be issued individual locks, keys and tags when required by general industry requirements. The locks and tags shall be marked so as to identify the person to whom they belong.

15.4.2.2 The locks and tags will be:

15.4.2.2.1 Durable – capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

15.4.2.2.2 Standardized – devices shall be standardized within the facility in at least one of the following criteria: color, shape, or size. In the case of tagout devices, print and format shall be standardized.


15.4.2.2.3 Substantial – Lockout devices shall be substantial enough to prevent removal without the use of

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excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

15.4.3 Three forms of hazardous energy control shall be permitted:

- 15.4.3.1** Individual Employee Hazardous Energy Control Procedure will be followed for minor maintenance, service, adjustment, cleaning, inspection, operating conditions, and the like. The work shall be permitted to be performed without the placement of a lockout/tagout device provided the disconnecting means is adjacent to the equipment on which the work is being performed and is clearly visible to the individual qualified employee involved in the work, and the work does not extend beyond one shift.
 - 15.4.3.2** The first lock installed in any three forms of hazardous energy control, also the last lock removed, and fitted shall be by the person overseeing the operation.
 - 15.4.3.3** Simple Lockout/ Tagout/ Tryout Procedure. All lockout/ tagout/ tryout procedures that involve only a qualified person(s) deenergizing one energy source (i.e. one set of conductors or circuit part source). Refer to section titled "Simple Lockout/Tagout/Tryout Procedure".
 - 15.4.3.4** Complex Lockout/ Tagout/ Tryout Procedure. Refer to section titled "Complex Lockout/ Tagout/ Tryout". All lockout/ tagout/ tryout procedures where one or more of the following exist:
 - 15.4.3.4.1** Multiple energy sources
 - 15.4.3.4.2** Multiple crews
 - 15.4.3.4.3** Multiple crafts
 - 15.4.3.4.4** Multiple locations
 - 15.4.3.4.5** Multiple employers
 - 15.4.3.4.6** Different disconnecting means
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15.4.3.4.7 Particular Sequences

15.4.3.4.8A job or task that continues for more than one work period.

15.4.3.5 Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained & otherwise rendered safe. If there is a possibility of accumulation of stored energy level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.


15.4.3.6 Sub-contractors involved in operations relating to equipment or machinery lockout that affect Carbon America employees, must submit their energy control procedures to an Carbon America management representative. Employees covered under this program shall be trained and notified as designated in this program.

15.4.4 Preparation for Lockout/Tagout/Tryout

15.4.4.1 The authorized employee shall conduct a survey to locate and identify all isolating devices to be certain which switches, valves, or other energy isolating devices apply to the equipment to be locked out. If more than one energy source, refer to “Multi-Energy Source Procedures” provided in this program. The appropriate tagging system will be dictated by the Multi-energy source Procedure.

15.4.4.2 Before an authorized employee shuts down any machine or equipment, they shall have knowledge of the type and magnitude of the energy, the hazards of that energy, and the methods to control it.

15.4.4.3 Before shut down, affected employees shall be notified by the authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given

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before the controls are applied, and after they are removed from the machine or equipment.

15.4.5 Equipment shall be de-energized, locked out, tagged, and placed into Zero Energy State (ZES) prior to performing work.

15.4.6 Multiple locks and tags shall be used in lockout/ tagout situations that contain more than one person. Each affected member of the group shall install their own device and tag to ensure that all members have isolated the source properly.

15.4.7 Electrical equipment shall be tested to ensure Zero Energy State – refer to section in this program titled “Electrical Test Verification of Deenergized Circuits”.

15.4.8 If ZES is not possible, the work will not be conducted until employees receive approval from management personnel, who shall insure an equal level of employee safety through task specific procedures.

15.5 Positioning Machines, Equipment, or Components

15.5.1 In situations where lockout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

15.5.1.1 Clear the machine or equipment of tools and materials.


15.5.1.2 Remove employees from the machine or equipment area.

15.5.1.3 Remove the lockout/tagout devices.

15.5.1.4 Energize and proceed with testing or positioning.

15.5.1.5 De-energize all systems and reapply energy control measures to continue the servicing and/or maintenance.

15.5.1.6 When using electrical testing devices (i.e. testing voltage), the qualified employees shall comply with the Company policies regarding arc flash protection.

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15.5.2 Restoring Machines, Equipment, and/or Electrical Circuits to Normal Production.

15.5.2.1 After the servicing and/or maintenance is complete and equipment is ready for normal production operations, check the area to ensure that all persons and tools are clear.

15.5.2.2 After all tools have been removed, guards have been reinstalled, and employees are in the clear, remove all lockout / tagout devices and notify affected employees of their removal.

15.5.2.3 The only persons who may remove a lockout lock are:

15.5.2.3.1 The authorized person who placed the lock, and;

15.5.2.3.2 A project foreman (or designee) and employee representative after following all elements for “removal of lockout / tagout devices by other than the authorized employee”. This will only be allowed when an employee leaves site without removing his/her lock. Employees who leave the site without removing his/her lock may be subject to disciplinary action (unless instructed to do so).


15.5.3 Removal of Lockout/Tagout Devices by Other than the Authorized Employee

15.5.3.1 If the employee who applied the lock is not available, prior to removal, the project manager (or designee) and employee representative must:

15.5.3.1.1 Complete the Lock Removal Authorization Form found in **Attachment 1**.

15.5.3.1.2 Verify that the authorized person who placed that lock is not in the facility.

15.5.3.1.3 Make a reasonable effort to contact the employee to advise them that their lock is going to be removed or

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to instruct them to return to the facility to remove their lock.

15.5.3.1.4 If the employee is unable to be contacted, the supervisor and management representative shall perform a walk-down inspection of the lockout area to ensure the person is no longer on site and not in danger when a lock is removed.

15.5.3.1.5 Ensure that the authorized employee is advised of his/her lockout lock's removal by returning their lock to them when they start their shift.

15.5.3.1.6 All areas involved in a lockout must be notified before the lock is removed. The individual removing the lock is responsible for returning the lock to the identified employee at the start of that employee's shift.

15.5.4 Simple Lockout Tagout Tryout Procedure


15.5.4.1 All lockout/tagout/tryout procedures that involve only a qualified person(s) deenergizing one energy source (i.e. one set of conductors or circuit part source) are Simple Lockouts.

15.5.4.2 Alert the operator and other users of the system or equipment that is to be shut off and the reason.

15.5.4.3 Plan the shutdown to ensure that the system will be off. This will be coordinated with an owner representative and Company project foreman. If the machine, equipment, or circuit is operating, shut it down by standard procedure.

15.5.4.4 The authorized employee(s) servicing the system or equipment will lockout the energy source with his/her issued lock. No other employee may lockout the energy source for the authorized employee.

15.5.4.5 Electrical equipment shall be tested to ensure Zero Energy State – refer to section in this program titled “Electrical Test Verification of Deenergized Circuits”.

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15.5.4.6 Tryout the lockout / tagout procedure to be sure the system has been successfully placed into a Zero Energy State.
CAUTION: Return operating controls to neutral or off positions after the test.

15.5.4.7 When work is completed, the authorized employee will notify any affected persons that the system or equipment will have its energy source restored.

15.5.4.8 Only after all affected employees have been warned of re-energizing, will the authorized employee(s) remove their lock(s).

15.5.4.9 Do not permit employees to remove another's lock. Be sure employees do not expose other employees to danger. Before re-energizing the machine or equipment, verify that the equipment is clear, and post a watch, if necessary.

15.5.5 Complex Lockout / Tagout / Tryout Procedure

15.5.5.1 All lockout/tagout/tryout procedures where one or more of the following exist require a complex lockout/tagout/tryout procedure:

15.5.5.1.1 Multiple energy sources

15.5.5.1.2 Multiple crews

15.5.5.1.3 Multiple crafts


15.5.5.1.4 Multiple locations

15.5.5.1.5 Multiple employers

15.5.5.1.6 Different disconnecting means

15.5.5.1.7 Particular Sequences

15.5.5.1.8 A job or task that continues for more than one work period.

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15.5.5.2 A person shall be in charge of a complex lockout. This person shall:

15.5.5.2.1 Be a qualified individual who is specifically appointed with overall responsibility to ensure that all energy sources are under lockout and to account for all persons working on the job/task.

15.5.5.2.2 Be permitted to install locks/tags, or direct their installation, on behalf of other employees.

15.5.5.2.3 Accountable for safe execution of the complex lockout.

15.5.5.3 A written procedure (in addition to this written program) is required for all complex lockout jobs and/or tasks. The written procedure will include at least the following:

15.5.5.3.1 Identify the person in charge;

15.5.5.3.2 Address all the concerns of employees who might be exposed.

15.5.5.4 Identify the method to account for all persons who might be exposed to electrical hazards in the course of the lockout. This shall be achieved through one of the following:


15.5.5.4.1 Each individual will install his/her own personal lock on each lockout and/or tagout device

15.5.5.4.2 The person in charge shall lock his/her key in a lockbox and each individual will install his/her own personal lock on each lockout and/or tagout device.

15.5.5.4.3 The person in charge shall maintain a sign in/out log for all persons entering/exiting the area

15.5.5.4.4 Another equally effective methodology.

15.5.5.5 All machinery and equipment with more than one energy source shall have a written energy control procedure.

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15.5.5.6 Each specific hazardous energy control procedure for Multi-Energy Source Machines must provide the following information:

15.5.5.6.1 Identification of the system or equipment and its location

15.5.5.6.2 Identification of energy sources needed dissipated, locked out and tagged out.

15.5.5.6.3 Step by step shutdown procedures.

15.5.5.6.4 The types of lockout / tagout devices that will be used.

15.5.5.6.5 Start-up procedures ensuring the equipment is clear prior to start up.


15.5.5.7 Multi-energy source machines or equipment shall be turned off or shutdown using the procedures established and maintained by the equipment owner.

15.5.5.8 Lockout devices shall hold the source of energy in the safe or off position.

15.5.5.9 After the application of a lockout device to a machine, all potentially hazardous, stored, or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe.

15.5.5.10 Lock out devices shall be affixed to each energy isolating device by authorized employees

15.5.5.11 Where Tagout devices are used with energy isolation devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached. Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

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15.5.5.12 Electrical equipment shall be tested to ensure Zero Energy State – refer to section in this program titled “Electrical Test Verification of Deenergized Circuits”.

15.5.5.13 Prior to starting work, the authorized employee shall verify isolation and ensure all energy to the machine or equipment has been eliminated.

15.5.5.14 Before lockout/tagout devices are removed and energy is restored to the equipment, the work area shall be inspected to ensure all nonessential items have been removed and that the machine or equipment components are operationally intact. Authorized employees shall be notified that their lockout/tagout device(s) must be removed. Affected employees shall be notified that the machine or equipment will be energized.

15.5.6 Shift or Personnel Change

15.5.6.1 A change over period will be established so that authorized employees may exchange their locks/tags.


15.5.6.2 Authorized employees assuming control of the lockout shall be fully briefed in the scope and stage of work by those employees being relieved. The authorized employees assuming control will not begin until satisfied that the lockout/tagout condition is safe.

15.5.7 Periodic Inspections

15.5.7.1 At least annually, the effectiveness of this Lockout / Tagout / Tryout Program will be evaluated. Any deviation or inadequacies found during the inspection will be documented and corrected.

15.5.7.2 An authorized employee (other than the one performing the work) shall conduct the inspection.

15.5.7.3 A blank annual inspection form can be found in **Attachment 2**.

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15.5.8 Electrical Test Verification of Deenergized Circuits

- 15.5.8.1** Only qualified electrical personnel may test electrical equipment.
- 15.5.8.2** Testing to Ensure Zero Energy State – Electrical Tryout
- 15.5.8.3** After properly interrupting the load current, open the disconnecting device(s) for each source.
- 15.5.8.4** When possible, visually verify that all blades of the disconnecting device(s) are fully open or that drawout-type circuit breakers are withdrawn to the fully disconnected position.
- 15.5.8.5** Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. 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.
- 15.5.8.6** Apply grounds when necessary (i.e. potential for induced voltages or stored electrical energy exists).
- 15.5.8.7** An Energized Electrical Work Permit may be required for the test.

15.5.9 Work in Panelboards

- 15.5.9.1** Panelboards should be equipped with a lockable cover. If the permanent cover cannot be installed, a temporary cover of a suitable material, with hasps and locks will be fabricated. If fabrication requires an unusual design, the electrician will consult a supervisor for direction.
- 15.5.9.2** In the process of working within or testing the panelboard, the panelboard shall not be left unattended or effectively isolated.

15.5.10 Work on Energized Circuits

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15.5.10.1 Approval must be obtained from the VP of Carbon America prior to any work on energized circuits.

15.5.10.2 An Energized Electrical Work Permit is required for all work on or near energized electrical equipment.

15.6 Training

15.6.1 Company employees will receive training according to their level of participation regarding the lockout process and their normal work duties.

15.6.2 Three levels of training are: authorized, affected, and awareness.

15.6.3 Authorized Personnel.

15.6.3.1 Authorized personnel are those employees that perform maintenance or service and are required to work under the protection of a lockout lock. A list of authorized persons (employee titles) are provided in Attachment 3. Authorized personnel shall be instructed in the following:

15.6.3.1.1 The recognition of hazardous energy sources.


15.6.3.1.2 The type and magnitude of the energy in the workplace.

15.6.3.1.3 The methods and means necessary for energy isolation and control.

15.6.3.1.4 Identification of single and multi-energy source equipment.

15.6.3.1.5 Purpose and use of Hazardous Energy Control Procedures.

15.6.3.1.6 Nature and limitations of tags. A tag is not to be removed without authorization. The tag is never to be ignored or defeated in any way.

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15.6.3.1.7 Conditions for restarting machinery and equipment or removing lockout / tagout devices.

15.6.3.1.8 Relative elements of Subpart S – Electrical.

15.6.3.1.9 Relative elements of NFPA 70E.

15.6.4 Affected Personnel.

15.6.4.1 Affected personnel are those employees whose normal job duty is to operate the equipment or machines under OR have job tasks in the area in which lockout/tagout is being performed. Affected personnel shall be instructed in the following:

15.6.4.1.1 The purpose and use of the energy control procedures.

15.6.4.1.2 Type and magnitude of the energy sources.


15.6.4.1.3 Purpose and use of Hazardous Energy Control Procedures.

15.6.4.1.4 Nature and limitations of tags. A tag is not to be removed without authorization. The tag is never to be ignored or defeated in any way.

15.6.4.1.5 Conditions for restarting machinery and equipment or removing lockout / tagout devices, location of isolation devices for the energy sources.

15.6.5 Awareness Level Personnel.

15.6.5.1 Awareness level personnel are those employees whose work operations are or may be in an area where energy control procedures may be utilized. Awareness personnel shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment, which are locked out or tagged out.

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15.6.5.2 Retraining shall be provided for authorized and affected personnel when there is:

15.6.5.2.1 a change in job assignments;

15.6.5.2.2 a change in machines, equipment or processes that present a new hazard;

15.6.5.2.3 a change in the energy control procedure;


15.6.5.2.4 when the periodic inspection reveals, or when there is reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

15.6.6 All training and/or retraining must be documented and signed by both the instructor and attendee(s).

Attachment 1 Lock Removal Authorization Form

Attachment 2 Annual Inspections

Attachment 3 List of Authorized and Affected Persons

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Attachment 1

Lock Removal Authorization Form

**** USE THIS FORM WHEN REMOVING A LOCKOUT LOCK THAT WAS
INADVERTENTLY LEFT ON AN ENERGY ISOLATING DEVICE****

Notice!

In the event of an emergency or should an employee forget to remove his/her lock prior to leaving site and a lock needs to be removed, the project foreman (or designee) will make every effort possible to contact that individual to remove the lock.

If the person is contacted, he/she will remove the lock or give their verbal permission to remove their lock. The project foreman (or designee) and employee representative will proceed with the lock removal, documenting the conversation.

If the person cannot be contacted, insure the employee accountable for the lock has actually left the premises.

Exhaust all reasonable efforts to locate the employee who left the lock on the equipment.

To remove the lock a “walk-down” of the area must be completed by the project foreman (or designee) and employee representative. A “walk-down” includes a search of the premises to ensure the employee, who left the lock on the equipment, is not in danger.

Check the equipment to be energized to be sure that it is safe to remove the lock.

When the project foreman (or designee) and employee representative participating in the “walk-down” determine that the lock can be removed, they will execute their signatures on this form authorizing the removal of the lock.

The lock shall be removed with all members of the “walk-down” present.

Advise the employee that his/her lock has been removed before he/she reports to the next work shift. It is requested and advised that the employee be met at the entrance at which time the lock is returned and the employee notified of the removal.

Employee Name* _____

Lock ID (#): _____


Company Official _____

Date: _____

Business Segment (construction) _____

Date: _____

* Enter the name and lock number of the employee whose lock was removed.

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Attachment 2

Annual Inspection

Date of Evaluation:

Evaluation Made By:


Comments on General Policy:

The following specific procedures have been reviewed (list below):

The following specific procedures were modified (list below):

The following specific procedures were added (list below):

A review of the OSHA 300 log was conducted and the following incidents occurred, which involved lockout/tagout/tryout (include corrective action taken):

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Attachment 3

List of Authorized and Affected Persons

Lockout Tagout Authorized Persons:

Any electrician/Employee, upon receipt of proper training and lockout/tagout devices.


Any apprentice electrician/Employee, upon receipt of proper training and lockout/tagout devices.

Note: Authorized electrical lockout tagout / tryout requires qualified workers in accordance with 29 CFR 1910 Subpart S – Electrical

Lockout Tagout Affected Persons:

Any electrician/employee, upon receipt of proper training.

Any apprentice electrician/employee, upon receipt of proper training.

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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

16.1 Policy Statement

16.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment as free as possible from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

16.2 Purpose

16.2.1 To ensure safe use of mobile crane equipment.

16.2.2 To comply with OSHA standard 29 CFR 1926 Subpart CC

16.3 General Operation Rules


16.3.1 All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.

16.3.2 All manufacturer procedures applicable to the operational functions of equipment, including its use with attachments, must be followed at all times and must be readily available in the cab at all times for use by the operator.

16.3.2.1 Where the manufacturer procedures are unavailable, all procedures necessary for the safe operation of the equipment and attachments must be developed by a qualified person.

16.4 Operator Qualification/Certification.

16.4.1 Operators must be determined as qualified or certified prior to operating any crane or piece of equipment.

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16.4.2 Crane operators must have required licenses by National Commission for the Certification of Crane Operators (NCCCO), State Board of Crane Operators, or other requirements that directed by the state that work is being performed.

16.4.3 OSHA 1910.179(a)(1) defines A *crane* as a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power.

16.4.3.1.1 A derrick

16.4.3.1.2 A crawler crane

16.4.3.1.3 A wheel mounted crane of both truck and self-propelled wheel type

16.4.3.1.4 A tower crane, which has a manufacturer's rated maximum lifting capacity of 10 metric tons or more

16.4.4 The term doesn't include:


16.4.4.1 Any vehicle, aircraft or helicopter, or equipment which does not have a power-operated winch and load line.

16.4.4.2 Crane licensing categories include, but are not limited to, tower crane, lattice boom crawler, lattice boom truck, telescopic boom (rotating control station), and telescopic boom (fixed control station).

16.4.4.3 Excluded are digger derricks, forklifts, bucket trucks and tow trucks.


16.4.5 A central requirement for licensure is certification from the National Commission for the Certification of Crane Operators (NCCCO) or other organization meeting the applicable ASME standard and accredited by the American National Standards Institute (ANSI) or the National Commission for Certifying Agencies (NCCA).

16.4.5.1 Trainees may operate cranes as long as they have passed a written examination by an organization such as NCCCO and are under the immediate supervision of a certified crane operator. For a one-year period only, individuals may be licensed if they pass the NCCCO practical exam or can document to the board's satisfaction at least five years' experience specific to the type of crane for which they are seeking licensure.

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16.5 Operator Responsibilities.

- 16.5.1** The operator must not engage in any practice or activity that diverts his/her attention while actually engaged in operating the equipment, such as the use of cellular phones (other than when used for signal communications).
 - 16.5.2** The boom or other parts of the equipment must not contact any obstruction.
 - 16.5.3** Equipment must not be used to drag or pull loads sideways.
 - 16.5.4** On wheel-mounted equipment, no loads must be lifted over the front area, except as permitted by the manufacturer.
 - 16.5.5** Neither the load nor the boom must be lowered below the point where less than two full wraps of rope remain on their respective drums.
 - 16.5.6** Traveling with a load is prohibited if the practice is prohibited by the manufacturer or other owner client to whom the contact work is being performed.
 - 16.5.7** The operator must verify that the load is within the rated capacity of the equipment. Operators must reduce the load capacity under adverse field conditions until, it is determined, the machine can safely handle the lift. (Test Lift)
 - 16.5.8** Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment.
 - 16.5.9** Where rated capacities are available in the cab only in electronic form: In the event of a failure which makes the rated capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the rated capacities (in electronic or other form) are available.
 - 16.5.10** The operator must not be required to operate any equipment in excess of its rated capacity.
 - 16.5.11** The operator must obey a stop (or emergency stop) signal, irrespective of who gives it.
 - 16.5.12** The operator must test the brakes each time a load that is 90% or more of the maximum line pull is handled by lifting the load a few inches and
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applying the brakes. In duty cycle and repetitive lifts where each lift is 90% or more of the maximum line pull, this requirement applies to the first lift but not to successive lifts.

16.5.13 Safety devices and operational aids must not be used as a substitute for the exercise of professional judgment by the operator.

16.5.14 Whenever there is a concern as to safety, the operator has the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

16.5.15 When a local storm warning has been issued, the competent person must determine whether it is necessary to implement manufacturer recommendations for securing the equipment.

16.5.16 The operator must not leave the controls while the load is suspended, except where all of the following are met:

16.5.16.1 The operator remains adjacent to the equipment and is not engaged in any other duties.

16.5.16.2 The load is to be held suspended for a period exceeding normal lifting operations.

16.5.16.3 The competent person determines that it is safe to do so and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger or stabilizer functions.


16.5.17 Barricades or caution lines, and notices, are erected to prevent all employees from entering the fall zone. No employees are permitted in the fall zone.

16.5.18 Ensure a pre-operation inspection is completed as specified in section 25.4 prior to operating any equipment.

16.5.19 If equipment adjustments or repairs are necessary:

16.5.19.1 The operator must, in writing, promptly inform the person designated by the employer to receive such information and, where there are successive shifts, to the next operator; and

16.5.19.2 Notify all affected employees, at the beginning of each shift, of the necessary adjustments or repairs and all alternative measures.


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16.6 Competent Person Responsibilities.

- 16.6.1** Must determine if there is a slack rope condition requiring re-spooling of the rope. If so, it must be verified (before starting to lift) that the rope is seated on the drum and in the sheaves as the slack is removed.
- 16.6.2** Must adjust the equipment and/or operations to address the effect of wind, ice, and snow on equipment stability and rated capacity.
- 16.6.3** Supervises the operation of traveling with a load, determines if it is necessary to reduce rated capacity, and makes determinations regarding load position, boom location, ground support, travel route, overhead obstructions, and speed of movement necessary to ensure safety.

16.7 Ground Conditions.

- 16.7.1** Equipment shall not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.
 - 16.7.2** The *controlling entity* must:
 - 16.7.2.1** Ensure that ground preparations necessary to meet the requirements of this section are provided.
 - 16.7.2.2** Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.
 - 16.7.2.3** If there is no controlling entity for the project, the requirements of this section shall be met by the employer that has authority at the site to make or arrange for ground preparations.
 - 16.7.2.4** If the *A/D director* or the operator determines that ground conditions do not meet the requirements of this section, that person's employer must have a discussion with the controlling entity regarding
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the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements can be met.

16.8 Signal Person.

16.8.1 A signal person must meet qualification requirements determined by a qualified evaluator prior to giving any signals and must:

16.8.1.1 Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

16.8.1.2 Be competent in the application of the type of signals used.

16.8.1.3 Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

16.8.1.4 Know and understand the relevant requirements for any signal person.

16.8.2 Documentation that demonstrates a signal person meets the qualification requirements and specifies the type of signaling being used must be available at the site.

16.8.3 A signal person must be provided in each of the following situations:


16.8.3.1 The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the operator.

16.8.3.2 When the equipment is traveling, the view in the direction of travel is obstructed.

16.8.3.3 Due to site specific safety concerns, either the operator or the person handling the load determines that it is necessary.

16.9 Types of signals.

16.9.1 Signals to operators must be by hand, voice, audible, or new signals. Means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions.

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16.9.2 When using hand signals, the Standard Method must be used and hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations. (Attachment 1)

16.9.2.1 Where use of the Standard Method for hand signals is infeasible, or where an operation or use of an attachment is not covered in the Standard Method, non-standard hand signals may be used.

16.9.2.2 The signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used.

16.9.3 Radio, telephone or other electronic transmission of signals.

16.9.3.1 The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.

16.9.3.2 Signal transmission must be through a dedicated channel, except:

16.9.3.2.1 Multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.


16.9.3.2.2 Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.

16.9.4 Voice signal requirements.

16.9.4.1 Prior to beginning operations, the operator, signal person and lift director (if there is one), must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.

16.9.4.2 Each voice signal must contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command.

16.9.4.3 The operator, signal person and lift director (if there is one), must be able to effectively communicate in the language used.

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16.9.5 Signals other than hand, voice, or audible signals may be used where the employer demonstrates that:

16.9.5.1 The new signals provide at least equally effective communication as voice, audible, or Standard Method hand signals, or

16.9.5.2 The new signals comply with a national consensus standard that provides at least equally effective communication as voice, audible, or Standard Method hand signals.

16.9.6 During operations requiring signals, the ability to transmit signals between the operator and signal person must be maintained. If that ability is interrupted at any time, the operator must safely stop operations requiring signals until it is reestablished and a proper signal is given and understood.

16.9.7 If the operator becomes aware of a safety problem and needs to communicate with the signal person, the operator must safely stop operations. Operations must not resume until the operator and signal person agree that the problem has been resolved.

16.9.8 Only one person may give signals to a crane/derrick at a time unless anyone becomes aware of a safety problem and must alert the operator or signal person by giving the stop or emergency stop signal.

16.9.9 All directions given to the operator by the signal person must be given from the operator's direction perspective.


16.9.10 Where a signal person(s) is in communication with more than one crane/derrick, a system must be used for identifying the crane/derrick each signal is for, as follows:

16.9.10.1 For each signal, prior to giving the function/direction, the signal person must identify the crane/derrick the signal is for, or

16.9.10.2 Must use an equally effective method of identifying which crane/derrick the signal is for.

16.10 Work area control.

16.10.1 Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries where there are accessible areas in which the equipment's rotating superstructure (whether permanently or temporarily mounted) poses a reasonably foreseeable risk of swing radius hazards including, but not limited to:

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16.10.1.1 Striking and injuring an employee; or

16.10.1.2 Pinching/crushing an employee against another part of the equipment or another object.

16.10.2 To prevent employees from entering these hazard areas, each employee assigned to work on or near the equipment ("authorized personnel") must be trained in how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure.

Exception: When the employer can demonstrate that it is neither feasible to erect such barriers on the ground nor on the equipment, the hazard areas must be clearly marked by a combination of warning signs (such as "Danger--Swing/Crush Zone") and high visibility markings on the equipment that identify the hazard areas and train each employee to understand what these markings signify.

16.11 Keeping clear of the load.

16.11.1 Hoisting routes that minimize the exposure of employees to hoisted loads must be used as feasible.

16.11.2 While the operator is not moving a suspended load, no employee must be within the fall zone, except for employees:

16.11.2.1 Engaged in hooking, unhooking or guiding a load;


16.11.2.2 Engaged in the initial attachment of the load to a component or structure; or

16.11.2.3 Operating a concrete hopper or concrete bucket.

16.11.3 When employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:

16.11.3.1 The materials being hoisted must be rigged to prevent unintentional displacement.

16.11.3.2 Hooks with self-closing latches or their equivalent must be used.
Exception: "J" hooks are permitted to be used for setting wooden trusses.

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16.11.3.3 The materials must be rigged by a qualified rigger.

16.12 Receiving a load.

16.12.1 Only employees needed to receive a load are permitted to be within the fall zone when a load is being landed.

16.12.2 During a tilt-up or tilt-down operation, only employees essential to the operation are permitted in the fall zone (but not directly under the load).

16.13 Equipment

16.13.1 Safety devices.

16.13.1.1 The following safety devices are required on all equipment unless otherwise specified:

16.13.1.1.1 A crane level indicator that is either built into the equipment or is available on the equipment.

16.13.1.1.2 Boom stops, except for derricks and hydraulic booms.

16.13.1.1.3 Jib stops (if a jib is attached), except for derricks.

16.13.1.1.4 Equipment with foot pedal brakes with locks.


16.13.1.1.5 Hydraulic outrigger jacks and hydraulic stabilizer jacks with an integral holding device/check valve.

16.13.1.1.6 Equipment on rails must have rail clamps and rail stops, except for portal cranes.

16.13.1.1.7 A horn that is either built into the equipment or is on the equipment and immediately available to the operator.

16.13.1.2 Excluded from the requirements of this section are digger derricks when used for utility work.

Note: Operations must not begin unless all of the safety devices listed in the previous section are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. If any of the devices listed in this section are not in proper working order, the equipment must be taken out of service and operations must not resume until the device is again working properly. Alternative safety device measures are not permitted to be used.

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16.14 Engineering Controls (Operational aids)

16.14.1 Category I operational aids:

16.14.1.1 Boom hoist limiting device.

16.14.1.1.1 Required for all equipment manufacturer after December 1969.

16.14.2 Luffing jib limiting device.

16.14.2.1 Applies to equipment equipped with a luffing jib.

16.14.3 Anti-two blocking device.

16.14.3.1 Applies to all equipment. Only applies to digger derricks manufactured after November 2011.

16.14.4 Category II operational aids:

16.14.4.1 Boom angle or radius indicator.

16.14.4.1.1 Only applies to digger derricks manufactured after November 2011.

16.14.4.1.2 Does not apply to articulating cranes.

16.14.4.2 Jib angle indicator if the equipment has a luffing jib.

16.14.4.2.1 Does not apply to articulating cranes. Applies to all other equipment.


16.14.4.3 Boom length indicator if the equipment has a telescopic boom.

16.14.4.3.1 Does not apply when the rated capacity is independent of the boom length.

16.14.4.3.2 Does not apply to articulating cranes. Applies to all other equipment.

16.14.4.4 Load weighing or similar devices.

16.14.4.4.1 Applies to digger derricks manufactured after November 2011.

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16.14.4.4.2 Applies to other equipment manufactured after March 2003 with a rated capacity over 6,000 pounds.

16.14.4.4.3 Special provision for articulating cranes manufactured after November 2011.

16.15 Inspection.

16.15.1 A competent person must complete a visual inspection prior to each shift and each month the equipment is in service. All safety devices must be in proper working order before operation begins. At a minimum each inspection must include all of the following:

16.15.1.1 Control mechanisms for maladjustments interfering with proper operation.

16.15.1.2 Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.

16.15.1.3 Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.

16.15.1.4 Hydraulic system for proper fluid level.


16.15.1.5 Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.

16.15.1.6 Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.

16.15.1.7 Tires (when in use) for proper inflation and condition; and

16.15.1.8 Wire rope (For wire rope inspection requirements see the Rigging and Material Handling Program Section 44.)

16.15.1.9 Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, ground water accumulation, or similar conditions.

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16.15.1.10 The equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.

16.15.1.11 Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.

16.15.1.12 Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.

16.15.1.13 Safety devices and operational aids for proper operation.

16.16 Inspection Documentation.

16.16.1 The following inspection information must be documented, maintained, and retained by the employer for a minimum of three months:

16.16.1.1 The items checked and the results of the inspection.

16.16.1.2 The name and signature of the person who conducted the inspection and the date.

16.17 Modified Equipment.

16.17.1 Modifications or additions which affect the capacity or safe operation of the equipment are *prohibited* except where the following requirements are met:


16.17.1.1 Manufacturer review and approval.

16.17.1.2 The manufacturer approves the modifications/additions in writing.

16.17.1.3 The load charts, procedures, instruction manuals and instruction plates/tags/decals are modified as necessary to accord with the modification/addition.

16.17.1.4 The original safety factor of the equipment is not reduced.

16.17.2 Equipment that has had any modifications or additions which affect the safe operation of the equipment must be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. The inspection must meet all of the following requirements:

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16.17.2.1 The modifications or additions meet the requirements set forth by the *manufacturer review and approval*.

16.17.2.2 Functional testing of the equipment.

16.18 Repaired/adjusted Equipment.

16.18.1 Equipment that has had a repair or adjustment that relates to safe operation of the equipment must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The inspection must determine:

16.18.1.1 If the repair/adjustment meets manufacturer equipment criteria (where applicable and available).

16.18.1.2 Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person must:

16.18.1.3 Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE; and

16.18.1.4 Include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.


16.18.1.5 Equipment must not be used until an inspection demonstrates that the repair/adjustment meets the requirements set forth by this section.

16.19 Tagging out of service equipment/functions.

16.19.1 Equipment out of service must be tagged in a conspicuous position in the cab stating that the equipment is out of service and is not to be used. The tag must state that the function is out of service and is not to be used.

16.19.2 If there is a warning (tag-out or maintenance/do not operate) sign on the equipment or starting control, the operator must not activate the switch or start the equipment until the sign has been removed by a person authorized to remove it, or until the operator has verified that:

16.19.2.1 No one is servicing, working on, or otherwise in a dangerous position on the machine.

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16.19.2.2 The equipment has been repaired and is working properly.

16.19.3 If there is a warning (tag-out or maintenance/do not operate) sign on any other switch or control, the operator must not activate that switch or control until the sign has been removed by a person authorized to remove it, or until the operator has verified that:

16.19.3.1 No one is servicing, working on, or otherwise in a dangerous position on the machine;

16.19.3.2 The equipment has been repaired and is working properly;

16.19.3.3 Where the manufacturer procedures are unavailable, the employer must develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments;

16.19.3.4 Procedures for the operational controls must be developed by a qualified person;

16.19.3.5 Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment; and

16.19.3.6 Before starting the engine, the operator must verify that all controls are in the proper starting position and that all personnel are in the clear.


16.20 Assembly / Disassembly.

16.20.1 Procedures for assembling or disassembling equipment (or attachments), must comply with all applicable manufacturer procedures, instructions, and prohibitions or must be developed by a qualified person to:

16.20.1.1 Prevent unintended dangerous movement or collapse of any part of the equipment;

16.20.1.2 Provide adequate support and stability of all parts of the equipment; and

16.20.1.3 Position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

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16.21 A/D Director.

- 16.21.1** All assembly/disassembly operations must be directed by an individual who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons.
- 16.21.2** The A/D director must understand the applicable assembly/disassembly procedures adequate precautions to protect against potential hazards associated with the operation.


16.22 A/D Crew.

- 16.22.1** Before the operation begins, the A/D director must ensure that the crew members understand all of the following:
- 16.22.1.1** Their tasks.
 - 16.22.1.2** The hazards associated with their tasks.
 - 16.22.1.3** The hazardous positions/locations that they need to avoid.
- 16.22.2** Crew members must notify the operator when he/she is out of view.
- 16.22.3** Establish a pre-arranged system for communication.

16.23 Power Line Safety

16.23.1 General Rules

- 16.23.1.1** All power lines must be presumed energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
- 16.23.1.2** At least one electrocution hazard warning must be conspicuously posted in the cab so that it is in view of the operator and at least two on the outside of the equipment.
- 16.23.1.3** No part of a crane/derrick, load line, or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed below a power line or is allowed closer than the minimum approach distance under Table A in this section unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.

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16.23.1.4 Prior to any crane assembly or hoist-related activity, a pre-operational hazard assessment must be conducted and the work zone must be identified.

16.23.1.5 Additionally crews are required to complete the crane overhead power line evaluation form.

16.23.1.6 The work zone must be identified by:

16.23.1.6.1 Demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or

16.23.1.6.2 Defining the work zone as the area 360 degrees around the equipment, up to the equipment's maximum working radius.

16.23.1.7 A pre-operation hazard assessment must determine:

16.23.1.7.1 If any part of the equipment, load line, or load (including rigging and lifting accessories) could get closer than 20 feet to a power line during assembling/disassembling, or if operated up to the equipment's maximum working radius in the identified work zone.


16.23.1.7.2 Exemption: Power line safety rules do not apply to utility personnel or contractors operating cranes for the construction and maintenance of Transmission and Distribution lines and equipment (covered under 1910.269 and 1926 subpart V).

16.23.1.7.3 The term "construction" includes the erection of new electric transmission and distribution lines and equipment, and the alteration, conversion, and improvement of existing electric transmission and distribution lines and equipment.

16.23.1.7.4 Digger derricks under this exemption must comply with 29 CFR 1910.268.

16.23.2 Preventing encroachment/electrocution.

16.23.2.1 If the pre-operational hazard assessment determines that any part of the equipment, load line, or load (including rigging and lifting accessories) could get closer than 20 feet to a power line at any time:

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16.23.2.1.1 Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite; or

16.23.2.1.2 Determine that the minimum clearance distance to the power line permitted under Table A of this section can be maintained at all times.

16.23.2.2 If the pre-operational hazard assessment determines that the power line has not been deenergized and visibly grounded at the worksite; and the minimum clearance distance to the power line permitted under Table A of this section cannot be maintained during assembly/disassembly; the following provisions must be taken:

16.23.2.2.1 Tag lines must be nonconductive if they are used.

16.23.2.2.2 A planning meeting must be conducted with the Assembly/Disassembly director (A/D director), operator, assembly/disassembly crew and the other workers who will be in the assembly/disassembly area to review the location of the power line(s) and the steps that will be implemented to prevent encroachment/electrocution; and

16.23.2.3 At least one of the following additional measures must be in place and effective in preventing encroachment:

16.23.2.3.1 A proximity alarm set to give the operator sufficient warning to prevent encroachment.


16.23.2.3.2 A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

16.23.2.3.3 A device that automatically limits range of movement, set to prevent encroachment.

16.23.2.3.4 An elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings.

16.23.2.3.5 *A dedicated spotter*

Note: If proximity alarms or insulating links/devices are used as an additional effective measure for preventing encroachment, refer to OSHA Letter of Interpretation subjected *Temporary*

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Enforcement Policy for Proximity Alarm and Insulating Link Use with Cranes and Derricks in Construction (June 25,2012)

16.23.2.4 If the pre-operational hazard assessment determines that the power line has not been deenergized and visibly grounded at the worksite; and the minimum clearance distance to the power line permitted under Table A of this section cannot be maintained if the equipment is operated up to the maximum working radius in the identified work zone; the following provisions must be taken:

16.23.2.4.1 Tag lines must be nonconductive if they are used.

16.23.2.4.2 A planning meeting must be conducted with the operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.

16.23.2.4.3 An elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings must be erected and maintained at 20 feet from the power line or at the minimum approach distance under Table A of this section.

16.23.2.5 If the operator is unable to see the elevated warning line, a *dedicated spotter* must be used, in addition to one of the following measures:

16.23.2.5.1 A proximity alarm set to give the operator sufficient warning to prevent encroachment; or

16.23.2.5.2 A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment; or

16.23.2.5.3 A device that automatically limits range of movement, set to prevent encroachment.


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TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

Note: For power lines above 350 kV and at or below 1000 kV, wherever the distance "20 feet" is specified, the distance "50 feet" must be substituted. For power lines over 1000 kV, the minimum clearance distance must be established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

16.24 Traveling under or near power lines with no load.

16.24.1 Equipment traveling under or near a power line on a construction site with no load must ensure that:

16.24.1.1 The clearances specified in Table T of this section are maintained (including the boom/mast and boom/mast support system).

16.24.1.2 The effects of speed and terrain on equipment movement (including movement of the boom/mast) are considered so that those effects do not cause the minimum clearance distances specified in Table T of this section to be breached.

16.24.1.3 If any part of the equipment while traveling will get closer than 20 feet to the power line, a *dedicated spotter* must be used.

16.24.1.4 When traveling at night or in poor visibility, additional precautions must be taken:

16.24.1.4.1 The power lines are illuminated or another means of identifying the location of the lines is used.

16.24.1.4.2 A safe path of travel is identified and used.


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TABLE T—MINIMUM CLEARANCE DISTANCES WHILE TRAVELING WITH NO LOAD

Voltage (nominal, kV, alternating current)	While traveling—minimum clearance distance (feet)
up to 0.75	4
over .75 to 50	6
over 50 to 345	10
over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

16.25 Training

16.25.1 Each operator and crew member assigned to work with the equipment must be trained on all of the following:

16.25.1.1 The procedures to be followed in the event of electrical contact with a power line. Such training must include:

16.25.1.1.1 Information regarding the danger of electrocution from the operator simultaneously touching the equipment and the ground.

16.25.1.1.2 The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.

16.25.1.1.3 The safest means of evacuating from equipment that may be energized.


16.25.1.1.4 The danger of the potentially energized zone around the equipment (step potential).

16.25.1.1.5 The need for crew in the area to avoid approaching or touching the equipment and the load.

16.25.1.1.6 Safe clearance distance from power lines.

16.26 Definitions

16.26.1 A/D director (Assembly/Disassembly director) - means an individual who meets this subpart's requirements for an A/D director, irrespective of the person's formal job title or whether the person is non-management or management personnel.

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16.26.2 Articulating crane - means a crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.

16.26.3 Assembly/Disassembly - means the assembly and/or disassembly of equipment covered under this written program. With regard to tower cranes, "erecting and climbing" replaces the term "assembly," and "dismantling" replaces the term "disassembly." Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing the height of the crane is an erection process.

16.26.4 Blocking (also referred to as "cribbing") - is wood or other material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly/disassembly and under outrigger and stabilizer floats.

16.26.5 Boom (equipment other than tower crane) - means an inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height or height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.


16.26.6 Boom (tower cranes): - On tower cranes, if the "boom" (*i.e.*, principal horizontal structure) is fixed, it is referred to as a jib; if it is moveable up and down, it is referred to as a boom.

16.26.7 Boom angle indicator - means a device which measures the angle of the boom relative to horizontal.

16.26.8 Boom hoist limiting device - includes boom hoist disengaging device, boom hoist shut-off, boom hoist disconnect, boom hoist hydraulic relief, boom hoist kick-outs, automatic boom stop device, or derricking limiter. This type of device disengages boom hoist power when the boom reaches a predetermined operating angle. It also sets brakes or closes valves to prevent the boom from lowering after power is disengaged.

16.26.9 Boom length indicator - indicates the length of the permanent part of the boom (such as ruled markings on the boom) or, as in some computerized systems, the length of the boom with extensions/attachments.

16.26.10 Boom stop - includes boom stops, (belly straps with struts/standoff), telescoping boom stops, attachment boom stops, and backstops. These devices restrict the boom from moving above a certain maximum angle and toppling over backward.

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16.26.11 Boom suspension system -means a system of pendants, running ropes, sheaves, and other hardware which supports the boom tip and controls the boom angle.

16.26.12 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 authorization to take prompt corrective measures to eliminate them.

16.26.13 Controlled load lowering - means lowering a load by means of a mechanical hoist drum device that allows a hoisted load to be lowered with maximum control using the gear train or hydraulic components of the hoist mechanism. Controlled load lowering requires the use of the hoist drive motor, rather than the load hoist brake, to lower the load.

16.26.14 Controlling entity - means an employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project--its planning, quality and completion.

16.26.15 Counterweight - means a weight used to supplement the weight of equipment in providing stability for lifting loads by counterbalancing those loads.

16.26.16 Crane - "power-operated equipment that, when used in construction, can hoist, lower and horizontally move a suspended load"


16.26.17 Dedicated channel - means a line of communication assigned by the employer who controls the communication system to only one signal person and crane/derrick or to a coordinated group of cranes/derricks/signal person(s).

16.26.18 Dedicated pile-driver - is a machine that is designed to function exclusively as a pile-driver. These machines typically have the ability to both hoist the material that will be pile-driven and to pile-drive that material.

16.26.19 Dedicated spotter (power lines): - To be considered a dedicated spotter, the requirements of § 1926.1428 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

16.26.20 Drum rotation indicator - means a device on a crane or hoist which indicates in which direction and at what relative speed a particular hoist drum is turning.

16.26.21 Encroachment - is where any part of the crane, load line or load (including rigging and lifting accessories) breaches a minimum clearance distance that this subpart requires to be maintained from a power line.

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16.26.22 Fall restraint system - means a fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

16.26.23 Fall zone - means the area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.

16.26.24 Flange points - are points of contact between rope and drum flange where the rope changes layers.

16.26.25 Free fall (of the load line) - means that only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).

16.26.26 Hoist - means a mechanical device for lifting and lowering loads by winding a line onto or off a drum.

16.26.27 Hoisting - is the act of raising, lowering or otherwise moving a load in the air with equipment covered by this standard. As used in this standard, "hoisting" can be done by means other than wire rope/hoist drum equipment.

16.26.28 Insulating link/device - means an insulating device listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with 29 CFR 1910.7.


16.26.29 Jib stop - (also referred to as a jib backstop), is the same type of device as a boom stop but is for a fixed or luffing jib.

16.26.30 Land crane/derrick - is equipment not originally designed by the manufacturer for marine use by permanent attachment to barges, pontoons, vessels, or other means of floatation.

16.26.31 Load - refers to the object(s) being hoisted and/or the weight of the object(s); both uses refer to the object(s) and the load-attaching equipment, such as, the load block, ropes, slings, shackles, and any other ancillary attachment.

16.26.32 Load moment (or rated capacity) - indicator means a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the equipment, *i.e.*, load multiplied by radius. It compares this lifting condition to the equipment's rated capacity, and indicates to the operator the percentage of capacity at which the equipment is working. Lights, bells, or buzzers may be incorporated as a warning of an approaching overload condition.

16.26.33 Load moment (or rated capacity) limiter - means a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the

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equipment, *i.e.*, load multiplied by radius. It compares this lifting condition to the equipment's rated capacity, and when the rated capacity is reached, it shuts off power to those equipment functions which can increase the severity of loading on the equipment, *e.g.*, hoisting, telescoping out, or luffing out. Typically, those functions which decrease the severity of loading on the equipment remain operational, *e.g.*, lowering, telescoping in, or luffing in.

16.26.34 Luffing jib limiting device - is similar to a boom hoist limiting device, except that it limits the movement of the luffing jib.

16.26.35 Mobile crane - means a lifting device incorporating a cable suspended latticed boom or hydraulic telescopic boom designed to be moved between operating locations by transport over the road.

16.26.36 Nationally recognized accrediting agency - is an organization that, due to its independence and expertise, is widely recognized as competent to accredit testing organizations. Examples of such accrediting agencies include, but are not limited to, the National Commission for Certifying Agencies and the American National Standards Institute.

16.26.37 Nonconductive - means that, because of the nature and condition of the materials used, and the conditions of use (including environmental conditions and condition of the material), the object in question has the property of not becoming energized (that is, it has high dielectric properties offering a high resistance to the passage of current under the conditions of use).


16.26.38 Operational aids - are devices that assist the operator in the safe operation of the crane by providing information or automatically taking control of a crane function. These include, but are not limited to, the devices listed in § 1926.1416 ("listed operational aids").

16.26.39 Operational controls - means levers, switches, pedals and other devices for controlling equipment operation.

16.26.40 Operator - means a person who is operating the equipment.

16.26.41 Overhead and gantry cranes - includes overhead/bridge cranes, semigantry, cantilever gantry, wall cranes, storage bridge cranes, launching gantry cranes, and similar equipment, irrespective of whether it travels on tracks, wheels, or other means.

16.26.42 Pendants - includes both wire and bar types. Wire type: A fixed length of wire rope with mechanical fittings at both ends for pinning segments of wire rope together. Bar type: Instead of wire rope, a bar is used. Pendants are typically used in a latticed boom crane system to easily change the length of the boom suspension system without completely changing the rope on the drum when the boom length is increased or decreased.

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16.26.43 Personal fall arrest system - means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

16.26.44 Portal crane - is a type of crane consisting of a rotating upper structure, hoist machinery, and boom mounted on top of a structural gantry which may be fixed in one location or have travel capability. The gantry legs or columns usually have portal openings in between to allow passage of traffic beneath the gantry.

16.26.45 Proximity alarm - is a device that provides a warning of proximity to a power line and that has been listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with 29 CFR 1910.7.

16.26.46 Qualified evaluator (not a third party) - means a person employed by the signal person's employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

16.26.47 Qualified evaluator (third party) - means an entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

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

16.26.49 Qualified rigger - is a rigger who meets the criteria for a qualified person.


16.26.50 Range control limit device - is a device that can be set by an equipment operator to limit movement of the boom or jib tip to a plane or multiple planes.

16.26.51 Range control warning device - is a device that can be set by an equipment operator to warn that the boom or jib tip is at a plane or multiple planes.

16.26.52 Rated capacity - means the maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radii, boom length, and other parameters of use.

16.26.53 Running wire rope - means a wire rope that moves over sheaves or drums.

16.26.54 Runway - means a firm, level surface designed, prepared and designated as a path of travel for the weight and configuration of the crane being used to lift and

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travel with the crane suspended platform. An existing surface may be used as long as it meets these criteria.

16.26.55 Sideboom crane - means a track-type or wheel-type tractor having a boom mounted on the side of the tractor, used for lifting, lowering or transporting a load suspended on the load hook. The boom or hook can be lifted or lowered in a vertical direction only.

16.26.56 Stability (flotation device) - means the tendency of a barge, pontoons, vessel or other means of flotation to return to an upright position after having been inclined by an external force.

16.26.57 Standard Method - means the protocol in Appendix A of this subpart for hand signals.


16.26.58 Tagline - means a rope (usually fiber) attached to a lifted load for purposes of controlling load spinning and pendular motions or used to stabilize a bucket or magnet during material handling operations.

16.26.59 Tender - means an individual responsible for monitoring and communicating with a diver. Digger.

16.26.60 Tilt up or tilt down operation - means raising/lowering a load from the horizontal to vertical or vertical to horizontal.


16.26.61 Tower crane - is a type of lifting structure which utilizes a vertical mast or tower to support a working boom (jib) in an elevated position. Loads are suspended from the working boom. While the working boom may be of the fixed type (horizontal or angled) or have luffing capability, it can always rotate to swing loads, either by rotating on the top of the tower (top slewing) or by the rotation of the tower (bottom slewing). The tower base may be fixed in one location or ballasted and moveable between locations. Mobile cranes that are configured with luffing jib and/or tower attachments are not considered tower cranes under this section.

16.26.62 Two blocking - means a condition in which a component that is uppermost on the hoist line such as the load block, hook block, overhaul ball, or similar component, comes in contact with the boom tip, fixed upper block or similar component. This binds the system and continued application of power can cause failure of the hoist rope or other component.

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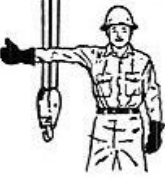

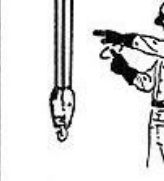
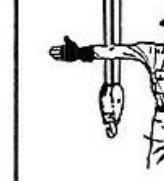

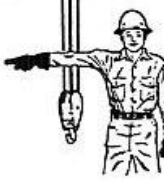





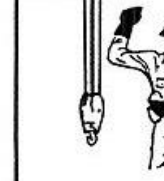
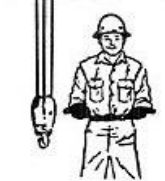
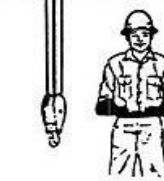
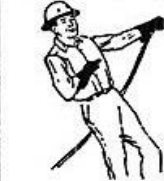

Attachment 2 Sample Suspended Personnel Platform


Attachment 3 Overhead Power Line Evaluation Form

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 <p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	 <p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>	 <p>USE MAIN HOIST. Tap fist on head; then use regular signals.</p>	 <p>USE WHIPLINE (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.</p>
 <p>RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.</p>	 <p>LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.</p>	 <p>MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the signal. (Hoist slowly shown as example.)</p>	 <p>RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.</p>
 <p>LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.</p>	 <p>SWING. Arm extended with finger in direction of swing of boom.</p>	 <p>STOP. Arm extended, palm down, hold position rigidly.</p>	 <p>EMERGENCY STOP. Arm extended, palm down, move hand rapidly right and left.</p>
 <p>TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>	 <p>DOG EVERYTHING. Clap hands in front of body.</p>	 <p>TRAVEL (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward. (For crawler cranes only.)</p>	 <p>TRAVEL (One Track) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only.)</p>
 <p>EXTEND BOOM (Telescoping Boom). Both fists in front of body with thumbs pointing outward.</p>	 <p>RETRACT BOOM (Telescoping Boom). Both fists in front of body with thumbs pointing toward each other.</p>	 <p>EXTEND BOOM (Telescoping Boom). One Hand Signal: One fist in front of chest, thumb pointing outward and heel of fist tapping chest.</p>	 <p>RETRACT BOOM (Telescoping Boom). One Hand Signal: One fist in front of chest with thumb tapping chest.</p>

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Attachment 2

Sample Suspended Personnel Platform

Manbasket Design (Must be Approved by an Engineer)

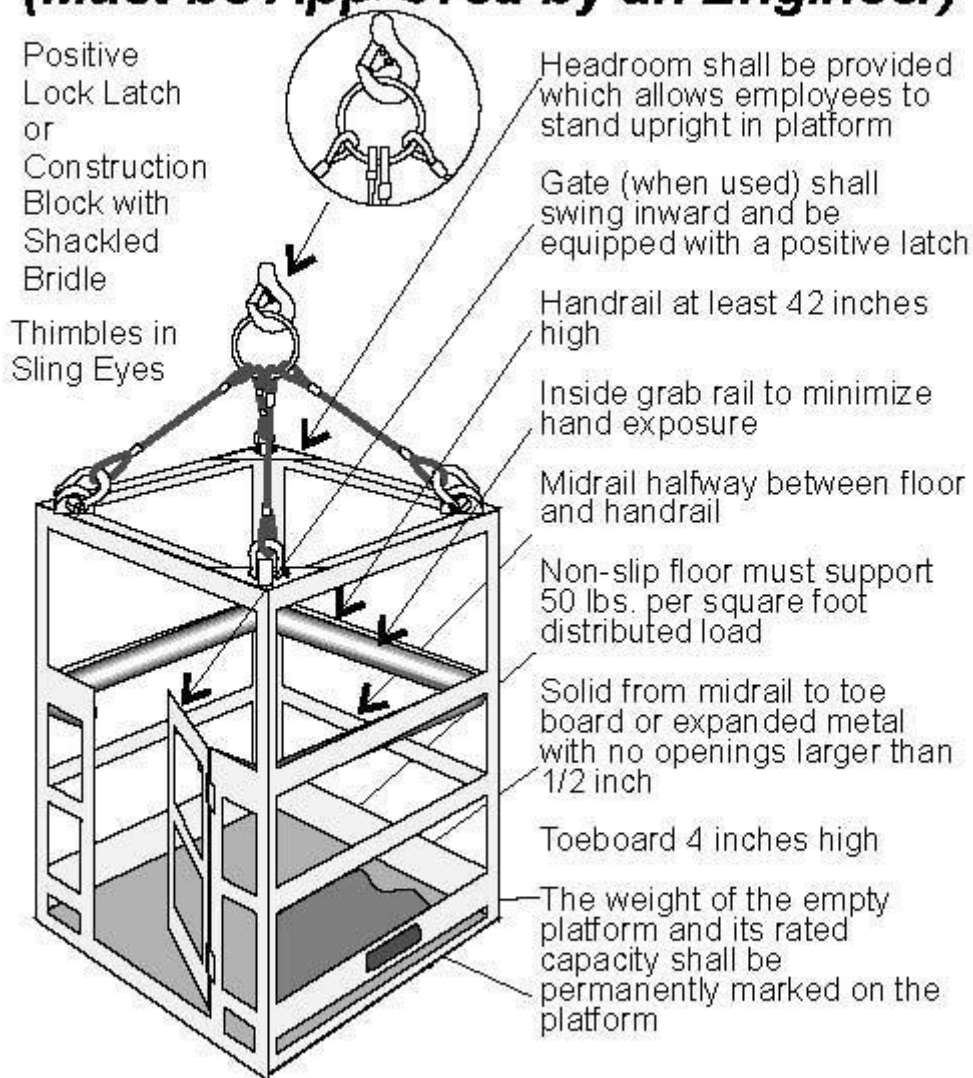



Illustration #95 - Manbasket Design

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Attachment 3

OVERHEAD POWER LINE EVALUATION FORM

At the start of the project the entire route will be assessed and this form filled out for each overhead crossing. Additionally before the daily work activity begins (at the morning tailgate meeting or JSA) that has the capability to reach or be closer than a minimum safe distance to the energized power lines this evaluation form will be completed daily.
 Contact Williams Management on any questions about this form (one form required per utility crossing at start of project)
 Form not required for daily car and truck traffic (only machinery).

PROJECT NAME: _____ CONTRACTOR: _____
 PROJECT WORK ORDER NUMBER: _____ TODAY'S DATE: _____
 WILLIAMS PROJECT MANAGER: _____
 (PRINT)
 WILLIAMS SITE INSPECTOR / REP. / CONST MGR: _____
 (PRINT)
 WORK DURATION NEAR THE POWERLINE: FROM: _____ TO: _____
 STREET ADDRESS (OR NEAREST ROAD INTERSECTION) OF THE WORK AREA: _____
 NATURE OF WORK (NEAR THE POWER LINE): _____

1. THE LOWEST POINT (HEIGHT) OF THE POWER LINES ASSOCIATED WITH THIS WORK IS APPROXIMATELY _____ FT FROM EXISTING GRADE.
2. THIS WAS VERIFIED BY (PRINT NAME) _____
 ON (DATE): _____ BY WHAT METHOD _____
3. GOAL POSTS INSTALLED ON BOTH SIDES OF ACCESS: Y ☐ N ☐ DATE: _____
 - Goal Post Markers WILL BE INSTALLED before and after (and parallel if within the min. working distances) overhead power lines both sides (both ends) of the affected ROW.
 - If you know the line's voltage, you may use the minimum clearance distance in Table A if it is not verified by the local utility then the minimum is distance is 20 feet. Table A provides:


Table A – Minimum Clearance Distances While Working Near Power Lines

Voltage (kV)	Minimum clearance distance (ft)
Up to 50	15 ft. from the closest wire
>50 to 200	20 ft. from the closest wire
> 200 to 350	25 ft. from the closest wire
>350 to 500	30 ft. from the closest wire
>500 to 750	35 ft. from the closest wire
>750 to 1,000	45 ft. from the closest wire

Table B – Minimum Clearance Distances While in Transit with No Load and Boom/Mast Lowered

Voltage (nominal, kV, alternating current)	While Traveling – Minimum clearance distance (feet)
up to 0.75	4 (while traveling/boom lowered)
over .75 to 50	6 (while traveling/boom lowered)
over 50 to 345	10 (while traveling/boom lowered)
over 345 to 750	16 (while traveling/boom lowered)
Over 750 to 1,000	20 (while traveling/boom lowered)

On very high voltage lines special steps must be taken to ensure induced current is mitigated
 A de-energized power line does not eliminate the need for goal posts and spotters

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4. OVERHEAD HAZARD WARNING SIGNS INSTALLED: Y ☐ N ☐ DATE: _____

5. SPOTTER ASSIGNED: (PRINT NAME) _____

6. CLOSEST DISTANCE TO POWER LINES WHILE WORK BEING PERFORMED: _____

7. NAME OF ELECTRICAL COMPANY: _____

8. PHONE # OF ELECTRICAL COMPANY: _____

9. ELECTRIC COMPANY CONTACT (IF KNOWN): _____

POWER LINE PROXIMITY WORK PLAN SUMMARY (HOW WILL YOU PREVENT HITTING THE LINE):

(USE ADDITIONAL PAGES IF NEEDED)

CONTRACTOR SUPERVISOR: _____

CONTRACTOR EQUIPMENT OPERATOR: _____

CONTRACTOR EQUIPMENT OPERATOR: _____

CONTRACTOR EQUIPMENT OPERATOR: _____


ADDITIONAL SIGNATURE: (ADDITIONAL SPOTTERS, SAFETY)

EXAMPLE OF GOAL POSTS INSTALLED PARALLEL TO



EXAMPLE OF GOAL POST INSTALLED PERPENDICULAR



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17.1 Policy Statement

17.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

17.1.2 Carbon America will comply with OSHA standard 1926.28, **Personal Protective Equipment** through implementation of this written program.

17.2 Purpose

17.2.1 The purpose of this written program is to provide guidelines, requirements, and procedures that will ensure employee safety when conducting work.


17.2.2 This document applies to all Carbon America employees, visitors and contractors.

17.3 References

17.3.1 29 CFR 1926. 28 Personal Protective Equipment

17.4 General Requirements

17.4.1 The Requirement for PPE

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17.4.2 Specific requirements for PPE are presented in many different OSHA standards. This program identifies job hazards, PPE selection, what is required by each employee under Carbon America.

17.4.3 PPE Hazard Assessment

17.4.3.1 A PPE Hazard Assessment should be completed for each task performed by employees working under Carbon America. These tasks can be found in the Appendix of this program under their respective company business segment.

17.4.3.2 The hazard assessment is to indicate a determination if hazards are present or are likely to be present, which necessitates the use of PPE.

17.4.3.3 The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated, the person certifying that the evaluation has been performed, the date (s) of the hazard assessment, and identification of assessment documents.


17.4.4 Selecting PPE

17.4.4.1 All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. Fit and comfort will be taken into consideration when selecting appropriate PPE items for each job task.

17.4.4.2 If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed.

17.4.4.3 Employees who provide their own PPE outside of Carbon America's selection decisions, must have the Director of Safety's approval so that documentation can be made accordingly.

17.4.5 Eye Protection

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17.4.5.1 Employee's under Carbon America can be exposed to a large number of hazards that pose a hazard to their eyes. Foam lined or gasketed eye protection is required by employees when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially infected material, potentially harmful light radiation or any other hazard that was assessed to be dangerous and potentially hazardous to an employee's eyes.

17.4.5.2 Prescription lenses will not provide adequate protection against most occupational eye hazards, employees must wear eye protection that incorporates the prescription into the design or wear additional eye protection over their prescription lenses.


17.4.5.3 Laser light radiation can be extremely dangerous to the unprotected eye and direct or reflected beams can cause permanent eye damage. Laser retinal burns can be painless, so it is essential that all personnel in or around laser operations (surveying) shall wear the appropriate eye protection.

17.4.5.4 Laser safety goggles should protect for the specific wavelength of the laser and must be of sufficient optical density for the energy involved. Safety goggles intended for use with laser beams must be labeled with the laser wavelengths for which they are intended to be used, the optical density of those wavelengths and the visible light transmission.

17.4.5.5 The table below, taken from 29 CFR 1926.102(b)(2), lists maximum power or energy densities and appropriate protection levels for optical densities 5 through 8.

Table #1
Selecting Laser Safety Glasses

Intensity, CW maximum power density (watts/ cm ²)	Attenuation	
	Optical Density (O.D.)	Attenuation Factor

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10 ⁻²	5	10 ⁵
10 ⁻¹	6	10 ⁶
1.0	7	10 ⁷
10.0	8	10 ⁸

17.4.6 Face Protection


17.4.6.1 Face protection is required when activities are performed that expose the face to hazards such as flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors potentially infected material or potentially harmful light radiation.

17.4.6.2 Two types of face protection will be used:

17.4.6.2.1 Face Shield- protect against nuisance dusts and potential splashes or sprays of hazardous liquids but will not provide adequate protection against impact hazards. Face shields will be used in combination with goggles or safety glasses so to provide additional protection against impact hazards.

17.4.6.2.2 Welding Shield- protect eyes from burns caused by infrared or intense radiant light. Welding shield protects both the eyes and face from flying sparks, metal spatter and slag chips produced during welding, brazing, soldering and cutting operations.


17.4.6.2.3 During welding operations, the intense light associated with welding can cause serious and sometimes permanent eye damage if operations do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting or brazing operations varies according to a number of factors including the task producing the light, electrode size and the arc current.

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17.4.6.2.4 The following tables show the minimum protective shades for a variety of welding, cutting and brazing operations in general industry and construction.

Table #2
Filter Lenses for Protection against Radiant Energy

Operations	Electrode size in 1/32" (0.8mm)	Arc Current	Minimum* Protective Shade
Shielded Metal Arc Welding	<3	<60	7
	3-5	60-160	8
	5-8	160-250	10
	>8	250-550	11
Gas Metal Arc Welding and Flux Cored Arc Welding		<60	7
		60-160	10
		160-250	10
		250-500	10
Gas tungsten Arc Welding		<50	8
		50-150	8
		150-500	10
Air Carbon	Light	<500	10
Arc Cutting	Heavy	500-1,000	11
Plasma Arc Welding		<20	6
		20-100	8
		100-400	10
		400-800	11
Plasma Arc Cutting	Light**	<300	8
	Medium**	300-400	9
	Heavy**	400-800	10
Torch Brazing			3
Torch Soldering			2
Carbon Arc Welding			14
Gas Welding: Light	< 1/8	<3.2	4
Gas Welding: Medium	1/8-1/2	3.2-12.7	5
Gas Welding: Heavy	>1/2	>12.7	6
Oxygen Cutting:	<1	<25	3

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Light			
Oxygen Cutting: Medium	1-6	25-150	4
Oxygen Cutting: Heavy	>6	>150	5


29 CFR 1910.133(a)(5)

* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxy-fuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

** These values apply where the actual arc is clearly seen. Experience has shown that light filters may be used when the arc is hidden by the work piece.

Table #3
Construction Industry Requirements for Filter Lens Shade Number for Protection
against Radiant Energy

Welding Operations	Shade Number
Shielded Metal-Arc Welding 1/16, 3/32, 1/8, 5/32 inch diameter electrodes	10
Gas-Shielded Arc Welding (nonferrous) 1/16, 3/32, 1/8, 5/32 inch diameter electrodes	11
Gas-Shielded Arc Welding (ferrous) 1/16, 3/32, 1/8, 5/32 inch diameter electrodes	12
Shielded Metal-Arc Welding 3/16, 7/32, 1/4 inch diameter electrodes 5/16, 3/8 inch diameter electrodes	12 14
Atomic Hydrogen Welding	10-14
Carbon-Arc Welding	14
Soldering	2
Torch Brazing	3 or 4
Light Cutting, up to 1 inch	3 or 4
Medium Cutting, 1-6 Inches	4 or 5
Heavy Cutting,	5 or 6

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More than 6 inches	
Gas Welding (light), up to 1/8 inch	4 or 5
Gas Welding (medium), 1/8 to 1/2 inch	5 or 6
Gas Welding (heavy), More than 1/2 inch	6 or 8

29 CFR 1926.102(b)(1)

17.4.7 Head Protection

17.4.7.1 Hard hats must be worn wherever there is a potential hazard from impact, penetration, electrical shock and burns. Hard hats should resist penetration by objects, absorb the shock of a blow, be water resistant, slow burning, and have clear instructions explaining the proper adjustment and replacement of the suspension and headband.


17.4.7.2 Hard hats must have a hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 1 to 1 ¼ inches away from the head. This type of design provides shock absorption during an impact and ventilation during normal wear.

17.4.7.3 Types of Hard Hats:

17.4.7.3.1 Class G: Provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts).

17.4.7.3.2 Class E: provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/ falling objects.

17.4.7.3.3 Class C: provide lightweight comfort and impact protection but offer no protection from electrical hazards.

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17.4.7.3.4 Employee inspection of hard hat should identify the following defects:

17.4.7.3.4.1 Perforation, cracking, or deformity of the brim or shell

17.4.7.3.4.2 Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking)

17.4.7.3.4.3 Always replace a hard hat if it sustains an impact, even if damage is not noticed.

17.4.8 Foot Protection


17.4.8.1 All field employees, foreman and supervisors under Carbon America are required to wear a good supportive boot with good tread. Some specific sites do require a safety toed boot. Please refer to the Site Specific Safety Plan for additional details.

17.4.8.2 Safety footwear should be inspected prior to each use. This includes looking for cracks or holes, separation of materials, broken buckles or laces. The soles of the shoes should be checked for pieces of metal or other embedded items that could present a tripping hazard.

17.4.8.3 Employees should follow the manufacturers' recommendations for cleaning and maintenance of protective footwear.

17.4.9 Hand Protection

17.4.9.1 Employees are required to wear Hand Protection on all Carbon America sites where any type of work is being conducted. These hazards include but are not limited to skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures,

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fractures, and amputations. Protective equipment can include gloves, finger guards and arm coverings or elbow-length gloves. All gloves must have a minimum of an ANSI 2 cut rating.

17.4.9.2 The nature of the hazard and the operation involved was taken into consideration when completing the PPE Hazard Assessment. Reference the hazard assessment for glove type.

17.4.9.3 Protective gloves should be inspected before each use to ensure that they are not torn, punctured or made ineffective in anyway.

17.4.9.4 Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation form chemical exposure.

17.4.9.5 Any glove with impaired protective ability should be discarded and replaced.

17.4.10 Body Protection


17.4.10.1 Employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practices or administrative controls, must wear appropriate body protection. Types of workplace hazards that are found under the Carbon America hazard assessment:

17.4.10.1.1 Hot splashes from molten metals or sparks from welding- require a welding jacket

17.4.10.1.2 The completed Hazard Assessment, for each job task, will identify were specific Body Protection is needed.

17.4.11 Hearing Protection

17.4.11.1 Hearing Protection must be worn were employees are exposed to excessive noise. The requirements for Hearing Protection for each company are outlined in the Hearing

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Conservation Program. This program should be referenced for identification needs for Hearing Protection, sound level surveys, requirements for employees and PPE selection.

17.4.12 Respiratory Protection

17.4.12.1 Respiratory Protection must be worn were employees are exposed to an airborne contaminate or low oxygen levels. The requirements for Respiratory Protection for each company are outlined in the Respiratory Protection Program. This program should be referenced for identification of hazardous areas or tasks that will require Respiratory Protection, requirements for employees and PPE selection.

17.5 Employee Requirements

17.5.1 Employee Dress- The follow dress is required by all field personnel on all sites:

17.5.1.1 Long work pants or jeans

17.5.1.2 Sleeved shirt

17.5.1.3 Hard Hat

17.5.1.4 Safety Glasses

17.5.1.5 Good Supporting Work Boots

17.5.1.6 Appropriate Gloves for the Task


17.5.1.7 The following clothing items or accessories are not allowed by field personnel:

17.5.1.7.1 No employee is permitted to work if any of the above stated items are not being utilized

17.5.1.7.2 No cut-off tee-shirts or tank-tops

17.5.1.7.3 No loose or baggy clothing

17.5.1.7.4 No jewelry

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17.5.1.8 Employees are responsible for inspecting all Personal Protective Equipment prior to start of shift.

17.5.1.9 Employees need to inform the Supervisor, Foreman or Safety Director of defective PPE so that it can be replaced.

17.5.1.10 Defective or Damaged PPE shall not be used.

17.5.1.11 Employees are required to be trained and meet all training requirements prior to the use of Personal Protective Equipment.

17.6 Training

17.6.1 Training on Personal Protective Equipment must address the areas.

17.6.1.1 When PPE is necessary

17.6.1.2 What PPE is necessary

17.6.1.3 How to properly put on, take off, adjust and wear PPE

17.6.1.4 The limitations of PPE

17.6.1.5 Proper care, maintenance, useful life and disposal of PPE


17.6.2 Each employee must demonstrate an understanding of the PPE training as well as the ability to properly wear and use of PPE before they are allowed to perform work requiring the use of PPE.

17.6.3 Situations which will require addition training or retraining include:

17.6.3.1 The employee is not demonstrating the proper understanding or skill level in the use of PPE

17.6.3.2 Changes in workplace or type of work

17.6.3.3 Change in the PPE worn

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17.6.4 Documentation of the training for each employee required to wear or use PPE will be kept in the employees file and the master training form will contain the name of the employee who was trained, the date of training and clear identification of the subject (training outline).

17.7 Definitions

17.7.1 Personal Protective Equipment (PPE)- Includes devices and clothing designed to be worn or used for the protection or safety of an individual while in potentially hazardous areas or performing potentially hazardous operations. This specialized clothing includes, but is not limited to eye protection, head protection, body protection, foot protection, hearing protection and respiratory protection.

17.7.2 Employee Owned Equipment- For this program, employee owned equipment is defined as when an employee provides their own protective equipment (example: safety glasses, hard hat, etc.) If the employee provides their own equipment, it must meet or exceed the requirements set forth by this procedure and must be cleared by the safety director. The PPE must meet adequacy, including proper maintenance, and sanitation of such employee owned equipment.

17.7.3 Attenuation Factor- The ratio of the incident radiation dose or dose rate to the radiation dose or dose rate transmitted through a shielding material.

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18.1 Policy Statement

18.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

18.1.2 Carbon America will comply with the OSHA ***Aerial Lift*** standard, 29 CFR 1926.453, through implementation of this written program.

18.2 Purpose

18.2.1 To ensure safe operation of aerial lift equipment at the jobsite by Carbon America employees and subcontractors.

18.2.2 To comply with OSHA standard 29 CFR 1926.453

18.3 References


18.3.1 29 CFR 1926.453

18.3.2 ANSI A92.2-1969

18.4 General Requirements

18.4.1 Responsibilities

18.4.1.1 Supervisors

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18.4.1.1.1 Supervisors have the ultimate responsibility to ensure operators are trained and familiarized prior to operating a MEWP

18.4.1.1.2 Supervisors must develop a rescue plan for workers who may require rescue from a platform in an elevated position.

18.4.1.1.3 Provide detailed requirements for different weather conditions.

18.4.1.1.4 Ensuring that the operator operates the MEWP in accordance to the manufactures operating instructions.

18.4.1.1.5 Complete a risk assessment before use.

18.4.1.2 Operator

18.4.1.2.1 Operate the MEWP in accordance to the manufactures operating instructions.

18.4.1.2.2 Ensure that all training is up to date before operating.

18.4.1.2.3 Ensure that the rescue plan and risk assessment is in place before operating.

18.4.1.2.4 Inspecting the MEWP before use and complete pre-trip inspection.


18.4.2 Equipment Requirements

18.4.2.1 Aerial lifts shall be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix.

18.4.2.2 Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground:

18.4.2.2.1 Extensible boom platforms;

18.4.2.2.2 Aerial ladders;

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18.4.2.2.3 Articulating boom platforms;

18.4.2.2.4 Vertical towers; and

18.4.2.2.5 A combination of any such devices. Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.

18.4.2.3 Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this section and to be at least as safe as the equipment was before modification.

18.4.2.4 The date with the last annual inspection of the lift must be displayed on the lift.

18.4.2.5 Operators manual must be present with MEWP functions, operating characteristics, limitations and device familiarization.


18.4.3 Ladder trucks and tower trucks.

18.4.3.1 Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.


18.4.4 Extensible and articulating boom platforms.

18.4.4.1 Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

18.4.4.2 Only authorized persons trained in the hazards associated and safe operating procedures associated with aerial lifts shall operate an aerial lift.

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- 18.4.4.3** Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.
 - 18.4.4.4** 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.
 - 18.4.4.5** A full-body harness and a lanyard equipped with a deceleration device shall be worn and attached to the boom or basket when working from an aerial lift.
 - 18.4.4.6** Boom and basket load limits specified by the manufacturer shall not be exceeded.
 - 18.4.4.7** The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.
 - 18.4.4.8** An aerial lift truck shall not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation.
 - 18.4.4.9** Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.
 - 18.4.4.10** Climbers shall not be worn while performing work from an aerial lift.
 - 18.4.4.11** Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position.
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18.4.4.12 Aerial lifts shall have a reverse signal alarm audible above the surrounding noise level OR the vehicle is backed only under the direction of a spotter person.

18.4.5 Scissor Lifts

18.4.5.1 A scissor-lift or lift cart is considered by OSHA to be a mobile scaffold. It must be used in accordance with the OSHA standards for mobile scaffolds used in construction work. Those standards prohibit employers from letting employees ride on the scaffold unless the following conditions exist.

18.4.5.2 The surface on which the scaffold is being moved is within 3 degrees of level, free of pits, holes, and obstructions.

18.4.5.3 The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements.

18.4.5.4 Outrigger frames, when used, are installed on both sides of the scaffold.

18.4.5.5 When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of 1 foot per second (.3 mph).


18.4.5.6 No employee is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

18.4.5.7 Carbon America requires that all personnel must be 100% tied off inside of scissor lifts and aerial lifts with a full body harness

18.5 SAFETY DURING OPERATION

18.5.1 A full body Harness must be worn at all times while in the basket of an aerial lift.

18.5.2 Attention shall be given towards the direction of travel, clearances above, below and on all sides.

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18.5.3 Planks, ladders or other devices shall not be used on the work platform.

18.5.4 An aerial lift shall not be moved when the boom is elevated in a working position with employees in the basket.

18.5.5 Aerial lift shall not be placed against another object to steady the elevated platform.

18.5.6 Aerial lift shall not be used as a crane or other lifting device.

18.5.7 Aerial lift devices shall not be operated on grades, side slopes or ramps that exceed the manufacturer's recommendations.

18.5.8 The brakes shall be set and outriggers, when used, shall be positioned on pads or a solid surface.

18.5.9 Speed of aerial lift devices shall be limited according to the conditions of the ground surface, congestion, visibility, slope, location of personnel and other factors that may cause hazards to other nearby personnel.

18.5.10 Stunt driving and horseplay shall not be permitted.

18.5.11 Booms and elevated platform devices shall not be positioned in an attempt to jack the wheels off the ground.


18.5.12 The area surrounding the elevated platform shall be cleared of personnel and equipment prior to lowering the elevated platform.

18.5.13 All equipment must be secured on the inside of the aerial lift or scissor lift.

18.5.14 Do not exceed the load limits of the equipment. Allow for the combined weight of the worker, tools and materials.

18.5.15 Sensing equipment to help detect load capacity, wind, allowable reaching limits, and stability must be in working order.

18.5.16 Entrance to the lift must contain a gate with a toe board.

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18.5.17 Handrail height must be 43.5"

18.6 Proximity to overhead electrical conductors.

18.6.1 The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

18.6.2 Aerial lift operators shall ensure that no part of the aerial lift or any conductive object come closer than the distances provided in the table below.


Voltage	Min. Distance
Less than 50,000 volts (50kV)	10 feet
Greater than 50,000 volts (50kV)	10 feet plus 0.4 inches for each 1 kV over 50kV

Note 1: conductive objects may include, but are not limited to: the operator, any tools used by the operator, uninsulated booms, materials handled by the operator, etc.

Note 2: The distances above are reserved to electrically unqualified personnel; different minimum approach distances (MAD) are provided for electrically qualified personnel.

18.6.2.1 Electrical tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However equivalent DC voltage tests may be used in lieu of the AC voltage specified in A92.2-1969; DC voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test.

18.6.2.2 Bursting safety factor. The provisions of the American National Standards Institute standard ANSI A92.2-1969, section 4.9 Bursting Safety Factor shall apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least 2 to 1.

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18.6.2.3 Mobile Equipment Inspection forms must be completed by the operator each shift prior the equipment's operation (**See Attachment 1**)

18.6.2.4 Welding standards. All welding shall conform to the following standards as applicable:

18.6.2.4.1 Standard Qualification Procedure, AWS B3.0-41.

18.6.2.4.2 Recommended Practices for Automotive Welding Design, AWS D8.4-61.

18.6.2.4.3 Standard Qualification of Welding Procedures and Welders for Piping and Tubing, AWS D10.9-69.

18.6.2.4.4 Specifications for Welding Highway and Railway Bridges, AWS D2.0-6.

18.7 Training

18.7.1 Initial Training


18.7.1.1 Employees will undergo classroom training before being assigned duties requiring the operation of aerial lifts.

18.7.1.2 Employees will be required to pass a written test showing competency of operation after the initial training is complete.

18.7.1.3 Employees must undergo hands on evaluation, and show competency of operation prior to being issued a certification card.

18.7.1.4 Carbon America will assign a competent operator to oversee the trainee during their initial field evaluation of the machine and at all times during the trainees first 40 hours of operation of the equipment.

18.7.1.5 Employees who successfully complete the 40 hour evaluation will be designated competent operators, and be permitted to operate the lifts unsupervised.

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18.7.1.6 Personnel directly supervising MEWP operators must receive supervisor training for the MEWP.

18.7.2 Refresher Training

18.7.2.1 Employee must undergo refresher training and hands-on evaluation testing if any of the following conditions are observed:

18.7.2.1.1 The operator has been observed to operate the aerial lift in an unsafe manner

18.7.2.1.2 The operator has been involved in an accident or near-miss incident.


18.7.2.1.3 The operator has received an evaluation that reveals that the operator is not operating the aerial lift safely.

18.7.2.1.4 The operator is assigned to drive a different type of aerial lift.

18.7.2.1.5 A Condition in the workplace changes in a manner that could affect safe operation of the aerial lift.

18.7.2.1.6 Operator's performance shall be evaluated at least once every three years.

18.7.2.1.7 If an operator has previously received training and evaluation, as mentioned above, and such training is appropriate to the aerial lift and working conditions encountered, additional training in that topic is not required.

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REVIEW LOG:

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05/10/2022	New Safety Manual	Hinz

19.1.0 Policy Statement

19.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.


19.1.2 Carbon America will comply with the OSHA **Respiratory Protection** standard, 29 CFR 1910.134, and 1926.103 through implementation of this written program. Carbon America will incorporate engineering and/or administrative controls when feasible to control hazards; the use of respirators will be used when no other controls are feasible or effective against air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, or vapors. Additionally, employees shall be protected from potential oxygen-deficient environments; employees shall not work in immediately dangerous to life or health (IDLH) atmospheres.

19.2 Purpose

19.1.3 This section will set the requirements for the selection, use and care of, maintenance, and medical surveillance for Carbon America employees wearing a respirator.

19.2.2 This section encompasses the requirements of OSHA 29 CFR 1926.103, Subpart E- Respiratory Protection and OSHA 29 CFR 1910.134, Subpart E- Respiratory Protection.

19.2.3 This program is to ensure compliance with all aspects of the OSHA requirements for Respiratory Protection and to provide technical

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information to the Carbon America supervisory personnel and to the Carbon America safety department to ensure compliance with the following:

19.2.4 all requirements of this respiratory protection program,

19.2.5 medical evaluation and surveillance program,

19.2.6 fit testing requirements,

19.2.7 requirements for non-mandatory use of respirators,

19.2.8 respiratory selection requirements, and

19.2.9 the maintenance and care of respirators.

19.2.10 A respirator shall be provided to each employee when such equipment is necessary to protect the health of such employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. This includes emergency use applications.

19.2.11 This program is administered and evaluated by The Carbon America Corporate Safety Director or his/her designate.

19.3 References


19.3.2 29 CFR 1910.134 Respiratory Protection

19.3.3 29 CFR 1926.103 Respiratory Protection

19.4 General Requirements

19.4.2 Selection and Purchase of Respirators

19.4.2.1 Selection of Respirators. Respirators can only be purchased that have been approved by the Carbon America safety

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department and operations management. All respirators used at Carbon America must be approved by NIOSH.

19.4.3 Purchase of Dust Masks. Approved dust masks may be purchased by Carbon America supervisory personnel and used by Carbon America employees without any notification to the Carbon America safety department.

19.4.4 Purchase of All Other Respirators. The safety department will ensure any needed equipment is purchased. This is required to ensure adequacy of the respirator(s) being purchased, and to ensure indoctrination of the Carbon America employee(s) into this respiratory protection program. In all cases, other than a dust mask, the safety department will purchase the respirator(s).


19.5 Medical Evaluation

19.5.2 Any Carbon America employee required to wear an approved respirator will be required to be indoctrinated into the medical evaluation process of this program as required in this section. It is the responsibility of the most senior Carbon America supervisor on the job to ensure that this occurs.

19.5.3 Medical evaluations associated with respiratory use shall be provided at no cost to employees.

19.5.4 The requirements of the medical evaluation process are as follows.

19.5.4.1 Initial Evaluation. An initial evaluation will be conducted by a Physician or Licensed Health Care Practitioner (LHCP) at one of Carbon America's occupational medicine panel providers. The medical questionnaire in **Attachment 1** must be issued to the employee by the Carbon America safety department, confidentially completed by the employee, and confidentially given to the Physician/LHCP by the Carbon America employee. The Physician/LHCP will use this for his/her initial evaluation. A comparable medical questionnaire is acceptable if provided by the occupational medicine panel provider. The Physician/LHCP will utilize the questionnaire in accordance with OSHA 29 CFR 1910.134 (c)- Medical

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Evaluation, to determine the Carbon America employee's ability to wear a respirator.

19.5.5 On-Going Medical Evaluation.

- 19.5.5.1** Negative Pressure Respirator. At a minimum, any Carbon America employee required to wear a negative-pressure respirator will go through the medical evaluation process annually, or at a shorter time frame determined by the Physician/LHCP.
- 19.5.5.2** Positive Pressure Respirator. At a minimum, any employee required to wear a positive-pressure respirator will go through the medical evaluation process every 2 years, or at a shorter time frame determined by the Physician/LHCP.
- 19.5.5.3** Additional Medical Evaluations. An employee will be provided with an additional medical evaluation if he/she reports medical signs or symptoms that are related to his/her ability to use the respirator, when the Physician/LHCP determines it to be necessary, or when changes in the work conditions occur which increase the physiological burden on the employee.

19.5.6 Supplemental Information Provided to the Physician/LHCP.

- 19.5.6.1** The following information will be submitted to the Physician/LHCP for the medical evaluation process:
 - 19.5.6.2** A copy of this written Respiratory Protection Program.
 - 19.5.6.3** Type and weight of the respirator to be used by the employee.
 - 19.5.6.4** Duration and frequency of respirator use.
 - 19.5.6.5** Expected physical work effort.
 - 19.5.6.6** Additional protective clothing and equipment to be worn by the employee.
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19.5.6.7 Temperature and humidity extremes to be encountered by the employee.

19.5.7 Medical Determination.

19.5.7.1 The Carbon America safety department and the Carbon America employee will be issued a written recommendation regarding the employee's ability to use the respirator from the Physician/LHCP.

19.5.7.2 This will be placed in the employee's personnel file with the Carbon America human resources department.

19.6 FIT TESTING

19.6.2 Initial Fit Testing.

19.6.2.1 Once the Carbon America employee satisfactorily completes the medical evaluation process he/she will then be fit tested.


19.6.2.2 This will be completed by a representative at the occupational medicine panel provider's office. A qualitative fit test will be done at a minimum. A quantitative fit test will be completed if specified by the safety department. The respirator to be worn by the employee will be taken by the employee to the fit testing. This respirator will be used to do the fit testing.

19.6.3 Change in Type of Respirator. If for any reason, the make, model, size, style, or manufacturer of the respirator is changed, then the employee will be required to be fit tested on that particular respirator prior to use.

19.6.4 Annual Fit Testing. Once employees receive their fit test, they must be fit tested annually thereafter.

19.6.5 Additional Fit Testing. Fit testing will be required whenever changes in the physical condition of the employee occurs, for example, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

19.7 Respirator Use

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19.7.2 Facepiece Seal Protection. Tight fitting respirators are not permitted to be worn by employees who have:


- 19.7.2.1** Facial hair that comes between the sealing surface of the facepiece and the face with valve function.
- 19.7.2.2** Any condition that interferes with the face-to-facepiece seal or valve function.
- 19.7.2.3** Corrective lenses (glasses) that interfere with the face-to-facepiece seal.

19.7.3 User Seal Check. Carbon America employees will be instructed as part of their training, on how to perform a negative and positive seal check of the respirator. A seal check is required every time an employee puts on a respirator. (**See Attachment #2**)

19.8 Maintenance and Care of Respirators

19.8.2 Cleaning and Disinfecting.

- 19.8.2.1** It is the responsibility of the supervisor and each employee assigned a respirator to ensure that respirators are kept clean, sanitary, and in good working order.
 - 19.8.2.2** Each respirator issued to an employee must be cleaned by the employee as often as necessary to be maintained in a sanitary condition. Employees must leave the area to wash, change cartridges, or if they detect break-through or resistance; this practice shall be confirmed through surveillance by supervisory personnel.
 - 19.8.2.3** Supervisory personnel shall ensure that adequate locations are provided (away from the work area, if necessary) to clean respirators.
 - 19.8.2.4** It is the responsibility of the Carbon America supervisor overseeing the work to ensure that respirator wipes are available to employees cleaning the respirators or that other
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means necessary to clean the respirators are available and in accordance with the manufacturer's cleaning guidelines.

19.8.3 Storage.

19.8.3.1 The supervisor and each employee assigned a respirator are responsible to ensure that the respirators when stored are protected from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they must be stored to prevent deformation of the facepiece and exhalation valve.

19.8.4 Inspection.

19.8.4.1 It is the responsibility of the supervisor and each employee assigned a respirator to inspect the respirator before each use and during cleaning for the following items: tightness of connections and condition of various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters.

19.8.4.2 In addition to the continuous inspections, the Respirator Inspection Record in **Attachment 3**, must be completed once per week by the employee using the respirator, while the respirator is in use.


19.8.5 Repairs.

19.8.5.1 If deficiencies are found that jeopardize proper functioning of the respirator, then it must either be removed from service and sent to the manufacturer for repairs or properly discarded.

19.9 Breathing Air for Supplied Air Hoods (Blasting Hoods)

19.9.2 It is the responsibility of the supervisor to ensure that all manufacturer's criteria are met in regards to the air employees will breath (Grade D) with supplied air hoods, and all criteria for use as required by the manufacturer.

19.10 Recordkeeping

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19.10.2 Records of medical evaluations shall be retained and made available in accordance with 29 CFR 1910.1020.

19.10.3 Written Records. Written records will be kept of the medical evaluations, fit testing, air testing for contaminants, and the respirator program.

19.10.4 Medical Evaluations. Medical evaluation records will be kept by the human resources department and by the occupational medicine panel provider.

19.10.5 Fit Testing. Written records of the fit testing will be kept by the Carbon America safety department. These records will contain the following:

19.10.5.1 Name of employee tested.

19.10.5.2 Type of fit test performed.

19.10.5.3 Specific make, model, style, and size of respirator tested.

19.10.5.4 Date of test.


19.10.5.5 Pass or fail results for a qualitative fit test, or a fit factor for a quantitative test.

19.10.5.6 Records will be retained at least until the next fit test is given.

19.11 Training

19.11.2 Annual Training. Employees required to wear a respirator will receive training annually by the Carbon America Safety Department. All employees will receive respiratory protection awareness training. Any employee that is required as part of their job description to wear a respirator will undergo extensive training.

19.11.3 Each employee will be required to demonstrate what he/she was educated on, and will consist of the following items:

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19.11.4 Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.

19.11.5 What the limitations and capabilities of the respirator are.

19.11.6 How to inspect, put on and remove, use, and check the seals of the respirator.

19.11.7 What the procedures are for maintenance and storage of the respirator.

19.11.8 How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

19.11.9 All criteria required in this program.

19.12 More Frequent Training. Training will also be done when the following situations occur:

19.12.2 Changes in the type of respirator.


19.12.3 The employee assigned the respirator cannot demonstrate the competencies as required in this program.

20 Definitions

20.2 Air-Purifying Respirator- Means a respirator with an air-purifying filter, cartridge, or canister that removes specific contaminants by air passing through the filter (e.g.- Half-Face or Full-Face Negative Pressure Respirator).

20.3 Approved Respirator- This is a respirator that has been selected by the Carbon America safety department through an approved safety equipment vendor, approved for use by the safety department, and Carbon America supervisory personnel are permitted to purchase. All other respirators are not approved for use.

20.4 Assigned Protection Factor (APF)- Means the level of protection that a respirator is expected to provide to an Carbon America employee, compared to the OSHA Permissible Exposure Limits(PEL). An example of this is that a PAPR respirator has an Assigned Protection Factor of 1,000. This means that the respirator will

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protect an employee to 1,000 times the OSHA Permissible Exposure Limit for specific contaminants.

- 20.5** Fit Test - Means a measure of the quantitative or qualitative effective fit to keep contaminants out of a respirator worn by an Carbon America employee. An Assigned Protection Factor is assigned, once a fit test is passed by an employee.
- 20.6** Immediately dangerous to life or health (IDLH) - means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- 20.7** Negative Pressure Respirator- Means a respirator that is tight fitting and that air has to be drawn through the filters by breathing in.
- 20.8** Positive Pressure Respirator- Means a respirator that air has been pushed through the filters by an outside source (e.g.- battery pack with motor, compressor, etc...).
- 20.9** (PAPR) Power Air-Purifying Respirator- Means a respirator that uses a blower to force air through the filters into the breathing area.
- 20.10** Seal Check- This is a negative pressure and positive pressure check by a Carbon America employee every time the respirator is put on and prior to use in an air contaminated area. This is done to determine if the respirator is seated to the face.

Attachment 1 Medical Questionnaire

Attachment 2 Instructions for Qualitative Fit Testing Refer to OSHA 1910.134 Appendix A

Attachment 3 Respirator Cleaning Schedule

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Attachment 1 Medical Questionnaire

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: _____

2. Your name: _____

3. Your age (to nearest year): _____

4. Sex (circle one): Male/Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title: _____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____

9. The best time to phone you at this number: _____

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No


11. Check the type of respirator you will use (you can check more than one category):

a. _____ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).


12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s): _____

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Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").


1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month: Yes/No
2. Have you *ever had* any of the following conditions?
 - a. Seizures: Yes/No
 - b. Diabetes (sugar disease): Yes/No
 - c. Allergic reactions that interfere with your breathing: Yes/No
 - d. Claustrophobia (fear of closed-in places): Yes/No
 - e. Trouble smelling odors: Yes/No
3. Have you *ever had* any of the following pulmonary or lung problems?
 - a. Asbestosis: Yes/No
 - b. Asthma: Yes/No
 - c. Chronic bronchitis: Yes/No
 - d. Emphysema: Yes/No
 - e. Pneumonia: Yes/No
 - f. Tuberculosis: Yes/No
 - g. Silicosis: Yes/No
 - h. Pneumothorax (collapsed lung): Yes/No
 - i. Lung cancer: Yes/No
 - j. Broken ribs: Yes/No
 - k. Any chest injuries or surgeries: Yes/No
 - l. Any other lung problem that you've been told about: Yes/No
4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?
 - a. Shortness of breath: Yes/No
 - b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
 - c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
 - d. Have to stop for breath when walking at your own pace on level ground: Yes/No
 - e. Shortness of breath when washing or dressing yourself: Yes/No
 - f. Shortness of breath that interferes with your job: Yes/No
 - g. Coughing that produces phlegm (thick sputum): Yes/No
 - h. Coughing that wakes you early in the morning: Yes/No
 - i. Coughing that occurs mostly when you are lying down: Yes/No
 - j. Coughing up blood in the last month: Yes/No
 - k. Wheezing: Yes/No
 - l. Wheezing that interferes with your job: Yes/No
 - m. Chest pain when you breathe deeply: Yes/No
 - n. Any other symptoms that you think may be related to lung problems: Yes/No
5. Have you *ever had* any of the following cardiovascular or heart problems?
 - a. Heart attack: Yes/No
 - b. Stroke: Yes/No
 - c. Angina: Yes/No
 - d. Heart failure: Yes/No
 - e. Swelling in your legs or feet (not caused by walking): Yes/No
 - f. Heart arrhythmia (heart beating irregularly): Yes/No

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- g. High blood pressure: Yes/No
- h. Any other heart problem that you've been told about: Yes/No
- 6. Have you *ever had* any of the following cardiovascular or heart symptoms?
 - a. Frequent pain or tightness in your chest: Yes/No
 - b. Pain or tightness in your chest during physical activity: Yes/No
 - c. Pain or tightness in your chest that interferes with your job: Yes/No
 - d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
 - e. Heartburn or indigestion that is not related to eating: Yes/No
 - f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No
- 7. Do you *currently* take medication for any of the following problems?
 - a. Breathing or lung problems: Yes/No
 - b. Heart trouble: Yes/No
 - c. Blood pressure: Yes/No
 - d. Seizures (fits): Yes/No
- 8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9.)
 - a. Eye irritation: Yes/No
 - b. Skin allergies or rashes: Yes/No
 - c. Anxiety: Yes/No
 - d. General weakness or fatigue: Yes/No
 - e. Any other problem that interferes with your use of a respirator: Yes/No
- 9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

- 10. Have you *ever lost* vision in either eye (temporarily or permanently): Yes/No
- 11. Do you *currently* have any of the following vision problems?
 - a. Wear contact lenses: Yes/No
 - b. Wear glasses: Yes/No
 - c. Color blind: Yes/No
 - d. Any other eye or vision problem: Yes/No
- 12. Have you *ever had* an injury to your ears, including a broken ear drum: Yes/No
- 13. Do you *currently* have any of the following hearing problems?
 - a. Difficulty hearing: Yes/No
 - b. Wear a hearing aid: Yes/No
 - c. Any other hearing or ear problem: Yes/No
- 14. Have you *ever had* a back injury: Yes/No
- 15. Do you *currently* have any of the following musculoskeletal problems?
 - a. Weakness in any of your arms, hands, legs, or feet: Yes/No
 - b. Back pain: Yes/No
 - c. Difficulty fully moving your arms and legs: Yes/No
 - d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
 - e. Difficulty fully moving your head up or down: Yes/No

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- f. Difficulty fully moving your head side to side: Yes/No
- g. Difficulty bending at your knees: Yes/No
- h. Difficulty squatting to the ground: Yes/No
- i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
- j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them: _____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

- a. Asbestos: Yes/No
- b. Silica (e.g., in sandblasting): Yes/No
- c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
- d. Beryllium: Yes/No
- e. Aluminum: Yes/No
- f. Coal (for example, mining): Yes/No
- g. Iron: Yes/No
- h. Tin: Yes/No
- i. Dusty environments: Yes/No
- j. Any other hazardous exposures: Yes/No

If "yes," describe these exposures: _____

4. List any second jobs or side businesses you have: _____


5. List your previous occupations: _____

6. List your current and previous hobbies: _____

7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a HAZMAT team? Yes/No
9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No

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If "yes," name the medications if you know them: _____

10. Will you be using any of the following items with your respirator(s)?
 - a. HEPA Filters: Yes/No
 - b. Canisters (for example, gas masks): Yes/No
 - c. Cartridges: Yes/No
11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?
 - a. Escape only (no rescue): Yes/No
 - b. Emergency rescue only: Yes/No
 - c. Less than 5 hours *per week*: Yes/No
 - d. Less than 2 hours *per day*: Yes/No
 - e. 2 to 4 hours per day: Yes/No
 - f. Over 4 hours per day: Yes/No
12. During the period you are using the respirator(s), is your work effort:
 - a. *Light* (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.

Examples of a light work effort are *sitting* while writing, typing, drafting, or performing light assembly work; or *standing* while operating a drill press (1-3 lbs.) or controlling machines.

- b. *Moderate* (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.

Examples of moderate work effort are *sitting* while nailing or filing; *driving* a truck or bus in urban traffic; *standing* while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; *walking* on a level surface about 2 mph or down a 5-degree grade about 3 mph; or *pushing* a wheelbarrow with a heavy load (about 100 lbs.) on a level surface. c. *Heavy* (above 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.


Examples of heavy work are *lifting* a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; *shoveling*; *standing* while bricklaying or chipping castings; *walking* up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No

If "yes," describe this protective clothing and/or equipment: _____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No
15. Will you be working under humid conditions: Yes/No
16. Describe the work you'll be doing while you're using your respirator(s):


17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

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18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance: _____
 Estimated maximum exposure level per shift: _____
 Duration of exposure per shift: _____
 Name of the second toxic substance: _____
 Estimated maximum exposure level per shift: _____
 Duration of exposure per shift: _____
 Name of the third toxic substance: _____
 Estimated maximum exposure level per shift: _____
 Duration of exposure per shift: _____
 The name of any other toxic substances that you'll be exposed to while using your respirator:

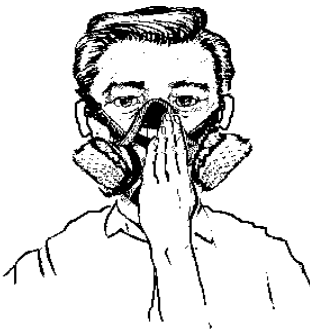
19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

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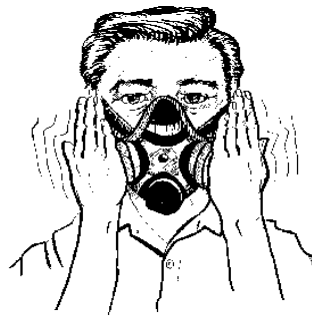
Attachment 2
Instructions for Qualitative Fit Testing
Refer to OSHA 1910.134 Appendix A

Figure 1

Positive Pressure Check




Negative Pressure Check




1. Allow fit test subject to smell a weak concentration of the irritant to become familiarized with odor.
2. Have subject wear respirator approx. 10 minutes before test.
3. Subject shall perform positive and negative pressure fit tests before starting.
4. Open ventilation smoke tube.
5. Have subject close eyes.
6. Have subject to do the following:
 - i. Breathe normally.
 - ii. Breathe deeply.
 - iii. Turn head from one side to the other- do not bump respirator on shoulder.
 - iv. Nod head up and down.
 - v. Talking (first and last name, address etc.)
 - vi. Repeat the following passage:

RAINBOW PASSAGE

When sunlight strikes raindrops in the air it acts like a prism and forms a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

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Note: Always check the following for defects: Exhalation valve, head straps, inhalation membrane, face seal, cartridge threads, and exhalation membrane.

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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

20.1 Policy Statement

20.1.1 It is the policy of CARBON AMERICA, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

20.1.2 CARBON AMERICA will comply with the OSHA standard, 29 CFR 1926.251, through implementation of this written program.

20.2 Purpose

20.2.1 To ensure safe rigging equipment is available and safe rigging practices are utilized on all company job sites.


20.2.2 This program applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this part. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).

20.2.3 To comply with OSHA standard 29 CFR 1926.251.

20.3 References

20.3.1 29 CFR 1926.251

20.4 General Requirements

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20.4.1 Rigging equipment shall not be loaded in excess of its recommended safe working load, as prescribed in OSHA 1926.251 Tables H-1 through H-20 and manufacturer specifications.

20.4.2 Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to employees.

20.4.3 Special custom design grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials, shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.

20.4.4 Tag lines shall be used to control loads (unless such use creates a greater hazard).

20.4.5 All employees shall be kept clear of loads about to be lifted and of suspended loads.

20.4.6 All employees will exercise caution to avoid pinch points associated with rigging activity.

20.4.7 All employees shall ensure that when not in use, all rigging shall be removed from the immediate work area.


20.5 Inspections.

20.5.1 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.

20.5.2 Defective rigging equipment shall be removed from service.

20.5.3 Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer.

20.5.4 Additional inspections shall be performed during sling use, where service conditions warrant.

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20.5.5 Damaged or defective rigging shall be immediately removed from service.

20.6 Alloy steel chains

20.6.1 Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.

20.6.2 Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.

20.6.3 Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.

20.6.4 Rated capacity (working load limit) for alloy steel chain slings shall conform to the values shown in 29 CFR 1926.251 Table H-1.

20.6.5 Whenever wear at any point of any chain link exceeds that shown in 29 CFR 1926.251 Table H-1, the assembly shall be removed from service.

20.6.6 Inspections.

20.6.6.1 A thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of:


20.6.6.1.1 frequency of sling use;

20.6.6.1.2 severity of service conditions;

20.6.6.1.3 nature of lifts being made; and

20.6.6.1.4 Experience gained on the service life of slings used in similar circumstances.

20.6.6.2 Such inspections shall in no event be at intervals greater than once every 12 months.

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20.6.6.3 The employer shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination.

20.7 Wire rope.

20.7.1 29 CFR 1926.251 Tables H-3 through H-14 shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope and wire rope slings with various types of terminals. For sizes, classifications, and grades not included in these tables, the safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than 5 is maintained.

20.7.2 Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

20.7.3 Wire rope shall not be secured by knots, except on haul back lines on scrapers.


20.7.4 The following limitations shall apply to the use of wire rope:

20.7.4.1 An eye splice made in any wire rope shall have not less than three full tucks. However, this requirement shall not operate to preclude the use of another form of splice or connection which can be shown to be as efficient and which is not otherwise prohibited.

20.7.4.2 Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one continuous piece without knot or splice.

20.7.4.3 Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.

20.7.4.4 Wire rope shall not be used if, in any length of eight diameters, the total number of visible broken wires exceeds 10 percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.

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20.7.4.5 When U-bolt wire rope clips are used to form eyes, 29 CFR 1926.251 Table H-20 shall be used to determine the number and spacing of clips.

20.7.4.6 When used for eye splices, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.

20.7.4.7 Slings shall not be shortened with knots or bolts or other makeshift devices.

20.7.4.8 Sling legs shall not be kinked.

20.7.4.9 Slings used in a basket hitch shall have the loads balanced to prevent slippage.

20.7.4.10 Slings shall be padded or protected from the sharp edges of their loads.

20.7.4.11 Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.

20.7.4.12 Shock loading is prohibited.


20.7.4.13 A sling shall not be pulled from under a load when the load is resting on the sling.

20.7.5 Minimum sling lengths.

20.7.5.1 Cable laid and 6 X 19 and 6 X 37 slings shall have minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves or end fittings.

20.7.5.2 Braided slings shall have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings.

20.7.5.3 Cable laid grommets, strand laid grommets and endless slings shall have a minimum circumferential length of 96 times their body diameter.

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20.7.6 Safe operating temperatures.

20.7.6.1 Fiber core wire rope slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of 200 deg. F (93.33 deg. C).

20.7.6.2 When non-fiber core wire rope slings of any grade are used at temperatures above 400 deg. F (204.44 deg. C) or below minus 60 deg. F (15.55 deg. C), recommendations of the sling manufacturer regarding use at that temperature shall be followed.

20.7.7 End attachments.

20.7.7.1 Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling.

20.7.7.2 All welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of proof test, and make it available for examination.

20.8 Natural rope, and synthetic fiber


20.8.1 General.

20.8.1.1 When using natural or synthetic fiber rope slings, 29 CFR 1926.251 Tables H-15, 16, 17, and 18 shall apply.

20.8.1.2 All splices in rope slings provided by the employer shall be made in accordance with fiber rope manufacturer's recommendations.

20.8.1.3 In manila rope, eye splices shall contain at least three full tucks, and short splices shall contain at least six full tucks (three on each side of the center line of the splice).

20.8.1.4 In layed synthetic fiber rope, eye splices shall contain at least four full tucks, and short splices shall contain at least eight full tucks (four on each side of the center line of the splice).

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20.8.1.5 Strand end tails shall not be trimmed short (flush with the surface of the rope) immediately adjacent to the full tucks. This precaution applies to both eye and short splices and all types of fiber rope. For fiber ropes under 1-inch diameter, the tails shall project at least six rope diameters beyond the last full tuck. For fiber ropes 1-inch diameter and larger, the tails shall project at least 6 inches beyond the last full tuck. In applications where the projecting tails may be objectionable, the tails shall be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck).

20.8.1.6 For all eye splices, the eye shall be sufficiently large to provide an included angle of not greater than 60 deg. at the splice when the eye is placed over the load or support.

20.8.1.7 Knots shall not be used in lieu of splices.

20.8.2 Safe operating temperatures.


20.8.2.1 Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from minus 20 deg. F (-28.88 deg. C) to plus 180 deg. F (82.2 deg. C) without decreasing the working load limit.

20.8.2.2 For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations shall be followed.

20.8.3 Splicing.

20.8.3.1 Spliced fiber rope slings shall not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer:

20.8.3.1.1 In manila rope, eye splices shall consist of at least three full tucks, and short splices shall consist of at least six full tucks, three on each side of the splice center line.

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20.8.3.1.2 In synthetic fiber rope, eye splices shall consist of at least four full tucks, and short splices shall consist of at least eight full tucks, four on each side of the center line.

20.8.3.1.3 Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under 1 inch (2.54 cm) in diameter, the tail shall project at least six rope diameters beyond the last full tuck. For fiber rope 1 inch (2.54 cm) in diameter and larger, the tail shall project at least 6 inches (15.24 cm) beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail shall be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck).

20.8.3.1.4 Fiber rope slings shall have a minimum clear length of rope between eye splices equal to 10 times the rope diameter.

20.8.3.1.5 Knots shall not be used in lieu of splices.


20.8.3.1.6 Clamps not designed specifically for fiber ropes shall not be used for splicing.

20.8.3.1.7 For all eye splices, the eye shall be of such size to provide an included angle of not greater than 60 degrees at the splice when the eye is placed over the load or support.

20.8.4 End attachments.

20.8.4.1 Fiber rope slings shall not be used if end attachments in contact with the rope have sharp edges or projections.

20.8.5 Removal from service.

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20.8.5.1 Natural and synthetic fiber rope slings shall be immediately removed from service if any of the following conditions are present:

20.8.5.1.1 Abnormal wear.

20.8.5.1.2 Powdered fiber between strands.

20.8.5.1.3 Broken or cut fibers.

20.8.5.1.4 Variations in the size or roundness of strands.

20.8.5.1.5 Discoloration or rotting.

20.8.5.1.6 Distortion of hardware in the sling.

20.9 Synthetic webbing (nylon, polyester, and polypropylene)

20.9.1 The employer shall have each synthetic web sling marked or coded to show:

20.9.1.1 Name or trademark of manufacturer.

20.9.1.2 Rated capacities for the type of hitch.

20.9.1.3 Type of material.

20.9.2 Rated capacity shall not be exceeded.


20.9.3 Webbing. Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing's width.

20.9.4 Fittings. Fittings shall be:

20.9.4.1 Of a minimum breaking strength equal to that of the sling; and,

20.9.4.2 Free of all sharp edges that could in any way damage the webbing.

20.9.5 Attachment of end fittings to webbing and formation of eyes.

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20.9.6 Stitching shall be the only method used to attach end fittings to webbing and to form eyes.

20.9.7 The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.

20.9.8 Environmental conditions.

20.9.8.1 When synthetic web slings are used, the following precautions shall be taken:

20.9.8.1.1 Nylon web slings shall not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.

20.9.8.1.2 Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

20.9.8.1.3 Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

20.9.8.1.4 Safe operating temperatures. Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of 180 deg. F (82.2 deg. C). Polypropylene web slings shall not be used at temperatures in excess of 200 deg. F (93.33 deg. C).

20.9.9 Removal from service.


20.9.9.1 Synthetic web slings shall be immediately removed from service if any of the following conditions are present:

20.9.9.1.1 Acid or caustic burns;

20.9.9.1.2 Melting or charring of any part of the sling surface;

20.9.9.1.3 Snags, punctures, tears or cuts;

20.9.9.1.4 Broken or worn stitches; or

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20.9.9.1.5 Distortion of fittings.

20.10 Shackles and hooks.

20.10.1 29 CFR 1926.251 Table H-19 shall be used to determine the safe working loads of various sizes of shackles, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products, provided that a safety factor of not less than 5 is maintained.

20.10.2 The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.

20.10.3 Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

20.10.4 No hooks shall be used without a latch, which eliminates the throat opening.


20.11 Pre-Lift Meeting.

20.11.1 Prior to any hoisting using rigging, the riggers, operators, supervisor, and any other affected persons shall participate in a pre-lift meeting.

20.11.2 The following, at a minimum, shall be discussed/reviewed during the pre-lift meeting:

20.11.2.1 Load capacities (lifting equipment and rigging)

20.11.2.2 Affected persons roles

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20.11.2.3 Rigging configuration calculations (sling angles, attachment hardware, etc.)

20.11.2.4 Communication methods (i.e. radios, hand signals, etc.)

20.12 Training

20.12.1 Employees performing rigging activities shall be trained in at least the following:

20.12.1.1 OSHA and ANSI requirements

20.12.1.2 Wire rope construction

20.12.1.3 Wire rope type and inspection

20.12.1.4 Slings (nylon and steel)

20.12.1.5 Rigging hardware and accessories

20.12.1.6 Center of gravity issues

20.12.1.7 Calculating basic load weights, angles, and lifts

20.12.1.8 Safe rigging practices

20.12.1.9 Types of rope damage

20.12.1.10 Knowing and understanding hand signals

20.12.1.11 Securing the load


20.12.1.12 Unsafe conditions

20.12.1.13 Pre-lift meeting requirements

20.12.1.14 Use of communication requirements

20.12.1.15 Properly don/doff personal protective equipment (PPE)

20.12.2 A record of training shall be maintained.

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20.12.3 Training sessions will be conducted to employees who engage in rigging activities at the time of hire, and at least annually thereafter.

Attachment 1 Rigging Sling Tension Illustration

Attachment 2 Requirements for Turnbuckle installation for multiple leg slings

Attachment 3 Screw pin Shackle Capacity

Attachment 4 Wire Rope Cable Clip Sizing/Capacity Chart


Attachment 5 Installation Requirements for Wire Rope Cable Clips

Attachment 6 Rigging Eyebolt Capacity and Pull Direction Chart

Attachment 7 Open Wedge Socket Sizing Capacity

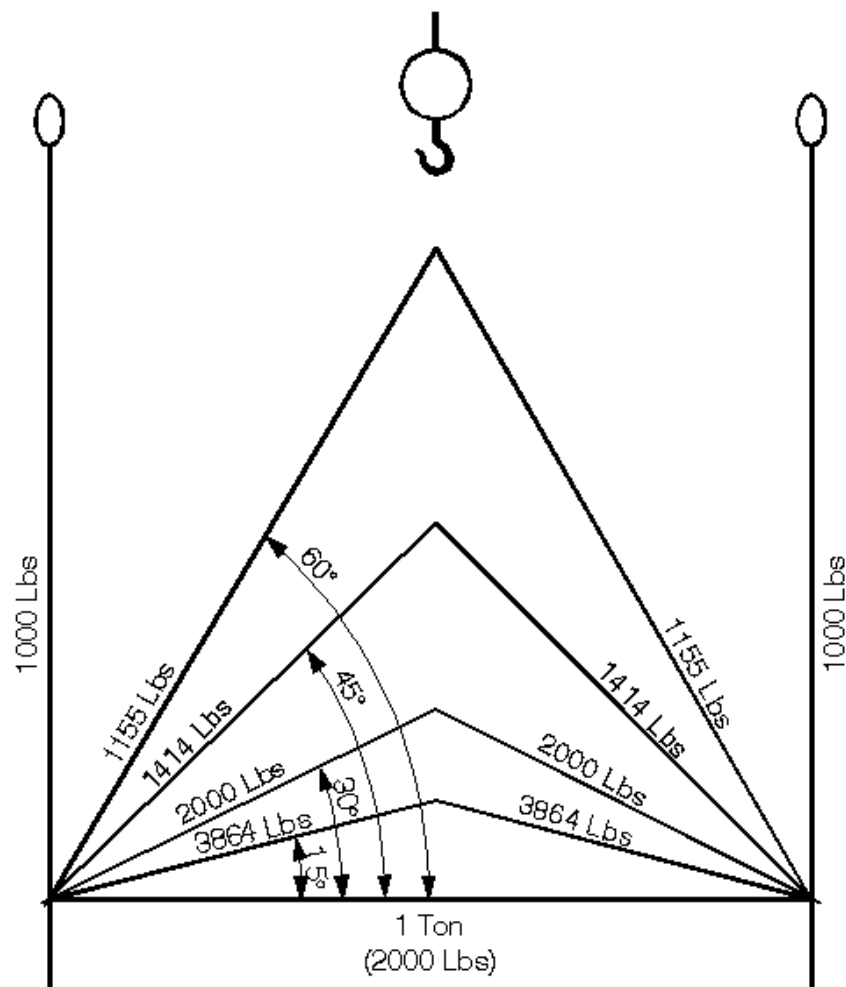
Attachment 8 Open Wedge Socket Installation Requirements


Attachment 9 Common Rigging Hitches

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Attachment 1

Rigging Sling Tension Illustration



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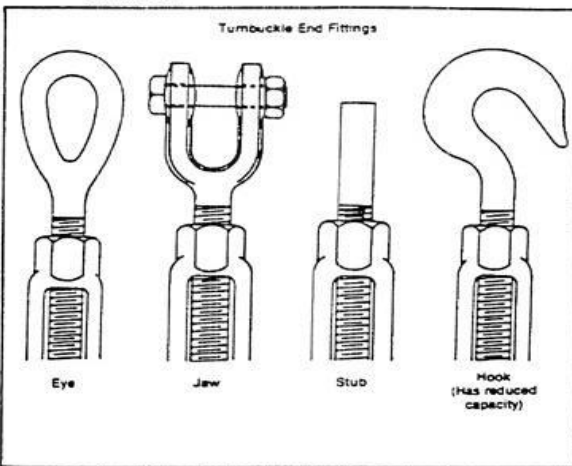
Attachment 2

Requirements for Turnbuckle Installation Instructions for Multi-leg Slings

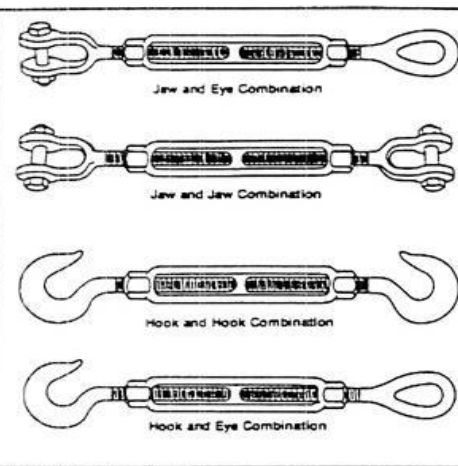
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Turnbuckles

Turnbuckle End Fittings



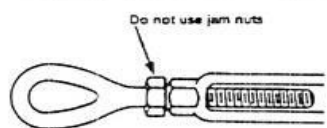
Eye Jaw Stub Hook
(Has reduced capacity)



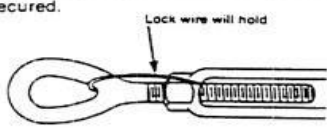
Jaw and Eye Combination
Jaw and Jaw Combination
Hook and Hook Combination
Hook and Eye Combination

Securing of Turnbuckle End Fittings

Do not use jam nuts

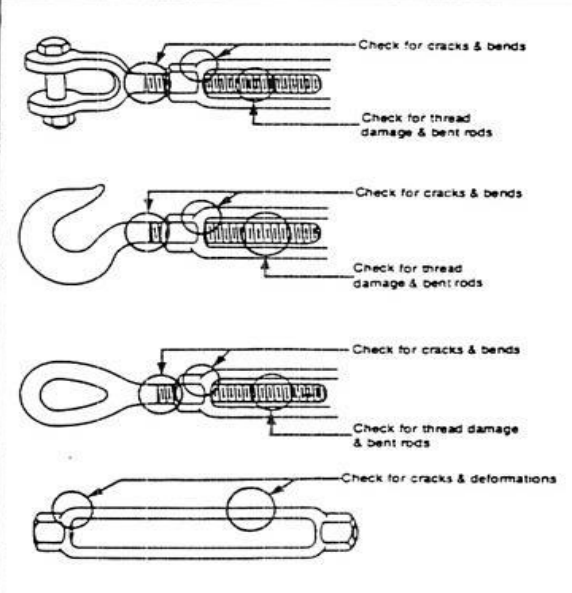


End Fittings must be secured.



Lock wire will hold

Turnbuckle Inspection Areas



Check for cracks & bends
Check for thread damage & bent rods

Check for cracks & bends
Check for thread damage & bent rods


Check for cracks & bends
Check for thread damage & bent rods

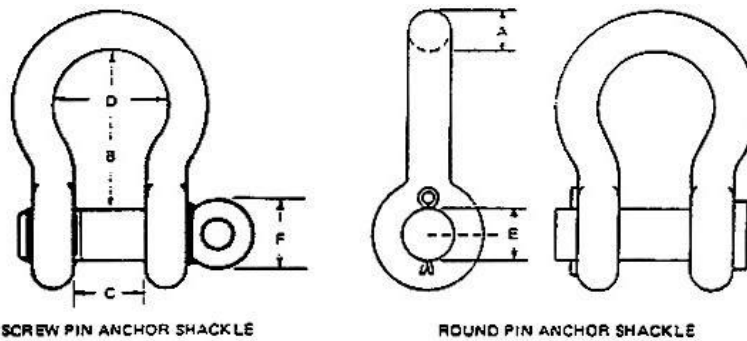
Check for cracks & deformations

TURNBUCKLES		
— Weldless Construction — Forged Alloy Steel		
End Fitting, Stock Diameter (Inches)	SWL of Any Combination of Jaw End Fittings, Eye End Fittings and Stub End Fittings (Lbs)	SWL of Any Turnbuckle Having a Hook End Fitting (Lbs)
1/4	500	400
5/16	800	700
3/8	1,200	1,000
1/2	2,200	1,500
5/8	3,500	2,250
3/4	5,200	3,000
7/8	7,200	4,000
1	10,000	5,000
1 1/4	15,200	5,000
1 1/2	21,400	7,500
1 3/4	28,000	—
2	37,000	—
2 1/2	60,000	—
2 3/4	75,000	—

Attachment 3


Screw Pin Shackle Capacity

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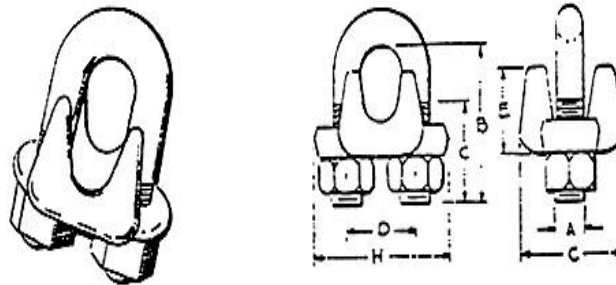


ALLOY ANCHOR SHACKLES-ROUND PIN-SCREW PIN

DIMENSIONS IN INCHES									
Safe Working Load-Tons	Size Inches A	Inside Length B	Inside Width		Diameter		Tolerance Plus or Minus		Weight Pounds Each
			at Pin C	at Bow D	Pin E	Outside of Eye F	Length	Width	
1/3	3/16	7/8	3/8	19/32	1/4	9/16	1/16	1/16	.05
1/2	1/4	1-1/8	15/32	25/32	5/16	11/16	1/16	1/16	.12
3/4	5/16	1-7/32	17/32	27/32	3/8	13/16	1/16	1/16	.18
1	3/8	1-7/16	21/32	1-1/32	7/16	31/32	1/8	1/16	.30
1-1/2	7/16	1-11/16	23/32	1-5/32	1/2	1-1/16	1/8	1/16	.49
2	1/2	1-7/8	13/16	1-5/16	5/8	1-3/16	1/8	1/16	.74
3-1/4	5/8	2-3/8	1-1/16	1-11/16	3/4	1-9/16	1/8	1/16	1.44
4-3/4	3/4	2-13/16	1-1/4	2	7/8	1-7/8	1/4	1/16	2.16
6-1/2	7/8	3-5/16	1-7/16	2-0/32	1	2-1/8	1/4	1/16	3.37
8-1/2	1	3-3/4	1-11/16	2-11/16	1-1/8	2-3/8	1/4	1/16	5.3
9-1/2	1-1/8	4-1/4	1-13/16	2-29/32	1-1/4	2-5/8	1/4	1/16	7.0
12	1-1/4	4-11/8	2-1/32	3-1/4	1-3/8	3	1/4	1/16	9.6
13-1/2	1-3/8	5-1/4	2-1/4	3-5/8	1-1/2	3-5/16	1/4	1/8	12.6
17	1-1/2	5-3/4	2-3/8	3-7/8	1-5/8	3-5/8	1/4	1/8	17.3
25	1-3/4	7	2-7/8	5	2	4-5/16	1/4	1/8	27.8
35	2	7-3/4	3-1/4	5-3/4	2-1/4	5	1/4	1/8	41.1
50	2-1/2	10-1/2	4-1/8	7-1/4	2-3/4	6	3/4	1/8	83.5
75	3	13	5	7-7/8	3-1/4	6-1/2	3/4	1/8	119
100	3-1/2	15	5-3/4		3-3/4	8	1	1/4	250
130	4	17	6-1/2		4-1/4	9	1	1/4	358
250	5	20	8-1/4	13	5	—	—	—	600
300	5	19-1/2	8-1/2	13	6	—	—	—	775


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Wire Rope Cable Clip Sizing/Capacity Chart



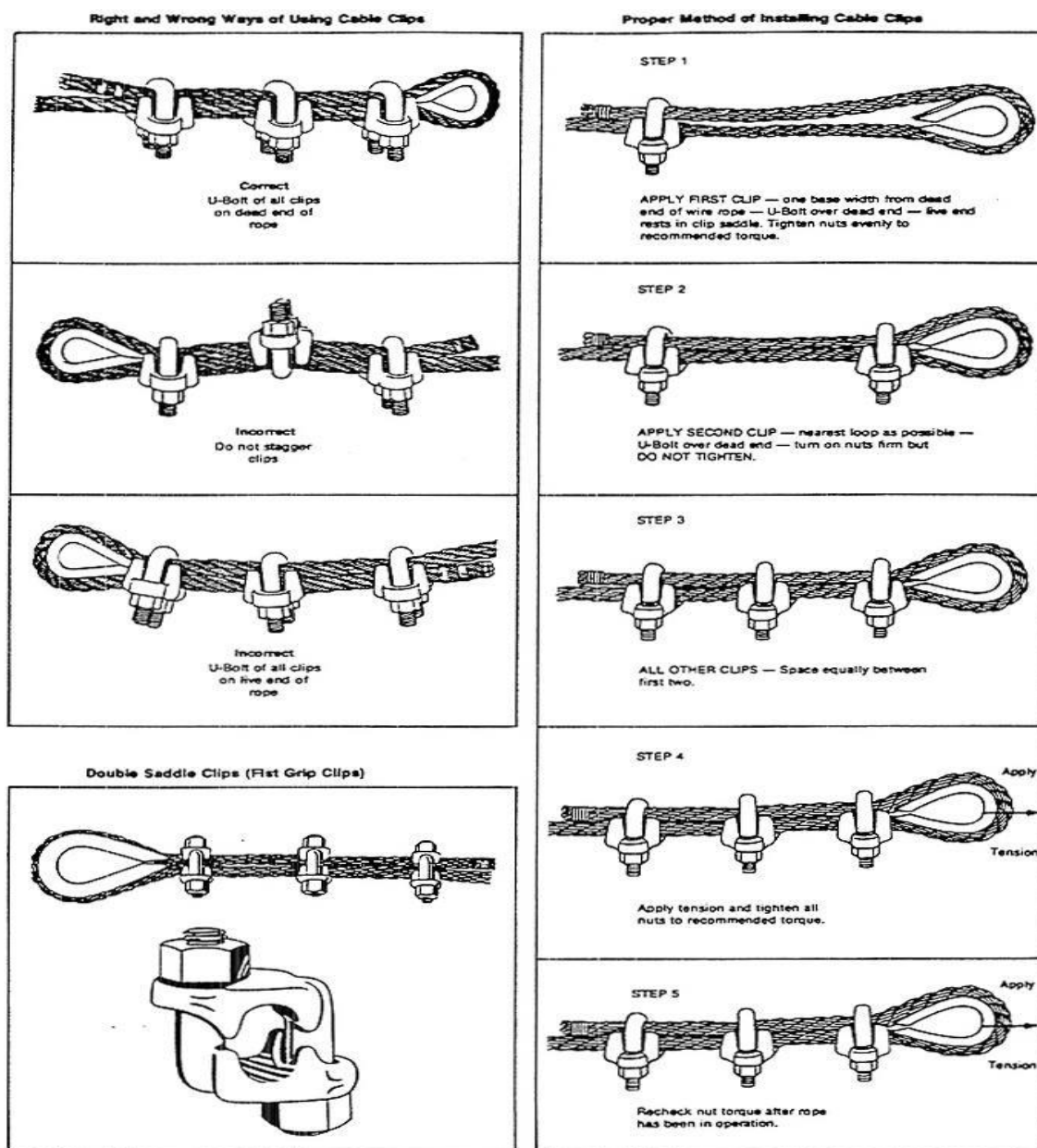
GENERAL INFORMATION


CLIP SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
A	7/32	1/4	5/16	3/8	7/16	1/2	1/2	9/16	5/8	3/4	7/8	1
B	23/32	31/32	1-1/32	1-3/8	1-1/2	1-7/8	1-7/8	2-1/4	2-3/8	2-3/4	3-1/8	3-1/2
C	7/16	9/16	1/2	3/4	3/4	1	1	1-1/4	1-1/4	1-7/16	1-5/8	1-13/16
D	15/32	19/32	3/4	7/8	1	1-3/16	1-3/16	1-5/16	1-5/16	1-1/2	1-3/4	1-7/8
E	25/64	1/2	21/32	23/32	29/32	1-1/64	1-1/8	1-7/32	1-11/32	1-25/64	1-37/64	1-49/64
G	13/16	15/16	1-3/16	1-5/16	1-5/8	1-13/16	1-29/32	2-1/16	2-1/16	2-1/4	2-7/16	2-5/8
H	15/16	1-5/32	1-7/16	1-11/16	1-15/16	2-9/32	2-9/32	2-31/64	2-1/2	2-27/32	3-5/32	3-15/32
Minimum No. Per Fastening	2	2	2	2	2	2	3	3	3	4	4	5
Weight Pounds Per 100	5	9	18	30	42	70	75	100	100	150	240	250
CLIP SIZE	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2	2-1/4	2-1/2	2-3/4	3	
A	3/4	7/8	7/8	7/8	1	1-1/8	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	
B	3-7/8	4-1/4	4-5/8	4-15/16	5-5/16	5-3/4	6-7/16	7-1/8	7-11/16	8-5/16	9-3/16	
C	2	2-1/8	2-5/16	2-3/8	2-5/8	2-3/4	3	3-3/16	3-7/16	3-9/16	3-7/8	
D	2	2-5/16	2-3/8	2-19/32	2-3/4	3-1/16	3-3/8	3-7/8	4-1/8	4-3/8	4-3/4	
E	1-29/32	2-11/64	2-5/16	2-17/32	2-21/32	2-59/64	3-9/32	3-15/16	4-7/16	4-7/8	5-11/32	
G	2-13/16	3-1/8	3-1/8	3-13/32	3-5/8	3-13/16	4-7/16	4-9/16	4-11/16	5	5-5/16	
H	3-19/32	4-1/8	4-3/16	4-7/16	4-3/4	5-9/32	5-7/8	6-3/8	6-5/8	6-7/8	7-5/8	
Minimum No. Per Fastening	6	6	7	7	7	8	9	9	9	10	10	
Weight Pounds Per 100	310	460	520	590	730	980	1340	1570	1790	2200	3200	

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Attachment 5

Installation Requirements for Wire Rope Cable Clips

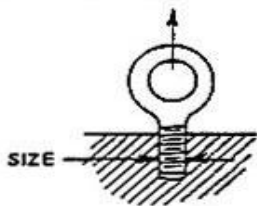
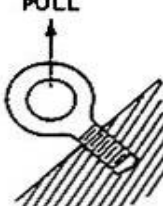
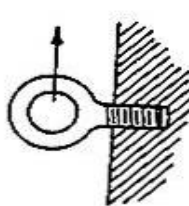


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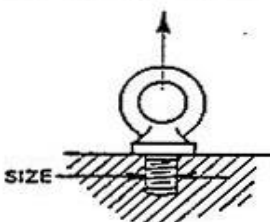
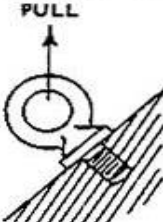
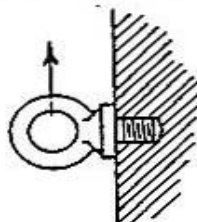
Attachment 6
Eyebolt Capacity/Pull Direction Chart

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ORDINARY DROP FORGED STEEL EYE BOLTS

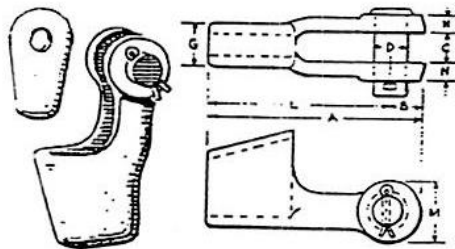
SIZE			
1/2"	1,100 lb	50 lb	40 lb
5/8"	1,800 lb	90 lb	65 lb
3/4"	2,800 lb	135 lb	100 lb
7/8"	3,900 lb	210 lb	150 lb
1"	5,100 lb	280 lb	210 lb
1-1/4"	8,400 lb	500 lb	370 lb
1-1/2"	12,200 lb	770 lb	575 lb
1-3/4"	16,500 lb	1,080 lb	800 lb
2"	21,800 lb	1,440 lb	1,140 lb

DROP FORGED STEEL SHOULDER TYPE EYE BOLTS

SIZE			
1/4"	300 lb	30 lb	40 lb
1/2"	1,300 lb	140 lb	150 lb
3/4"	3,000 lb	250 lb	300 lb
1"	6,000 lb	500 lb	600 lb
1-1/4"	9,000 lb	800 lb	900 lb
1-1/2"	13,000 lb	1,200 lb	1,300 lb
2"	23,000 lb	2,100 lb	2,300 lb
2-1/2"	37,000 lb	3,800 lb	4,300 lb

Only drop forged steel eye bolts shall be used for lifting.
Field fabricated eye bolts must be designed by a Structural Engineer.

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OPEN WEDGE SOCKETS

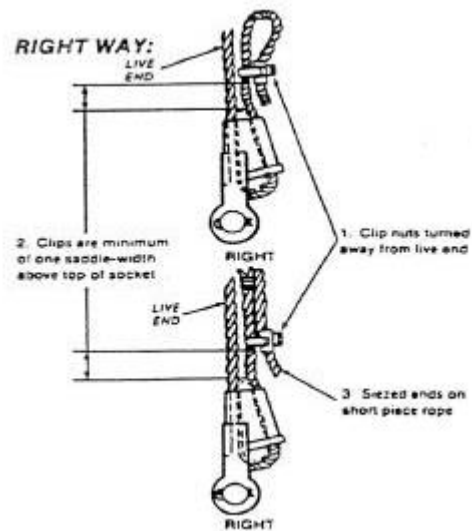
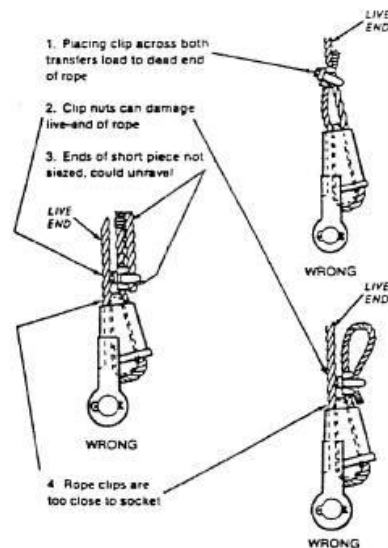
CAST STEEL


Pin diameter and jaw opening designed to open socket standards. High grade cast steel with Manganese content, heat treated to resist abrasion.

Wire Rope Diam. Inches	DIMENSIONS IN INCHES								Wt. lbs. each (with Pin)
	A	B	C	D	G	L	M	N	
3/8	5-5/8	7/8	13/16	13/16	1-1/8	4-3/4	1-9/16	7/16	2.25
1/2	6-13/16	1-1/16	1	1	1-3/8	5-3/4	1-15/16	1/2	4.75
5/8	8-5/32	1-7/32	1-1/4	1-3/16	1-3/4	6-15/16	2-1/4	9/16	8.5
3/4	9-25/32	1-13/32	1-1/2	1-3/8	2-1/16	8-3/8	2-5/8	21/32	13.6
7/8	11-5/32	1-21/32	1-3/4	1-5/8	2-5/16	9-1/2	3-1/8	3/4	21.75
1	12-3/4	2	2	2	2-9/16	10-3/4	3-3/4	7/8	31.6
1-1/8	14-3/8	2-1/4	2-1/4	2-1/4	2-15/16	12-1/8	4-1/4	1	42.6
1-1/4	16	2-1/2	2-1/2	2-1/2	3-3/16	13-1/2	4-3/4	1-1/8	57.2

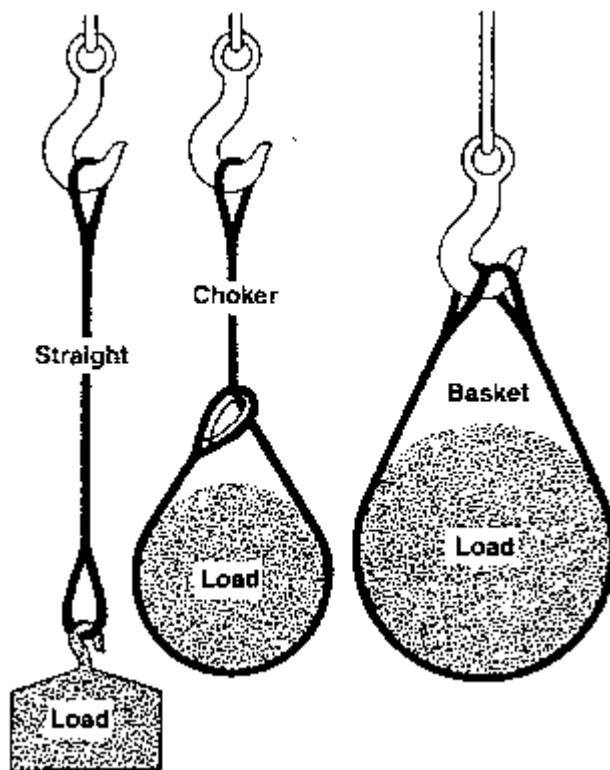
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Open Wedge Socket Installation Requirements



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Attachment 9
Common Rigging Hitches



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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

21.1 Policy Statement

21.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

21.1.2 Carbon America will comply with the OSHA **Scaffolding** standard, 29 CFR 1926.451, through implementation of this written program.

21.2 PURPOSE

21.2.1 To provide safety guidelines for erecting and dismantling elevated work platforms.


21.3 SCOPE

21.3.1 This procedure applies to all facilities.

21.4 DEFINITIONS

21.4.1 *Fixed Scaffolds* include the following; tubular welded frame, bracket scaffolds, tube and coupler (tube-lox) scaffolds, wood pole scaffolds and trestle scaffolds.

21.4.2 *Suspended Scaffolds* include the following: two-point suspended scaffolds, multilevel suspended scaffolds, floats,

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needle-beam scaffolds, boatswain's chair and electric hoist platforms.

21.4.3 *Qualified Person* means a person with specific training, knowledge and experience in the area that the person has the responsibility and authority to control.

21.5 REFERENCES

21.5.1 OSHA 29 CFR 1926.451 – Scaffolding

21.5.2 ANSI A 10.8 - Safety Requirements for Scaffolding

21.6 RESPONSIBILITY

21.6.1 Supervision is responsible for implementing and administering this procedure. In addition, supervision is in charge of the scaffolding erection and are responsible for the work being performed

21.6.2 The Safety Department is responsible to make sure all employees have the necessary training. Supervision is responsible for implementing and administering this program.

21.7 SAFE WORK PRACTICE


21.7.1 Any elevated work presents a many potential hazards; (fall, electrical, falling objects, therefore, it is essential that precautionary measures are thorough.

21.7.2 Retraining is done annually or if conditions change from the original hazard assessment.

21.7.3 All working platforms must be capable of sustaining a minimum-working load of 75 psf on 6-ft spans or have a safety factor of 4 to1 for the intended load.

21.7.4 Posts shall be plumb, and scaffold platforms shall be level.

21.7.5 A stationary scaffold shall be secured to the building or a fixed structure vertically every 25 ft starting at the base of the scaffold and horizontally every 30 ft.

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21.7.6 Outriggers may be used in lieu of tying off, or scaffolds may be clamped together so that the height does not exceed three times the smallest base dimension without additional stabilization.

21.7.7 A qualified person shall determine the structural integrity of structural steel, reinforcing steel, and concrete or building members prior to the attachment of scaffolds by bracing or tie off.

21.7.8 Where persons are required to work or walk under scaffolding, a screen guard of No. 18 gage ½ in. wire mesh or equivalent shall be provided between the toe board and handrail.

21.7.9 All employees shall tie off with a safety harness when there is no or an incomplete handrail, when there are openings over 18 inches in the working platform, or when on suspended working platforms.


21.7.10 Swinging stages, floats, and boatswain's chairs shall be tested before using (test by applying a dead load with unit close to floor or ground).

21.7.11 Crews requiring scaffolds shall request them well in advance to avoid delays and to allow time to provide the best scaffold for the job.

21.7.12 Scaffold erection crews shall inspect all components for defects as the erection proceeds. Any components found to be defective shall be set aside and tagged for repair or disposal.

21.7.13 Daily inspections shall be performed under the direction of competent supervision responsible for the work being performed. All defects shall be corrected at once or have defective tags attached.

21.7.14 All lumber used in scaffolding should be fire-retardant treated except when otherwise specified in writing by the company's division or client. Fire retardant may be applied by pressure treatment or fire-retardant paint. Non-combustible

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scaffolding such as aluminum pick boards or aluminum grating should be used whenever it is practical to do so.

21.8 FIXED SCAFFOLDS REQUIREMENTS

21.8.1 Fixed scaffolds include tubular welded-frame scaffolds, bracket scaffolds, tube and coupler (Tube-lox) scaffolds, and trestle scaffolds.

21.8.1.1 Tubular Welded-Frame Scaffolds Requirements

21.8.1.2 Scaffolds of 10 ft or more in height shall include diagonal braces, handrails, mid-rails, toe boards, and 2 in. x 10 in. or 2 in. x 12 in. scaffold planks or manufactured scaffold decking which will provide a complete working deck without gaps or openings. Corner posts shall have the metal feet in place.

21.8.1.3 On soft ground, wooden sills of at least 2 in. x 10 in. lumber or channel iron shall be provided. Scaffold planks shall be rough-cut undressed lumber.


21.8.1.4 Scaffold planks shall be painted on each end for 12 in. to designate it as an inspected plank only to be used for scaffolding, and marked for overhang limits.

21.8.1.5 When scaffold sections are erected, only scaffold pins are to be used for the corner post connections. (Do not use tie-wire or welding rods.)


21.8.1.6 When casters are used for a rolling scaffold, they shall be locked except when the scaffold is being moved. No one shall be permitted on a scaffold while it is being moved.

21.8.1.7 Scaffold screw jacks shall be extended in accordance with the manufacturer's recommendations but in no case shall they be extended in excess of 12 in.

21.8.1.8 Whenever screw jacks and casters wheels are not used, metal base plates must be used for adequate base support. All supports are to be pinned and secured.

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- 21.8.1.9** Scaffolds shall have solid footing and shall be erected so that vertical members are always plumb and the platform is as horizontal as practical.
 - 21.8.1.10** Scaffold planks must have cleats, be wired down, or otherwise secured against accidental displacement.
 - 21.8.1.11** Wedge shims shall not be used. Work from incomplete scaffolds, when approved, will require that the employee take added precautions to meet accident prevention and fall protection requirements.
 - 21.8.1.12** Safety harnesses must be worn if handrails are missing or the platform is incomplete or other fall hazards exist.
 - 21.8.1.13** Horizontal braces of 2 in. x 4 in. lumber or equivalent shall be secured across corner posts when it is necessary to remove the diagonal braces. Diagonal braces shall not be removed from more than one section in a series of sections unless there are four braced sections between.
 - 21.8.1.14** Ladders shall be used if access to the scaffold platform is blocked or the scaffold climbing devices are more than 16 in. apart.
 - 21.8.1.15** Every scaffold higher than 50 ft. must be inspected and approved by a licensed professional engineer. This inspection shall be documented and kept on file.
 - 21.8.1.16** Toe boards shall be secured in a firm manner by interlocking at the corner posts with notches, wiring, nailing, U-clamping to the bearing members, or by use of approved commercial toe board systems.
 - 21.8.1.17** Employees gaining access to scaffolds shall have both hands free at all times and shall use the hand-over-hand method of climbing on the rungs. Employees shall not use toe boards as handholds or footholds to gain access to the platform.
-

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21.9 Bracket Scaffolds Requirements

21.9.1 Where more than one layer of horizontal bars has been placed and conditions permit, the scaffold shall be secured to an inside horizontal bar.

21.9.2 If conditions do not permit attaching the bracket scaffold to an inside horizontal bar, the scaffold shall be secured with a minimum of three 3/8-in. diameter U-bolts attached to each end and middle of the outer horizontal or vertical bar. Additionally, No. 9 wire shall be placed at a minimum of every fourth tie location.

21.9.3 The horizontal reinforcing bar shall be secured to a vertical reinforcing bar that is either embedded in concrete or has been spliced by an approved method.

21.9.4 Each scaffold shall have a 4 ft x 1/4 in. safety chain attached to the ends of the scaffold and secured to an inner rebar other than the bar that is supporting the scaffold.


21.9.5 Guardrails and toe boards shall be installed on all open sides and ends of scaffolds.

21.9.6 No more than three persons plus the necessary tools and equipment shall be permitted on a single scaffold section at any one time. The load is not to go beyond the scaffold's designed capacity. Bracket scaffolds shall be constructed to support 1,550 lb. and the capacity shall be posted on the scaffold.

21.9.7 Employees working with safety harnesses shall have the lanyard secured above the point of operation, but under no circumstances shall it be attached to the scaffold.

21.9.8 Scaffolds may be painted caution yellow to give the adjacent crane operators a better perspective when working close to them during the day or night.

21.10 Tube and Coupler (Tube-Lox) Scaffolds

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21.10.1 Posts shall be erected on suitable bases and maintained plumb.

21.10.2 Diagonal cross bracing shall be provided horizontally every third section, vertically every fourth section, and whenever posts are farther apart than 7 ft, the braces shall be at 45 degree angles.

21.10.3 Runners shall be erected along each side vs. the scaffold at the bottom and top of each section.

21.10.4 Bearers and braces shall extend past the posts a minimum of 4 in., but not more than 12 in. Extensions of these shall not protrude into walking or climbing areas.

21.11 Trestle Scaffolds

21.11.1 Trestle scaffolds shall have at least a 6 in. ridgepole and should be limited to one level only.

21.12 Suspended Scaffolds Requirements

21.12.1 Suspended scaffolds include two-point suspended scaffolds, multilevel suspended scaffolds, floats, needle-beam scaffolds, boatswain's chairs, and electric hoist platforms.


21.13 Two-Point Suspended Scaffolds

21.13.1 When two-point suspended scaffolds are used, the following rules will apply:

21.13.1.1 These scaffolds shall have standard toe boards, mid-rails and handrails.

21.13.1.2 A lifeline for each employee shall be provided and secured independently from the scaffold support lines.

21.13.1.3 Employees shall be tied off at all times when on the scaffold, using a triple sliding hitch or catch hardware. Employees must be provided with a safe method of moving to and from the scaffold.

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21.13.1.4 When moving the scaffold root supports, co-workers must remain behind the guardrail or be tied off with a safety boil to an independent support if there is no guardrail.

21.13.1.5 Protection for areas below the work shall be provided by the use of signs and barricades and screened staging, when applicable.

21.13.1.6 Do not lower the scaffold below the point of three turns of the supporting cables on the drum of a swinging stage scaffold. Supporting cables shall be marked or painted to include limits.

21.13.1.7 Check the loading on the stage one foot off the ground before using it.

21.13.1.8 Outrigger beams, when required, should extend from 1 Forklift Training to 6 Forklift Training beyond the edge of the building, and the inboard length from the fulcrum should be at least 1½ times the outboard length from the fulcrum. A mechanical stop to retain the supporting cables shall be secured at the outer end of the outrigger.

21.13.1.9 If cornice hooks are used, each hook must be tied back to something solid. All hooks must be latched.


21.14 Multilevel Suspended Scaffolds Requirements

21.14.1 Multilevel suspended scaffolds are used primarily for large-area vertical work such as installation of siding.

21.14.2 Multilevel suspended scaffolds shall have two lifelines attached to the scaffold, independent of the supporting lines.

21.14.3 Employees on the top stage will tie off with a safety harness to an independent lifeline.

21.14.4 Employees on the lower stages will tie off with a safety harness to the scaffold itself.

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21.15 Floats

- 21.15.1** Floats shall be in accordance with standard rigging practices, using a 1 in. manila rope, or equivalent. The supporting ropes shall be run diagonally under the platform from corner to corner.
- 21.15.2** Employees working on floats shall tie off with a safety harness before getting on a float and untie after getting off a float.
- 21.15.3** Floats are to be constructed to the standard 4 ft. x 6 ft. size, and additional support shall be given to the platform with diagonal 1 in. x 4 in. braces on the bottom.
- 21.15.4** The platform shall be of 3/4 in. plywood or equivalent, with 4 in. x 1 in. minimum edging on top to prevent items from rolling off.

21.16 Needle-Beam Scaffolds

- 21.16.1** Needle-beam scaffolds shall be supported by 1 in. manila rope, ½ in. wire rope cable, 1/4 in. or high-test chain or equivalent, using a standard scaffold hitch or eye splice, with supports on the beam not to be more than 10 ft. apart for the 4 in. x 6 in. timbers.
- 21.16.2** Needle-beams shall be construction grade lumber, with a minimum of 1,500-psi fiber stress.
- 21.16.3** The platform span between needle-beams shall not exceed 8 ft. when 2-in. scaffold plank is used. The overhang of scaffold planks shall not be less than 6 in. or more than 12 in.
- 21.16.4** Handrails and toe boards shall be used, and employees shall wear a safety harness.

21.17 Boatswain's Chairs

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21.17.1 Seats shall be a minimum of 12 in. x 24 in. and 2 in. thick. Cleats fastened on the underside shall prevent splitting of the board.

21.17.2 Boatswain's chairs shall be suspended with the standard 5/8-in. nylon rope boatswain's sling through four corner holes.

21.17.3 The employee shall be tied off to an independent lifeline with a safety harness.

21.18 Electric Hoist Platforms

21.18.1 When working platforms are suspended from electric hoist mechanisms and used to raise and lower employees to and from working positions, a safety harness shall be worn and properly attached to a lifeline secured independently from the platform support line.

21.18.2 Such platforms shall have sides 42 in. in height above the platform.

21.18.3 Prior to each use, the hoist mechanism shall be visually inspected and the load support checked at 1 ft. off the ground.


21.18.4 The cable and the lay of the cable on the spool shall be checked constantly.

21.19 Scissor Lifts

21.19.1 A scissor-lift or lift cart is considered by OSHA to be a mobile scaffold. It must be used in accordance with the OSHA standards for mobile scaffolds used in construction work. Those standards prohibit employers from letting employees ride on the scaffold unless the following conditions exist.

21.19.2 The surface on which the scaffold is being moved is within 3 degrees of level, free of pits, holes, and obstructions.

21.19.3 The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed

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and constructed to meet or exceed nationally recognized stability test requirements.

21.19.4 Outrigger frames, when used, are installed on both sides of the scaffold.

21.19.5 When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of 1 foot per second (.3 mph).

21.19.6 No employee is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

21.19.7 Carbon America requires that all personnel must be 100% tied off inside of scissor lifts and aerial lifts with a full body harness

21.19.8 Daily inspection of the lift must be performed prior to use each day.

21.20 Scaffold Erection and Dismantling Requirements


21.20.1 A risk of serious accident may exist when scaffolds are being erected or dismantled. All individuals working on scaffolds at these times shall comply with the following safety rules and regulations:

21.20.1.1 Employees must keep both hands empty for secure handholds when moving above on scaffolds.

21.20.1.2 Packets, pouches, and tool belts are to be used to carry the necessary tools for the work.

21.20.1.3 Scaffold members shall be hoisted or lowered with a hand line or passed from hand to hand. Throwing items up to employees or dropping them is not permitted.

21.20.1.4 Constant fall prevention measures must be maintained. Provisions shall be established for using a safety harness and working on firm scaffold decks when this can be done safely.

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21.20.1.5 Scaffold feet shall be established on a firm and level base of support.

21.20.1.6 When scaffolds are to be secured to fixed structures or outriggers are to be used, they shall be installed as soon as possible. When dismantling a scaffold, these should be left on as long as is practical.

21.20.1.7 The coordination of this activity with surrounding operations and environment shall be given priority consideration.

21.21 SCAFFOLD TAGGING

21.21.1 General Scaffold Tagging Requirements

21.21.2 This scaffold tagging procedure is designed to ensure the safe use of all scaffolds.

21.21.3 A scaffold that is ready for use shall be tagged with either a green or a yellow tag.

21.21.4 A green scaffold tag designates a complete scaffold, as defined by the manufacturer.


21.21.5 A yellow scaffold tag designates a scaffold that is not complete but which is altered to suit a specific job and may be used safely. A yellow scaffold tag shall detail the reason or reasons the scaffold is incomplete and safety measures needed.

21.21.6 If scaffold is in the process of being erected, changed, or dismantled, it shall have a red tag. A scaffold that contains a red scaffold tag shall be considered unsafe and shall not be used.

21.21.7 If a scaffold has been damaged or is defective, a Red Tag must be attached.

21.21.8 The yellow, red, and green scaffold tags are approximately 4 in. wide by 8 in. long with a hole centered at the top of the tag.

21.22 Installation & Removal of Scaffold Tags

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21.22.1 A qualified person shall determine whether a useable scaffold receives a yellow or a green tag. He/she shall be responsible for completing all pertinent information on the tag and affixing the tag to any scaffold erected under his/her supervision.

21.22.2 The scaffold tag shall be affixed to each scaffold access ladder approximately 5 ft., 6 in., from its base, where it will not interfere with normal access.

21.22.3 The qualified person may remove a scaffold tag from a scaffold that has been damaged, has been improperly modified, is missing components, or is deficient in any safety aspect. A red tag may be used in these circumstances.

21.22.4 After a scaffold has been repaired, the qualified person shall inspect it to determine whether it is ready to be re-tagged and shall do so accordingly.

21.22.5 Periodic inspections shall be performed to ensure that all tags are legible and in good condition.


21.22.6 Inspection, attention, and stability are three keys to scaffold safety. No tag on scaffold shall be considered the same as a red tag.

21.23 INSPECTION AND TESTING - SCAFFOLD PLANKS

21.23.1 Scaffold planks shall be inspected and tested upon receipt, prior to use, and users shall examine each plank visually prior to each use.

21.23.2 Examine planks for knots, excessive grain slope, shakes, decay, dry rot, and other defects.

21.23.3 Density of lumber should be equivalent to Douglas Fir and capable of supporting four times the intended load. Moisture content should not exceed 20 percent.

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21.23.4 All scaffold planks shall be scaffold grade or equivalent as recognized by approved grading rules.

21.23.5 Planks shall be 2 in. x 10 in. or 2 in. by 12 in. heavy duty (75 psi on 6 ft. span).


21.23.6 Discard the plank as a scaffold plank if evidence of a defect is noted.

21.24 SPECIAL SCAFFOLDING

21.24.1 Any scaffold a qualified person must approve.

21.25 STORAGE OF SCAFFOLDING

21.25.1 Scaffold materials shall be temporarily stored in a manner that will protect and prevent damage to them. Scaffold materials shall not be left in work areas where they obstruct traffic and/or cause fire hazards.

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22.1 INTRODUCTION

22.1.1 Any condition that poses a potential hazard(s) to the general public, other contractor employees, the owner and/or visitors to the project site should be identified by signs, signals or barricades, as appropriate.

22.2 RESPONSIBILITIES


22.2.1 Prior to the start of operations that may pose a hazard to personnel, such as overhead work operations, hearing protection, and lead abatement, the supervisor of the crew conducting operations must place effective warning devices consistent with the degree of hazards. All project personnel must be mindful of these warning signs.

22.2.2 Project Managers, Superintendents, Engineers and Foremen with assistance from the **Safety Manager** must periodically inspect the work area to assure that warning devices are properly positioned and are effectively warning or restricting all personnel. If this inspection reveals a safety problem, immediate corrective action will be taken.

22.3 IMPLEMENTATION

22.3.1 Warning Signs/Tags Specifications

22.3.1.1 Only approved warning signs shall be used to identify hazards or "tag -out" equipment. Caution, Warning and Danger signs and tape must meet the size, description and color arrangement as defined in OSHA 1926 standards.

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22.3.2 Storage Areas

22.3.2.1 Flammable and combustible storage areas should be identified as "No Smoking" areas, and appropriate warning signs will be posted.

22.3.2.2 Project locations used to store either toxic chemicals and/or flammable shall be identified to warn personnel of the pending hazard. Vehicles used to transport these materials within the project site will be identified as required by the Department of Transportation (DOT).

22.3.3 Signals

22.3.3.1 The responsible supervisor shall use signals to warn people of overhead lifts and similar operations and prevent unauthorized entry into the danger zone. An air horn or a similar effective device may be used to provide this signal.

22.3.3.2 The supervisor will use flag persons when traffic conditions are adversely affected by construction operations. Flag persons will use ANSI approved warning vests and traffic signal flags or paddles. During hours of dusk and darkness illuminated signals and /or light plants will be provided. The supervisor shall review signaling conditions and determine their effectiveness.


22.3.4 Barricades

22.3.4.1 Barricades will be used but not limited to safeguard project personnel when any of the following conditions exist:

22.3.4.1.1 When overhead work creates a hazardous condition below

22.3.4.1.2 When tripping hazards are created

22.3.4.1.3 When trenches and excavations are cut

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22.3.4.1.4 When toxic substances may drain, spill or leak on any project personnel

22.3.4.1.5 When driving hazards are created

22.3.4.1.6 When cleaning vessels, pipes or equipment


22.3.4.1.7 When spray-painting operations are conducted

22.3.4.1.8 During non-destructive test operations and operations which include laser and other similar equipment use.

22.3.4.2 Project barricades will be located to maximize personal safeguarding. Each barricade shall warn personnel of the hazard potential.

22.3.4.3 The Contractor supervisor shall select the type of barricade to be used for personnel protection. This barricade may be as simple as hazard warning tape or more complex as a wood barricade corridor.

22.3.4.4 When the hazard is eliminated the responsible supervisor should promptly remove the barricade.

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23.1 Purpose

23.1.1 The Silica Exposure Control Plan (ECP) has been developed to control worker exposure to crystalline silica dust created by industrial and mechanical processes listed in OSHA Directive CPL 03-00-007, *National Emphasis Program-Crystalline Silica*.

23.1.2 This program applies to all occupational exposures to crystalline silica for affected Carbon America Employees and Contractors during work activities in which crystalline silica-containing materials are present or may be present in the work environment.

23.1.3 This policy does not apply to amorphous silica also known as diatomaceous earth or silica gel such as “aerogel”.


23.1.4 The exposure control plan (ECP) must be reviewed every 3 years and updated as necessary.

23.2 Definitions

23.2.1 Competent Person - one who is capable of identifying existing and predictable silica dust hazards in the surroundings and who has authorization to take prompt corrective measures to eliminate them such as an Industrial Hygienist, or other Safety and Health professional.

23.2.2 Crystalline Silica- the dioxide form of silicon, occurring especially as quartz, tridymite, and cristobalite. This procedure applies to any product that contains $\geq 1\%$ by weight of crystalline silica. For the purposes of this work practice “silica” refers to crystalline silica.

23.3 Responsibilities

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23.3.1 Due to the significant risk posed by respirable silica, it is critical that all personnel involved in operations that could potentially create silica dust take specific action to ensure that a hazard is not created.

23.3.2 Competent Person

23.3.2.1 The Competent Person's Responsibilities include:

23.3.2.2 Conducting a periodic review of the effectiveness of the ECP. This would include a review of the available dust-control technologies to ensure these are selected and used when practical.

23.3.2.3 Initiating sampling of worker exposure to silica dust when no such sampling information has been conducted –OR- when there are non-standard work practices for which the control methods to be used have not been proven to be adequately protective.

23.3.2.4 Ensuring supervisors and workers are educated and trained to an acceptable level of competency.

23.3.2.5 Coordinating the work with the contractor site contacts and other employers to ensure a safe work environment.

23.3.3 Maintenance Supervisor:

23.3.3.1 Ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this exposure control plan are readily available where and when they are required.

23.3.4 Employee Supervisor

23.3.4.1 Reviewing the ECP and making it available at the worksite.


23.3.4.2 Selecting, implementing, and documenting the appropriate site-specific control measures.

23.3.4.3 Providing adequate instruction to workers on the hazards of working with silica-containing materials.

23.3.4.4 Ensuring that all required tools, equipment, and personal protective equipment are readily available and used as required by the ECP.

23.3.4.5 Directing the work in a manner that ensures the risk to workers is minimized and adequately controlled

23.3.5 Employee

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- 23.3.5.1 Knowing the hazards of silica dust exposure
- 23.3.5.2 Using the assigned protective equipment in an effective and safe manner
- 23.3.5.3 Following established work procedures as directed by the supervisor
- 23.3.5.4 Reporting any unsafe conditions or acts to the supervisor

23.3.6 Safety Department

- 23.3.6.1 Thoroughly evaluate all Chemical Approval Forms for material that contains silica.
- 23.3.6.2 Ensure material is applied in a manner that prevents or limits exposure to silica dust.

23.4 Exposure Limits, Determination, Air Monitoring and Control Worker Exposure Measurements


23.4.1 The American Conference of Government Industrial Hygienists (ACGIH) lists a threshold limit value (TLV) for respirable crystalline silica of 0.025 milligrams per cubic meter (mg/m³). This is a concentration to which nearly all workers could be exposed for eight hours a day, five days a week, without adverse health effects. However, as a suspected carcinogen, exposure to silica shall be kept as low as possible below the TLV. Carbon America has adopted the 0.025 mg/m³ TLV as an occupational exposure limit (OEL). Exposures or potential exposures at or above the permissible exposure limit will require one or a combination of PPE, engineering controls, ventilation, air monitoring.

23.4.2 Exposure Determination

- 23.4.2.1 Air monitoring is required for each work activity with potential exposure to silica that does not have current exposure data.
- 23.4.2.2 The primary activity associated with potential silica exposures can consist of grinding, chipping, and mixing of concrete or mortar, abrasive blasting, and refractory mixing or removal.

23.4.3 Air Monitoring

- 23.4.3.1 Work activities with potential for silica exposures will require initial monitoring to be conducted.

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23.4.3.2 Air monitoring will be performed at the beginning of each job task, and more frequently if necessary as determined by exposure results, for each type of work with a potential for silica exposures.

23.4.3.3 Air monitoring must be representative of each task that will be conducted (i.e., monitoring conducted while setting up the work area cannot be used to represent exposures during hot work).

23.4.3.4 Workers must wear personal protective equipment until air monitoring results indicate that it can be downgraded.

23.4.3.5 If sampling is discontinued and work procedures, equipment, or materials involving silica related activities change during a job in such

***NOTE:** Full enclosures must be constructed in such a way that personnel inside the enclosure are adequately protected. This may be achieved by combining various forms of engineering controls, personal protective equipment, and alternative space constructions.

a way as to possibly increase the silica exposure, then sampling will be reinstated.

23.4.4 Controlling Exposure

23.4.4.1 Worker exposure to silica dust will be reduced or eliminated by selecting a combination of the following controls listed in order of preference:

23.4.4.2 Elimination/substitution (e.g., using products with less silica or using work methods that would eliminate the need for surface grinding)


23.4.4.3 Engineering controls (e.g., water, local exhaust ventilation, enclosure)

23.4.4.4 Administrative controls (e.g., coordination of tasks with subcontractors, signage)

23.4.4.5 Personal protective equipment (e.g., coveralls, respiratory protection)

23.4.5 Elimination and substitution

23.4.5.1 Reasonable efforts must be taken to identify all practical approaches to eliminate or reduce the need for surface grinding or other mechanical

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processes with the ability to produce dust. The work must be planned in an appropriate manner and minimize the amount of silica dust generated.

23.4.5.2 During the project planning phase, the use of methods that reduce the need for cutting, grinding, or drilling of concrete surfaces will be considered.

23.4.5.3 Work will be scheduled while the concrete is still wet whenever possible to minimize dust emissions.

23.4.6 Engineering controls

23.4.6.1 Dust control systems may employ three well-established techniques:

23.4.6.1.1 Local exhaust ventilation (LEV)

23.4.6.1.2 Wet dust suppression (WDS)

23.4.6.1.3 Restricting or isolating the work activity with barriers or full enclosures* (this may be the only option where LEV or WDS is not practical or effective)

23.4.6.1.4 Vacuum Dust Collection Systems (VDC)

23.4.6.2 Local Exhaust Ventilation

23.4.6.2.1 Local Exhaust Ventilation shall employ the following systems and safe work practices when applicable:


23.4.6.2.1.1 Vacuum attachment systems to capture and control the dust at its source whenever possible.

23.4.6.2.1.2 Dust control systems (used regularly and well maintained).

23.4.6.2.1.3 Grinding wheels operated at the manufacturers' recommended rpm (operating in excess of this can generate significantly higher airborne dust levels).

23.4.6.2.1.4 Retrofit shrouds or exhaust cowlings for corner grinding; use manufacturer-specified rpm speeds and a well-maintained HEPA vacuum.

23.4.6.2.1.5 HEPA or good quality, multi-stage vacuum units approved for use with silica dust. The vacuum units should be capable of creating a target airflow of at least 70 cfm. This should achieve a face velocity at

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the shroud of about 1.3 m/s (260 fpm)—the higher the face velocity, the more dust captured at source.

- 23.4.6.2.1.6** Good housekeeping work practices (for example, use vacuums with high-efficiency particulate air (HEPA) filters, or use wet sweeping).
- 23.4.6.2.1.7** Train workers and supervisors on how to properly use and maintain the equipment. Workers must not be situated between the material being worked on and the fan.
- 23.4.6.2.1.8** LEV equipment must be regularly inspected for damage and be properly maintained.
- 23.4.6.2.1.9** Personnel must be adequately protected when performing servicing or maintenance of LEV equipment.

23.4.6.3 Wet methods for dust control

23.4.6.3.1 Wetting is very effective at reducing dust release at the source. A drawback to this method of dust control is that the dust is not collected—the wet slurry must be cleaned up so that the dust does not dry and become airborne. The following work practice shall be followed when using water spray systems:

- 23.4.6.3.1.1** To prevent electrocution, pneumatic grinders will be used instead of electric-powered grinders if water is the method of control.
- 23.4.6.3.1.2** Pressure and flow rate of water will be controlled in accordance with tool manufacturers' specifications.
- 23.4.6.3.1.3** When sawing concrete or masonry use only saws that provide water to the blade.
- 23.4.6.3.1.4** Wet slurry will be cleaned from work surfaces when the work is completed, using a wet vacuum or wet sweeping.

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NOTE: Use of water spray controls presents potential safety hazards, which include electrocution, slipping, and potentially hypothermia. Oil-based dust suppressants should be used in freezing temperatures. Water spray can effectively reduce exposure levels but is not feasible in many applications (e.g., tuck point grinding and cutting fibrous cement board) because water can result in material discoloration and expansion, building damage, and waste water disposal problems.

23.4.6.4 Barriers and enclosures


23.4.6.4.1 Barriers are used to isolate the work area from the rest of the project and to prevent entry by unauthorized workers. They do not prevent dust drift and should only be used where natural ventilation is sufficient and dust release is controlled. Barriers will be constructed to notify other workers that concrete grinding work is underway and access to the immediate work zone is restricted to authorized personnel.

23.4.6.4.2 Enclosures may be used to dusty atmosphere. They consist of a partial structure (poly draping or partial plywood boarding) or a full enclosure equipped with some capacity for maintaining a lower than ambient pressure inside the space (negative pressure). For partial enclosures, airflow in the enclosure could be created by setting up a ventilating (blower) fan or air mover where the dusty air would be discharged to an unoccupied outdoor location. This option should **only** be used when dust levels are low or to supplement LEV or wet methods such as in stairwells.

23.4.6.4.3 Full enclosures **shall** be fitted with a negative air unit that pumps air from inside the structure. Negative air units draw dusty air through a large HEPA filter panel before the air is discharged outside the enclosure. Another option to create airflow in the enclosure is to set up ventilating (blower) fans where the dusty air can be discharged to an unoccupied outdoor location.

23.4.6.5 Administrative Controls

23.4.6.6 The following administrative controls will be followed:

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- 23.4.6.6.1** Exposure control plans and the site risk assessment/workplan will be reviewed prior to the start of work.
- 23.4.6.6.2** Establish procedures for housekeeping, restricting work areas, personal hygiene, worker training, and supervision.
- 23.4.6.6.3** As part of our project planning, assess when silica dust may be generated and plan ahead to eliminate or control the dust at the source. Recognize that awareness and planning are key factors in the prevention of silicosis.
- 23.4.6.6.4** Warning signs will be posted to warn workers about the hazards of silica and to specify any protective equipment required.
- 23.4.6.6.5** Work that generates silica dust will attempt to be conducted after hours.

23.5 Personal Protective Equipment

23.5.1 Respiratory protection

- 23.5.1.1** When engineering and administrative controls are not sufficient to reduce employees' exposure below 0.025 mg/m³, respiratory protection will be required.
- 23.5.1.2** Respirators should not be relied upon as a primary means of preventing or minimizing exposure to silica dust. Only after engineering and administrative controls have been utilized will PPE be considered as secondary protection.
- 23.5.1.3** All workers who wear respirators will do so in adherence with Carbon America 6.0 Respirator Protection Program.
- 23.5.1.4** Respiratory protection will be selected based upon the following table:

Airborne Concentration (Silica OEL .025 mg/m ³) ^(R)	Required Respirator Type
.25 mg/m ³ or less (10 x PEL or less)	Half-face air-purifying respirator with P-100/HEPA filters
>.25 mg/m ³ and <.63 mg/m ³ (25 x PEL or less)	Powered air-purifying respirator (PAPR) with loose fitting hood or helmet equipped with P-100/HEPA filters, or supplied-air respirator with a loose-fitting hood or helmet facepiece operated in the continuous-flow mode.

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Airborne Concentration (Silica OEL .025 mg/m ³) ^(R)	Required Respirator Type
>.63 mg/m ³ and <1.25 mg/m ³ (50 x PEL or less)	Full facepiece air-purifying respirator equipped with P-100/HEPA filters, or a PAPR with a tight-fitting half mask equipped with P-100/HEPA filters, or a supplied-air respirator with a tight-fitting half mask operated in continuous-flow mode.
>1.25 mg/m ³ and <25 mg/m ³ (1000 x PEL or less)	PAPR with a tight-fitting full facepiece or hood equipped with P-100/HEPA filters or a supplied-air respirator with full facepiece operated in the pressure-demand or other positive-pressure mode or with a full facepiece operated in continuous flow mode.
> 25 mg/m ³ or unknown (> 1000 x PEL or unknown)	Self-contained breathing apparatus with a full facepiece operated in the pressure-demand or other positive-pressure mode.

23.5.2 Protective clothing


23.5.2.1 Workers will wear protective clothing as specified in “Personal Protective Equipment” and the Exposure Modes and Control Table (Appendix A.) to prevent contamination of worker clothing. **Workers will not use compressed air to clean themselves, their clothing, or their equipment.**

23.5.2.2 Equipment contaminated with silica dust must be HEPA vacuumed, water washed or wet wiped. Equipment is considered contaminated if subsequent handling can create an exposure hazard.

23.6 Decontaminating Work Areas

23.6.1 Work areas (permanent structures) and equipment which are contaminated with silica dust must be cleaned in such a way that minimizes potential for worker exposure.

23.6.2 Cleaning methods may include HEPA vacuuming, water washing, or other similar means of decontamination that will not expose employees. HEPA vacuum or wet methods are the methods of first choice. If these are found to be ineffective,

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other methods (e.g. dry sweeping, shoveling, etc) can be used if the area is isolated and workers protected properly. Compressed air shall not be used.

23.6.3 Exemptions to this requirement are as follows:

- 23.6.3.1** Work areas which by their nature cannot be effectively cleaned (e.g. open air field activities, work in temporary fab tents, etc.)
- 23.6.3.2** Confined spaces do not need to be decontaminated prior to start up. However, anytime work will be performed in the contaminated space, an exposure determination must be performed and workers must be protected accordingly.
- 23.6.3.3** Temporary structures (e.g. fab tents, spark enclosures, etc.) do not need to be decontaminated if the materials will be sent for disposal. Workers must be protected during the tear down process.

23.7 Waste Disposal


- 23.7.1** Waste, scrap, debris, and any other materials contaminated with silica dust and consigned for disposal must be collected and disposed of in a sealed, impermeable bag/container.
- 23.7.2** Disposable clothing or respirator cartridges contaminated with silica can be discarded with normal waste as long as they are properly bagged and labeled so as not to release dust during disposal. The bags containing the discarded waste may be deposited in a city landfill.

23.8 Training

23.8.1 Silica dust training program must be established for workers who have the potential for airborne, eye, and skin exposure to silica dust.

23.8.2 The worker training program shall consist of the following:

- 23.8.2.1** Hazards associated with exposure to silica dust
- 23.8.2.2** The risks of exposure to silica
- 23.8.2.3** Signs and symptoms of silica disease
- 23.8.2.4** Safe work procedures to be followed (e.g., setup of enclosures, disposal of silica waste, personal decontamination)
- 23.8.2.5** Use of respirators and other personal protective equipment (e.g., donning and doffing of personal protective equipment, and cleaning and maintenance of respirators)

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23.8.2.6 Use of control systems (e.g., LEV and wet methods)

23.8.2.7 What to do in the case of an incident

23.8.3 Records of training will be kept with the Training Department. As well as Refresher Training Annually.


Appendix A - Exposure Modes and Control Table

Task		Control methods	Personal protective equipment	Comments
Grinding, Drilling, chip or jack hammering	Concrete	<ul style="list-style-type: none"> Barrier or enclosure systems are required to restrict access to the work area. Local exhaust ventilation (LEV)—use concrete grinders with HEPA vacuum attachments. Grinding using wet method of dust control may be an option for specific circumstances. These circumstances must be listed on the site workplan. Personal protective equipment. 	<ul style="list-style-type: none"> Half-mask air purifying respirator equipped with 100 series HEPA filters. Supplied Air when heavy work and poor dilution ventilation in work area. Disposable coveralls are recommended for all grinding work and are required for stairwell and similar work. Eye protection should be worn when using a half-face respirator. 	<ul style="list-style-type: none"> Vacuum systems equipped with HEPA filtration are the best control options for flat surface grinding. Ensure they are well designed for this type of work. A variety of suitable systems are readily available. Very little visible dust should be present in the air. Inspect the LEV unit frequently to ensure it is operating properly and the filters are not overloaded. Hearing protection should be worn when using powered equipment. When LEV and wet grinding

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Appendix A - Exposure Modes and Control Table

Task		Control methods	Personal protective equipment	Comments
				<p>systems cannot be used, dry grinding is permitted, provided a full enclosure system is constructed. Workers should wear full-face respirators and disposable coveralls.</p> <ul style="list-style-type: none"> Large concrete drills can be purchased that are equipped with a water spray attachment. Any wet slurry must be cleaned up when the work is completed
Abrasive blasting	Concrete surfaces	<ul style="list-style-type: none"> Barrier systems are required when dust can be controlled at the source. Full enclosure system required when source control of dust cannot be established Blasting units that capture the dust (e.g., shot recycle 	<ul style="list-style-type: none"> Full-face supplied-air helmet or hood respirator with a neck shroud, operated in continuous-flow mode. Heavy waterproof protective clothing should be worn. Hearing protection should be considered when using powered 	<ul style="list-style-type: none"> Caution—water may produce electrocution and slipping hazards. Slurry cleanup of interior surfaces must be part of the workplan. For non-concrete surfaces, use silica-free blasting agents.

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Appendix A - Exposure Modes and Control Table

Task		Control methods	Personal protective equipment	Comments
		<p>systems) should be used when practical.</p> <ul style="list-style-type: none"> Blast systems that discharge a wet slurry shot should be used when practical. Personal protective equipment. 	equipment.	
Cleanup	General cleanup	<ul style="list-style-type: none"> Barrier to restrict access to and contain the work area. Full enclosure systems can be used in dust-sensitive areas or when unprotected workers cannot be restricted from entering cleanup work areas. Use vacuum (HEPA-equipped) when practical. Wetting of dust prior to sweeping/scooping to be used when practical. Planning for bulk/coarse debris cleanup followed by fine-dust cleanup can reduce the amount of dry sweeping. 	<ul style="list-style-type: none"> Half-face air purifying respirator when vacuum systems or wet sweeping methods are used. Full-face or powered air purifying respirator (PAPR) with P100 series HEPA filters for all other cleanup. Eye protection should be worn when using a half-face respirator. Hearing protection should be considered when using powered equipment. 	<ul style="list-style-type: none"> Dust-suppressing agents or absorbents are only marginally effective in minimizing airborne dust during sweeping. Safe work procedures must be followed. Rolling a seam of dust suppressant into fine, settled dust is reported to work better than a wide-spread scattering.

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Appendix A - Exposure Modes and Control Table

Task		Control methods	Personal protective equipment	Comments
		<ul style="list-style-type: none"> Dust suppressants should be used if dry sweeping is the only practical option. 		
Task		Control methods	Personal protective equipment	Comments
Cleanup	Vacuum bag/filter changing and maintenance of LEV	<ul style="list-style-type: none"> Barrier to restrict access to the work area. Signage marking an area removed from other workers may be adequate. 	<ul style="list-style-type: none"> Half-face air purifying respirator with P100 series HEPA filters. Eye protection should be worn when using a half-face respirator. 	<ul style="list-style-type: none"> Safe work procedures must be established and followed. Many vacuums are designed to collect the dust in a bag (rather than loose in the canister) that can be tied and disposed without generating airborne dust. Any new vacuum systems purchased should have this design feature.

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24.1 Scope

24.1.1 Carbon America is dedicated to the prevention of injuries and illnesses that are related to the erection of structural steel. To assist in this process, the following program has been developed as a supplement guide to other Carbon America safety and health policies: Safety Planning and Communication, Fall Protection, Rigging, and Crane Safety, and is outlined as follows:


24.1.1.1 For the purposes of this program Carbon America defines the scope of steel erection activities to include but are not limited to:

24.1.1.1.1 The fabrication of temporary falsework bents that support permanent steel members;

24.1.1.1.2 Rigging, hoisting, laying out, placing, connecting, welding and burning, guying, bracing, bolting, plumbing, installing / removing jacking towers, and installing structural cabling of permanent structural steel elements;

24.1.1.1.3 The installation of metal decking systems, ornamental steel, and utility raceways, and;

24.1.1.1.4 All support operations associated with these activities that provided point-to point delivery of personnel and materials in support of these operations.

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24.2 Roles and Responsibilities

24.2.1 Any one individual cannot accomplish Carbon America's objective of a safe and productive jobsite; rather each team member must be dedicated to managing his or her specific roles and responsibilities in accordance with this program, which include but are not limited to the following:

24.2.2 Project Manager

24.2.2.1 The Project Manager with the assistance of the **Competent Person(s)**, and the **Safety Department** is responsible for the total implementation of the guidelines set forth in this program as well as all related Carbon America Safety and Health Programs.


24.2.3 Competent Person(s)

24.2.3.1 The **Project Manager** shall designate the Competent Person(s) for each operation. It shall be the responsibility of the **Competent Person(s)** to assist in the development and implementation of erection specific Work Activity Plans (WAP).

24.2.3.2 *Note that for the purposes of this program, Carbon America defines a competent person as a person who by certificate, or professional standing (i.e., journeyman), and who by extensive knowledge or experience is capable of identifying existing and predictable hazards in the surroundings, working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.*

24.2.4 Designated Connectors

24.2.4.1 The **Project Manager** with the assistance of the **Competent Person(s)** shall identify designated connectors for each operation. Designated connectors will be those individuals through appropriate experience, skills, and training that have

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demonstrated the requisite ability to perform connecting task safely.

24.2.5 Employees

24.2.5.1 Employees will be trained in the requirements of this program as well as other related Carbon America Safety and Health Programs referenced by this program. Furthermore, employees will be issued required and trained on Personnel Protective Equipment (PPE) use, care, inspection, and maintenance of such items. Once this has been accomplished, employees will responsible for the proper PPE and safe work practice compliance, and failures to do so will be handled in accordance with Carbon America Safety Self Awareness and Discipline Program.


24.2.6 Safety Department

24.2.6.1 The Safety Department will provide assistance in training employees, reviewing JHA for applicable safety and health items, and adequacy purposed controls measure, assisting in the management of, and advise Project Management on unsafe acts / conditions and necessary corrective actions to be taken to eliminate or prevent reoccurrence of said acts / conditions.

24.3 Work Activity Planning for Steel Erection

24.3.1 In keeping with our Safe culture, The **Project Manager** with the assistance of the **Competent Person(s)**, **Safety Department**, and key employees is responsible for developing steel erection operation specific JHA. As part of this JHA process the **Project Manager** will meet with said employees to conduct an advanced planning meeting, and solicit their input for the safe execution of each steel erection operation. This meeting and the steel erection operation specific JHA shall include the following:

24.3.1.1 Note that steel erection shall not be started unless the **Project Manager** has received written notification that the concrete in

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the footings, piers, and abutments have attained, on the basis of an appropriate ASTM standard test method of field cured sample of at least 75 percent of the intended minimum compressive design strength to support the loads imposed during steel erection, and that any repairs, replacement and modifications to the anchor bolts, have been completed and approved.

24.3.2 Identification of Competent Person and Designated Connectors

24.3.3 The **Project Manager** with the assistance of **Competent Person(s)**, and **Safety Department** shall ensure that the following conditions are provided and maintained throughout the operations:

24.3.3.1 Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, and the material to be erected and means and methods for pedestrian and vehicular control


24.3.3.2 A firm properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the erector's equipment

24.4 CRITICAL LIFT PLAN

24.4.1 For the purposes of this program, a critical lift is defined as any lift that is made by a single crane that exceeds 75% of its rated capacity, or when making a dual crane lift. The **Project Manager** with the assistance of **Competent Person(s)**, and outsourced professional engineering will generate drawings detailing the erection sequences and operational specific procedures to be followed. Additionally, Carbon America Crane Safety and Rigging Operations Safety Programs shall be implemented.

24.5 CRANE OPERATION

24.5.1 In accordance with Carbon America Crane Safety Program, The **Project Manger** with the assistance of the **Competent Person**, shall ensure that the **Operator** has conducted and documented the daily pre-shift inspection of the crane. To this end, the Operator is

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responsible for, and has the authority to stop any lift. The **Safety Department** will be responsible for monitoring conformance with this requirement.

24.6 MULTI-LIFT HOISTING & RIGGING


24.6.1 In accordance with Carbon America Rigging Operations Safety Program the **Competent Person** shall visually inspect rigging for deficiencies prior to it being placed into use. All multiple lift (i.e., Christmas Treeing) rigging operations are to be performed under the following guidelines:

- 24.6.1.1** ONLY special multiple lift rigging is to be used, and it must have a maximum capacity for the total intended load with a 5:1 safety factor on all components.
- 24.6.1.2** ONLY Qualified Riggers shall be allowed to perform multi-lift rigging.
- 24.6.1.3** A maximum of five similar members (e.g. diaphragms) may be lifted at one time.
- 24.6.1.4** Members must be rigged at their center of gravity, from the top down, and at least seven (7) feet apart.
- 24.6.1.5** Members must be set from the bottom up.
- 24.6.1.6** The crane must be equipped with controlled load lowering.
- 24.6.1.7** All employees on the connecting crew must be trained in the safe work procedures to be followed, and this training must be documented.

24.7 PERSONNEL HOISTING

24.7.1 Shall be performed in accordance with Carbon America Personnel Hoisting Safety Program.

24.8 FALL PROTECTION

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24.8.1 Means and methods to be implemented, in accordance with Carbon America Fall Protection Safety Program.

24.9 FALLING OBJECT PROTECTION

24.9.1 All materials, equipment, and tools, which are not in use, shall be secured against accidental displacement. To protect employees from falling objects other than materials being hoisted, Carbon America shall install and maintain debris netting on the arch, and implement controlled access zones below steel erection operations that are not under the protection of said nets.

24.10 REVIEW AND SIGN-OFF OF THE WAP

24.10.1 Once the steel erection specific JHA has been completed, the **Project Manager**, with assistance of the **Competent Person(s)**, and the **Safety Department** will conduct a pre-operation coordination meeting with employees. During this meeting, safety and production procedures and sequences pertinent to the activity will be presented, and opportunity for questions and discussion of the plan offered to all employees. At the end of the meeting all personnel will sign off on the JHA. In doing so, Carbon America allows for a more personal approach to injury / illness prevention via planning, training, and implementation of effective control measures.


24.10.2 In the event new employees are brought into the process after the JHA review meeting they too will be provided with a review of the plan under the direction of the **Project Manager**, with assistance of the **Competent Person(s)**, and the **Safety Department** and sign off on the plan.

24.11 FALL PROTECTION ERECTION SPECIFICS

24.11.1 PLATE GIRDERS

24.11.1.1 For the unloading and erection, and field splice connection of plate girders, **Designated Connectors** and employees will:

24.11.1.1.1 Unloading and Staging of Plate Girders

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24.11.1.1.1.1 Employees that are unloading and staging girders will be provided access by placing ladders against girders so that it extends at least three (3') feet above the top flange and securing it to the girder.

24.11.1.1.1.2 Employees will install anchorages, posts and horizontal lifelines in accordance with the procedures outlined in the *Carbon America Fall Protection Program*, while the girder is on the truck.

24.11.1.1.1.3 In accordance with Carbon America Fall Protection Safety Program, 100% Fall Protection practices are to be implemented at heights greater than six (6') feet above a lower level.


24.11.1.1.1.4 Employees will attach to the horizontal lifeline, once it has been installed, by means of a retractable lanyard or 4 – 6 foot adjustable shock absorbing lanyard, and full body harness, place the spread beam, and exit the top flange of the girder.

24.11.1.1.1.5 Steps 1, 3, and 4 will be repeated when the beam reaches the staging area, or when it rigged to be lifted into its final position.

24.11.2 Accessing Plate Girders and Diaphragms

24.11.2.1 Accessing points to girders located over the ground will be made via Elevating Work Platforms. Employees shall be trained in the proper operation of Elevating Work Platforms in accordance with Carbon America Elevating Work Platform Safety Program.

24.11.2.2 Accessing points to girders located over the water will be made via personnel suspended platforms (i.e., man baskets). Employees shall be trained in Carbon America Personnel Hoisting Safety Program.

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24.11.2.3 When the designated connector(s) access the girder, a second lanyard will be attached to the horizontal lifeline prior to disconnecting lanyard from the basket.

24.11.3 Connection of Plate Girders and Diaphragms

24.11.3.1 Designated connectors will make the top flange of the field splice between the two girders and secure with a minimum of (2) two bull pins.

24.11.3.2 Designated connectors will then place Carbon America approved engineered “personnel suspended platforms” in place.

24.11.3.3 Designated connectors accessing the webs and bottom flanges of girders will connected to the horizontal lifeline located on the top flange of the girder by means of a retractable lanyard and full body harness.


24.11.3.4 For the erection of welded structural steel angle diaphragms, designated connectors will be connected to the horizontal lifeline by either a lanyard and full body harness, or a retractable lanyard and full body harness.

24.12 TIED ARCH

24.12.1 For the unloading and erection, and field splice connection of tied arch members, **Designated Connectors** and employees will:

24.12.1.1 Unloading and Staging Tie Cord Members

24.12.1.1.1 Stanchion posts and horizontal lifelines shall be installed on members prior to the member being lifted. In accordance with Carbon America Fall Protection Safety Program, 100% Fall Protection practices are to be implemented on all connections that are made at heights greater than six (6') feet above a lower level.

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24.12.1.1.2 Designated connectors will attach to the horizontal lifeline by means of a retractable lanyard, 4 – 6 foot adjustable shock absorbing lanyard, and full body harness.

24.12.1.1.3 For the field splice connection of tie chords, designated connectors will enter the top cover plates into the field splice and secure the member with a minimum of two (2) bull pins.

24.12.1.1.4 Designated connectors will then place Carbon America approved engineered “personnel suspended platforms” in place.

24.12.1.1.5 Designated connectors or employees accessing the webs and lower bottom cover plates of members will connect to the horizontal lifeline located on the top of the member via a retractable lanyard and full body harness.


24.12.2 ARCH RIBS

24.12.2.1 Stanchions and horizontal lifelines shall be installed on members prior to the member being lifted. In accordance with Carbon America Fall Protection Safety Program, 100% Fall Protection practices are to be implemented on all connections that are made at heights greater than six (6') feet above a lower level.

24.12.2.2 Employees will attach to the horizontal lifeline by means of a retractable lanyard, 4 – 6 foot adjustable shock absorbing retractable lanyard, and full body harness.

24.12.2.3 Employees accessing the webs and lower bottom cover plates of members will connect to the horizontal lifeline located on the top of the member by a retractable lanyard and full body harness.

24.12.2.4 Designated connectors will then place Carbon America approved engineered “personnel suspended platforms” in place.

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24.12.2.5 Employees accessing the webs and lower bottom cover plates of members will tie off to the horizontal lifeline located on the top of the member by a vertical retractable lanyard and full body harness.

24.12.3 FLOOR BEAMS, STRINGERS, LATERALS

24.12.3.1 To improve employee access across the floor beams of the Westbound Arch* two (2) forty-foot (40') manufactured aluminum picks that are twenty-four inches (24") in width will be fixed together, and equipped with a top-rail at 42-inches (+/-3-inches) and mid rails at 21-inches (+/-3-inches) and anchored to the floor beams on the North and South Side of the arch. Combined these access walkways will have a maximum center span load rated capacity of 750 lbs.


24.12.3.2 **Note this is a change being made from the construction of the eastbound arch to provide a more controlled and safer access to multiple points on the arch, than could be provided by a standard Horizontal Lifeline. Elements of the Eastbound arch will be retrofitted*

24.12.3.3 To provide access to the arch rib, a mid point stair tower will be erected on the North and South side of the structure at approximately mid-point of the arch.

24.12.3.4 Stanchions and horizontal lifelines shall be installed on members prior to the member being lifted. In accordance with Carbon America Fall Protection Safety Program, 100% Fall Protection practices are to be implemented when employees are working at heights greater than six (6') feet above a lower level.

24.12.3.5 Employees will attach to the horizontal lifeline by means of a retractable lanyard, 4 – 6 foot adjustable shock absorbing lanyard, and full body harness.

24.12.3.6 Designated connectors will then place Carbon America approved engineered "personnel suspended platforms" in place.

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24.12.3.7 Employees accessing the webs and lower bottom cover plates of members will tie off to the horizontal lifeline located on the top of the member by a retractable lanyard, and full body harness.

24.13 Training

24.13.1 Prior to the commencement of steel erection work activities the employees will be trained in the following areas in accordance with the Carbon America Safety and Health Manual:

24.13.1.1 New Hire Orientation

24.13.1.2 Fall Protection

24.13.1.3 Steel Erection Safety Program


24.13.1.4 Crane Safety

24.13.1.5 Rigging Safety – *note that all employees engaged in the multiple lifts will be trained in the nature of the hazards associated with multiple lifts as well as proper procedures and equipment to perform multiple lifts.*

24.13.1.6 Elevating Work Platforms (when used)

24.13.1.7 Suspended Personnel Platforms (when used)

24.13.2 Furthermore, the **Project Manager** with the assistance of the **Safety Department** shall ensure that each Designated Connector has been provided training in the nature of hazards associated with connecting, proper connecting techniques, project specific safety hazards and requirements.

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25.1 Policy Statement

25.1.1 It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

25.1.2 Carbon America will comply with the OSHA ***Hand and Power tools*** standard, 29 CFR 1910.242 and 29 CFR 1926.300, through implementation of this written program.

25.2 Purpose

25.2.1 To ensure safe operation of hand and power tools at the jobsite.

25.2.2 To Comply with OSHA standard 29 CFR 1910.242

25.2.3 To Comply with OSHA standard 29 CFR 1926.300


25.3 References

25.3.1 29 CFR 1910.242

25.3.2 29 CFR 1926.300

25.3.3 ANSI B7.1 Safety Code for the Use, Care, and Protection of Abrasive Wheels

25.4 General Requirements

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25.4.1 Condition of tools.

25.4.1.1 All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

25.4.2 Guarding

25.4.2.1 When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.


25.4.2.2 Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements as set forth in American National Standards Institute, B15.1-1953 (R1958), Safety Code for Mechanical Power-Transmission Apparatus.

25.4.2.3 "Types of guarding." One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are - barrier guards, two-hand tripping devices, electronic safety devices, etc.

25.4.2.4 "Point of Operation Guarding"

25.4.2.5 Point of operation is the area on a machine where work is actually performed upon the material being processed.

25.4.2.6 The point of operation of machine's whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards therefor, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.

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25.4.2.7 Special hand tools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this section, but can only be used to supplement protection provided.

25.4.2.8 The following are some of the machines which usually require point of operation guarding:

25.4.2.8.1 Guillotine cutters.

25.4.2.8.2 Shears.

25.4.2.8.3 Grinders.

25.4.2.8.4 Powered presses.

25.4.2.8.5 Milling machines.

25.4.2.8.6 Power saws.

25.4.2.8.7 Jointers.


25.4.2.8.8 Portable power tools.

25.4.2.8.9 Forming rolls and calendars.

25.4.2.8.10 "Exposure of blades." When the periphery of the blades of a fan is less than 7 feet (2.128 m) above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than 1/2 inch (1.27 cm).

25.4.2.9 "Anchoring fixed machinery" Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

25.4.2.10 "Guarding of abrasive wheel machinery - exposure adjustment."

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25.4.2.11 Safety guards of the types described in this program, where the operator stands in front of the opening, shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel.

25.4.2.12 The maximum angular exposure above the horizontal plane of the wheel spindle as specified shall never be exceeded, and the distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed 1/4 inch (0.635 cm). (See Figures I-1 through I-6.)

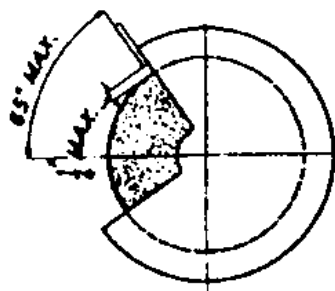


Figure I-1

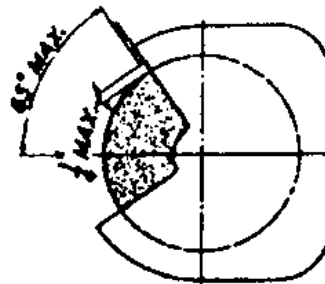


Figure I-2

Figures I-1 and I-2 are Correct -Showing adjustable tongue giving required angle protection for all sizes of wheel used.

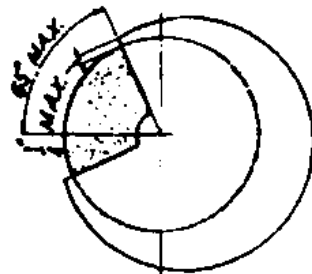


Figure I-3

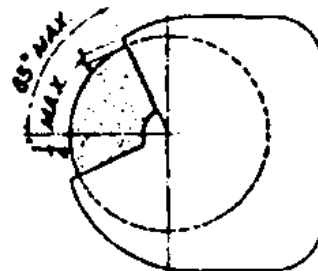



Figure I-4

Figures I-3 and I-4 are Correct - Showing movable guard with opening small enough to give required protection for the smallest size wheel used.

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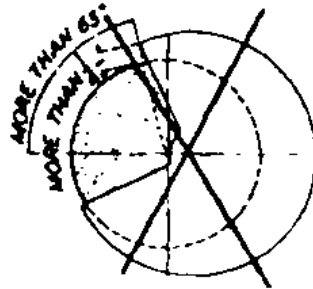


Figure I-5



Figure I-6

Figures I-5 and I-6 are Incorrect - Showing movable guard with size of opening correct for full size wheel but too large for smaller wheel.

25.4.2.13 Bench and floor stands. The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90 deg. or one-fourth of the periphery. This exposure shall begin at a point not more than 65 deg. above the horizontal plane of the wheel spindle. (See Figures I-7 and I-8)

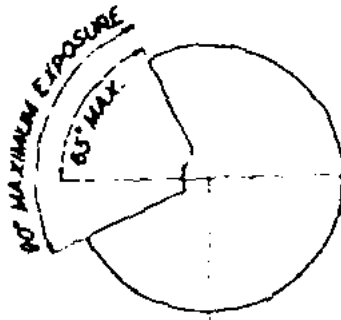


Figure I-7

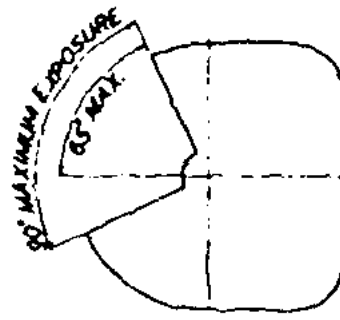



Figure I-8

Whenever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125 deg. (See Figures I-9 and I-10.)

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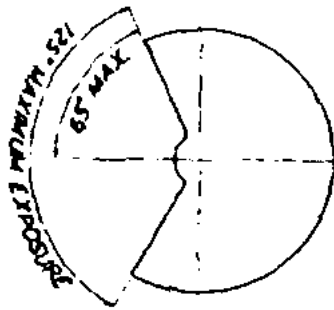


Figure I-9

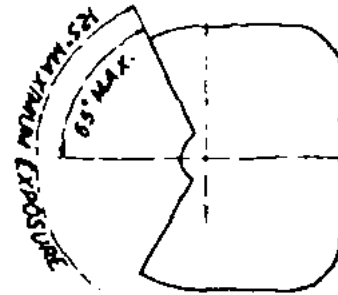


Figure I-10

25.4.2.14 Cylindrical grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on cylindrical grinding machines shall not exceed 180 deg.. This exposure shall begin at a point not more than 65 deg. above the horizontal plane of the wheel spindle. (See Figures I-11 and I-12 and paragraph (b)(7) of this section.)

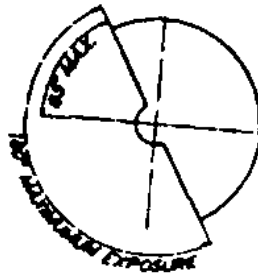


Figure I-11

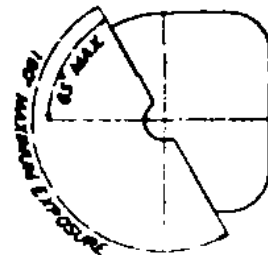



Figure I-12

25.5 Personal protective equipment

25.5.1 Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard.

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25.5.2 All personal protective equipment shall meet the requirements and be maintained according to relative standards.

25.6 Switches

25.6.1 All hand-held powered platen sanders, grinders with wheels 2-inch diameter or less, routers, planers, laminate trimmers, nibblers, shears, scrolls saws, and jigsaws with blade shanks one-fourth of an inch wide or less may be equipped with only a positive “on-off” control.

25.6.2 All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools shall be equipped with a momentary contact "on-off" control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

25.6.3 All other hand-held powered tools, such as circular saws, chain saws, and percussion tools without positive accessory holding means, shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.

25.6.4 Exception: This paragraph does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, and similar hand operated power tools. Relative standards and manufacturer requirements shall be followed for these tools.


25.7 Inspections

25.7.1 Hand and power tools shall be inspected before each use.

25.7.2 Any tool which is not in compliance with any applicable standard or requirement of this written program is prohibited from use and shall be identified as unsafe by tagging with an Carbon America lock out tag and red zip tie, or locked at the controls to render them inoperable. Such a tool shall be physically removed from its place in operation.

25.8 Training


25.8.1 Annual Training

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25.8.1.1 Employees required to use hand and power tools shall be trained on their proper use, care, maintenance and inspection, and the required use of PPE for that particular tool.

25.8.2 Refresher Training

25.8.2.1 Any employee who is involved in an incident or near miss with a hand or power tool will undergo refresher training in that particular tools safe operation and use.

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REVIEW LOG:

Date	Purpose for review	Person
05/10/2022	New Safety Manual	Hinz

26.1 Policy Statement

26.1.1 It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

26.1.2 Carbon America will comply with the OSHA **Welding, Cutting & Brazing** standard, 29 CFR 1910.252, 253, through implementation of this written program.

26.2 Purpose

26.2.1 The purpose of this written program is to provide guidelines, requirements, and procedures that will ensure employee safety when performing cutting, welding and brazing operations.

26.2.2 This document applies to all Carbon America employees, visitors, and contractors who conduct hot work, Including, welding, cutting & brazing operations.

26.3 References


26.3.1 29 CFR 1910 Subpart Q Welding, Cutting & Brazing

26.3.2 29 CFR 1926 Subpart J Welding, Cutting & Brazing

26.3.3 API Recommended Practice 54

26.3.4 ANSI Z87.1-1979 Practice for Occupational and Educational Eye and Face Protection standard

26.4 General Requirements

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26.4.1 Management

26.4.2 Management shall recognize its responsibility for the safe usage of cutting and welding equipment on its property and:

- 26.4.2.1** Based on fire potentials of plant facilities, establish areas for cutting and welding, determine if a hot work permit is required and establish procedures for cutting and welding, in other areas.
- 26.4.2.2** Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.
- 26.4.2.3** Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.
- 26.4.2.4** Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.
- 26.4.2.5** When required, ensure the hot work permit is completed.

26.4.3 Supervisors

- 26.4.3.1** Shall be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.
- 26.4.3.2** Shall determine the combustible materials and hazardous areas present or likely to be present in the work location.
- 26.4.3.3** Shall have the work moved to a location free from dangerous combustibles
- 26.4.3.4** If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.
- 26.4.3.5** See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.

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26.4.3.6 Shall secure authorization for the cutting or welding operations from the designated management representative.

26.4.3.7 Shall determine that the cutter or welder secures his approval that conditions are safe before going ahead.

26.4.3.8 Shall determine that fire protection and extinguishing equipment are properly located at the site.

26.4.3.9 Where fire watches are required, the supervisor shall see that they are available at the site.

26.5 Fire Prevention Precautions

26.5.1 Cutting or welding shall be permitted only in areas that are or have been made fire safe. When work cannot be moved practically, as in most construction work, the area shall be made safe by removing combustibles or protecting combustibles from ignition sources.

26.6 Welding or Cutting Containers

26.6.1 No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors.

26.6.2 Any pipe lines or connections to the drum or vessel shall be disconnected or blanked.


26.7 Venting & Purging

26.7.1 All hollow spaces, cavities or containers shall be vented to permit the escape of air or gases before preheating, cutting or welding.

26.7.2 Purging with inert gas is recommended.

26.8 Accidental Contact

26.8.1 When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be

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removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source.

26.9 Torch Valve

26.9.1 In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose shall also be removed from the confined space.

26.10 First Aid Equipment

26.10.1 First-aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid shall be rendered until medical attention can be provided.

26.11 Field Shop Operations

26.11.1 Where field shop operations are involved for fabrication of fittings, river crossings, road crossings, and pumping and compressor stations the requirements of this program shall be observed.

26.12 Electric Shock


26.12.1 When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock shall be supplied.

26.13 Fire Prevention and Protection

26.13.1 The basic precautions for fire prevention in welding or cutting work are:

26.13.1.1 Fire hazards. If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.

26.13.1.2 Guards. If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be

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used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

26.13.1.3 Restrictions. If the requirements stated above cannot be followed then welding and cutting shall not be performed.

26.13.2 Special Precautions for Combustible Material

26.13.2.1 Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks that could drop through the floor.

26.13.2.2 Precautions shall be observed to prevent sparks and slag from dropping to lower levels with regard to cracks or holes in walls, open doorways and open or broken windows.

26.13.3 Fire Extinguishers

26.13.3.1 Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use.

26.13.3.2 Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.


26.13.4 Fire Watch & Hot Work Permits

26.13.4.1 A Fire watcher and hot work permit shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

26.13.4.1.1 Appreciable combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation.

26.13.4.1.2 Appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.

26.13.4.1.3 Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

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26.13.4.1.4 Closed Flame – that is 35 feet (10.7 m) or less from areas where flammable or combustible atmospheres may exist.

26.13.4.1.5 Opened Flame – that is 75 feet (22.9 m) or less from areas where flammable or combustible atmospheres may exist.

26.13.4.1.6 Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

26.13.5 Fire Watch Duties

26.13.5.1 Fire watchers shall have fire extinguishing equipment readily available and be trained in its use.

26.13.5.2 The minimum requirement is a 20 lb. multi-purpose (Class ABC) dry chemical fire extinguisher

26.13.5.3 They shall be familiar with facilities for sounding an alarm in the event of a fire.

26.13.5.4 They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm.


26.13.5.5 A fire watch shall be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

26.13.6 Fire Watch Training

26.13.6.1 Shall include at a minimum;

26.13.6.1.1 Definition of flammable and combustible materials and how to identify them.

26.13.6.1.2 Hazards associated with fires.

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26.13.6.1.3 Site-specific training on the materials being protected from fire and potential hazards of the materials should they catch fire.

26.13.6.1.4 The uses and limitation of firefighting equipment (i.e. fire extinguishers, fire hoses, etc.).

26.13.6.1.5 Hot work permit system and requirements.

26.14 Hot Work Permit Requirements

26.14.1 Before cutting or welding is permitted, the area shall be inspected by the individual responsible for authorizing cutting and welding operations (Carbon America Foreman or Supervisor). He or she shall designate precautions to be followed in granting authorization to proceed.

26.14.2 The Hot Work Permit must be revalidated before work can be restarted following an interruption due to Stop Work Authority, weather conditions, alarms or unforeseen dangerous conditions.

26.14.3 At a minimum a hot work permit is required anytime the following conditions exist:


26.14.3.1 Anytime appreciable combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation.

26.14.3.2 Anytime appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.

26.14.3.3 Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

26.14.3.4 Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

26.14.3.5 Carbon America will follow the procedures and requirements of the host employer in regards to Hot Work permits, provided that they meet the requirements of this written program and 29 CFR 1910.252- and 1926.352

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26.14.3.6 See **Attachment 1** for the Carbon America Hot Work Permit

26.14.4 Floors

26.14.4.1 Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet (10.7 m).

26.14.4.2 Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields.

26.14.4.3 Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

26.15 Prohibited Areas

26.15.1 Cutting or welding shall not be permitted in the following situations:

26.15.1.1 In areas not authorized by management.

26.15.1.2 In sprinklered buildings while such protection is impaired.


26.15.1.3 In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

26.15.1.4 In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

26.15.1.5 Where ignition can be caused by heat conduction, such as on metal walls or pipes in contact with combustibles on the other side.

26.15.1.6 On used containers such as drums.

26.16 Relocation of Combustibles

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26.16.1 Where practicable, all combustibles shall be relocated at least 35 feet (10.7 m) from the work site.

26.16.2 Where relocation is impracticable, combustibles shall be protected with flame proofed covers or otherwise shielded with metal or curtains.

26.16.3 Ducts. Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

26.16.4 Combustible Walls

26.16.4.1 Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.

26.16.5 Noncombustible Walls

26.16.5.1 If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.

26.16.6 Combustible Cover

26.16.6.1 Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.


26.16.7 Pipes

26.16.7.1 Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

26.17 Protection of Personnel

26.17.1 Welding cable. Welders shall place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

26.17.2 Eye Protection

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26.17.2.1 Proper helmets and face shields with appropriately shaded sight glass shall be used during all arc welding or arc cutting operations, excluding submerged arc welding.

26.17.2.2 Goggles with proper shade selection shall be worn during arc welding, cutting and brazing.

26.17.2.3 Helpers or attendants shall be provided with proper eye protection.

26.17.2.4 Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations.

26.17.2.5 All operators and attendants of resistance welding or resistance brazing equipment shall use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required.

26.17.2.6 Eye protection in the form of suitable goggles shall be provided where needed for brazing operations.

26.17.3 Specifications for Protectors

26.17.3.1 Helmets and hand shields shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall be not readily flammable and shall be capable of withstanding sterilization.


26.17.3.2 Helmets shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

26.17.3.3 Helmets shall be provided with filter plates and cover plates designed for easy removal.

26.17.3.4 All parts shall be constructed of a material which will not readily corrode or discolor the skin.

26.17.3.5 Goggles shall be ventilated to prevent fogging of the lenses as much as practicable.

26.17.3.6 All glass for lenses shall be tempered, substantially free from striae, air bubbles, waves and other flaws. Except when a lens

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is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows shall be smooth and parallel.

26.17.3.7 Lenses shall bear some permanent distinctive marking by which the source and shade may be readily identified.

26.17.3.8 The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.

26.17.3.9 Filter lenses must meet the test for transmission of radiant energy prescribed by any of the consensus standards listed in 29 CFR 1910.133(b)(1)-, 1926.353 (d)(1)

26.17.4 Protection from Arc Welding Rays

26.17.4.1 Where the work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultraviolet radiations) and lamp black, or shall be enclosed with noncombustible screens similarly painted.


26.17.4.2 Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

26.17.5 Protective Clothing

26.17.5.1 Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment in accordance with the requirements of 1910.132.

26.17.5.2 Appropriate protective clothing required for any welding operation will vary with the size, nature and location of the work to be performed.

26.18 Confined Spaces

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26.18.1 As used herein confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure vessel, or small compartment of a ship – Refer to the Carbon America Confined Space Entry Program.

26.18.2 Ventilation. Ventilation is a prerequisite to work in confined spaces. For ventilation requirements see paragraph (c) of this section.

26.18.3 Securing cylinders and machinery. When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement


26.18.4 Lifelines. Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose they shall be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant with a preplanned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

26.18.5 Electrode removal. When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine disconnected from the power source.

26.18.6 Gas cylinder shutoff. In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable the torch and hose shall also be removed from the confined space.

26.18.7 Warning sign. After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

26.19 Health Protection and Ventilation

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26.19.1 Contamination.

26.19.1.1 These requirements have been established on the basis of the following three factors in arc and gas welding which govern the amount of contamination to which welders may be exposed:

26.19.1.1.1 Dimensions of space in which welding is to be done (with special regard to height of ceiling).

26.19.1.1.2 Number of welders.

26.19.1.1.3 Possible evolution of hazardous fumes, gases, or dust according to the metals involved.

26.19.1.2 Screens. When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.


26.19.1.3 Maximum allowable concentration. Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in 29 CFR 1910.1000 1000n and or 1926.353.

26.20 Precautionary Labels

26.20.1 A number of potentially hazardous materials are employed in fluxes, coatings, coverings, and filler metals used in welding and cutting or are released to the atmosphere during welding and cutting.

26.20.2 The suppliers of welding materials shall determine the hazard, if any, associated with the use of their materials in welding, cutting, etc.

26.20.3 All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers: CAUTION Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate

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ventilation. See ANSI Z49.1-1967 Safety in Welding and Cutting published by the American Welding Society.

26.20.4 Brazing (welding) filler metals containing cadmium in significant amounts shall carry the following notice on tags, boxes, or other containers: WARNING CONTAINS CADMIUM - POISONOUS FUMES MAY BE FORMED ON HEATING Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1-1967. If chest pain, cough, or fever develops after use call physician immediately.

26.20.5 Brazing and gas welding fluxes containing fluorine compounds shall have a cautionary wording to indicate that they contain fluorine compounds. One such cautionary wording recommended by the American Welding Society for brazing and gas welding fluxes reads as follows: CAUTION CONTAINS FLUORIDES This flux when heated gives off fumes that may irritate eyes, nose and throat. 1. Avoid fumes - use only in well-ventilated spaces. 2. Avoid contact of flux with eyes or skin. 3. Do not take internally.

26.21 Ventilation

26.21.1 Mechanical ventilation shall be provided when welding or cutting is done on metals not covered in this written program.


26.21.2 A hazard assessment, which may include hygiene testing, shall be conducted to determine the exposure levels of each potential contaminant.

26.21.3 Minimum rate. Ventilation shall be at the minimum rate of 2,000 cubic feet (57 m(3)) per minute per welder, except where local exhaust hoods and booths, or airline respirators approved by the U.S. Bureau of Mines for such purposes are provided.

26.21.4 Natural ventilation is considered sufficient for welding or cutting operations where the following restrictions are not present:

26.21.4.1 In a space of less than 10,000 cubic feet (284 m(3)) per welder.

26.21.4.2 In a room having a ceiling height of less than 16 feet (5 m).

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26.21.4.3 In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

26.21.5 Local Exhaust Hoods and Booths

26.21.5.1 Mechanical local exhaust ventilation may be by means of either of the following:

26.21.5.1.1 Hoods. Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with a rate of air-flow sufficient to maintain a velocity in the direction of the hood of 100 linear feet (30 m) per minute in the zone of welding when the hood is at its most remote distance from the point of welding. The rates of ventilation required to accomplish this control velocity using a 3-inch (7.6 cm) wide flanged suction opening are shown in the following table:

Welding Zone	Minimum air flow (1) cubic feet/ minutes	Duct diameter, inches (2)
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3 1/2
8 to 10 inches from arc or torch	425	4 1/2
10 to 12 inches from arc or torch	600	5 1/2


Footnote(1) When brazing w/ cadmium bearing materials or cutting on such materials increased rates of ventilation may be required.

Footnote(2) Nearest half-inch duct diameter based on 4,000 feet per minute velocity in pipe.

26.21.5.2 Fixed enclosure. A fixed enclosure with a top and not less than two sides which surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

26.21.6 Ventilation in Confined Spaces

26.21.6.1 Air replacement. All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent

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the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All air replacing that withdrawn shall be clean and respirable.

26.21.6.2 Airline respirators. In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR part 84 must be used.

26.21.6.3 Self-contained units. In areas immediately hazardous to life, a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH under 42 CFR part 84 must be used.


26.21.6.4 Oxygen for ventilation. Oxygen shall never be used for ventilation.

26.22 Potential Hazardous Compounds

26.22.1 Hexavalent Chromium

26.22.1.1 The employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below the PEL unless the employer can demonstrate that such controls are not feasible. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall use them to reduce employee exposure to the lowest levels achievable, and shall supplement them by the use of respiratory protection that complies with the requirements of Carbon America 6.0 Respirator Protection.

26.22.1.2 Maximum allowable concentration. The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown such protection to be desirable for fixed-location production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the

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Chromium (VI) is liberated below the maximum allowable concentration, such protection is not necessary.

26.22.2 Fluorine compounds.

26.22.2.1 In confined spaces, welding or cutting involving fluxes, coverings, or other materials which contain fluorine compounds shall be done in accordance with OSHA 29 CFR 1910.252(c)(4). A fluorine compound is one that contains fluorine, as an element in chemical combination, not as a free gas.

26.22.2.2 Maximum allowable concentration. The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown such protection to be desirable for fixed-location production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the fluorides liberated are below the maximum allowable concentration, such protection is not necessary.

26.22.3 Zinc.


26.22.3.1 In confined spaces welding or cutting involving zinc-bearing base or filler metals or metals coated with zinc-bearing materials shall be done in accordance with OSHA 29 CFR 1910.252(c)(4) and or 1926.353 (c)(1)(i).

26.22.3.2 Indoors. Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials shall be done in accordance with OSHA 29 CFR 1910.252(c)(3) and or 1926.353 (c)(1)(i).

26.22.4 Lead.

26.22.4.1 In confined spaces, welding involving lead-base metals (erroneously called lead-burning) shall be done in accordance with OSHA 29 CFR 1910.252(c)(4) and or 1925.353 (c)(1)(ii).

26.22.4.2 Indoors. Indoors, welding involving lead-base metals shall be done in accordance with OSHA 29 CFR 1910.252(c)(~~34~~) and or 1925.353 (c)(1)(ii).

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26.22.4.3 Local ventilation. In confined spaces or indoors, welding or cutting operations involving metals containing lead, other than as an impurity, or metals coated with lead-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84. In all cases, workers in the immediate vicinity of the cutting operation must be protected by local exhaust ventilation or airline respirators.

26.22.5 Beryllium.

26.22.5.1 Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by 1910.1000 of this part.


26.22.5.2 In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

26.22.6 Cadmium.

26.22.6.1 In confined spaces or indoors, welding or cutting operations involving cadmium-bearing or cadmium-coated base metals must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators, such as fume respirators, approved for this purpose by NIOSH under 42 CFR part 84.

26.22.6.2 Welding (brazing) involving cadmium-bearing filler metals shall be done using ventilation as prescribed in paragraph in accordance with OSHA 29 CFR 1910.252 (c)(3) or (c)(4).

26.22.7 Mercury.

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26.22.7.1 In confined spaces or indoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000.

26.22.7.2 Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84.

26.22.8 Cleaning compounds.

26.22.8.1 Manufacturer's instructions. In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturers' instructions shall be followed.

26.22.8.2 Degreasing. Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloroethylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

26.22.9 Cutting of stainless steels.


26.22.9.1 Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

26.22.10 All Other Potentially Hazardous Compounds

26.22.10.1 A hazard assessment, which may include hygiene testing, shall be conducted to determine what, if any, exist with the potential to harm any employee's health.

26.23 Oxygen Fuel Gas Welding and Cutting

26.23.1 Flammable mixture. Mixtures of fuel gases and air or oxygen may be explosive and shall be guarded against. No device or attachment

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facilitating or permitting mixtures of air or oxygen with flammable gases prior to consumption, except at the burner or in a standard torch, shall be allowed unless approved for the purpose.

26.23.2 Maximum pressure. Under no condition shall acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 psig (103 kPa gauge pressure) or 30 psia (206 kPa absolute). (The 30 psia (206 kPa absolute) limit is intended to prevent unsafe use of acetylene in pressurized chambers such as caissons, underground excavations or tunnel construction.) This requirement is not intended to apply to storage of acetylene dissolved in a suitable solvent in cylinders manufactured and maintained according to U.S. Department of Transportation requirements, or to acetylene for chemical use. The use of liquid acetylene shall be prohibited.

26.23.3 Apparatus. Only approved apparatus such as torches, regulators or pressure-reducing valves, acetylene generators, and manifolds shall be used.


26.23.4 Personnel. Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems shall be readily available.

26.24 Cylinders and Container - Approval and Marking

26.24.1 All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation, 49 CFR Parts 171-179.

26.24.2 Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be located on the shoulder of the cylinder.

26.24.3 Compressed gas cylinders shall be equipped with connections complying with the American National Standard Compressed Gas

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Cylinder Valve Outlet and Inlet Connections, ANSI B57.1-1965, which is incorporated by reference as specified in Sec. 1910.6.

26.24.4 All cylinders with a water weight capacity of over 30 pounds (13.6 kg) shall be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve.

26.25 Storage of Cylinders

26.25.1 Cylinders shall be kept away from radiators and other sources of heat.

26.25.2 Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 (6.1 m) feet from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.


26.25.3 Empty cylinders shall have their valves closed.

26.25.4 Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.

26.26 Storage of Fuel-Gas Cylinders

26.26.1 Inside a building, cylinders, except those in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet (56 m³) or 300 pounds (135.9 kg) of liquefied petroleum gas.

26.26.2 For storage in excess of 2,000 cubic feet (56 m³) total gas capacity of cylinders or 300 pounds (135.9 kg) of liquefied petroleum gas, a separate room or compartment conforming to the requirements specified in paragraphs (f)(6)(i)(H) and (f)(6)(i)(I) of this section shall be provided, or cylinders shall be kept outside or in a special building. Special buildings, rooms or compartments shall have no open flame for heating or lighting and shall be well ventilated. They may also be used for storage of calcium carbide in quantities not to exceed 600 (271.8 kg) pounds, when contained in metal containers complying with paragraphs (g)(1)(i) and (g)(1)(ii) of this section.

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26.26.3 Acetylene cylinders shall be stored valve end up with protective caps affixed and properly secured. When a job using acetylene devices is completed or prior to transporting acetylene cylinders, the valve on the acetylene cylinder shall be closed and pressure on the hoses bled to zero.

26.27 Oxygen Storage

26.27.1 Cylinders shall not be kept in unventilated enclosures, such as lockers or cupboards.


26.27.2 Oxygen cylinders shall not be stored near highly combustible material, especially oil and grease; or near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire; or in an acetylene generator compartment.

26.27.3 Oxygen cylinders stored in outside generator houses shall be separated from the generator or carbide storage rooms by a noncombustible partition having a fire-resistance rating of at least 1 hour. This partition shall be without openings and shall be gastight.

26.27.4 Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

26.27.5 Where a liquid oxygen system is to be used to supply gaseous oxygen for welding or cutting and the system has a storage capacity of more than 13,000 cubic feet (364 m³) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), connected in service or ready for service, or more than 25,000 cubic feet (700 m³) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), including unconnected reserves on hand at the site, it shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965, which is incorporated by reference as specified in Sec. 1910.6.

26.28 Operating Procedures

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26.28.1 Cylinders, cylinder valves, couplings, regulators, hose, and apparatus shall be kept free from oily or greasy substances. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves. A jet of oxygen must never be permitted to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank.

26.28.2 When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform shall be used. Slings or electric magnets shall not be used for this purpose. Valve-protection caps, where cylinder is designed to accept a cap, shall always be in place.

26.28.3 Cylinders shall not be dropped or struck or permitted to strike each other violently.

26.28.4 Valve-protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended. Valve-protection caps are designed to protect cylinder valves from damage.

26.28.5 Unless cylinders are secured on a special truck, regulators shall be removed and valve-protection caps, when provided for, shall be put in place before cylinders are moved.

26.28.6 Cylinders not having fixed hand wheels shall have keys, handles, or nonadjustable wrenches on valve stems while these cylinders are in service. In multiple cylinder installations only one key or handle is required for each manifold.


26.28.7 Cylinder valves shall be closed before moving cylinders.

26.28.8 Cylinder valves shall be closed when work is finished.

26.28.9 Valves of empty cylinders shall be closed.

26.28.10 Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them, or fire-resistant shields shall be provided.

26.28.11 Cylinders shall not be placed where they might become part of an electric circuit. Contacts with third rails, trolley wires, etc., shall be avoided. Cylinders shall be kept away from radiators, piping systems,

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layout tables, etc., that may be used for grounding electric circuits such as for arc welding machines. Any practice such as the tapping of an electrode against a cylinder to strike an arc shall be prohibited.

26.28.12 Cylinders shall never be used as rollers or supports, whether full or empty.

26.28.13 The numbers and markings stamped into cylinders shall not be tampered with.

26.28.14 No person, other than the gas supplier, shall attempt to mix gases in a cylinder. No one, except the owner of the cylinder or person authorized by him, shall refill a cylinder.

26.28.15 No one shall tamper with safety devices in cylinders or valves.

26.28.16 Cylinders shall not be dropped or otherwise roughly handled.

26.28.17 Unless connected to a manifold, oxygen from a cylinder shall not be used without first attaching an oxygen regulator to the cylinder valve. Before connecting the regulator to the cylinder valve, the valve shall be opened slightly for an instant and then closed. Always stand to one side of the outlet when opening the cylinder valve.


26.28.18 A hammer or wrench shall not be used to open cylinder valves. If valves cannot be opened by hand, the supplier shall be notified.

26.28.19 Cylinder valves shall not be tampered with nor should any attempt be made to repair them. If trouble is experienced, the supplier should be sent a report promptly indicating the character of the trouble and the cylinder's serial number. Supplier's instructions as to its disposition shall be followed.

26.28.20 Complete removal of the stem from a diaphragm-type cylinder valve shall be avoided.

26.28.21 Fuel-gas cylinders shall be placed with valve end up whenever they are in use. Liquefied gases shall be stored and shipped with the valve end up.

26.28.22 Cylinders shall be handled carefully. Rough handling, knocks, or falls are liable to damage the cylinder, valve or safety devices and cause leakage.

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26.28.23 Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately. The valve shall be opened while standing to one side of the outlet; never in front of it. Never crack a fuel-gas cylinder valve near other welding work or near sparks, flame, or other possible sources of ignition.

26.28.24 Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator.

26.28.25 Nothing shall be placed on top of an acetylene cylinder when in use which may damage the safety device or interfere with the quick closing of the valve.

26.28.26 If cylinders are found to have leaky valves or fittings which cannot be stopped by closing of the valve, the cylinders shall be taken outdoors away from sources of ignition and slowly emptied.

26.28.27 A warning should be placed near cylinders having leaking fuse plugs or other leaking safety devices not to approach them with a lighted cigarette or other source of ignition. Such cylinders should be plainly tagged; the supplier should be promptly notified and his instructions followed as to their return.


26.28.28 Safety devices shall not be tampered with.

26.28.29 Fuel-gas shall never be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.

26.28.30 The cylinder valve shall always be opened slowly.

26.28.31 An acetylene cylinder valve shall not be opened more than one and one-half turns of the spindle, and preferably no more than three-fourths of a turn.

26.28.32 Where a special wrench is required it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In the case of manifolded or coupled cylinders at least one such wrench shall always be available for immediate use.

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26.29 Manifolding of Cylinders

26.29.1 Manifolds shall be approved either separately for each component part or as an assembled unit.

26.29.2 Except as provided in paragraph (c)(1)(iii) of this section fuel-gas cylinders connected to one manifold inside a building shall be limited to a total capacity not exceeding 300 pounds (135.9 kg) of liquefied petroleum gas or 3,000 cubic feet (84 m³) of other fuel-gas. More than one such manifold with connected cylinders may be located in the same room provided the manifolds are at least 50 feet (15 m) apart or separated by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

26.29.3 Fuel-gas cylinders connected to one manifold having an aggregate capacity exceeding 300 pounds (135.9 kg) of liquefied petroleum gas or 3,000 cubic feet (84 m³) of other fuel-gas shall be located outdoors, or in a separate building or room constructed in accordance with paragraphs (f)(6)(i)(H) and (f)(6)(i)(I) of this section.


26.29.4 Separate manifold buildings or rooms may also be used for the storage of drums of calcium carbide and cylinders containing fuel gases as provided in paragraph (b)(3) of this section. Such buildings or rooms shall have no open flames for heating or lighting and shall be well-ventilated.

26.29.5 High-pressure fuel-gas manifolds shall be provided with approved pressure regulating devices.

26.29.6 High-pressure oxygen manifolds (for use with cylinders having a Department of Transportation service pressure above 200 psig (1.36 MPa).

26.29.7 Manifolds shall be approved either separately for each component part or as an assembled unit.

26.29.8 Oxygen manifolds shall not be located in an acetylene generator room. Oxygen manifolds shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

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26.29.9 Except as provided in paragraph (c)(2)(iv) of this section, oxygen cylinders connected to one manifold shall be limited to a total gas capacity of 6,000 cubic feet (168 m³). More than one such manifold with connected cylinders may be located in the same room provided the manifolds are at least 50 feet (15 m) apart or separated by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.


26.29.10 An oxygen manifold, to which cylinders having an aggregate capacity of more than 6,000 cubic feet (168 m³) of oxygen are connected, should be located outdoors or in a separate noncombustible building. Such a manifold, if located inside a building having other occupancy, shall be located in a separate room of noncombustible construction having a fire-resistance rating of at least one-half hour or in an area with no combustible material within 20 feet (6.1 m) of the manifold.

26.29.11 An oxygen manifold or oxygen bulk supply system which has storage capacity of more than 13,000 cubic feet (364 m³) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), connected in service or ready for service, or more than 25,000 cubic feet (700 m³) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), including unconnected reserves on hand at the site, shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965.

26.29.12 High-pressure oxygen manifolds shall be provided with approved pressure-regulating devices.

26.29.13 Low-pressure oxygen manifolds (for use with cylinders having a Department of Transportation service pressure not exceeding 200 psig (1.36 MPa)).

26.29.14 Manifolds shall be of substantial construction suitable for use with oxygen at a pressure of 250 psig (1.7 MPa). They shall have a minimum bursting pressure of 1,000 psig (6.8 MPa) and shall be protected by a safety relief device which will relieve at a maximum pressure of 500 psig (3.4 MPa). DOT-4L200 cylinders have safety devices which relieve at a maximum pressure of 250 psig (1.7 MPa) (or 235 psig (1.6 MPa) if vacuum insulation is used).

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26.29.15 Hose and hose connections subject to cylinder pressure shall comply with paragraph (e)(5) of this section. Hose shall have a minimum bursting pressure of 1,000 psig (6.8 MPa).

26.29.16 The assembled manifold including leads shall be tested and proven gas-tight at a pressure of 300 psig (2.04 MPa). The fluid used for testing oxygen manifolds shall be oil-free and not combustible.

26.29.17 The location of manifolds shall comply with paragraphs (c)(2)(ii), (c)(2)(iii), (c)(2)(iv), and (c)(2)(v) of this section.

26.29.18 The following sign shall be conspicuously posted at each manifold:
 Low-Pressure Manifold Do Not Connect High-Pressure Cylinders
 Maximum Pressure - 250 psig (1.7 MPa)

26.30 Portable Outlet Headers

26.30.1 Portable outlet headers shall not be used indoors except for temporary service where the conditions preclude a direct supply from outlets located on the service piping system.


26.30.2 Each outlet on the service piping from which oxygen or fuel-gas is withdrawn to supply a portable outlet header shall be equipped with a readily accessible shutoff valve.

26.30.3 Hose and hose connections used for connecting the portable outlet header to the service piping shall comply with paragraph (e)(5) of this section.

26.30.4 Master shutoff valves for both oxygen and fuel-gas shall be provided at the entry end of the portable outlet header.

26.30.5 Portable outlet headers for fuel-gas service shall be provided with an approved hydraulic back-pressure valve installed at the inlet and preceding the service outlets, unless an approved pressure-reducing regulator, an approved back-flow check valve, or an approved hydraulic back-pressure valve is installed at each outlet. Outlets provided on headers for oxygen service may be fitted for use with pressure-reducing regulators or for direct hose connection.

26.30.6 Each service outlet on portable outlet headers shall be provided with a valve assembly that includes a detachable outlet seal cap, chained or otherwise attached to the body of the valve.

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26.30.7 Materials and fabrication procedures for portable outlet headers shall comply with paragraphs (d)(1), (d)(2), and (d)(5) of this section.

26.30.8 Portable outlet headers shall be provided with frames which will support the equipment securely in the correct operating position and protect them from damage during handling and operation.

26.31 Manifold Operating Procedures

26.31.1 Cylinder manifolds shall be installed under the supervision of someone familiar with the proper practices with reference to their construction and use.

26.31.2 All manifolds and parts used in methods of manifolding shall be used only for the gas or gases for which they are approved.

26.31.3 When acetylene cylinders are coupled, approved flash arresters shall be installed between each cylinder and the coupler block. For outdoor use only, and when the number of cylinders coupled does not exceed three, one flash arrester installed between the coupler block and regulator is acceptable.

26.31.4 The aggregate capacity of fuel-gas cylinders connected to a portable manifold inside a building shall not exceed 3,000 cubic feet (84 m(3)) of gas.

26.31.5 Acetylene and liquefied fuel-gas cylinders shall be manifolded in a vertical position.


26.31.6 The pressure in the gas cylinders connected to and discharged simultaneously through a common manifold shall be approximately equal.

26.32 Arc Welding and Cutting

26.32.1 General Requirements.

26.32.1.1 Equipment selection. Welding equipment shall be chosen for safe application to the work to be done as specified in this written program

26.32.1.2 Installation. Welding equipment shall be installed safely as specified in this written program.

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26.32.1.3 Instruction. Workmen designated to operate arc welding equipment shall have been properly instructed and qualified to operate such equipment as specified in this written program.

26.32.2 Application of Arc Welding Equipment

26.32.2.1 Assurance of consideration of safety in design is obtainable by choosing apparatus complying with the Requirements for Electric Arc-Welding Apparatus, NEMA EW-1-1962, National Electrical Manufacturers Association or the Safety Standard for Transformer-Type Arc-Welding Machines, ANSI C33.2-1956, and Underwriters' Laboratories, both of which are incorporated by reference as specified in Sec. 1910.6.

26.32.3 Environmental Conditions


26.32.3.1 Standard machines for arc welding service shall be designed and constructed to carry their rated load with rated temperature rises where the temperature of the cooling air does not exceed 40 deg. C. (104 deg. F.) and where the altitude does not exceed 3,300 feet (1,005.8 m), and shall be suitable for operation in atmospheres containing gases, dust, and light rays produced by the welding arc.

26.32.3.2 Unusual service conditions may exist, and in such circumstances, machines shall be especially designed to safely meet the requirements of the service. Chief among these conditions are:

- 26.32.3.2.1** Exposure to unusually corrosive fumes.
- 26.32.3.2.2** Exposure to steam or excessive humidity.
- 26.32.3.2.3** Exposure to excessive oil vapor.
- 26.32.3.2.4** Exposure to flammable gases.
- 26.32.3.2.5** Exposure to abnormal vibration or shock.
- 26.32.3.2.6** Exposure to excessive dust.
- 26.32.3.2.7** Exposure to weather.
- 26.32.3.2.8** Exposure to unusual seacoast or shipboard conditions.

26.32.4 Voltage

26.32.4.1 The following limits shall not be exceeded:

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26.32.4.1.1 Alternating-current machines

26.32.4.1.2 Manual arc welding and cutting - 80 volts.

26.32.4.1.3 Automatic (machine or mechanized) arc welding and cutting - 100 volts.

26.32.4.2 Direct-current machines: Manual arc welding and cutting - 100 volts; Automatic (machine or mechanized) arc welding and cutting - 100 volts.

26.32.4.3 When special welding and cutting processes require values of open circuit voltages higher than the above, means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means.

26.32.4.4 For a.c. welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.


26.32.5 Design

26.32.5.1 A controller integrally mounted in an electric motor driven welder shall have capacity for carrying rated motor current, shall be capable of making and interrupting stalled rotor current of the motor, and may serve as the running overcurrent device if provided with the number of overcurrent units as specified by

26.32.5.2 On all types of arc welding machines, control apparatus shall be enclosed except for the operating wheels, levers, or handles.

26.32.5.3 Input power terminals, top charge devices and live metal parts connected to input circuits shall be completely enclosed and accessible only by means of tools.

26.32.5.4 Terminals for welding leads should be protected from accidental electrical contact by personnel or by metal objects i.e., vehicles, crane hooks, etc. Protection may be obtained by

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use of: Dead-front receptacles for plug connections; recessed openings with nonremovable hinged covers; heavy insulating sleeving or taping or other equivalent electrical and mechanical protection. If a welding lead terminal which is intended to be used exclusively for connection to the work is connected to the grounded enclosure, it must be done by a conductor at least two AWG sizes smaller than the grounding conductor and the terminal shall be marked to indicate that it is grounded.

26.32.5.5 No connections for portable control devices such as push buttons to be carried by the operator shall be connected to an a.c. circuit of higher than 120 volts. Exposed metal parts of portable control devices operating on circuits above 50 volts shall be grounded by a grounding conductor in the control cable.

26.32.5.6 Auto transformers or a.c. reactors shall not be used to draw welding current directly from any a.c. power source having a voltage exceeding 80 volts.

26.32.6 Installation of Arc Welding Equipment


26.32.6.1 General. Installation including power supply shall be in accordance with the requirements of Subpart S of this part.

26.32.7 Grounding.

26.32.7.1 The frame or case of the welding machine (except engine-driven machines shall be grounded under the conditions and according to the methods prescribed in Subpart S of this part.

26.32.7.2 Conduits containing electrical conductors shall not be used for completing a work-lead circuit. Pipelines shall not be used as a permanent part of a work-lead circuit, but may be used during construction, extension or repair providing current is not carried through threaded joints, flanged bolted joints, or caulked joints and that special precautions are used to avoid sparking at connection of the work-lead cable.

26.32.7.3 Chains, wire ropes, cranes, hoists, and elevators shall not be used to carry welding current.

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26.32.7.4 Where a structure, conveyor, or fixture is regularly employed as a welding current return circuit, joints shall be bonded or provided with adequate current collecting devices.

26.32.7.5 All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current.


26.32.8 Supply Connections and Conductors

26.32.8.1 A disconnecting switch or controller shall be provided at or near each welding machine which is not equipped with such a switch or controller mounted as an integral part of the machine. The switch shall be in accordance with Subpart S of this part. Overcurrent protection shall be provided as specified in Subpart S of this part. A disconnect switch with overload protection or equivalent disconnect and protection means, permitted by Subpart S of this part, shall be provided for each outlet intended for connection to a portable welding machine.

26.32.8.2 For individual welding machines, the rated current-carrying capacity of the supply conductors shall be not less than the rated primary current of the welding machines.

26.32.8.3 For groups of welding machines, the rated current-carrying capacity of conductors may be less than the sum of the rated primary currents of the welding machines supplied. The conductor rating shall be determined in each case according to the machine loading based on the use to be made of each welding machine and the allowance permissible in the event that all the welding machines supplied by the conductors will not be in use at the same time.

26.32.8.4 In operations involving several welders on one structure, d.c. welding process requirements may require the use of both polarities; or supply circuit limitations for a.c. welding may require distribution of machines among the phases of the supply circuit. In such cases no load voltages between electrode holders will be 2 times normal in d.c. or 1, 1.41, 1.73, or 2 times normal on a.c. machines. Similar voltage differences will exist if both a.c. and d.c. welding are done on the same structure.

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26.32.8.5 All d.c. machines shall be connected with the same polarity.

26.32.8.6 All a.c. machines shall be connected to the same phase of the supply circuit and with the same instantaneous polarity.

26.32.9 Operation and Maintenance

26.32.9.1 General. Workers assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of this section and with 1910.252 (a), (b), and (c) of this part.

26.32.9.2 Machine hook up. Before starting operations all connections to the machine shall be checked to make certain they are properly made. The work lead shall be firmly attached to the work; magnetic work clamps shall be freed from adherent metal particles of spatter on contact surfaces. Coiled welding cable shall be spread out before use to avoid serious overheating and damage to insulation.

26.32.9.3 Grounding. Grounding of the welding machine frame shall be checked. Special attention shall be given to safety ground connections of portable machines.

26.32.9.4 Leaks. There shall be no leaks of cooling water, shielding gas or engine fuel.


26.32.9.5 Switches. It shall be determined that proper switching equipment for shutting down the machine is provided.

26.32.9.6 Manufacturers' instructions. Printed rules and instructions covering operation of equipment supplied by the manufacturers shall be strictly followed.

26.32.9.7 Electrode holders. Electrode holders when not in use shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks.

26.32.9.8 Electric shock. Cables with splices within 10 feet (3 m) of the holder shall not be used. The welder should not coil or loop welding electrode cable around parts of his body.

26.32.10 Maintenance

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26.32.10.1 The operator should report any equipment defect or safety hazard to his supervisor and the use of the equipment shall be discontinued until its safety has been assured. Repairs shall be made only by qualified personnel.

26.32.10.2 Machines which have become wet shall be thoroughly dried and tested before being used.

26.32.10.3 Cables with damaged insulation or exposed bare conductors shall be replaced. Joining lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions.

26.33 Training

26.33.1 Carbon America employees who perform cutting, welding and brazing operations must be trained on the contents of this program. Cutters, welders and their supervisors must be suitably trained in:


26.33.1.1 the safe operations of their equipment and the safe use of the process.


26.34 Definitions

26.34.1 *Welder and welding operator* mean any operator of electric or gas welding and cutting equipment.

26.34.2 *Approved* means listed or approved by a nationally recognized testing laboratory. Refer to 1910.155(c)(3) for definitions of listed and approved, and 1910.7 for nationally recognized testing laboratory.

Attachment 1 – CARBON AMERICA Hot Work Permit

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CARBON AMERICA CONSTRUCTION, Inc. HOT WORK AUTHORIZATION

THIS AUTHORIZATION MUST BE USED FOR:

- ☐ Portable Gas or Electric Cutting or Welding

☐ Burning

☐ Brazing or Torch Soldering

☐ Abrasive Grinding or Blasting

☐ Other Processes Generating Heat, Sparks or Flames that are Potential Ignition Sources:

Date of Issue: ____/____/____ Time: ____: ____

Permit Expires: ____/____/____ Time: ____: ____

Company (s): _____


Hot Work Location: _____
Building
Area


Task Description: _____

Additional Requirements: _____

Person Authorizing the Hot Work: _____
Contractor, Owner, or Client

Person Authorizing the Hot Work: _____
Performing Contractor or Subcontractor

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27.1 Policy Statement

27.1.1 It is the policy of Carbon America and its subsidiary companies, to provide all employees with a safe and healthful work environment as free as possible from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.


27.2 Purpose and Scope

27.2.1 To implement measures to ensure the occurrence of dropped objects from heights, having the possibility of harming personnel or damaging property is prevented.

27.2.2 Through adoption of industry best practices, meeting legislative requirements, as well as safety controls already in place the dropped object hazards will be mitigated and controlled. This will be achieved by using pre-planning task card, hazard assessments/JHA, site inspections, and safety observation reports through Carbon America's Behavior Based Safety Program.

27.3 Application

27.3.1 This Dropped Objects Management Program applies to all "Carbon America" employees.

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27.3.2 Sub-contractors shall also comply with requirements of this written program OR have their own company written program meeting at least the minimum requirements of this program.

27.4 Responsibilities

27.4.1 Dropped Object Workgroup

27.4.1.1 Each project/crew will need to develop a Dropped Object Workgroup. Below describe functions assigned to personnel required by this program. This could include, but is not limited to projects such as boring, trenching, pipe installation, excavation, mechanical work, water transfers, loading and unloading of vehicles.

27.4.1.2 Each workgroup shall assess the job and specific activities and work areas where a potential for dropped object hazards exist.

27.4.1.3 Other responsibilities of the Workgroup include:

27.4.1.3.1 Establishment of an equipment register

27.4.1.3.2 Inspection Plans and regular inspections.

27.4.1.3.3 Identification of areas of opportunity for:

27.4.1.3.3.1 Removal of unnecessary equipment

27.4.1.3.3.2 Improvement of maintenance routines


27.4.1.3.3.3 Developing and setting key performance indicators

27.4.1.3.3.4 And providing suitable instruction and training to personnel

27.4.1.3.4 Raising awareness of potential dropped objects and specific control measures for each on their jobsites.

27.4.1.3.5 As well as reviewing action plans on a regular basis.

27.4.2 Management.

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27.4.2.1 Management will be responsible for coordinating the workgroup, providing instruction and training to personnel, scheduling meetings, monitoring actions from any DROPS Incidents, and communicating lessons learned through the “Safety Alert” system.

27.4.3 Supervision.

27.4.3.1 All onsite Foreman shall ensure that the Dropped Objects Prevention strategy is being implemented by assisting in inspections and helping identifying possible DROPS items.

27.4.4 Employees.

27.4.4.1 All employees working in Dropped Object Management designated areas shall have gone through the proper DROPS training. Employees/Foreman shall be responsible for implementing guidelines set herein and conduct inspections to track compliance.

27.5 Dropped Objects Management Requirements


27.5.1 Management of Potential Dropped Objects

27.5.1.1 The control and management of potential dropped objects falling from heights on jobsites is accounted for through inspection and identification of specific areas.

27.5.1.2 Work areas shall be assigned to specified individuals by splitting/dividing the jobsite into manageable areas by crew foreman. Area owners are then responsible for that specific divided area.

27.5.2 Potential Dropped Objects Register

27.5.2.1 Carbon America has compiled a register to be completed to identify Potential Dropped Objects on jobsites if applicable. The following is addressed and must be completed prior to beginning work:

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27.5.2.1.1 Identifying equipment, securing means, and location on the jobsite.

27.5.2.1.2 Assess risk involved with the specific dropped object.

27.5.2.1.3 Frequency of inspection required, and inspection process.

27.5.2.1.4 As permitted, photograph items on the register to identify the potential failing. This will be used to identify deterioration

27.5.2.1.5 Registry of potential dropped objects should be updated regularly and reviewed by the Workgroup individuals to ensure actions are being taken and corrected in a timely manner.

27.5.3 Inspections


27.5.3.1 Dropped object inspections must be done as in accordance with the planned maintenance activities (as described on the equipment register).

27.5.3.2 Inspections shall be recorded and communicated to the relevant area owner. If any defects in securing methods are identified, stop the job and immediately communicated findings to Supervisor/Foreman/Area Owner.

27.5.3.3 All items deemed unsatisfactory requiring corrective actions should be added to the Potential Dropped Objects Register; risk ranked and appropriate actions taken to correct.

27.5.3.4 All individuals completing inspections of areas for potential dropped objects shall have the proper training in identifying, categorizing, and mitigating insufficient items.

27.5.4 Classifications of Identified Items

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27.5.4.1 Any items identified with the potential that they may be dropped shall be classified in to a High Risk, Medium Risk, and Low Risk scale as follows.

27.5.4.2 High Risk- An item of equipment which has a high probability of becoming a Dropped Object, sited over an area where personnel are in regular attendance. This could include:

27.5.4.2.1 Something with poor or unsuitable methods of securing

27.5.4.2.2 Continually exposed to environmental effects or significant vibration.

27.5.4.2.3 Continually exposed to contact from moving machinery e.g. within the radius of crane operations.

27.5.4.3 Medium Risk – An item of equipment with a medium probability of becoming a Dropped object, sited over an area where personnel are intermittently in attendance. This could include:

27.5.4.3.1 Something with less than satisfactory method of securing (Pipe Installation)


27.5.4.3.2 Something that may be exposed to significant environmental effects or vibration (Trenching)

27.5.4.3.3 Or something that may occasionally be exposed to contact from moving machinery.

27.5.4.4 Low Risk – An item of equipment with low probability of becoming a Dropped Object, sited over an area where personnel infrequently are in attendance. This could include:

27.5.4.4.1 An item with a satisfactory method of securing, this may include a secondary securing wire.

27.5.4.4.2 Something that is not exposed to significant environmental effects or vibrations

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27.5.4.4.3 or that is not exposed to contact from moving machinery.

27.5.4.5 When seeking an alternative to reduce high and medium risk, a hierarchy of control should be used in the following order.

27.5.4.6 Elimination- anytime that the potential dropped object can be completely removed or eliminated, this shall be done.

27.5.4.7 Substitution – if the potential dropped object can be replaced with a similar object that creates less of a hazard.

27.5.4.8 Engineering Controls – When the potential dropped object cannot be eliminated or substituted for, employees shall be protected/warned from the hazards by engineering solutions. This can include but are not limited to: Physical barriers/barricading, secondary securing devices, reinforcement, etc.

27.5.4.9 Administrative controls – Instructions created to reduce the risk from a potential dropped object. These may include but are not limited to Barriers (Handrail, red rope/tape/flagging, etc.) as well as appropriate signage to warn.

27.5.4.10 Anytime new equipment is introduced to the worksite, it must be assessed for dropped object risk potential. If there is a risk it must be reduced to as low as reasonably practicable.

27.5.4.11 Additionally, anytime a specific process changes it shall be reevaluated for Potential Dropped Object Hazards.

27.5.4.12 Activities with the potential for Dropped Objects


27.5.4.12.1 Trenching

27.5.4.12.2 Excavation

27.5.4.12.3 Mechanical Work

27.5.4.12.4 Pipe installation

27.5.4.12.5 Lifting Operations

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27.5.4.13 As part of the risk assessment process for lifting operations, the integrity of the load and lifting equipment should be considered. This will also include inspections to identify and mitigate any potential hazards from all or part of the load falling or the failure of lifting equipment.

27.5.5 Working at Heights

27.5.5.1 As part of the risk assessment process for working at height, any equipment and tools being taken aloft should be considered as a potential dropped object. Suitable mitigation should be put into place e.g., tools/equipment at height register, secondary securing devices [lanyards, etc.].

27.5.6 Scaffolding Operations

27.5.6.1 Scaffolding operations historically are high risk activities with regard to dropped objects. Satisfactory planning, risk assessment, and mitigation measures for potential dropped objects are necessary, currently Carbon America does not utilize scaffolds for operations.


27.5.7 Control of Temporary Equipment

27.5.7.1 The introduction of Temporary Equipment into worksites can create a Dropped Object Hazard. Temporary equipment must be subjected to the same degree of scrutiny as the fixed equipment. Local Control of Temporary Equipment Procedures / Policies should address dropped object management.

27.5.8 Dropped Object Incidents

27.5.8.1 When a dropped incident occurs, the event shall be immediately reported to supervisor/foreman.

27.5.8.2 All incidents shall be classified into category by severity of incident (i.e. near miss)

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27.5.8.3 The incident shall be investigated by the supervisor as per the requirements of the Carbon America Incident Investigation program.

27.6 Training.


27.6.1 Initial employee training shall be provided prior to starting any work activity.

27.6.2 The training shall include, at a minimum, the following elements:

27.6.2.1 Proper Dropped Object Management procedures.

27.6.2.2 Elements of this written program.

27.6.2.3 Training shall be documented including the employee name, date of training, and name of instructor.

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28.1 Cold Weather Safety / Cold Stress

28.1.1 Purpose

28.1.1.1 The purpose of this program is to address control measures to protect employees from stress or injuries when working in cold temperatures.

28.1.2 Scope

28.1.2.1 Each Carbon America worksite shall implement a site-specific cold weather/cold stress hazard assessment and have the control plan approved by the Carbon America Safety Director.

28.1.3 Responsibilities


28.1.3.1 Safety Manager

28.1.3.1.1 Identify and conduct an assessment of tasks and occupations where there is the potential for cold stress.

28.1.3.1.2 Implement and/or provide controls (engineering, administrative or personal protective equipment) to minimize cold stress.

28.1.3.1.3 Provide training and education regarding cold stress, including early signs and symptoms of cold-related exposure.

28.1.4 Worker Responsibilities

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28.1.4.1 Adhere to all control measures or work procedures that have been designed and implemented to reduce exposure to conditions that could cause cold stress

28.1.4.2 Leave cold environments if signs or symptoms of cold-related stress appear.

28.1.4.3 Wear all required cold temperature clothing and PPE.

28.1.4.4 Immediately report any signs or symptoms of cold-related stress.

28.1.5 Cold Temperature Procedures

28.1.5.1 Health Effects of Cold Stress


28.1.5.1.1 Warning signs of hypothermia can include complaints of nausea, fatigue, dizziness, irritability or euphoria. Workers can also experience pain in their extremities (hands, feet, ears, etc.), and severe shivering. Workers should be moved to a heated shelter and seek medical advice when appropriate.

28.1.5.2 Hazard Assessment

28.1.5.2.1 An assessment will be conducted by the Safety Manager to identify the types of jobs or employees who are at risk for cold exposure. Jobs that are at risk for cold exposure include, but are not limited to: airport ground personnel, auto repair and refuelling, cold storage, construction and demolition, ice making, logging, mining, oil and gas drilling, pulp and paper, railroad and trucking, snow and trash removal, utility repair and warehousing. The assessment must also consider employees who work inside but have to go outside for any portion of the shift to either perform work or to travel to transportation departure or arrival points.

28.1.5.3 Facilities

28.1.5.3.1 Regularly used walkways and travel ways shall be sanded, salted or cleared of snow and ice as soon as practicable.

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28.1.5.3.2 Employees will be informed of the dangers associated with working around unstable snow and ice build-ups. All employees will be informed of the dangers and destructive potential caused by unstable snow build-up, sharp icicles, ice dams and know how to prevent incidents caused by them.

28.1.5.3.3 When dangerous overhead build-ups of snow or ice are present barricades will be used to prevent staff from walking or driving into potential fall zones.

28.1.5.4 Clothing, PPE and Supplies

28.1.5.4.1 Proper cold weather protection must be worn by employees when working in cold, wet and windy conditions. Protective clothing is the most important way to avoid cold stress. The type of fabric also makes a difference.


28.1.5.4.2 Cotton loses its insulation value when it becomes wet. Wool, silk and most synthetics, on the other hand, retain their insulation even when wet. The following are recommendations for working in cold environments:

28.1.5.4.2.1 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 hot - an outer wind and rain protection layer that allows some ventilation to prevent overheating.

28.1.5.4.2.2 Wear a hat or hood. Up to 40% of body heat can be lost when the head is left exposed.

28.1.5.4.2.3 Keep a change of dry clothing available in case work clothes become wet.

28.1.5.4.2.4 With the exception of the wicking layer do not wear tight clothing. Loose clothing allows better ventilation of heat away from the body.

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28.1.5.4.2.5 Do not underestimate the wetting effects of perspiration. Oftentimes wicking and venting of the body's sweat and heat are more important than protecting from rain or snow.

28.1.5.4.2.6 Wear insulated boots or other footwear. Felt-lined, rubber bottomed, leather-topped boots with removable felt insoles are best suited for heavy work in cold since leather is porous, allowing the boots to "breathe" and let perspiration evaporate.

28.1.5.4.2.7 Liner socks made from polypropylene will help keep feet dry and warmer by wicking sweat away from the skin. Always wear the right thickness of socks for your boots.

28.1.5.4.2.8 In extremely cold conditions, where face protection is used, eye protection must be separated from the nose and mouth to prevent exhaled moisture from fogging and frosting eye shields or glasses.

28.1.5.4.2.9 Clothing must be dry. Moisture should be kept off clothes by removing snow prior to entering heated shelters.

28.1.5.4.2.10 Cold weather supplies will be regularly inspected and restocked when necessary by Carbon America regular inspections on cold weather supplies such as hand warmers, jackets, shovels, etc. will be carried out to ensure that supplies are always in stock.


28.1.5.5 Preventative Controls That Are Implemented to Avoid Cold Induced Injuries.

28.1.5.5.1 Workers will be under constant protective observation by a co-worker or supervisor. Carbon America will implement a "Buddy System" to ensure that no employee is working alone in cold work environments.

28.1.5.5.2 Some preventive measures include drinking plenty of liquids, avoiding caffeine and alcohol.

28.1.5.5.3 It is easy to become dehydrated in cold weather. If possible, heavy work should be scheduled during the warmer parts of the day.

28.1.5.5.4 Take breaks out of the cold.

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28.1.5.5.5 Try to work in pairs to keep an eye on each other and watch for signs of cold stress.

28.1.5.5.6 Avoid fatigue since energy is needed to keep muscles warm.

28.1.5.5.7 Take frequent breaks and consume warm, high calorie food such as pasta to maintain energy reserves.

28.1.5.5.8 If a worker exposed to cold shows signs or reports symptoms of cold stress or injury the worker must be removed from further exposure and treated by an appropriate first aid attendant, if available, or a physician.

28.1.5.5.9 continuous work in temperatures below the freezing point, heated warming shelters such as tents, cabins or rest rooms should be available. The work should be paced to avoid excessive sweating. If such work is necessary, proper rest periods in a warm area should be allowed and employees should change into dry clothes.


28.1.5.5.10 New employees should be given enough time to get acclimatized to cold and protective clothing before assuming a full work load.

28.1.5.5.11 For work below the freezing point, metal handles and bars should be covered by thermal insulating material. Also, machines and tools should be designed so that they can be operated without having to remove mittens or gloves.

28.1.6 Training

28.1.6.1.1 Carbon America employees who are required to work in cold weather conditions will receive initial and annual training regarding the health effects of cold exposure and proper rewarming procedures, recognition of and first aid for frostbite and hypothermia, required protective clothing, proper use of warming shelters, the buddy system, maintaining communications, vehicle breakdown procedures and proper eating and drinking habits for working in the cold.

28.1.7 Health Effects

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28.1.7.1 Where employees are exposed to work conditions that may present a hazard because of excessive cold Carbon America shall ensure that a competent person provides training to ensure the employees are familiar with the signs and symptoms of cold weather induced health problems such as hypothermia, frostbite and trench foot. Training will include:


28.1.7.1.1 Hypothermia occurs when body heat is lost faster than it can be replaced. When the core body temperature drops below the normal 98.6°F to around 95°F the onset of symptoms normally begins. The person may begin to shiver and stomp their feet in order to generate heat. Workers may lose coordination, have slurred speech and fumble with items in the hand. The skin will likely be pale and cold.

28.1.7.1.2 Frostbite occurs when the skin actually freezes and loses water. In severe cases, amputation of the frostbitten area may be required. While frostbite usually occurs when the temperatures are 30°F or lower, wind chill factors can allow frostbite to occur in above freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. The affected body part will be cold, tingling, stinging or aching followed by numbness. Skin color turns red, then purple, then white and is cold to the touch. There may be blisters in severe cases.

28.1.7.1.3 Trench Foot or immersion foot is caused by having feet immersed in cold water at temperatures above freezing for long periods of time. It is similar to frostbite, but considered less severe. Symptoms usually consist of tingling, itching or a burning sensation. Blisters may be present.

28.1.7.1.4 Workers and supervisors involved with work in cold environments should be informed about symptoms of adverse effect exposure to cold, proper clothing habits, safe work practices, physical fitness requirements for work in cold, and emergency procedures in case of cold injury. While working in cold, a buddy system should be used. Look out for one another and be alert for the symptoms of hypothermia.

28.1.8 First Aid Training

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28.1.8.1 Employees will be trained to administer proper first aid treatment on cold induced injuries or illnesses. All Carbon America employees who are required to perform work in cold conditions will be knowledgeable on how to administer first aid treatment on cold induced injuries or illnesses.

28.1.8.2 All training shall be documented

28.2 Heat Illness Prevention

28.2.1 Purpose

28.2.1.1 This program is designed to reduce the risk of work-related heat illnesses.

28.2.2 Scope

28.2.2.1 This procedure applies to all work being performed in hot environments.


28.2.3 Definitions

28.2.3.1 "Acclimatization" means temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.

28.2.3.2 "Heat Illness" means a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.

28.2.3.3 "Preventative recovery period" means a period of time to recover from the heat in order to prevent heat illness.

28.2.3.4 "Shade" means blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable

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shade to a person inside it, unless the car is running with air conditioning.

28.2.4 Requirements

28.2.4.1 All managers and supervisors are responsible for implementing and maintaining the Heat Illness Program in their work areas.

28.2.5 Provision of Water

28.2.5.1 Employees shall have access to potable drinking water. Employees shall have access to potable drinking water. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift.

28.2.6 Access to Shade


28.2.6.1 Employees will be provided with access to shade. Employees suffering from heat illness or believing a preventative recovery period is needed, he or she shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling. Such access to shade shall be permitted at all times. See definition of “Shade”.

28.2.7 Control Measures

28.2.7.1 Each work location involved in working in hot environments shall implement measures that must be in place to control the effects of environmental factors that can contribute to heat related illnesses. The most common environmental factors are air temperature, humidity, radiant heat sources and air circulation.

28.2.7.2 Physical factors that can contribute to heat related illness shall be taken into consideration before performing a task. The most common physical factors that can contribute to heat related illness are type of work, level of physical activity and duration, and clothing color, weight and breathability.

28.2.7.3 Supervisors must ensure personal factors that contribute to heat related illness are taken into consideration before assigning a task where there is the possibility of a heat-related illness occurring. The most common

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personal factors that can contribute to heat related illness are age, weight/fitness, drug/alcohol use, prior heat-related illness, etc.

28.2.7.4 Each work site shall develop site specific procedures but shall include the minimum:

28.2.7.4.1 Bring at least 2 quarts per employee at the start of the shift and the supervisors/designated persons will monitor water containers every 30 minutes, and employees are encouraged to report to supervisor/designated person low levels or dirty water.

28.2.7.4.2 Supervisors will provide frequent reminders to employees to drink frequently.

28.2.7.4.3 Every morning there will be short tailgate meetings to remind workers about the importance of frequent consumption of water throughout the shift during hot weather.

28.2.7.4.4 Place water containers as close as possible to the workers.

28.2.7.4.5 When drinking water levels within a container drop below 50%, the water shall be replenished immediately or water levels should not fall below the point that will allow for adequate water during the time necessary to effect replenishment.


28.2.7.4.6 Disposable/single use drinking cups will be provided to employees or provisions will be made to issue employees their own cups each day.

28.2.7.4.7 Supervisors will set-up an adequate number of umbrellas, canopies or other portable devices at the start of the shift and will relocate them to be closer to the crew, as needed.

28.2.7.4.8 Non-agricultural employers can use other cooling measures if they demonstrate that these methods are as effective as shade.

28.2.7.4.9 Working hours will be modified to work during the cooler hours of the day, when possible.

28.2.7.4.10 When a modified or shorter work-shift is not possible, more water and rest breaks will be provided.

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28.2.7.4.11 Supervisors will continuously check all employees and stay alert to the presence of heat related symptoms.

28.2.7.4.12 Supervisors will carry cell phones or other means of communication, to ensure that emergency services can be called and check that these are functional at the worksite prior to each shift.

28.2.7.4.13 Every morning, workers will be reminded about address and directions to the worksite to inform medical responders and emergency procedures.

28.2.7.4.14 All newly hired workers will be assigned a buddy or experienced coworker to ensure that they understood the training and follow the Carbon America procedures.

28.2.8 Training

28.2.8.1 Training in the following topics shall be provided to all supervisory and non-supervisory employees:

28.2.8.1.1 The environmental and personal risk factors for heat illness;


28.2.8.1.2 The importance of frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties;

28.2.8.1.3 The importance of acclimatization;

28.2.8.1.4 The different types of heat illness and the common signs and symptoms of heat illness;

28.2.8.1.5 The importance to employees of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers;

28.2.8.1.6 Carbon America procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;

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28.2.8.1.7 Carbon America procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider;

28.2.8.1.8 Carbon America procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders.

28.2.8.1.9 Supervisors must receive training in the prevention of heat related illnesses prior to supervising employees working in heat. Supervisors will be trained in the Carbon America heat illness emergency response procedures to prevent heat illness and procedures to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

28.2.8.1.10 Communication for employees shall be in a form readily understandable by all affected employees.

28.2.8.1.11 Carbon America shall ensure all contractors, subcontractors, staffing companies, etc. employees (including temporary) working outdoors have been trained in heat illness prevention.

28.3 Lightning


28.3.1 The protocol for lightning in close proximity is as follows;

28.3.1.1 The safety department will monitor the radar and lightning.

28.3.1.2 If the lightning is within 3-8 miles per the lightning detector, all elevated outdoor operations must cease to continue. This includes, but is not limited to crane and aerial lift operations.

28.3.1.3 If the lightning is within 0-3 miles per the lightning detector, all out door operations must cease to continue. All personnel on-site must go to the nearest indoor area.

28.3.1.4 Work will resume 30 minutes after the last strike within the 0-3 mile range.

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28.3.1.5 All calls for work stoppage will be given from the construction manager and site safety manager. Together they will go through each radio station to alert all personnel.

28.3.1.6 If threatening weather is closing in, do not call the safety department on channel 1, as it is necessary this radio channel remains open.

28.4 Tornadoes

28.4.1 Causes:

28.4.1.1 A tornado is a violent windstorm characterized by twisting, funnel-shaped wind.

28.4.1.2 Tornadoes tend to occur in the afternoon and evening hours.

28.4.2 Potential Hazards:

28.4.2.1 Tornadoes are unpredictable and may form without warning

28.4.2.2 Winds can exceed 200 to 300 mph

28.4.2.3 Tornadoes may appear nearly transparent until dust and debris are picked up or a cloud forms within the funnel

28.4.2.4 Severe damage can occur to structures


28.4.2.5 The precise location of a touch down point cannot be determined

28.4.3 Possible Actions:

28.4.3.1 If a watch or warning has been issued, the action plan should be activated

28.4.3.2 The crew should be regularly updated regarding any changes to potential weather conditions


28.4.3.3 All cast and crew members must follow all instructions given No employees should be working on elevated equipment. This includes aerial lifts, scaffolds, camera booms, and other high areas

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28.4.3.4 Evacuate the area immediately if instructed by a regulatory authority or production management

28.4.3.5 Only secure equipment if there is time and it can be done safely

28.4.3.6 Do not attempt to return to the area until an all clear signal has been given by a regulatory authority or production management

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29	Compressed Air	0	05/12/2022	

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29.1 General Policy

29.1.1 Compressed air shall not be used for cleaning purposes except where the pressure is reduced to less than 30 psi and effective chip guarding and personal protective equipment is implemented. Inspections of compressed gas cylinders must be performed. These inspections must follow the guidelines that apply to their scope of work. These guidelines are found in the Hazardous Materials Regulations of the Department of Transportation and pamphlets C-6 and C-8 from the Compressed Gas Association.

29.1.2 Every air receiver shall be equipped with an indicating pressure gauge, so located as to be readily visible, and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent.

29.1.3 All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition. Safety valves, indicating/controlling devices, and other safety appliances need to be constructed, located, and installed so they cannot be rendered inoperative by any means.

29.1.4 The drain valve on air receivers shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.

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29.1.5 DO NOT cause dust to become airborne during clean-up. Remove dust from equipment with a water hose or wet-wiping rather than with compressed air. (silica exposure section)

29.1.6 NEVER use oxygen as a substitute for compressed air.

29.2 PURPOSE / SCOPE

29.2.1 The purpose of this safety policy and procedure is to establish procedures for the protection of Alvarado Construction, herein referred to as Alvarado Construction, employees working with or on compressed air equipment.


29.2.2 Air compressor storage tanks store excess air that is generated from the compressor. Thus, air compressor storage tanks provide a convenient and readily accessible air source. However, because of the air pressure within these storage tanks, potential dangers can develop if certain practices and precautions are not followed.

29.2.3 This safety policy and procedure provides guidelines for the safe use of air compressor storage tanks. It includes provisions for training, discussion on where these air compressor storage tanks are used, and guidelines for locating drains and traps on air compressor storage tanks. Additionally, it presents requirements for gauges and valves and installation of gauges, valves, drains and traps.

29.2.4 Alvarado will not tolerate malfunctioning air compressor storage tanks that are a threat to employee safety. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Air Compressor Storage Tanks will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

29.3 RESPONSIBILITIES

29.3.1 MANAGERS

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29.3.1.1 Are responsible for ensuring that adequate funds are available for the purchase and repair of air compressor storage tanks in their areas.

29.3.1.2 Will be responsible for identifying the employees affected by this safety policy and procedure.

29.3.1.3 Will obtain and coordinate the required training for affected employees.

29.3.1.4 Will also ensure proper use and maintenance through regular standard audits of air compressor storage tanks.

29.3.2 SUPERVISORS

29.3.2.1 Will ensure that only those employees who have been trained to work with air compressor storage tanks will be allowed to operate such equipment.

29.3.2.2 Will ensure that equipment as needed is available and is in good working condition. If the equipment is not in good working condition, they will ensure that such equipment is repaired.

29.3.2.3 Will ensure that air compressor storage tanks are inspected every six months and that employees are provided with personal protective equipment (ppe) as necessary for their job.


29.3.3 EMPLOYEES

29.3.3.1 Will inspect air compressor storage tanks prior to use and note any damage or defects.

29.3.3.2 Shall immediately report any damages or defects to their supervisors.

29.3.3.3 Will empty manual drains and taps on a regularly scheduled basis.

29.3.4 SAFETY DEPARTMENT

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29.3.4.1 Will provide prompt assistance to managers/unit heads, supervisors, or others as applicable as necessary on any matter concerning this safety policy and procedure.

29.3.4.2 Will assist in developing or securing required training.

29.3.4.3 Will also work with purchasing to ensure that all newly purchased air compressor storage tanks comply with current safety regulations.

29.3.4.4 Will provide consultative service and audit assistance to ensure effective implementation of this safety policy and procedure.

29.3.5 TRAINING

29.3.5.1 Alvarado employees will be trained in:

29.3.5.1.1 The purpose of air compressor storage tanks


29.3.5.1.2 The basic operation of air compressor storage tanks

29.3.5.1.3 Maintenance requirements of drains and traps

29.3.5.1.4 Reading gauges and operating valves

29.3.5.1.5 Identifying damage and defects in the storage tanks

This training shall be performed upon initial employment and/or job reassignment. Periodic refresher training shall also be conducted at the discretion of the supervisor.

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30.1.0 Purpose

30.1.1 This document requirements for the use, transportation and storage of compressed gas, to ensure that hazards are controlled and to minimize the risk to employees, the public health and welfare, and the environment. Any applicable regulatory or Company requirements shall be followed, with the most stringent being met.

30.2.0 Scope

30.2.1 This document applies to all Company personnel who use, transport or store compressed gases or who use high-pressure compressed gas systems on Company projects or work locations.

NOTE: High pressure is defined as equal to as or greater than 15psig or having a system volume above 1000 ft³.

30.3.0 Definitions


30.3.1 No definitions.

30.4.0 Responsibilities

30.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

30.5.0 Process

30.5.1 General Requirements

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30.5.1.1 Personnel, who operate, maintain or modify compressed gas equipment, systems and associated equipment shall be trained to operate those systems safely before assignment.

30.5.1.2 Whenever there is a danger of material flowing back into the cylinder a check valve should be installed on the downstream side of the regulator valve.

30.5.1.3 Valve outlet connections shall comply with the Compressed Gas Association (CGA) V-1, American National, Canadian, and Compressed Gas Association Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections.

30.5.1.4 There shall be no attempt to repair, alter or otherwise tamper with cylinders, isolation valves, safety relief devices or other components of a compressed gas system.

30.5.1.5 Valves, regulator connections and other related piping connections shall not be forced or cross-threaded.


30.5.1.6 Compressed gas cylinders shall contain pressure relief devices.

30.5.1.7 Ventilation requirements for the discharged gas shall be evaluated and prudently controlled.

30.5.1.8 Compressed gas cylinders shall be inspected before handling or using them to ensure that the cylinders are not visibly damaged and the cylinder contents are clearly marked on the external surface with either the chemical or trade name of the gas, and also, to ensure that markings, labels, decals, tags and stencil marks attached by the supplier for identification of contents have not been removed or defaced.

30.5.1.9 Personnel shall contact the supplier of compressed gas cylinder if there is doubt as to the proper label for a compressed gas cylinder, prior to use.

30.5.1.10 At least 8 out of 12 inches of parallel sections of oxygen and fuel gas hoses shall be visible for line identification and inspection. They must be distinguishable from each other by means of different colors.

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30.5.1.11 Hose connections shall be clamped or otherwise securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but in no case shall the manufacturer's ratings be exceeded.

30.5.2 Receiving Areas

30.5.2.1 When compressed gas cylinders are received, they shall be inspected to ensure that the cylinders are properly marked, labeled and are not visibly damaged (cylinders delivered directly to the project site for use will be inspected by the user before they are placed into service).

30.5.3 Connecting and Using Compressed Gases

30.5.3.1 Suitable pressure regulating devices shall be used in all cases where gas is admitted to systems having pressure rating limitations lower than the cylinder pressure.

30.5.3.2 Before a regulator is removed from a cylinder, the cylinder isolation valve shall be closed and the regulator shall be relieved of gas pressure.


30.5.3.3 With the exception of ongoing processes or operations, regulators shall be removed from cylinders at the end of each work shift.

30.5.3.4 Only regulators that are approved and designed for the gas and cylinder in question shall be used.

30.5.3.5 No foreign compounds (i.e. white lead, oil, grease or other non-approved joint compound) shall be used for sealing oxygen system fittings. Only solder or litharge and glycerin or other joint compounds that have been approved for oxygen service shall be used to seal threaded connections in oxygen systems.

30.5.3.6 Two-stage regulators for inert gases shall be equipped with two relief valves that protect the regulator diaphragms and gauges from excessive over-pressure.

30.5.3.7 Single-stage cylinder regulators (except acetylene regulators) shall be equipped with a single relief device per the manufacturer's recommendations.

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30.5.3.8 Gas regulators used for corrosive gases, such as chlorine and fluorine, shall only be disassembled and inspected in accordance with vendor recommendations by a factory trained person qualified to perform this type of work.

30.5.3.9 Compressed gas systems shall be protected by reverse flow check valves if they could be contaminated by feedback or process materials; check valves and/or traps shall be checked and maintained on a regular schedule to ensure proper operation.

30.5.3.10 Flash-back arrestors shall be placed per manufacturer's instructions/recommendations and used with oxygen-fuel gas systems.

30.5.3.11 Any equipment (cylinder, regulator, hose or other associated hardware that defines a pressure boundary) that shows excessive corrosion, pitting, denting, burns or other irregularities or defects shall be tagged out of service immediately.

30.5.3.12 Cracking (quickly opening and closing the cylinder valve) is required prior to connecting components to clear debris, dust or water, and to prevent plugging of the hoses, torches, regulator or other systems.


30.5.3.13 Relief valves shall be safely vented on regulators for use with flammable and toxic gases.

WARNING: Explosions or spontaneous fire may occur if flammable gases or organic materials come into contact with oxygen. Gas/material incompatibilities can result in catastrophic failures. Oxygen will dramatically increase the flammability of ordinary combustibles.

30.5.3.14 Regulators, manifolds and their related components shall not be interchanged from one type of gas to another without a qualified person evaluating the change in application.

30.5.3.15 Connections shall be kept tight to prevent leakage.

30.5.3.16 All cylinders are uniquely threaded to minimize contamination. The use of adaptors or systems that compromise this safeguard are prohibited.

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30.5.3.17 Leak detection methods shall not generate additional hazards (i.e. use of lighter to discover leaks). Recommended leak detection method would be to use Snoop® Leak Detector or soapy water.

30.5.3.18 If a cylinder leak cannot be remedied by simply tightening a valve or packing nut, then the valve shall be closed and the equipment shall be tagged stating that the cylinder is unserviceable.

30.5.3.19 Leaking compressed gas systems shall be reported to Supervision and Safety personnel for corrective action as soon as they are discovered.

WARNING: Gases present numerous hazards, including asphyxiation, flammability and corrosion.

30.5.3.20 If a situation appears serious because of escaping gases, the immediate area shall be evacuated and local emergency procedures shall be initiated.

30.5.3.21 Cylinder valves on empty cylinders shall be kept closed to prevent internal contamination of the cylinder; valve protection caps shall be installed.

30.5.3.22 Pressure shall never be left on a hose that is not being utilized.


30.5.3.23 Removable keys or handles shall be kept on valve spindles or stems while cylinders are in service.

30.5.3.24 Cylinder pressure shall not be drawn below 25 psig, to prevent siphoning impurities into the cylinder.

30.5.3.25 Empty cylinders shall be identified using tag, label or other markings and shall be removed from the work area to a general location.

30.5.3.26 Cylinder isolation valves shall be opened slowly, with the valve opening away from the body and other persons.

30.5.3.27 Cylinders not having fixed hand wheels shall have keys, handles or nonadjustable wrenches on the valve stems while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency.

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30.5.3.28 Wrenches or tools that are not provided or approved by the gas manufacturer shall not be used for opening cylinders.

30.5.3.29 Quick-closing valves on fuel gas cylinders shall not be opened more than 1½ turns.

30.5.3.30 Oxygen shall not be used to purge lines, in pneumatic tools, for dusting clothing, or as a substitute for compressed air.

30.5.3.31 Oxygen cylinders shall not be handled with greasy or oily hands or gloves.

30.5.3.32 Cylinders of oxygen, acetylene, or other fuel gases shall not be placed within a confined space.

30.5.3.33 Gas cylinders shall not be taken into confined spaces without proper evaluation and controls being in place.

30.5.4 Transportation and Handling


30.5.4.1 Compressed gas cylinders shall be transported in an upright position and shall be securely restrained at about two-thirds their height (or as necessary to prevent the cylinder from falling), with the protective caps in place.

30.5.4.2 Valves shall be closed, regulators shall be removed, and valve-protection caps shall be installed before cylinders are moved, unless the cylinders are firmly secured on a special carrier intended for this purpose and the valves are protected.

30.5.4.3 When cylinders are moved mechanically by crane or hoist, they shall be secured with chain or rope tie-downs to a cradle, platform or specifically designed lifting device.

30.5.4.4 The protective cap shall never be used for lifting or handling the cylinder.

30.5.4.5 Magnets or choker slings shall not be used to hoist or transport individual cylinders.

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30.5.4.6 Bars shall not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed.

30.5.4.7 Bars shall not be used to pry valve protection caps loose.

30.5.4.8 Cylinders shall not be lifted vertically by the cap, dropped, or permitted to strike violently against each other or against other surfaces.

30.5.4.9 Cylinders shall not be used as rollers for moving materials or for supporting other items.

30.5.4.10 A two-wheel or specially designed cylinder cart with a chain tie-down shall be used to move cylinders where practical.

30.5.4.11 Oxygen cylinders shall never be stored near flammable or combustible materials such as oil, grease, reserve acetylene supplies or other fuel gases.

30.5.4.12 A suitable cylinder truck, chain or other steadying device shall be used to keep cylinders from being knocked over while in use.

30.5.5 Storage Locations

30.5.5.1 Compressed gas cylinders shall be stored in assigned places that meet the following criteria:

30.5.5.1.1 Cylinders will not be knocked over or damaged.


30.5.5.1.2 The area is dry and well ventilated (for inside storage only).

30.5.5.1.3 Cylinders will not be exposed to continuous dampness.

30.5.5.1.4 Cylinders are not to be stored near sources of intense heat such as furnaces, steam lines or radiators.

30.5.5.1.5 Cylinders shall be shaded from direct sunlight and not stored at temperatures above 125 degrees F.

30.5.5.1.6 Cylinders containing flammable or combustible materials shall be separated from oxidizing agents by at least 20 feet, or by a

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noncombustible barrier at least 5 feet high with a fire rating of at least 30 minutes.

30.5.5.1.7 For storage in subsurface locations, a Documented Safety Review shall be obtained before cylinders are stored and all applicable mitigations (i.e. monitoring requirements such as, barricading, signage postings, and access requirements) and nearby flammable/combustible ignition sources must be identified).

30.5.5.1.8 Compressed gas storage areas shall be prominently posted with the names of the gases to be stored and a “No Smoking or Open Flames” sign posted.

30.5.5.2 The following precautions shall be followed when storing cylinders:

30.5.5.2.1 Cylinders shall be held together using a chain or other device to prevent falling or tipping.

30.5.5.2.2 Cylinders shall be placed so they cannot become part of an electric circuit.


30.5.5.2.3 Cylinders shall not be placed near elevators, unprotected edges or other areas where cylinders could fall for a distance exceeding one-half the height of the cylinder.

30.5.5.2.4 Cylinders shall not be placed in areas where they are capable of being damaged by falling objects, or additional protection shall be installed.

30.5.5.3 Cylinders shall be stored in the upright position.

30.5.5.4 Cylinders shall be securely restrained to a firm structure, at about two thirds their height.

30.5.5.5 Cylinders shall be kept far enough away from hot work so that sparks, hot slag or flames will not reach them (if this is not possible, fire-resistant shields shall be provided for the cylinders).

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30.5.5.6 When cylinders are used in conjunction with electric welding, precautions shall be taken against accidentally grounding the cylinders or allowing them to be burned by electric welding arc.

30.5.5.7 Boxes used to store gas hose shall be ventilated, with the exception of hoses that have never been used.

30.5.5.8 A fire extinguisher (minimum of 20 lb. ABC) should be located between 25 feet and 75 feet away from storage rack.

30.5.6 Refilling Cylinders

30.5.6.1 Vendor-supplied compressed gas cylinders shall be refilled by the vendor only.

30.5.7 Fuel Gas and Oxygen Manifolds

30.5.7.1 Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least 1 inch high, either painted on the manifold or on a sign permanently attached to it.

30.5.7.2 Fuel gas and oxygen manifolds shall be placed in safe, well-ventilated and accessible locations.


30.5.7.3 Manifold and header connections shall be capped when equipment is not attached.

30.5.7.4 Manifold hose connections between fuel gas and oxygen manifolds and supply header connections shall not be interchangeable.

30.5.7.5 Manifold systems shall be designed and manufactured of materials suitable for the particular gas, potential contaminants and service for which they are intended and in compliance with OSHA, ANSI and CGA standards, and National Fire Protection Association (NFPA) Standards 50, 51, 51B and 55.


30.5.7.6 All flammable gas manifolds shall be electrically grounded.

30.5.7.7 Smoking shall be prohibited and there shall be no source of potential ignition in areas where flammable compressed gas cylinders are connected to manifolds. Signs shall be placed warning of the hazard.

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30.6.0 References

30.6.1 None

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31.1. PURPOSE

31.1.1. This procedure is intended to eliminate and mitigate exposure of hazards associated with concrete and masonry construction.

31.2. SCOPE

31.2.1. This procedure is applicable to all employees working on Carbon America sponsored projects.

31.3. RESPONSIBILITIES

31.3.1. Project Manager

31.3.1.1. Responsible for the implementation and compliance with this procedure.


31.3.2. Safety Manager

31.3.2.1. Responsible for determining the risk associated with concrete and masonry work in order to define what PPE shall be worn.

31.3.2.2. Training and educating employees on hazards and mitigation techniques associated with the work.

31.4. PROCEDURE

31.4.1. Inspection Requirements

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31.4.1.1. Pre and post-work inspections should occur for the following, but not limited to formwork installation and removal, shoring and re-shoring, precast placement, concrete placements, and pump truck setup.

31.4.1.2. Before an operation may occur, all tools and equipment must be inspected to ensure they are in good working condition and all safe guards are in place.

31.4.1.3. All personal protective equipment shall be inspected to guarantee it is in good condition before it can be used. If there are any defects or dry/residual concrete on any piece of the PPE it will be removed or replaced with clean supplies.

31.4.2. Planning Requirements

31.4.2.1. Each operation will have an operational work plan and hazard analysis, regardless of the duration. Each concrete placement may not need a new work plan; however, each placement will absolutely need a new hazard analysis.

31.4.3. General Requirements for Formwork

31.4.3.1. Formwork must be designed, fabricated, erected, supported, braced, and maintained so that it will be capable of supporting without failure all vertical and lateral loads that might be applied to the formwork.


31.4.3.2. Drawings and plans, including all revisions for the jack layout, formwork (including shoring equipment), working decks, and scaffolds, must be available at the jobsite.

31.4.3.3. A pre-placement check will occur prior to any pour to ensure the structural integrity of the formwork.

31.4.3.4. No construction loads will be placed on any concrete surface unless it is determined that the structure is capable of supporting the load.

31.4.4. Shoring and Reshoring

31.4.4.1. All shoring equipment (including equipment used in reshoring operations) must be inspected prior to erection to determine that the equipment meets the requirements specified in the formwork drawings.

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31.4.4.2. Damaged shoring equipment must not be used for shoring. Erected shoring equipment must be inspected immediately prior to, during, and immediately after concrete placement. Shoring equipment that is found to be damaged or weakened after erection must be immediately reinforced.

31.4.4.3. The sills for shoring must be sound, rigid, and capable of carrying the maximum intended load. All base plates, shore heads, extension devices, and adjustment screws must be in firm contact and secured, when necessary, with the foundation and the form.

31.4.4.4. Eccentric loads on shore heads must be prohibited unless these members have been designed for such loading.

31.4.4.5. If single-post shores are used one on top of another (tiered), then additional shoring requirements must be met. The shores must be as follows:

31.4.4.5.1. Designed by a qualified designer and the erected shoring must be inspected by an engineer qualified in structural design

31.4.4.5.2. Vertically aligned

31.4.4.5.3. Spliced to prevent misalignment


31.4.4.5.4. Adequately braced in two mutually perpendicular directions at the splice level and each tier also must be diagonally braced in the same two directions

31.4.4.5.5. Adjustment of single-post shores to raise formwork must not be made after the placement of concrete.

31.4.4.5.6. Reshoring must be erected, as the original forms and shores are removed, whenever the concrete is required to support loads in excess of its capacity.

31.4.5. Vertical Slip Forms

31.4.5.1. The steel rods or pipes on which jacks climb or by which the forms are lifted must be:

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31.4.5.1.1. Specifically designed for that purpose

31.4.5.1.2. Adequately braced where not encased in concrete

31.4.5.2. Forms must be designed to prevent excessive distortion of the structure during the jacking operation.

31.4.5.3. Jacks and vertical supports must be positioned in such a manner that the loads do not exceed the rated capacity of the jacks.

31.4.5.4. The jacks or other lifting devices must be provided with mechanical dogs or other automatic holding devices to support the slip forms whenever failure of the power supply or lifting mechanisms occurs.

31.4.5.5. The form structure must be maintained within all design tolerances specified during the jacking operation.

31.4.5.6. The predetermined safe rate of lift must not be exceeded.

31.4.5.7. All vertical slip forms must be provided with scaffolds or work platforms where employees are required to work or pass.


31.4.6. Reinforcing Steel

31.4.6.1. Reinforcing steel for walls, piers, columns, and similar vertical structures must be adequately supported to prevent overturning and collapse.

31.4.6.2. Measures must be taken to prevent unrolled wire mesh from recoiling. Such measures may include, but are not limited to, securing each end of the roll or turning over the roll.

31.4.7. Removal of Formwork

31.4.7.1. Forms and shores (except those that are used for slabs on grade and slip forms) must not be removed until the concrete has gained sufficient strength to support its weight and superimposed loads. Such determination must be based on compliance with one of the following:

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31.4.7.1.1. The plans and specifications stipulate conditions for removal of forms and shores, and such conditions have been followed, or

31.4.7.1.2. The concrete has been properly tested with an appropriate American Society for Testing and Materials (ASTM) standard test method designed to indicate the concrete compressive strength, and the test results indicate that the concrete has gained sufficient strength to support its weight and superimposed loads.

31.4.7.1.3. Reshoring must not be removed until the concrete being supported has attained adequate strength to support its weight and all loads placed upon it.

31.4.8. Precast Concrete


31.4.8.1. Precast concrete wall units, structural framing, and tilt-up wall panels must be adequately supported to prevent overturning and to prevent collapse until permanent connections are completed.

31.4.8.2. Lifting inserts that are embedded or otherwise attached to tilt-up wall panels must be capable of supporting at least two times the maximum intended load applied or transmitted to them; lifting inserts for other precast members must be capable of supporting four times the load. Lifting hardware shall be capable of supporting at least five times the maximum intended load applied or transmitted to the lifting hardware.

31.4.9. Lift-Slab Operations

31.4.9.1. Lift-slab operations must be designed and planned by a registered professional engineer who has experience in lift-slab construction. Such plans and designs must be implemented by the employer and must include detailed instructions and sketches indicating the prescribed method of erection. The plans and designs must also include provisions for ensuring lateral stability of the building/structure during construction.

31.4.9.2. Jacking equipment must be marked with the manufacturer's rated capacity and must be capable of supporting at least two and one-half times the load being lifted during jacking operations and the

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equipment must not be overloaded. For the purpose of this provision, jacking equipment includes any load bearing component that is used to carry out the lifting operation(s). Such equipment includes, but is not limited to, the following:

31.4.9.2.1. Threaded rods

31.4.9.2.2. Lifting attachments

31.4.9.2.3. Lifting nuts

31.4.9.2.4. Hook-up collars

31.4.9.2.5. T-caps

31.4.9.2.6. Shearheads, columns, and footings


31.4.9.3. Jacks/lifting units must be designed and installed so that they will neither lift nor continue to lift when loaded in excess of their rated capacity; and jacks/lifting units must have a safety device which will cause the jacks/lifting units to support the load at any position in the event of their malfunction or loss of ability to continue to lift.

31.4.9.4. No employee, except those essential to the jacking operation, shall be permitted in the building/structure while any jacking operation is taking place unless the building/structure has been reinforced sufficiently to ensure its integrity during erection. The phrase “reinforced sufficiently to ensure its integrity” as used in this paragraph means that a registered professional engineer, independent of the engineer who designed and planned the lifting operation, has determined from the plans that if there is a loss of support at any jack location, that loss will be confined to that location and the structure as a whole will remain stable.

31.4.10. Masonry Construction

31.4.10.1. Whenever a masonry wall is being constructed, a limited access zone must be established prior to the start of construction.

31.4.10.2. The limited access zone must be as follows:

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31.4.10.2.1. Equal to the height of the wall to be constructed plus 4 feet (1.2 meters), and shall run the entire length of the wall;

31.4.10.2.2. On the side of the wall that will have no scaffold;

31.4.10.2.3. Restricted to entry only by employees actively engaged in constructing the wall; and

31.4.10.2.4. Kept in place until the wall is adequately supported to prevent overturning and collapse unless the height of the wall is more than 8 feet (2.4 meters) and unsupported, in which case it must be braced. The bracing must remain in place until permanent supporting elements of the structure are in place.


31.4.11. Concrete Placement

31.4.11.1. When placing concrete, make sure the ground will support the loaded concrete truck. Check for buried tanks, shallow sewers and utilities or loosely back-filled trenches and basements. Trucks should stay away from excavated areas where their vibration and shifting weight can cause failure of unstable excavated areas.

31.4.11.2. Watch for tripping hazards in concrete formwork such as protrusions of rebar or formwork members. Be aware of dangerous form conditions including cracked joists, rotted wood, unsecured walers, loose snap ties or coil rods, un-spliced walers, unsecured bulkheads and un-shored gaps that can be blown out during a pour. Nails and tie wire can also cause serious injury from scratches and abrasions. Ensure all potentially exposed body parts are covered with gloves or protective clothing.

31.4.11.3. When working at heights over six feet, a plan for implementing fall protection shall be in place. OSHA CFR 29 1926.500 Subpart M – Fall Protection

31.4.11.4. Be aware of suspended loads when using a crane for concrete placements. NEVER place yourself underneath the concrete bucket while a crane is placing concrete. Be aware of the potential for the concrete bucket to for drift and spin as it is swung into place.

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31.4.11.5. Concrete weighs 150 pounds per cubic foot. Maintain stable footing and good balance to avoid strains and sprains from over lifting or shoveling, running hose or slick line.

31.4.11.6. Use caution when unfolding or attaching concrete truck chutes; make sure they are tied off properly to prevent unexpected or sudden movement and that open chutes are anchored properly before releasing concrete.

31.4.11.7. Stripped form material will have nails removed or bent over. Gloves will be used during all stripping operations.

31.4.11.8. Concrete delivery and pump truck setup must be planned to avoid risks associated with unstable ground, obstructions and any overhead power lines.

31.4.11.9. Reinforcing steel will be protected to avoid exposing employees to an impalement risk by adequate covers. Extreme care should be used when walking on rebar because of the increased risk of tripping and falling. If possible designate access, and cover rebar mats with plywood

31.4.11.10. Power trowels will be equipped with a “deadman” switch that will shut the engine down if the operator loses grip on the machine.


31.4.11.11. Bull float handles will be insulated if being used around power lines.

31.4.12. Pump Truck Setup and Operations

31.4.12.1. Set up

31.4.12.1.1. The area where the concrete pump truck will be placed shall be surveyed prior to the setting up of the truck in order to identify any obstructions or potential for hazardous conditions due to the introduction of the equipment.

31.4.12.1.2. Identify any potential for the boom of the pump truck being able to make contact or come within a set perimeter of power lines. A spotter must be in place if the boom of the concrete truck has the potential to come within 17 feet of the power line or any other calculated distance set forth by Carbon America or the client.

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Type of Material	Permissible Pressure
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Undisturbed	Ground 22 PSI
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Asphalt, min. 8" Thick	29 PSI
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Compressed crushed stone	36 PSI
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Clay/Silt Soil, Firm	43 PSI
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Mixed Granular Soil	51 PSI
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Firm Compacted Gravel	58 PSI
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More Compacted	72 PSI
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More Compacted (e.g. Class 5)	109 PSI
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Brittle weathered rock	145 PSI
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31.4.12.1.3. Using the permissible pressure values above, assume the load of one outrigger to be 40,000 pounds on the asphalt. If that outrigger was placed on a 12"X12" pad (144 Square Inches) you would take 40,000 pounds divided by 144 square inches which equals 278 PSI. In this case the outrigger would sink and cause the truck to tip. Additional cribbing for example 40"x40" would increase the square inches to 1600, which would decrease the loading to 25 PSI, creating an allowable working load on the asphalt

31.4.13. Signals/Communication

31.4.13.1. Establish what form of communication will be used prior to the concrete operation, either via radio or the use of hand signals. If hand signals are the chosen form of communication the operator and the individual providing direction for the work shall understand another before the discharging of concrete.

31.4.14. Placement

31.4.14.1. Never allow the pump discharge hose to rest against the placers body. Hold the hose with your hands, away from your body.

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31.4.14.2. Never straddle or sit on pump hoses.

31.4.14.3. Move slowly and deliberately watching foot placement, and pinch points.

31.4.14.4. Inspect hose connections before placement.

31.4.14.5. Each person should know how to shut down the pump in case of an emergency.

31.4.14.6. Wear proper PPE for concrete placement

31.4.14.6.1. Rubber boots if walking in concrete

31.4.14.6.2. Rubber gloves if contacting concrete with hands

31.4.14.6.3. Safety glasses and face shields

31.4.14.6.4. Rain gear or approved disposable coveralls if concrete can potentially contact clothing or skin

31.4.14.6.5. Hearing protection if working next to pump

31.4.14.6.6. High visibility safety-vest (unless project does not require)

31.4.14.6.7. NIOSH approved respirator if required


31.4.14.7. Never stand on or stick body parts in the concrete pump hopper or any other foreign objects.

31.4.14.8. Environmental Considerations

31.4.14.8.1. Designate a truck/pump clean out area that is lined with heavy plastic.

31.4.14.8.2. Do not allow clean out on site if designated area is not provided

31.4.14.8.3. Dispose of clean out material in approved dumpsters

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31.4.14.8.4. Control wash water runoff

31.4.15. Training Requirements

31.4.15.1. Each employee that is working with concrete must be aware of the hazards associated with their task. Training will be conducted before involved with coming in direct contact with concrete or concrete products, i.e. wet concrete, chipping, patching, finishing etc. The specific hazards will be addressed and each employee will be educated on specific hazards associated with concrete.

31.4.15.1.1. Each employee will know what to do in case of a concrete exposure


31.4.15.1.2. Each employee will know the proper PPE (personal protective equipment) to use when handling concrete products.

31.4.15.1.3. Each employee will know and understand the content of this procedure and how to incorporate the practices into their work.

31.5. REFERENCE

31.5.1. OSHA 1926 subpart Q – Concrete and Masonry Construction

31.5.2. OSHA CFR 29 1926.500 Subpart M – Fall Protection

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32.1. PURPOSE

32.1.1. To review the requirements of OSHA's drinking water and sanitation requirements.

32.2. SCOPE

32.1.2. This procedure applies to all Carbon America sponsored projects where the Company will be providing employees with potable water and sanitation solutions.

32.3. RESPONSIBILITIES

32.1.3. Project Manager


32.1.3.1. Responsible for ensuring that potable water is provided to all employees and that employees are provided a sanitary work environment under the provisions of all applicable standards.

32.4. PROCEDURE

32.1.4. Water

32.1.4.1. An adequate supply of potable water shall be provided and controlled as follows:

32.1.4.1.1. Potable containers shall be capable of being tightly closed, equipped with a top and shall be clearly identified of its contents. Dipping cups into a container is prohibited. Containers used for potable water are not to be used for any other purpose.

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The top of the water container should be sealed with duct tape, shrink wrap or similar, and the employee responsible for cleaning and distributing the water should date the seal. The seal is only to be removed by authorized employees.

32.1.4.1.2. Use of a common drinking cup is prohibited. Both a sanitary container for unused cups and a waste receptacle for used cups must be available where single service cups are used.

32.1.4.1.3. Outlets for non-potable water shall be clearly identified by suitable signs and are not to be used for drinking, washing or cooking. In addition, there shall be no connections between potable water and non-potable water systems.

32.1.4.1.4. Potable water containers shall be cleaned at regular intervals in a sanitary location.

32.1.4.1.5. An adequate supply of potable water shall be provided in all places of employment

32.1.5. Washing Facilities


32.1.5.1. Carbon America shall provide adequate washing facilities for employees engaged in the application of paints, coating, herbicides, or insecticides, or in other operations where contaminants may be harmful to the employees. Such facilities shall be in near proximity to the worksite and shall be so equipped as to enable employees to remove harmful substances.

32.1.5.2. Anything that could get hands dirty, including going to the bathroom, oils, dirt, etc. would be considered “other contaminates”.

32.1.5.3. Washing facilities shall be maintained in a sanitary condition and include potable water, soap, and single-use towels.

32.1.5.4. To ensure compliance, projects will have hand wash stations (can be purchased heated) and/or combination portable toilets that can be heated in the winter.

32.1.5.5. Each unit will have different service times based on the number of employees.

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32.1.5.6. Ensure hand sanitizer remains available in eating areas as an option.

32.1.6. Eating Areas

32.1.6.1. Carbon America will provide an eating area that will be free of any potential hazards or contaminants.

32.1.6.1.1. It is required that employees not be allowed to eat where welding or grinding, painting, where chemicals/fuels are used or stored.

32.1.6.1.2. Ensure adequate hand washing facilities and sanitizers are available.

32.1.6.1.3. Microwaves and other heating devices must be kept clean.

32.1.7. Sanitation

32.1.7.1. Toilets


32.1.7.1.1. An adequate supply of toilets is to be made available for use by our employees. The number of toilets shall not be less than indicated by the following table:

Number of Employees	Minimum Number of Toilets
20 or less	1
20 or more	1 toilet seat and 1 urinal per 40 employees
200 or more	1 toilet seat and 1 urinal per 50 employees

32.1.7.1.2. Under temporary field conditions, provisions are to be made to assure not less than one toilet facility is available.

32.1.7.1.3. Jobsites not provided with a sanitary sewer will be provided with one of the following toilets:

32.1.7.1.3.1. Privies

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32.1.7.1.3.2. Chemical toilets

32.1.7.1.3.3. Recirculating toilets

32.1.7.1.3.4. Combustion toilets

32.5. REFERENCE

32.5.1. OSHA 1926.51 Sanitation

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33	Hydrogen Sulfide	0	05/10/2022	

REVIEW LOG:

Date	Purpose for review	Person
05/10/2022	New Safety Manual	Hinz

33.1.0 Purpose

33.1.1 This document defines the procedures and guidelines for controlling and precluding exposures to Hydrogen Sulfide (H₂S).

33.2.0 Scope

33.2.1 This policy applies to all facilities, projects, and satellite facilities where the potential for exposure of Hydrogen Sulfides exists.

33.3.0 Definitions

33.3.1 No definitions.

33.4.0 Responsibilities


33.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

33.5.0 Process

33.5.1 General

33.5.1.1 H₂S is a colorless, flammable, extremely hazardous gas with a “rotten egg” smell.

33.5.1.2 Industrial activities that can produce the gas include petroleum/natural gas drilling and refining, waste water treatment, coke ovens, tanneries, and paper mills. H₂S comes from the decomposition of organic matter.

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33.5.1.3 Sites must have proper training and emergency response procedures in place along with proper detection equipment.

33.5.2 Hazardous Properties of H₂S Gas

33.5.2.1 H₂S is heavier than air and may travel along the ground collecting in lowlying areas.

33.5.2.2 The primary route of exposure is inhalation; it smells like rotten eggs or sewer gas. It creates a mild acid on the skin in higher concentrations, which may cause skin irritation or rashes.

33.5.2.3 H₂S is flammable and will burn between 4.3% and 46% in air. When burned, H₂S will generate Sulfur Dioxide, which is also very toxic.

33.5.2.4 H₂S is both an irritant and a chemical asphyxiate with effects on both oxygen utilization and the central nervous system. Health effects can vary depending on the level and duration of exposure.

33.5.2.5 Key Characteristics and levels:

33.5.2.5.1 Odor threshold – 0.13 PPM;

33.5.2.5.2 1 PPM amount detected by a gas detector;

33.5.2.5.3 10 PPM OSHA PEL;

33.5.2.5.4 15 PPM OSHA STEL;

33.5.2.5.5 100 PPM Immediately Dangerous;


33.5.2.5.6 100-200 PPM Loss of smell;

33.5.2.5.7 200-500 PPM Confusion, loss of consciousness; and

33.5.2.5.8 500-1000 PPM Death if not immediately rescued.

33.5.3 Protection against H₂S Exposure

33.5.3.1 Employees working in areas with known or suspected H₂S concentrations shall be trained in H₂S and respiratory protection. Rescue

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training will also be conducted.

33.5.3.2 A Site Safety Plan will review all H₂S safety processes before entering areas where H₂S may be present.

33.5.3.3 Air must be tested for the presence and concentration of H₂S by a qualified person using air monitoring equipment such as a H₂S detector tubes or a multi-gas meter. Tests should also determine if fire/explosion precautions are necessary.

33.5.3.4 Personal H₂S monitors must be considered when H₂S levels in the area have the potential to be at or above the OSHA PEL of 10 PPM.

33.5.3.5 If the gas is present, the space/area must be ventilated continually to remove gas.

33.5.3.6 If the gas cannot be removed, the person entering the space/area must use appropriate respiratory protection (SCBA or Airline respirator) and any other necessary personal protective equipment, rescue, and communication equipment.

33.5.4 Site Responsibilities


33.5.4.1 The Safety Department is responsible for assisting projects with the application of this standard.

33.5.4.2 Supervision is responsible for making employees aware of areas in the host facility that could contain H₂S and of any additional plant safety rules that apply including contingency/emergency plans.

33.5.5 General Procedures

33.5.5.1 In areas where fixed or portable monitors are being used and the alarms are set at the PEL of 10 PPM, individuals must vacate the area anytime the monitor alarm sounds.

33.5.5.2 Employees may not be exposed to H₂S at a concentration exceeding its ceiling limit (15 PPM) at any time without proper respiratory equipment.

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33.5.5.3 Employees may not enter a work zone that has concentrations above 100 PPM regardless of respiratory protection.

33.5.5.3.1 Rescue provisions by trained employees must be included when there is a potential for H₂S levels above IDLH.

33.5.5.4 The Project Team is responsible for instructing the jobsite on the proper evacuation method upon hearing the alarm sound.

33.5.5.5 The client's contingency plan shall be made aware to all employees in the Site Specific Contingency Plan.

33.5.6 Training

33.5.6.1 Employees will be trained in the following:

33.5.6.1.1 What H₂S is;

33.5.6.1.2 Where it can be found;

33.5.6.1.3 Properties and characteristics;

33.5.6.1.4 Detection equipment and warning properties;


33.5.6.1.5 Respiratory Protection;

33.5.6.1.6 Working around H₂S; and

33.5.6.1.7 Emergency procedures and rescue

33.6.0 References

33.6.1 None

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34	Material Handling and Storage	0	05/10/2022	

REVIEW LOG:

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34.1.0 Purpose

34.1.1 The purpose of this procedure is to provide minimum guidelines for the manual handling and storage of material and equipment.

34.2.0 Scope

34.2.1 This procedure is applicable to all jobsites.

34.3.0 Definitions

34.3.1 Manual Material Handling – The lifting, carrying, stacking, etc. of materials and equipment by manual energy rather than mechanized means such as forklifts, cranes, etc...


34.3.2 Material Handling Equipment – For the purposes of this procedure, this includes, but is not limited to, hand trucks and dollies, wagons, pallet jacks, push carts, grasshoppers (for moving pipe, steel, etc.), and any other non-mechanized equipment used by personnel to handle material. This equipment relies solely upon an employee for movement.

34.4.0 Responsibilities

34.4.1 The Project Manager will be responsible for the implementation and adherence to this procedure.

34.5.0 Process

34.5.1 Manual Material Handling Procedure

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34.5.1.1 The project/location should review the 50-pound maximum lifting requirement. Depending on the repetitive nature and personnel involved, this limit may need to be reduced. If reduced, the new limit shall be communicated to all employees through training and established project policy. When practical, such as in a warehouse, laydown yard, print shack, etc., the project shall post the established safe load limits in a legible format.

34.5.1.1.1 Employees must have a reasonable understanding of the weight of the object to be lifted. If not, it is expected that they will seek assistance before lifting.

34.5.1.1.2 Unless the load is clearly light enough to be handled safely, assistance through mechanical means or other personnel shall be utilized.

34.5.1.1.3 The travel path shall be reviewed to ensure there are no obstructions or walking/tripping hazards.

34.5.1.2 Employees shall wear the proper PPE for lifting/handling material and equipment.


34.5.1.2.1 Inspect the load that will be handled to identify any hazards and take steps to mitigate those hazards. Examples include removing nails from boards, checking for insects, filing down or buffering sharp edges, and stabilizing an unsecure load before attempting to handle it.

34.5.1.2.2 At a minimum, appropriate gloves must be worn to mitigate any identified hazards that may include but are not limited to, pinch points, sharp edges, rotating or moving parts, etc.

34.5.1.3 The Company shall not provide back belts to any employee.

34.5.1.3.1 Back belts are not recommended in general, unless prescribed by a physician.

34.5.1.3.2 The use of a back-belt for support has not been proven to decrease back injuries. OSHA does not recognize their use as

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an effective part of an injury reduction program. Unless specifically recommended by a physician, the company does not recommend their use. However, any employee who chooses to use a self-provided back belt should be advised to research the proper use and pros and cons of the equipment.

34.5.1.4 When handling loads of any weight or size, employees shall practice proper lifting techniques and body mechanics as described below:

34.5.1.4.1 Keep the load as close to the body as safely possible at all times during lift and handling;

34.5.1.4.2 Stand as close to the load as safely possible and squat down to grip the load, bending the knees and maintaining the naturally erect S-shape of the back;

34.5.1.4.2.1 Use this same technique to set the load.

34.5.1.4.3 Ensure that the grip is secure and adequate to safely handle the load;

34.5.1.4.4 Use the strength of the legs to lift the load;


34.5.1.4.5 Do not extend the load out from the body;

34.5.1.4.6 If it is necessary to turn to move or place the load, keep the load in front of the body, turning the feet to change the position of the load;

34.5.1.4.7 Avoid awkward or tight positions that limit body movement options; and

34.5.1.4.8 When lifting/handling a load with a partner, clearly communicate the process prior to picking up the load, during travel, and while setting the load.

34.5.1.5 Material Handling Equipment

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34.5.1.5.1 Employees shall be trained and knowledgeable of the proper use and limitations of any equipment they use for material handling.

34.5.1.5.2 All manufacturers' recommendations shall be followed and equipment shall be properly maintained.

34.5.1.5.3 Equipment shall be inspected prior to use and if found defective, a supervisor shall be notified for removal from service and/or repairs. It is prohibited to use damaged or substandard equipment.

34.5.1.5.4 The established safe load limit and proper lifting techniques shall be followed for any personnel handling materials when preparing a load for movement with this equipment, including lifting the load onto carts, wagons, etc.

34.5.1.5.5 When using equipment that relies upon human power for stabilization and use, the employee must consider the weight and security of the load and take measures to ensure that he/she can control the load and equipment. If there is any doubt, then other avenues of transport shall be considered (i.e., mechanized equipment).


34.5.1.6 No Knot Policy

34.5.1.6.1 No ropes with knots are to be used when hoisting materials (i.e. scaffolding poles/electrical conduit etc.)

34.5.1.6.2 5.1.6.2 When lifting or lowering materials utilizing a lifting bag, projects / areas will use a braided rope with an eye connected to a shackle or other acceptable positive securing devices and attached to the material.

34.5.1.6.3 These ropes will be for lowering / hoisting materials only and will be uniquely identified (i.e. specific color or marking).

34.5.1.6.4 A 30 lb. weight limit shall be maintained for lifting / lowering activities and superintendent approval is needed for any weight over the limit.

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34.5.1.7 Lifting Bags

34.5.1.7.1 Heavy-duty 24 oz. cotton duck canvas

34.5.1.7.2 Carabiner and Hoisting Strap

34.5.1.7.3 Equipped with a double twist-action locking carabiner for maximum safety

34.5.1.7.4 Equipped with a double twist-action locking carabiner for maximum safety

34.5.1.7.5 Heavy-duty 24 oz. cotton duck canvas with carabiner and hoisting strap

34.5.1.7.6 Canvas bucket with hook and loop closure system,

34.5.1.7.7 4 ft. (1.2 m), 100 lb. (45.4 kg) capacity.

34.5.1.7.8 6 ft. (1.8 m), 100 lb. (45.4 kg) capacity.

34.5.1.7.9 10 ft. (3.1 m), 100 lb. (45.4 kg) capacity.

34.5.1.7.10 3M™ DBI-SALA® Long Safe Buckets make transportation of scaffolding, materials, and longer equipment both easy and safe, and more effective than hand-to-hand transportation or using rope with hitch knots. Long Safe Buckets feature a hook and loop closure system that helps mitigate accidental drops. A heavy duty webbing hoisting strap comes with a built-in twist-lock aluminum carabiner for lifting.


34.5.1.8 Lifting Rope with Connectors

34.5.1.8.1 Rope

34.5.1.8.1.1 3-Stand twisted co-polymer

34.5.1.8.2 Snap Hook:

34.5.1.8.2.1 Clear Zinc Plated Forged Alloy Steel

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34.5.1.8.2.2 Proof Tested to 3,600 lbs.

34.5.1.8.3 Technical:

34.5.1.8.3.1 Rope Diameter: 5/8"

34.5.1.8.3.2 Minimum Tensile Strength: 5000 lbs.

34.5.1.8.3.3 Maximum Working Capacity: 310 lbs.

34.5.1.8.4 Certification:

34.5.1.8.4.1 OSHA: 1926.104, 1926.502, 1910.66, ANSI: Z359.1, A10.32 and CSA 259.1

34.5.2 Material Storage

34.5.2.1 When storing material/equipment, care shall be taken to ensure that the stored material is adequately secured and does not pose an unsecured object hazard.

34.5.2.1.1 The use of banding, tie-downs and other securing means shall be considered when a load is unstable.


34.5.2.1.2 In certain instances, the use of staggered stacking can adequately stabilize a load. For instance, low stacked cinder blocks can be staggered to provide a level of stabilization.

34.5.2.1.3 Some loads may require chocks, dunnage, etc. to provide stabilization for storage (i.e., pipe).

34.5.2.2 Storage of material/equipment on temporary platforms such as scaffold is prohibited unless express permission is obtained from the Project Manager or Safety Manager. This does not preclude a crew from having needed material hoisted to the platform for immediate use.

34.5.2.2.1 In no case shall the weight of the material, equipment, and personnel exceed the capacity of the temporary platform.

34.5.2.3 When an area is established for overhead storage, such as atop an office structure or warehouse shelving, the storage platform must be

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marked for capacity in pounds per square feet, and shall not be overloaded.

34.5.2.4 Industrial shelving must have engineered documents clearly showing with maximum allowable weight and proper configuration.

34.5.2.5 Any material/equipment stored overhead must be secured from falling and/or shifting, and shall not be stacked above any protective enclosures or walls, for example.

34.5.2.6 Loose material, including but not limited to bricks, lumber, stackable bags, pipe, etc., shall not be stacked higher than 6 feet.

34.5.2.7 Plan laydown and storage areas for ease of access

34.5.2.8 Store materials/equipment in proper storage containers, as applicable

34.5.2.9 Evaluate storage to accommodate weather considerations such as rain or high winds.


34.5.2.10 Environmental Regulations must be reviewed to ensure proper storage, labeling and disposal requirements.

34.5.2.11 Do not block aisles, doorways, access and egress pathways, or emergency equipment when storing materials/equipment.

34.5.2.12 Refer to federal, state, and local regulations and codes for required clearances from fire suppression and protection equipment, door

34.6.0 References

34.6.1 Material Handling Program


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Material Handling Program

Lifting and / or Lowering Materials


2018.04.30

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No Knot Policy

- No ropes with knots are to be used when hoisting materials (i.e. scaffolding poles/electrical conduit etc.)
- When lifting or lowering materials utilizing a lifting bag, projects / areas will use a braided rope with an eye connected to a shackle or other acceptable positive securing devices and attached to the material.
- These ropes will be for lowering / hoisting materials only and will be uniquely identified (i.e. specific color or marking).
- A 30 lb. weight limit shall be maintained for lifting / lowering activities and superintendent approval is needed for any weight over the limit.

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Lifting Bags

Heavy-duty 24 oz. cotton duck canvas

Carabiner and Hoisting Strap

Equipped with a double twist-action locking carabiner for maximum safety


Equipped with a double twist-action locking carabiner for maximum safety

Heavy-duty 24 oz. cotton duck canvas with carabiner and hoisting strap

Canvas bucket with hook and loop closure system,

- 4 ft. (1.2 m), 100 lb. (45.4 kg) capacity.
- 6 ft. (1.8 m), 100 lb. (45.4 kg) capacity.
- 10 ft. (3.1 m), 100 lb. (45.4 kg) capacity.

3M™ DBI-SALA® Long Safe Buckets make transportation of scaffolding, materials, and longer equipment both easy and safe, and more effective than hand-to-hand transportation or using rope with hitch knots. Long Safe Buckets feature a hook and loop closure system that helps mitigate accidental drops. A heavy duty webbing hoisting strap comes with a built-in twist-lock aluminum carabiner for lifting.

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Lifting Rope with Connectors



- Rope
 - 3-Strand twisted co-polymer
- Snap Hook:
 - Clear Zinc Plated Forged Alloy Steel
 - Proof Tested to 3,600 lbs.




- Technical:
 - Rope Diameter: 5/8"
 - Minimum Tensile Strength: 5000 lbs.
 - Maximum Working Capacity: 310 lbs.
- Certification:
 - OSHA: 1926.104, 1926.502, 1910.66
 - ANSI: Z359.1, A10.32 and CSA 259.1

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Next Steps

- If lifting or lowering materials and / or self performing scaffolding:
 - Order items.
 - Issue a toolbox talk to the project to inform employees of the changes.
- If scaffolding is being performed by subcontractors.
 - Order items for them to use.
 - Train the crews on their use.


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Product Description

Part Nomenclature

ANSI Z359.1-2007 complaint for connectors which meet the 3,600 lb. gate requirements

Model #	Description	Length	Weight
300L-Z7/25FT BL	ANSI compliant; 5/8" 3-Strand twisted co-polymer rope w/snap hook and loop	25 ft.	2.5 lbs.
300L-Z7/50FT BL	ANSI compliant; 5/8" 3-Strand twisted co-polymer rope w/snap hook and loop	50 ft.	4 lbs.
300L-Z7/100F TBL	ANSI compliant; 5/8" 3-Strand twisted co-polymer rope w/snap hook and loop	100 ft.	8.25 lbs.

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35.1. PURPOSE

35.1.1. The health and safety of employees shall be directed not only to those working within the elements of industrial and construction work areas, but also those employees assigned to office environments, in such a manner as to minimize the risk of accidents, injuries, and illnesses.

35.2. SCOPE

35.2.1. This procedure applies to all company personnel and subcontractors working in offices within operations covered by the Carbon America Corporate EHS Procedures, including project offices.

35.3. RESPONSIBILITIES


35.3.1. Office Manager / Department Head

35.3.1.1. The Office Manager shall ensure required posting of project notices and required regulations, as well as ensure that employees are informed of the locations of these postings. Additional responsibilities include:

35.3.1.1.1. Ensure implementation of this procedure;

35.3.1.1.2. Perform regular departmental assessments for safety hazards;

35.3.1.1.3. Compete a monthly office safety inspection form

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35.3.1.1.4. Ensure that appropriate employees are properly trained on the contents of this procedure;

35.3.1.1.5. Provide a basic safety orientation;

35.3.1.1.6. Ensure weekly safety meetings of topics applicable to an office environment;

35.3.1.1.7. Assign personnel that can perform First Aid/CPR/AED; and

35.3.1.1.8. Know and communicate emergency response plans;

35.3.1.1.9. Respond to employee questions/concerns, as well as facilitate corrective actions in a timely manner.

35.3.2. Employees

35.3.2.1. Employees are responsible for inspecting their office work areas to ensure that they are free of recognized hazards, as well as:

35.3.2.2. Attend orientation and safety meetings; and

35.3.2.3. Notifying their Supervisor of any safety concerns

35.4. PROCEDURE


35.4.1. General Safety Practices

35.4.1.1. Company policies inside the office are to be followed in the same manner as if out in a construction work area with few exceptions. When performing maintenance-type activities, ensure that:

35.4.1.1.1. A proper Job Safety Analysis (JSA) is completed on the activity or an approved procedure is available to follow;

35.4.1.1.2. The proper Personal Protective Equipment (PPE) is used while performing the task; and

35.4.1.1.3. Any equipment to be used is inspected prior to use.

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35.4.1.2. To avoid injury and fire risk, good housekeeping practices must be followed. All employees must expend the necessary effort to achieve and maintain a neat and orderly work environment.

35.4.1.3. Use caution when walking around blind corners. To avoid collisions, keep to the right when walking in hallways or aisles, especially when approaching doorways and blind corners.

35.4.1.4. Use handrails when climbing or descending stairs, and always walk — do not run.

35.4.1.5. Arrange electrical cords and equipment off the floors and out of the aisles where they may present a tripping hazard.

35.4.1.6. Tack down and secure loose carpeting or flooring immediately.

35.4.1.7. Remove any type of spilled liquid from the floor immediately.

35.4.1.8. Arrange furniture and other fixtures to prevent a tripping hazard.

35.4.1.9. Stack materials in a stable manner to prevent them from falling over.

35.4.1.10. Ensure that heavier, broader items are placed on the bottom when stacking material.


35.4.1.11. Do not lean back too far in a chair. Ensure that all legs remain on the floor at all times.

35.4.1.12. When accessing a chair to sit down, ensure that you place one hand on the chair to prevent it from moving beneath you as you sit.

35.4.2. Office Equipment

35.4.2.1. Whenever possible, filing cabinets should be arranged side-by-side and bolted together to prevent a cabinet from toppling forward when one of the higher drawers is opened.

35.4.2.2. Whenever possible, anchor single filing cabinets to the wall.

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35.4.2.3. Where there is a single file cabinet, care must be taken to prevent toppling when a higher drawer is opened. Arrange the files so that the lower drawers bear the heaviest load.

35.4.2.4. Keep drawers of desks and file cabinets closed when not in use.

35.4.2.5. Pull out only one drawer of a filing cabinet at a time to avoid overbalancing.

35.4.2.6. Never leave a drawer pulled out from a piece of furniture or equipment.

35.4.2.7. Use only an approved type ladder or another designed safe support when reaching for material on high shelves or at other elevated positions. Do not stand on boxes, chairs or other makeshift devices.

35.4.2.8. Do not use ventilation fans or space heaters unless they are UL Approved and guarded.

35.4.2.9. Keep fingers clear of the paper cutter blade and always lock the blade in the closed position when not in use.

35.4.2.10. Storage space must be adequate for the volume of materials being stored. If it is inadequate, dispose of the material or find an alternative storage location.


35.4.2.11. Stored materials must be in a stable configuration in order to permit safe access, avoid clutter, and minimize the hazard of falling materials.

35.4.2.12. Use only properly grounded UL Approved electrical office equipment, tools or appliances.

35.4.2.13. All damaged equipment shall be reported to your Supervisor immediately. Do not attempt to repair electrical or mechanical equipment unless authorized to do so.

35.4.2.14. Do not overload electrical outlets with multiple plugs.

35.4.2.15. When unplugging electrical office equipment, grip the plug not the cord.

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35.4.2.16. Flammable liquid/material shall not be stored in the office. Appropriate outside storage should be provided.

35.4.2.17. Chemicals, other than small amounts of household cleaners, shall not be stored in an office. Approved storage cabinets will be utilized outside the office.

35.4.2.18. All chemical containers shall be properly labelled and must not be left uncapped. Material Safety Data Sheets (MSDS/SDS) for all chemicals must be maintained in compliance with the Hazard Communication Program Procedure.

35.4.3. Emergency Response and Fire Hazards

35.4.3.1. All employees shall be aware of the emergency procedures for their location, as well as:

35.4.3.1.1. The location of emergency exits and fire alarm pull stations;

35.4.3.1.2. The location of the primary and secondary assembly areas;

35.4.3.1.3. The location and proper use of the nearest fire extinguisher;


35.4.3.1.4. The location of your area's primary and secondary evacuation routes;

35.4.3.1.5. The location of the First Aid kit and if appropriate, the AED; and

35.4.3.1.6. The proper procedures for reporting an injury or incident.

35.4.3.2. The office is required to conduct an emergency evacuation drill annually, at a minimum.

35.4.3.3. Employees expected to use a fire extinguisher shall be trained annually.

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35.4.3.4. Never obstruct emergency exits, fire alarm pull stations or emergency equipment with furnishings or other material. Do not obscure or conceal an emergency exit.

35.4.3.5. Never block open a fire door unless the hold-open device is interconnected to the building fire alarm system.

35.4.3.6. Ensure that exit signs are placed in highly visible areas and accurately detail the exit routes.

35.4.3.7. All emergency exit doors shall be tested on a regular basis. In the event that the facility utilizes electrically or magnetically locked doors within escape routes, the doors must be tested annually, at a minimum.

35.4.3.8. AED's should be inspected monthly or as outlined by manufacturer.

35.4.4. Ergonomics


35.4.4.1. Ensure that your chair is adjusted so that you can sit with your feet flat on the floor and your thighs parallel to the floor. Your trunk should be straight but inclined slightly forward at the hip.

35.4.4.2. Ensure that there is good support for your hands and forearms when you are typing. You should be able to rest them on a table top, a wrist rest or the arms of your chair.

35.4.4.3. While typing, try to avoid bending your wrist. A flat or wrist "neutral" position should be maintained, and elbows should be bent at 90 degrees, with forearms parallel to the floor.

35.4.4.4. A 15-minute rest break is recommended after one hour of continuous monitor work when there is a high visual demand, and a 15-minute break is recommended after two hours of continuous monitor work when there is a moderate visual demand.

35.4.4.5. Maintain sufficient lighting to avoid eye strain. When working at a monitor, adjust the screen so that there is no glare.

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35.4.4.6. Use a document holder to maintain the same distance and elevation as the computer screen, to minimize bending your neck. The operator's face should be 18 to 24 inches from the screen.

35.4.4.7. Top of monitor should be at eye level or below to minimize eye strain.

35.4.4.8. Employee should participate in a daily "stretch and flex" session.

35.4.5. Back Injury Prevention

35.4.5.1. The following proper lifting techniques are essential to maintaining a healthy and injury-free back:

35.4.5.1.1. Assess the load that you want to lift, to ensure that it can be lifted safely. If the load appears to be awkward in shape or too heavy, then ask for assistance.

35.4.5.1.2. Bend your knees, keeping your lower back straight, and use your legs to lift.

35.4.5.1.3. When lifting or setting object down, do not twist at the torso.


35.4.5.1.4. Ensure that the item's contents are not going to shift during lifting. This could cause loss of balance resulting in an accident or injury.

35.4.5.1.5. Lifting limits 50 lbs. (Includes lowering loads, pushing, pulling, carrying, etc.)

35.4.6. Training

35.4.6.1. This procedure shall be reviewed with each new employee permanently assigned to an office setting.

35.4.6.2. In addition, if the employee will be required to enter any construction areas on a routine basis, then the employee is required to attend the basic New Hire Orientation Training.

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35.4.6.3. If the employee will enter the work areas on a non-routine basis, then the employee must be escorted at all times.

35.5. REFERENCE

35.5.1. Office Safety Inspection Checklist

35.5.2. Hazard Communication Program Procedure


35.5.3. AED Inspection Sheet

35.5.4. Fire Extinguisher Inspection Log

35.5.5. Fire Prevention Procedure

35.5.6. Emergency Action Plan Procedure

35.5.7. Crisis Management

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36.1. PURPOSE

36.1.1. Although there are no specific regulations that address workplace security or protecting the public, Section 5(a)(1) of the Occupational Safety and Health Act (the General Duty clause), states that organizations are required to provide employees with a safe workplace. The Company also has a duty to provide protection to the general public from the hazards of construction activities.

36.1.2. Allowing strangers to wander through company facilities distracts employees from their work, and exposes visitors to dangers of which they may not be aware. Even if the Company allows only business associates or employees' relatives to visit freely, they are still exposed to hazards that employees must be trained to avoid. This policy aims to avoid unnecessary distractions, protect the public and maintain safety standards.

36.2. SCOPE


36.2.1. This procedure is applicable to all Carbon America sponsored projects.

36.3. RESPONSIBILITIES

36.3.1. Project and Safety Managers

36.3.1.1. Implementation and oversight of this procedure

36.4. PROCEDURE

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36.4.1 A risk assessment will be used at each fixed facility and prior to mobilization onto any new project to formulate a Site Specific Safety Plan based on the policies and procedures contained in this plan. Each major section of the plan will be developed on the basis of an assessment of potential threats to the public and operations. The level of plan detail and implementation will match the level of exposure.

36.4.1.1.1. The plan should be included as a section in the overall Site Specific Safety Plan.

36.4.1.2. Protection Assessment Process - Fixed Facility

36.4.1.2.1. Is the facility leased and is security part of the lease agreement?

36.4.1.2.2. Are parking areas and entrance ways well lighted?

36.4.1.2.3. Does the public have open access to the parking area or is it secured?

36.4.1.2.4. Are there any activities: vehicle traffic, deliveries, shop or yard activities, etc., at this facility that have the potential to put the public at risk?

36.4.1.3. Protection Assessment Process – Construction Jobsite


36.4.1.3.1. Is this jobsite at an existing facility or “green field”?

36.4.1.3.2. Is the jobsite located near residential areas or schools?

36.4.1.3.3. Is there heavy traffic or pedestrians?

36.4.1.3.4. Will special provisions need to be made for large equipment or machinery?

36.4.1.3.5. Will traffic control measures need to be provided at starting time and quitting time?

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36.4.1.3.6. Will hazardous materials (natural gas etc.) be introduced? Will procedures (gas blows etc.) take place?

36.4.1.3.7. Will crane activities have the potential to affect to public?

36.4.1.4. Protection Assessment Process – Visitors

36.4.1.4.1. Will access to the jobsite be open to the public?

36.4.1.4.2. If people can walk onto the jobsite how will we keep them from the construction areas?

36.4.1.4.3. Will the scope of work require a controlled access zone to the office, the warehouse or the materials lay-down area?

36.4.1.4.4. Is the project located in or near an urban area, where we need to provide protection for pedestrian traffic?

36.4.2. Protection Plan Elements

36.4.2.1. At a minimum, a Protection Plan (included in the Site Specific Safety Plan) will include:

36.4.2.1.1. A physical security survey of each fixed facility and project to determine the minimum-security safeguards required for protecting personnel, the public, and assets. This may include:


36.4.2.1.2. Complete perimeter fencing with gates.

36.4.2.1.2.1. Manned controlled access points

36.4.2.1.2.2. Traffic control, up to and including “Cone Zones” with certified traffic control flaggers

36.4.2.1.2.3. Visitor and delivery controls

36.4.2.2. Periodic reassessment of the Plan to determine if it meets pertinent regulations and policies

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36.4.2.3. A comprehensive and continuing awareness and education effort to gain the interest and support of employees, sub-contractors, and owners

36.4.2.4. Procedures for taking immediate, positive, and orderly action to safeguard life and property during an emergency

36.4.2.5. The Protection Plan shall be integrated with environmental, health, and safety (EHS) plans adopted at each facility and jobsite including:

36.4.2.5.1. Emergency Action Plan

36.4.2.5.2. Fire Prevention Plan

36.4.2.5.3. Hazardous weather Plan

36.4.2.5.4. Disaster Recovery Plan

36.4.2.5.5. Steel Erection Plan

36.4.2.5.6. Security Plan

36.4.2.5.7. Any other environmental and workplace safety plans and programs

36.4.3. General protection procedures


36.4.3.1. Install and maintain perimeter fencing or some other control to stop access to the general public during and after work hours.

36.4.3.2. Monitor and control who is entering your workplace: current employees, former employees, commercial delivery, and service personnel.

36.4.3.3. Store, lock, and inventory your facilities keys and access cards.

36.4.3.4. Secure mobile equipment and vehicles when not in use.

36.4.3.5. Keep an inventory of your most critical equipment, hardware, and software.

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36.4.3.6. Light, flag or barricade areas to prevent public from entering.

36.4.3.7. Set up public control zones and ensure overhead protection if public is exposed to falling debris.

36.4.3.8. All holes, large penetrations, excavations must be secured or protected to ensure night workers or public cannot enter them where there is a possibility of being entered.

36.4.3.8.1. Sites should evaluate what the location was used for. If adolescents or teenagers have been known to frequent the location, additional precautions should be considered such as: lighting, flashing danger signs, or physical security.


36.4.4. Other considerations

36.4.4.1. If city work, a Pedestrian/Vehicle Walk and Drive Flow Plan should be developed.

36.4.4.2. Physical security for densely populated areas

36.4.4.3. Tall (8 Ft) fencing around the perimeter of the jobsite

36.5. REFERENCE

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37.1. PURPOSE

37.1.1. This policy defines and outlines the Company Radiation Safety standard and how it applies to the Company employees working on Company locations or in owner facilities.

37.2. SCOPE

37.2.1. This policy applies to all projects, locations, and facilities. As a general rule, Company employees shall not participate in activities that would expose them to concentrations above any exposure limit without approval from the accompany executive. Employees shall not provide assistance to Radiographic companies that could potentially, by incident or accident, expose the employee to a radiation source without approval from the company executive.


37.3. RESPONSIBILITIES

Site Management and Supervision

37.3.1.1. Currently, the company does not have any monitored radiation workers and therefore does not have any employee exposure records on file. If it is determined and approved that a need for personal dosimetry monitoring is needed, any and all radiation dosimeters will be provided by the company at no cost to the employee.

37.3.1.2. All subsequent records will be retained per OSHA 29 CFR 1910.1096.

37.3.1.3. The primary source of potential employee radiation exposure is from field and shop non-destructive integrity testing (e.g. weld x-rays). All non destructive testing is sub-contracted out to pre-approved companies

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that monitor their own employees, control and restrict their own work areas and communicate any and all emergency procedures and signals to neighboring work sites and crews.

37.3.1.4. It is the responsibility of field supervision to ensure that safe distances are maintained while radiation devices are being used on a jobsite. It is also field supervision's responsibility to ensure sub-contractor compliance to applicable radiation safety standards directed by law, the owner facility expectations, and this standard.

37.4. PROCEDURE

General Health Effects from Ionizing Radiation

37.4.1.1. Acute Effects - The health effects associated with radiation are categorized as acute or chronic in nature. In order for acute effects to manifest, very large doses over a short period of time must take place. Below are some signs and symptoms of acute doses of ionizing radiation.

37.4.1.1.1. 5 – 10 rem - some changes in blood chemistry

37.4.1.1.2. ~50 rem - nausea (within hours of received dose)

37.4.1.1.3. 75 – 100 rem - vomiting, hair loss, diarrhea


37.4.1.1.4. 500 rem - possible death (within 2 months)

37.4.1.1.5. 1000 rem - destruction of intestinal lining, int. bleeding, death (weeks)

37.4.1.1.6. 2000 rem - damage to central nervous system and death (hours)

37.4.1.1.7. NOTE: 1 rem of dose is the same as 1000 mrem. Therefore 1 mrem is 1/1000 of a rem or a very small portion of the acute doses above. Remember, the occupational exposure limit is no more than 2 mrem / hr. to a member of the general public.

37.4.2. Barricades

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37.4.2.1. The universal radiation symbol is this trefoil. The colors may vary from purple (magenta) on yellow or black on yellow. This serves as warning or hazard signage indicating the presence of ionizing radiation hazards or radioactive material.

37.4.2.2. The minimum barricade distance that must be maintained, to protect the general public (or anyone that is not included in a radiation protection plan that includes radiation dose monitoring,) is the 2 mrem / hr. boundary or 50 feet whichever is greater.

37.4.2.3. This boundary separates the sub-contractor restricted area from the general work area. This distance should be calculated by the radiation technician in charge of the radiography job based off the strength of the source but no less than 50 feet.

37.4.2.4. The company will not use, possess or transfer sources of ionizing radiation without approval from Senior Management.

37.4.2.5. The barricade should be clearly marked stating "Caution – Radiation Area" using yellow and purple tape, radiation signs (with trefoil as shown above), cones, etc. and should not be any smaller than a 50' radius from the radiation source or origin.


37.4.2.6. Sufficient personnel should be supplied by the sub-contracting radiography company to adequately control the boundary, preventing unauthorized entry into the barricade.

37.4.2.7. Radiation barricades should not be left up after the radiography is completed. As soon as the radioactive source or the radiation hazards is properly contained or removed and secured, the barricade should be removed.

37.4.3. Other Considerations

37.4.3.1. Symbols shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol is the conventional three bladed design.

37.4.3.2. Radiation area - Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol with the words: "Caution - Radiation Area".

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37.4.3.3. All employees whose work may necessitate their presence in an area covered by the signal shall be made familiar with the actual sound of the signal-preferably as it sounds at their work location.

37.4.4. Norm Action Levels

37.4.4.1. For gamma radiation, measured by external survey of oil/water production equipment, tubular goods, operating gas processing equipment, soil, scale/sludge accumulations, etc.

37.4.4.2. Company action level is 50 micro roentgens per hour ($\mu\text{R/hr}$) including background, unless superseded by more stringent state regulations.

37.4.4.3. For alpha-beta radiation, measured by internal survey of opened gas processing vessels/other equipment:


37.4.4.3.1. AHC action level is 180 counts per minute (CPM) including background, unless superseded by more stringent state regulations.

37.4.5. Potential Health Hazards/ Occupational Exposure Limits

37.4.5.1. Although there are no specific federal regulations governing NORM, current OSHA standards do establish maximum allowable workplace exposure limits for radiation: 1.25 R/calendar quarter or approximately 2400 $\mu\text{R/hr}$ averaged over an 8-hour shift.

37.4.5.2. NORM generally does not present a radiation hazard [that is, exposures near or above the OSHA permissible exposure limit (VI.A)] to personnel working external to closed systems or equipment due to attenuation Radiation Safety Procedure (blockage) of the radiation by the steel equipment wall. However, recent field survey experience indicates that some equipment, both idle and inservice (particularly valves, elbows, and transition piping pieces) may exhibit relatively high (i.e. $> 1000 \mu\text{R/hr}$) external gamma radiation levels.

37.4.5.3. Avoiding prolonged or repeated close proximity to sources of higher level NORM contamination will provide satisfactory personnel protection. NORM survey meters can be used to determine safe

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distances, just as sound level meters can be used to determine safe distances from sources of high noise.

37.4.5.4. The major health concern associated with NORM is the inhalation of alpha radiation-contaminated dust or small particles during scale removal, vessel entry, or maintenance/repair on internal surfaces of NORM-contaminated equipment. Inhalation of alpha particles may contribute to the development of lung cancer. The presence of gamma radiation above the Action Level externally is indicative of alpha radiation internally.

37.4.5.5. Use of proper respiratory protection equipment, when appropriate, will prevent inhalation exposures. Protective clothing (disposable Tyvex) shall also be used, when appropriate, to prevent the accumulation of contaminated dust or particles on work clothing.

37.4.5.6. Ingestion of NORM (the result of eating, drinking, or smoking without washing hands after contact with NORM) and direct skin contact (especially through cuts or other open wounds) with NORM contaminated material shall be avoided.

37.4.5.7. Use of proper personal protective equipment and personal hygiene practices will prevent ingestion or direct skin contact exposures.

37.4.6. General Requirements


37.4.6.1. A NORM Survey shall be done when a Client suspects or communicates a potential NORM issue when working on, in or near the suspected contaminated area or material.

37.4.6.2. Only trained and authorized personnel shall conduct NORM surveys. Equipment must be operated in accordance with manufacturer's recommendations.

37.4.6.3. NORM survey results must be documented and retained in project files.

37.4.7. Work Practices When Handling NORM

37.4.7.1. Personnel Protection

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37.4.7.2. The following measures shall be implemented if NORM is detected at above the action level:

37.4.7.2.1. Employees must be advised of the presence of NORM, potential health hazards, and these procedures.

37.4.7.2.2. Keep the number of personnel in the work area to a minimum.

37.4.7.2.3. Direct skin contact with NORM must be avoided. Wear gloves, and bandage open cuts or wounds.

37.4.7.2.4. No eating, drinking, smoking or chewing around NORM contaminated materials.

37.4.7.2.5. Wash hands and face after handling NORM-contaminated materials, particularly prior to eating and before rest breaks.

37.4.7.2.6. Handle NORM wet if possible to reduce airborne NORM (in the form of dust).


37.4.7.3. Take efforts to minimize or prevent contamination of clothing by NORM dust or scale. Wear disposable coveralls (i.e., Tyvex) or other protective clothing if clothing contamination is a possibility.

37.4.7.4. Disposable clothing may not be discarded with ordinary trash if NORM is measured at or above the action level.

37.4.7.5. Contaminated disposable clothing shall be disposed of as NORM contaminated material, in accordance with applicable regulations.

4.7.6. Where airborne dust is possible, respiratory protection is required. Minimum acceptable respiratory protection is a half-mask cartridge respirator with approved filters (cartridges marked for radionuclide -magenta color).

47.4.7.7. Openings on NORM-contaminated equipment tubulars or other equipment shall be sealed, capped, or

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wrapped in plastic during movement or transfer to prevent dust generation or displacement of scale or sludge.

37.4.7.8. Take efforts to minimize or prevent ground contamination by NORM dust or scale. Use of plastic sheeting will minimize cleanup problems and minimize disposal costs.

37.4.8. Vessel/ Equipment Opening

37.4.8.1. If prior external survey of closed vessels/equipment identified NORM at or above the action level, the interior shall be presumed to be contaminated and tested prior to entry. Protective gloves and clothing, respiratory protection, and appropriate personal hygiene practices are required for personnel entering NORM-contaminated tanks/vessels.

37.4.8.2. If radiation levels inside equipment exceed 5000 $\mu\text{R/hr}$, entry shall not be permitted until the Safety Coordinator and/or NORM Coordinator advises on compliance with OSHA regulations.

37.4.8.3. Pumps, piping, valves, and other equipment should be considered NORM-contaminated if external measurements equal or exceed the action level.


37.4.8.4. Protective gloves and clothing and appropriate personal hygiene practices are required for personnel working on internal parts or surfaces of NORM-contaminated equipment.

37.4.8.5. If the work involves the potential for generating dust or airborne particles that are NORM-contaminated, appropriate respiratory protection is required.

37.4.9. Cleaning and Maintainance

37.4.9.1. Any NORM-contaminated scale, sludge, soil, or other material generated by cleaning must be collected and placed in suitable containers such as 55-gallon drums. Plastic sheets should be used to collect NORM to prevent ground contamination. Radiation levels on the ground after cleanup must be below the action level. Containers must be appropriately labeled.

37.4.10. Disposal

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37.4.10.1. Disposal regulations vary by state.

37.4.11. Warning Signs and Labels

37.4.11.1. Unless required by state or local regulation, the posting of NORM warning signs or labeling of individual pieces of equipment is not required at facilities other than NORM storage areas.

37.4.11.2. Dedicated NORM storage areas should have warning signs posted at entrances according to the following criteria:

37.4.11.2.1. For storage of material measuring above the action level but less than 5,000 $\mu\text{R/hr}$, required sign is: "CAUTION – NORM RESTRICTED AREA."

37.4.11.2.2. For storage of material measuring over 5,000 $\mu\text{R/hr}$ but less than 100,000 $\mu\text{R/hr}$, required sign is: "CAUTION - RADIATION AREA" (including OSHA radiation symbol).

37.4.11.3. For storage of material measuring above 100,000 $\mu\text{R/hr}$, required sign is: "CAUTION - HIGH RADIATION AREA" (including OSHA radiation symbol).


37.4.11.4. Measurements should be taken at storage areas every 6 months, and whenever significant amounts of material are added to the area. Measurements should be taken approximately 1 foot from stored equipment.

37.4.12. Training

37.4.12.1. If equipment or facilities are identified by survey to contain NORM at or above the "action levels" specified in this guidance manual:

37.4.12.1.1. Employees who work with or around contaminated equipment or other materials must receive training on the presence and potential hazards of NORM and protective measures to be taken;

37.4.12.1.2. Subcontractors must receive written notification prior to receiving, handling, or working with NORM-contaminated equipment or materials.

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37.4.12.2. Employee/Sub-contractor training and notification must be documented and retained in project files for audit purposes.


37.4.12.3. Employee training can be documented on safety meeting or safety training reports.

37.4.12.4. When determined by the Company that hazards from ionizing radiation exist, all individuals working in or frequenting any portion of that radiation area shall be informed of the occurrence of radioactive materials; shall be instructed in the safety problems associated with exposure; precautions and devices to minimize exposure including but not limited to time, distance, shielding, and keeping exposure limits As Low As Reasonably Achievable (ALARA).

37.4.12.5. They must also be instructed in the applicable provisions of this section for the protection of employees from exposure to radiation or radioactive materials, and shall be advised of reports of radiation exposure which employees may request a copy.

37.5. REFERENCES

37.5.1. [OSHA 29 CFR 1910.1096](#) – Toxic and Hazardous Substances – Ionizing radiation

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1.1 Policy Statement

1.1.1 It is the policy of Carbon America, referred to as the “Company”, to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.

1.1.2 Carbon America will comply with the OSHA **first aid** standard, 29 CFR 1926.50 and 29 CFR 1910.151, through implementation of this written program.

1.2 Purpose

1.2.1 To ensure provisions are in place to provide for prompt first aid and medical care for injured employees.

1.2.2 To ensure first aid is administered by appropriately trained personnel.

1.2.3 To ensure a base level of trained first aid employees on every site.


1.3 References

1.3.1 29 CFR 1926.50 Medical services and first aid.

1.3.2 29 CFR 1926.50 App A – First aid kits.

1.3.3 29 CFR 1910.151 Medical services and first aid.

1.3.4 29 CFR 1910.151 App A – First aid kits.

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1.4 General Requirements

1.4.1 The Company will insure the availability of medical personnel for advice and consultation on matters of occupational health.

1.4.2 Provisions shall be made prior to commencement of each project for prompt medical attention in case of serious injury.

1.4.3 In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite (within 3-4 minutes), which is available for the treatment of injured employees, a person who has a valid certificate in first-aid/ CPR/ AED training from the American Red Cross, or equivalent training shall be available at the worksite to render first aid.

1.4.4 First aid/ CPR/ AED supplies shall be readily accessible on each job site. Supplies must consist of appropriate items for field conditions and work environment.

1.4.5 The contents of the first aid kit will be in weather-proof containers and inspected at least weekly on each job to ensure that the expended items are replaced.


1.4.6 In areas where 911 emergency dispatch services are available and an employer uses a communication system for contacting necessary emergency-medical service, the employer must:

1.4.6.1 Ensure that the communication system is effective in contacting the emergency-medical service; and

1.4.6.2 When using a communication system in an area that does not automatically supply the caller's latitude and longitude information to the 911 emergency dispatcher, the employer must post in a conspicuous location at the worksite either:

1.4.6.3 The latitude and longitude of the worksite; or

1.4.6.4 Other location-identification information that communicates effectively to employees the location of the worksite.

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1.4.7 This does not apply to worksites with readily available telephone land lines that have 911 emergency service that automatically identifies the location of the caller.

1.4.8 Kit inspections shall be performed for the required kit onsite. Any contents, which are found to be deficient, shall be replaced by site supervisor prior to returning to the site following the inspection. Items, which are contained in the kit listed as other, shall be documented on the First-Aid Analysis and the documented inspection form shall be remitted to the Safety Department in order to update the inventory of the supplies. AED need to be checked on a monthly basis and location clearly identified.

1.4.9 Safety Department will be responsible for updating the form to include any items listed as other, to be required items.

1.4.10 Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, shall be readily accessible.


1.4.11 Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

1.5 Training

1.5.1 At least one person, who has a valid certificate in first-aid/ CPR/AED training from the American Red Cross or equivalent training, will be available at each worksite to render first aid for the treatment of injured employees as required.

1.5.2 Training of employees in basic first aid, cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) is encouraged and/or required under certain conditions.

1.5.3 Emergency responders. It is highly recommended that the following employees be trained in first aid, CPR, and AED.

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1.5.3.1 In general, employees identified as first aid trained (first responder) for the purposes of meeting this requirement do so as a collateral duty.


1.5.3.2 In that, providing first aid or other medical assistance is not their primary job assignment.

1.5.3.3 In addition, in the context of this program, a "Good Samaritan" is a person who volunteers assistance, as a personal choice, to a person in medical need.

1.5.4Recertification

1.5.4.1 As required by the American Red Cross, individuals who receive training as per the requirements shall be required to maintain their certification.

1.5.4.2 Re-training should be conducted in accordance with the terms and conditions as provided by the American red Cross; or at least every two years.

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2.0 PURPOSE

2.0.1 Carbon America is committed to providing a safe and healthy working environment for all employees. Musculoskeletal disorders (MSD) account for a majority of reported injuries and we must minimize the risk and incidence of MSDs. To achieve this goal, Carbon America requires each worksite to establish and maintain an MSD, Lifting and Handling Loads Program with the following elements:

2.0.1.1 Ongoing training of management, supervisors, and employees (including new hires) on MSD awareness hazards and control measures

2.0.1.2 Tracking of MSD statistics

2.0.1.3 MSD hazard identification and assessment (see MSD Hazard Identification form)

2.0.1.4 Control of MSD hazards through the application of engineering and/or administrative controls

2.0.1.5 Proactively integrating ergonomics principles into workplace design and work techniques

2.0.1.6 A realization that personal protective equipment may only be used as a substitute for engineering or administrative controls if it is used in circumstances in which those controls are not practicable.


2.1 RESPONSIBILITIES

2.1.1 SAFETY MANAGER

2.1.1.1 Develops Lifting and Handling Loads Programs for all worksites in accordance with this procedure and ensures all employees are aware of the requirements of the Lifting and Handling Loads Program.

2.1.1.2 Communicate, promote and support the MSD, Lifting and Handling Loads Program.

2.1.1.3 Conduct MSD training sessions and/or provide MSD training material.


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- 2.1.1.4 Maintain records of MSD training that they provide in a manner that supports accuracy and ease of access for monitoring purposes.
- 2.1.1.5 Monitor corrective actions taken as identified on incident reports.
- 2.1.1.6 Support supervisors and the worksite in the Lifting and Handling Loads Program process.
- 2.1.1.7 Assist in the investigation of MSD incidents to address injury hazards.
- 2.1.1.8 Bring to the attention of Carbon America management any MSD hazards identified during their investigations, audits or inspections.
- 2.1.1.9 Ensure distribution and awareness of MSD Hazard Identification Forms.
- 2.1.1.10 Provide input into purchasing specifications for new tools, equipment and furniture as needed to reduce MSD hazards.
- 2.1.1.11 Provide input into the development of safe work procedures to reduce MSD hazards.

2.1.2 WORKSITE MANAGER/SUPERVISOR

- 2.1.2.1 Responsible for the implementation and maintenance of the Lifting and Handling Loads Program for their facility and ensuring all assets are made available for compliance with the procedure.
- 2.1.2.2 Ensure that all worksite departments implement and maintain the provisions of the Lifting and Handling Loads Program.
- 2.1.2.3 Seek regular reports to ensure that their worksite is in compliance with the Lifting and Handling Loads Program.
- 2.1.2.4 Manual lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, carts, hoists must be provided for employees. Other engineering controls such as conveyors, lift tables, and workstation design should be considered.
- 2.1.2.5 Use of provided manual lifting equipment by employees must be enforced.

2.1.3 EMPLOYEES


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- 2.1.3.1 Shall attend all MSD related training for the task they are performing.
- 2.1.3.2 Practice MSD prevention strategies as per MSD training.
- 2.1.3.3 Comply with safe work procedures.
- 2.1.3.4 Correctly use the equipment provided by Carbon America according to manufacturers' recommendations.
- 2.1.3.5 Report to the supervisor any unsafe acts, unsafe tasks, unsafe conditions, or equipment problems that create MSD hazards.
- 2.1.3.6 Report any MSD incidents to the supervisor and cooperate in the investigation process.

2.2PROCEDURE

2.2.1 WORKSITE ASSESSMENT

- 2.2.1.1 Before manual lifting is performed, a hazard assessment must be completed. The assessment must consider size, bulk, and weight of the object(s), if mechanical lifting equipment is required, if two-man lift is required, whether vision is obscured while carrying and the walking surface and path where the object is to be carried. The assessment shall also include:
- 2.2.1.2 Use of the MSD Hazard Identification form contained within this procedure
- 2.2.1.3 Physical Demands
 - 2.2.1.3.1 Neck Back Shoulder Wrist
 - 2.2.1.3.2 Hand
 - 2.2.1.3.3 Knee Ankle/ Feet
- 2.2.1.4 Force Required and Working Distance
 - 2.2.1.4.1 Do employees push, pull, lift, lower, or carry objects that are too heavy or require too much force; away from the center of the body or in a jerky or twisting manner?
- 2.2.1.5 Work Postures
 - 2.2.1.5.1 Is the back is curved too much or in a stooped position?
 - 2.2.1.5.2 Is the back is twisted during movements?
 - 2.2.1.5.3 Is the neck bent or twisted?

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2.2.1.5.4 Are the arms away from the body?

2.2.1.5.5 Are the wrists flexed, extended or pinched positions?

2.2.1.6 Repetitive Use of Similar Muscles

2.2.1.6.1 Do employees perform movements over and over in the same way

2.2.1.7 Static Muscle Use and Duration

2.2.1.7.1 Do employees hold any of the above work postures for > 20 sec.?

2.2.1.7.2 Stand for long periods with their knees locked?

2.2.1.7.3 Stand in one position without moving or stretching?

2.2.1.8 Contact Stress

2.2.1.8.1 Do employees put localized pressure on any part of their body?

2.2.1.9 Work Space Layout and Conditions

2.2.1.9.1 Are there working heights, reaches in workspace, equipment, tool design, storage conditions, etc., that cause or contribute to employees experiencing any of the physical demands risk factors?

2.2.1.9.2 Also consider seating, floor surfaces, the characteristics of objects handled, including size and shape, load condition and weight distribution, and container as well as tool and equipment handles.

2.2.1.10 Organization of Work


2.2.1.10.1 Are there work processes, monotonous job tasks, work recovery cycles, task variability, work rate, machine paced tasks or peak activity demands that cause or contribute to rushing, frustration, fatigue or other visible signs of stress?

2.2.1.11 Environmental Conditions

2.2.1.11.1 Are employees exposed to poor lighting, vibration, cold or hot air/wind/water?

2.3 WORK CONTROLS

2.3.1 Carbon America must ensure based on the assessment, implement control measures to eliminate, minimize or reduce, so far as is reasonably practicable, the risk of musculoskeletal injury to the

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worker.

2.4 HANDLING HEAVY OR AWKWARD LOADS

2.4.1 Carbon America will take all practicable means to adapt the heavy or awkward loads to facilitate lifting, holding or transporting by workers or to otherwise minimize the manual handling required. Those include:

2.4.1.1 Where use of lifting equipment is impractical or not possible, two-man lifts must be used when any load is over 50 pounds.

2.4.1.2 All loads carried on handcarts shall be secured.

2.4.1.3 All awkward type loads shall be secured to prevent tipping.

2.4.1.4 Additional methods include:

2.4.1.4.1 Reducing the weight of the load by dividing it into two or more manageable loads

2.4.1.4.2 Increasing the weight of the load so that no worker can handle it and therefore mechanical assistance is required

2.4.1.4.3 Reducing the capacity of the container

2.4.1.4.4 Reducing the distance the load must be held away from the body by reducing the size of the packaging

2.4.1.4.5 Providing hand holds

2.4.1.4.6 Team lift the object with two or more workers

2.4.1.4.7 Improve the layout of the work process to minimize the need to move materials

2.4.1.4.8 Reorganize the work method(s) to eliminate or reduce repeated handling of the same object

2.4.1.4.9 Rotate workers to jobs with light or no manual handling


2.4.1.4.10 Use mobile storage racks to avoid unnecessary loading and unloading.

2.5 INCIDENTS AND INJURIES

2.5.1 If an employee reports symptoms of a MSI Carbon America will:

2.5.1.1 Musculoskeletal injuries caused by improper lifting must be investigated and documented. Incorporation of investigation findings into work procedures must be accomplished to prevent future injuries.

2.5.1.2 Injuries must be recorded and reported as required by 29

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CFR Part 1904.

2.6 REVIEW & UPDATING LIFTING AND HANDLING LOADS PROGRAM


2.6.1 Supervision must periodically evaluate work areas and employees' work techniques to assess the potential for and prevention of injuries. New operations should be evaluated to engineer out hazards before work processes are implemented.

2.7 TRAINING

2.7.1 Carbon America shall ensure that a worker who may be exposed to the possibility of musculoskeletal injury is trained in specific measures to eliminate or reduce that possibility. Our training shall include:




- 2.7.1.1** General principles of ergonomics
- 2.7.1.2** Recognition of hazards and injuries
- 2.7.1.3** Procedures for reporting hazardous conditions
- 2.7.1.4** Methods and procedures for early reporting of injuries.

2.7.2 Additionally, job specific training will be given on safe lifting and work practices, hazards, and controls.

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MSD HAZARD IDENTIFICATION FORM

Job Title:	Location of Assessment:
Task Assignment:	Hazard Identification applies to the following locations:
Job Code (if used):	Date:
RK Mechanical Location:	Completed by (Name/Title):
	In Consultation with:
Status: <input type="checkbox"/> Draft <input type="checkbox"/> Final	

1. AWKWARD POSTURES			MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE POSTURE?	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
Nec k	Working with the neck bent forward or to the side more than 30° for more than 2 hours total per day.	 Side <input type="checkbox"/>  Forward <input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____
Nec k	Working with the neck rotated more than 45° in either direction for more than 4 hours total per day or working with the neck bent back /up more		<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____





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	than 10° for more than 2 hours total per day					
Nec k	Working with the elbow(s) at or above the shoulder for more than 2 hours total per day		<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____

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1. AWKWARD POSTURES			MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE POSTURE?	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
Shoulder	Working while sitting or standing with the back bent forward, sideways, or twisted more than 30° for more than 2 hours total per day	 Side <input type="checkbox"/>  Twisted <input type="checkbox"/>  Forward <input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/> Date: _____
Back	Working while sitting or standing with the back bent back more than 10°, and with no support for the back, for more than 2 hours total per day	 Backward <input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/> Date: _____
Knees	Employee squats/ kneels for more than 2	 Kneel <input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/> Date: _____



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hours total per
day

—

**2. STATIC WHOLE BODY
POSTURES**

**MARK IF
REQUIRE
D**

**LIST TASK(S)
REQUIRING
THIS POSTURE
WHAT IS THE
POSSIBLE
CAUSE OF THE
POSTURE?**

**LIST POSSIBLE
CONTROL
MEASURE(S)
AND STATE IF
CONTROL
MEASURES
HAVE
BEEN
IMPLEMENTED**

**HAZARD
RESOLVE
D**

Prolonge
d
Sitting

Employee sits for
more than 6 hours
total per day

☐

☐
Date:

Prolonge
d
Standin
g

Employee stands
on hard surface
more than 4 hours
total per day
(standing in one
location without
taking > 2 steps in
any direction)

☐

☐
Date:

**3A. LIFT/LOWER
FORCES (MANUAL
LABOR)**

**MARK IF
REQUIRE
D**

**LIST
TASK(S)
REQUIRING
THIS
POSTURE
WHAT IS THE
POSSIBLE
CAUSE
OF THE
POSTURE?**

**LIST POSSIBLE
CONTROL
MEASURE(S) AND
STATE IF
CONTROL
MEASURES HAVE
BEEN
IMPLEMENTED**

**HAZARD
RESOLVE
D**

Lift/lower objects
up to
2 times an hour

Object close to the
body: 35 lb. or
more

☐

☐
Date:



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Back/ Shoulder	Object away from the body: 17 lb. or more				—
	Lift/lower objects 3 to 60 times an hour Object close to the body: 30 lb. or more Object away from the body: 15 lb. or more	<input type="checkbox"/>			<input type="checkbox"/> Date: _____
	Lift/lower objects 61 to 240 times an hour Object close to the body: 25 lb. or more Object away from the body: 15 lb. or more	<input type="checkbox"/>			<input type="checkbox"/> Date: _____
	Lift/lower objects >5 lb. more than 240 times an hour (more than 4 times a minute)	<input type="checkbox"/>			<input type="checkbox"/> Date: _____
3B. LIFT/LOWER FORCES (OFFICE WORK)		MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE POSTURE?	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
Back/	Lift/lower objects up to 2 times an hour - Object close to the body: 30 lb. or more	<input type="checkbox"/>			<input type="checkbox"/> Date: _____

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Shoulder	- Object away from the body: 15 lb. or more				
	Lift/lower objects 3 to 60 times an hour - Object close to the body: 25 lb. or more - Object away from the body: 15 lb. or more	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____
	Lift/lower objects 61 to	<input type="checkbox"/>			<input type="checkbox"/>

	240 times an hour - Object close to the body: 25 lb. or more - Object away from the body: 10 lb. or more				Date: _____ _____
	Lift/lower objects >5 lb. more than 240 times an hour (more than 4 times a minute)	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____

4A. PUSH/PULL FORCES (MANUAL LABOR) (CARTS, TROLLEYS, ROLLS, CABLES, ETC.) NOTE: PUSH/PULL FORCE IS THE FORCE REQUIRED TO MOVE	MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
---	-------------------------	--	---	------------------------



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**THE OBJECT, NOT THE
WEIGHT OF THE
OBJECT ITSELF.**

POSTURE?

Pushing/pulling up
to 2 times an hour
with initial
push/pull force of
more than 50 lb.

☐

☐
Date:

—

Back/
Shoulder

Pushing/pulling 3
to 120 times an
hour, with initial
push/pull force of
more than 25 lb.

☐

☐
Date:

—

Pushing/pulling
forces
>5 lb. more than
120 times an hour
(more than twice a
minute)

☐

☐
Date:

—

**4B. PUSH/PULL
FORCES (OFFICE
WORK)
(CARTS, TROLLEYS,
ROLLS, CABLES,
ETC.)**

**NOTE: PUSH/PULL
FORCE IS THE FORCE
REQUIRED TO MOVE
THE OBJECT, NOT THE
WEIGHT OF THE
OBJECT
ITSELF.**

**MARK IF
REQUIRE
D**

**LIST
TASK(S)
REQUIRING
THIS
POSTURE
WHAT IS THE
POSSIBLE
CAUSE OF THE
POSTURE?**

**LIST POSSIBLE
CONTROL
MEASURE(S) AND
STATE IF
CONTROL
MEASURES HAVE
BEEN
IMPLEMENTED**

**HAZARD
RESOLVE
D**

Pushing/pulling up
to 2 times an hour
with initial

☐

☐
Date:

Back/

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Shoulder	push/pull force of more than 50 lb.				—
	Pushing/pulling 3 to 120 times an hour, with initial push/pull force of more than 25 lb.	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ —
	Pushing/pulling force >5 lb. more than 120 times an hour (more than twice a minute)	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ —
5. REPETITION		MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE POSTURE?	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
Neck, shoulders, elbows, wrists or hands	Employee repeats the same motion with the neck, shoulders, elbows, wrists, or hands every few seconds with little or no variation for more than 2 hours total per day excluding computer use. Check body part(s) that apply: <input type="checkbox"/> Neck	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ —



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- ☐ Shoulder(s)
☐ Elbow(s)
☐ Wrist(s) ☐ Hand(s)

Computer Use

Employee uses computer more than 3 hours total per day

☐

☐
Date:

6. HAND/ARM VIBRATION

**MARK IF
REQUIRED**

**LIST
TASK(S)
REQUIRING
THIS
POSTURE
WHAT IS
THE
POSSIBLE
CAUSE OF
THE
POSTURE?**

**LIST POSSIBLE
CONTROL
MEASURE(S)
AND STATE IF
CONTROL
MEASURES
HAVE BEEN
IMPLEMENTED**

**HAZARD
RESOLVED**

Hands
Arms

Use high vibration tools (impact wrenches, chainsaws, jack hammers, riveting hammers) for more than 30 minutes total per day


☐

☐
Date:

Use moderate vibration hand tools (grinders, sanders, jig saws) that typically have moderate vibration levels more than 2 hours total per day

☐

☐
Date:

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7. REPEATED IMPACTS		MARK IF REQUIRED	LIST TASK(S) REQUIRING THIS POSTURE WHAT IS THE POSSIBLE CAUSE OF THE POSTURE?	LIST POSSIBLE CONTROL MEASURE(S) AND STATE IF CONTROL MEASURES HAVE BEEN IMPLEMENTED	HAZARD RESOLVED
Hands Knees	<p>Employee uses one of the following as a hammer more than 10 times per hour and for more than 2 hours total per day. (Check the body part(s) that apply)</p> <p><input type="checkbox"/> Hand (heel/base of palm), <input type="checkbox"/> Knee</p>	<input type="checkbox"/>			<input type="checkbox"/> Date: _____ _____

APPROVED BY:		MANUAL LIFTING PROGRAM


Complete this section only if potential hazards have been identified in the "Mark if required" column:

1. How many employees are exposed to the hazards identified above and how often?

	# OF EMPLOYEES EXPOSED	HOW OFTEN? (DESCRIBE IN HOURS PER DAY OR WEEK, AS APPROPRIATE)
AWKWARD POSTURES		
STATIC WHOLE BODY POSTURES		
LIFT/LOWER FORCES		
PUSH/PULL FORCES		
REPETITION		
HAND/ARM VIBRATION		
REPEATED IMPACTS		

2. In the past two years, how many MSD incidents been reported among employees who are exposed to the identified hazards? State the number of incidents and their nature (e.g., Lost Time, Medical Aid, First Aid, Incident only)

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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

3.1 Policy Statement


- 3.1.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 3.1.2** Carbon America will comply with the OSHA ***Wiring Design and Protection*** standard, 29 CFR 1926.404, through implementation of this written program.
- 3.1.3** Carbon America will use either ground fault circuit interrupters or an assured equipment grounding conductor program covering all cord sets, receptacles which are not part of the building or structure, and equipment connected by cord and plug which are available for use or used by employees and subcontractors.

3.2 Purpose

- 3.2.1** To protect employees on jobsites from hazards associated with electrical ground faults associated with temporary wiring and cord and plug equipment.
- 3.2.2** To comply with OSHA standard 29 CFR 1926.404.

3.3 References

- 3.3.1** 29 CFR 1926.404
-

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3.4 General Requirements

3.4.1 Ground-fault protection

3.4.1.1 Ground-fault circuit interrupters.

3.4.1.1.1 All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection.

3.4.1.1.2 Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit interrupters.

3.4.2 Assured equipment grounding conductor program.


3.4.2.1 The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering all cord sets, receptacles which are not a part of the building or structure, and equipment connected by cord and plug which are available for use or used by employees.

3.4.2.2 This program shall comply with the following minimum requirements:

3.4.2.2.1 A written description of the program, including the specific procedures adopted by the employer, shall be available at the jobsite for inspection and copying by the Assistant Secretary and any affected employee.

3.4.2.3 The employer shall designate one or more competent persons to implement the program.

3.4.2.4 Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects,

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such as deformed or missing pins or insulation damage, and for indications of possible internal damage. Equipment found damaged or defective shall not be used until repaired.

3.4.2.5 The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:

3.4.2.5.1 All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.

3.4.2.6 Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

3.4.2.7 All required tests shall be performed:

3.4.2.7.1 Before first use;

3.4.2.7.2 Before equipment is returned to service following any repairs;


3.4.2.7.3 Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over); and

3.4.2.7.4 At intervals not to exceed 3 months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.

3.4.2.8 Any equipment which has not met the requirements of this program shall be tagged, removed from service, and discarded.

3.4.2.9 Tests performed as required in this paragraph shall be recorded.

3.4.2.10 This test record shall identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test and shall indicate the last date it was tested or the interval for which it was tested.

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3.4.2.11 This record shall be kept by means of logs, color coding, or other effective means and shall be maintained until replaced by a more current record.

3.4.2.12 The record shall be made available on the jobsite for inspection by the Assistant Secretary and any affected employee.

3.4.2.13 Cord Sets inspected under the assured equipment grounding program should be identified with the application of a new marking after a completed quarterly test which would coincide with the last successful inspection period.

3.5 Outlet devices.

3.5.1 Outlet devices shall have an ampere rating not less than the load to be served and shall comply with the following:

3.5.1.1 Single receptacles. A single receptacle installed on an individual branch circuit shall have an ampere rating of not less than that of the branch circuit.

3.5.1.2 Two or more receptacles. Where connected to a branch circuit supplying two or more receptacles or outlets, receptacle ratings shall conform to the values listed in Table K-4.


3.5.1.3 Receptacles used for the connection of motors. The rating of an attachment plug or receptacle used for cord- and plug-connection of a motor to a branch circuit shall not exceed 15 amperes at 125 volts or 10 amperes at 250 volts if individual overload protection is omitted.

Attachment 1 Table K-4- Receptacle Ratings for Various Size Circuits


Attachment 1

TABLE K-4 - Receptacle Ratings for Various Size Circuits

	Ratings
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Receptacle Circuit Rating Amperes	
15	Not over 15
20	15 or 20
30	30
40	40 or 50
50	50

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REVIEW LOG:

Date	Purpose for review	Person
05/11/2022	New Safety Manual	Hinz

4.0 Purpose

4.0.1 The purpose of this program is to set forth procedures for the safe use of electrical equipment, tools, and to comply with NFPA 70E requirements.

4.1 Scope

4.1.1 This program applies to all Carbon America employees, temporary employees, and contractors. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers Carbon America employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.


4.1.2 Carbon America shall advise the host employer of:

- 4.1.2.1** Any unique hazards presented by the contract employer's work,
- 4.1.2.2** Any unanticipated hazards found during work by Carbon America that the host employer did not mention, and
- 4.1.2.3** The measures Carbon America took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

4.2 Definitions


4.2.1 Arc Flash: A dangerous condition associated with the possible release of energy caused by an electric arc.

4.2.1.1 Note No. 1: An arc flash hazard may exist when energized electrical conductors or circuit parts are exposed or when they are within equipment in a guarded or enclosed condition, provided a person is

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interacting with the equipment in such a manner that could cause an electric arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.

- 4.2.2 Arc Rating:** The value attributed to materials that describe their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm² and is derived from the determined value of the arc thermal performance value (ATPV) or energy of break open threshold (EBT).
- 4.2.3 Balaclava (Sock Hood):** An arc-rated hood that protects the neck and head except for the facial area of the eyes and nose.
- 4.2.4 Barricade:** A physical obstruction such as tapes, cones, or A-frame type wood or metal structures intended to provide a warning and limit access.
- 4.2.5 Barrier:** A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts or to prevent unauthorized access to a work area.
- 4.2.6 Boundary, Arc Flash:** 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.
- 4.2.6.1 Informational Note:** A second degree burn is possible by an exposure of unprotected skin to an electric arc flash above the incident energy level of 5 J/cm² (1.2 cal/cm²).
- 4.2.7 Boundary, Limited Approach:** An approach limited at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.
- 4.2.8 Boundary, Restricted Approach:** An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electric arc-over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.
- 4.2.9 De-energized:** Free from any electrical connection to a source of potential difference and from electrical charge. Not having a potential different from the earth.
- 4.2.10 Electrically Safe Work Condition:** A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.
- 4.2.11 Employer (Contract):** The employer performing the work covered in this standard.
- 4.2.12 Employer (host):** The owner or owner's representing for the work covered in this standard.

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4.2.13 Exposed (as applied to energized electrical conductor or circuit parts): Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

4.2.14 Incident Energy: The amount of thermal energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. Incident energy is typically expressed in calories per centimeter squared (cal/cm²).

4.2.15 Incident Energy Analysis: A component of an arc flash risk assessment used to predict the incident energy of an arc flash for a specified set of conditions.

4.2.16 Qualified Person: One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify and avoid the hazards involved.

4.2.16.1 Qualified Person Standards:

4.2.16.1.1 First Aid & CPR Certified

4.2.16.1.2 Completed RK-ESWC & EWP Training

4.2.16.1.3 Included applicable annual upgrade classes

4.2.17 Risk: A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.


4.2.18 Risk Assessment: An overall process that identifies hazards, estimates the potential severity of an injury or damage to health, estimates the likelihood of occurrence of injury or damage to health, and determines if protective measures are required.

4.2.18.1 Informational note: As used in this standard, arc flash risk assessment and shock risk assessment are types of risk assessments.

4.2.19 Shock Hazards: A dangerous condition associated with the possible release of energy caused by the contact or approach to energized electrical conductors or circuit parts.

4.2.20 Touch Potential: A ground potential gradient difference that can cause current flow from hand to hand, hand to foot, or another path, other than foot to foot, through the body.

4.2.21 Working On (energized electrical conductors or circuit parts): Intentionally or unintentionally coming in contact with energized electrical conductors or circuit parts with the hands, feet, or other body parts, with

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tools, probes, or with test equipment, regardless of the personal protective equipment (PPE) a person is wearing.

4.2.21.1 There are two categories of “working on”.

4.2.21.1.1 Diagnostic (testing) is taking readings or measurements of electrical equipment that does not require making any physical change to the equipment.

4.2.21.1.2 Repair is any physical alteration of electrical equipment, (such as making or tightening connections, removing or replacing components, etc.) or any work in the enclosure.

4.2.21.2 **Working on or “in” the Arc Flash Boundary, Limited Approach Boundary, Restricted Approach Boundary.**

4.3 Responsibilities

4.3.1 Managers/Supervisor

4.3.1.1 The HSE Manager will develop electrical safety programs and procedures in accordance with OSHA requirements and/or as indicated by events and circumstances.


4.3.1.2 Operations Managers and Supervisors are responsible for ensuring that only qualified employees and or qualified contractors perform electrical repairs or installations. 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 involved are in an electrically safe work condition.

4.3.1.3 Operations Managers and Supervisors shall ensure a documented job briefing is held before starting each job and will include all employees involved. The briefing will cover hazards associated with the job, work procedures involved, special precautions, energy source controls and PPE requirements.

4.3.1.4 Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

4.3.1.5 Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

4.3.1.6 Only qualified employees may work on electric circuit parts or equipment that has not been de-energized. Such employees shall

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be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools.

4.4 Safe Work Practices

4.4.1 Prior to any work being done within the Limited Approach Boundary a hazard risk analysis shall be performed. The analysis shall contain event severity, frequency, probability and avoidance to determine the level of safe practices employed.

4.4.2 Safe Work Practices for Working within the Limited Approach Boundary

4.4.2.1 The limited approach boundary is the distance from an exposed live part within which a shock hazard exists.

4.4.3 The restricted approach boundary is the closest distance to exposed live parts a qualified person can approach with without proper PPE and tools. Inside this boundary, accidental movement can put a part of the body or conductive tools in contact with live parts or inside the prohibited approach boundary. To cross the restricted approach boundary, the qualified person must:

4.4.3.1 Have an energized work permit that is approved by the supervisor or manager responsible for the safety plan.

4.4.3.2 Use PPE suitable for working near exposed live parts and rated for the voltage and energy level involved.

4.4.3.3 Be certain that no part of the body enters the prohibited space.


4.4.3.4 Minimize the risk from unintended movement, by keeping as much of the body as possible out of the restricted space; body parts in the restricted space should be protected.

4.4.4 The prohibited approach boundary is the minimum approach distance to exposed live parts to prevent flashover or arcing. Approaching any closer is comparable to making direct contact with a live part. To cross the prohibited approach boundary, the qualified person must:

4.4.4.1 Have specified training to work on exposed live parts.

4.4.4.2 Have a permit with proper written work procedures and justifying the need to work that close.

4.4.4.3 Do a risk analysis.

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4.4.4.4 Have (18.4.4.2) and (18.4.4.3) approved by the appropriate supervisor.

4.4.4.5 Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.

4.4.5 The Flash Protection Boundary is the approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

4.4.5.1 Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.

4.4.5.2 For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA and a clearing time of 6 cycles for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles.

4.4.5.3 When working on de-energized parts and inside the flash protection boundary for nearby live exposed parts - If the parts cannot be de-energized, use barriers such as insulated blankets to protect against accidental contact or wear proper PPE.

4.5 Arc Flash Hazard Analysis

4.5.1 An arc flash hazard analysis includes the following:

4.5.1.1 Collect data on the facility's power distribution system.

4.5.1.2 Arrangement of components on a one-line drawing with nameplate specifications of every device.

4.5.1.3 Lengths and cross-section area of all cables.


4.5.1.4 Contact the electric utility for information including the minimum and maximum fault currents that can be expected at the entrance to the facility.

4.5.1.5 Conduct a short circuit analysis followed by a coordination study is performed.

4.5.1.6 Feed the resultant data into the NFPA 70E equations.

4.5.1.7 These equations produce the necessary flash protection boundary distances and incident energy to determine the minimum PPE requirement.

4.5.1.8 The flash protection boundary is the distance at which PPE is needed to prevent incurable burns (2nd degree or worse) if an arc flash occurs. (It is still possible to suffer 1st or 2nd degree burns.)

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4.5.1.9 For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA (kiloamps) and a clearing time of 6 cycles (0.1 seconds) for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles (5000 ampere seconds).

4.5.2 When working on de-energized the parts, but still inside the flash protection boundary for nearby live exposed parts:


- 4.5.2.1** If the parts cannot be de-energized, barriers such as insulated blankets must be used to protect against accidental contact or PPE must be worn.
- 4.5.2.2** Employees shall not reach blindly into areas that might contain exposed live parts.
- 4.5.2.3** Employees shall not enter spaces containing live parts unless illumination is provided that allows the work to be performed safely.
- 4.5.2.4** Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.
- 4.5.2.5** Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.
- 4.5.2.6** When an employee works in a confined space or enclosed spaces (such as a manhole or vault) that contains exposed live parts, the employee shall use protective shields, barriers or insulating materials as necessary to avoid contact with these parts. Doors, hinged panels, and the like shall be secured to prevent them from swinging into employees. Refer to the confined space entry program.

4.6 Energized Work Procedure

4.6.1 Demonstrate energized work is permitted or justified; NFPA 70E section 130.2(A), PM, Safety Dept. approval.

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- 4.6.2** Conduct owner meeting.
 - 4.6.3** Define work procedures:
 - 4.6.3.1** Select Tasks (I.e. Removal or Installation CBs or switches), and determine equipment condition, and determine if arc flash PPE is required. Table 130.7(C)(15)(A)(a).
 - 4.6.3.2** Select Type of Equipment, (i.e. Panel boards or other equipment rated 240 V and below), determine Arc Flash PPE Category (1, 2, 3, 4), and determine Arc-Flash Boundary. Table 130.7(C)(15)(A)(b) for ac systems, or Table 130.7(C)(15)(B) for dc systems.
 - 4.6.3.3** Determine methods and perform Shock and Arc Flash Risk Assessments.
 - 4.6.3.4** Determine Arc-Rating of PPE in Cal/cm², (4 Cal / 8 Cal / 25 Cal / 40 Cal), and other clothing, Table 130.7(C)(16),
 - 4.6.3.5** Risk Assessment must include evaluation of need of a 2nd person.
 - 4.6.3.6** Rubber Insulating Gloves with heavy duty leather protectors are always required when working within the Restricted Approach Boundary. Select insulating gloves based on Voltage to be worked on.
 - 4.6.3.7** Insulated tools and equipment only shall be used when working within the Restricted Approach Boundary. Select Energized Work Tool Kit and Individual Items.
 - 4.6.4** Is Energized Work Permit (EWP) required? Exemptions NFPA 70E section 130.2(B)(3).
 - 4.6.4.1** Testing, Troubleshooting, and voltage measuring (Only with permission of CM or Safety Director)
 - 4.6.4.2** Thermography and visual inspections if the restricted approach boundary is not crossed.
 - 4.6.4.3** Access to and egress from an area with energized electrical equipment if no electrical work is performed and the restricted approach boundary is not crossed.
 - 4.6.4.4** General housekeeping and miscellaneous non-electrical tasks if the restricted approach boundary is not crossed.
 - 4.6.5** Fill out Energized Work Permit (EWP) and get all required signatures; (OM, PM, Safety Director).
 - 4.6.6** Fill out Lockout/Tagout Procedures form if required.
 - 4.6.7** Hold job briefing with all involved personnel performing work.
 - 4.6.8** Proceed using the EWP and any job specific requirements;
 - 4.6.8.1** Owner requirements: documentation, M.O.P. notifications, etc.
 - 4.6.8.2** Documentation, Pre-Task Plan, 1-line drawings, panel schedules, etc.
 - 4.6.8.3** Barricading, signs, other means of warning
 - 4.6.9** Other equipment; radios, lighting, meters and test equipment, insulated barriers, remote switches, LOTO, fire extinguisher, etc.
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4.7 Inspections

- 4.7.1 Electrical equipment, tools, and appliances must be inspected prior to each use.
- 4.7.2 The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110 volt equipment.
- 4.7.3 Faulty equipment, tools, or appliances shall be removed from service immediately and tagged "Out of Service", dated and signed by the employee applying the tag.

4.8 Equipment


- 4.8.1 Test instruments, equipment, and their accessories shall meet the requirements of ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1 General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 Volts and below.
- 4.8.2 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.

4.9 Personal Protective Equipment


- 4.9.1 All insulating PPE must be inspected 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.
- 4.9.2 Maximum test intervals for rubber insulating personal protective equipment shall include:
- 4.9.3 Blankets-before first issue/every 12 months thereafter
- 4.9.4 Gloves-before first issue and every 6 months
- 4.9.5 Slevvers before first issue and every 12 months
- 4.9.6 Covers and line hose shall be testing if insulating value is suspect.

ASTM Labeling Chart for Rubber Insulating Gloves

Class	Test AC	Max Use Voltage	Max Use Voltage	Label Color	Glove Label
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	Volts	AC	DC		
00	2,500	500	750	Beige	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA TYPE 1 MAX USE VOLT 500 AC
0	5,000	1,000	1,500	Red	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA TYPE 1 MAX USE VOLT 1,000 AC
1	10,000	7,500	11,250	White	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA TYPE 1 MAX USE VOLT 7,500V AC
2	20,000	17,000	25,500	Yellow	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA TYPE 1 MAX USE VOLT 17,000V AC
3	30,000	26,500	39,750	Green	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA TYPE 1 MAX USE VOLT 26,500V AC
4	40,000	36,000	54,000	Orange	10 SALISBURY ANSI / ASTM MADE IN D120 CLASS 00 USA

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					TYPE 1 MAX USE VOLT 36,000V AC
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Maximum use DC voltage is not part of any ASTM specification. Maximum use DC voltages are valid in reference to IEC 903 only. Type 1 Designates natural rubber. Table 130.7(C)(16) Personal Protective Equipment (PPE) for Arc Flash

<p align="center">PPE CATEGORY 1</p> <p>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-rated flash suit hood Arc-rated jacket, parka, rainwear, or hard hat liner (AN)</p> <p align="center">PROTECTIVE EQUIPMENT</p> <p align="center">Hard Hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear</p>	<p align="center">PPE CATEGORY 2</p> <p>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)</p> <p align="center">PROTECTIVE EQUIPMENT</p> <p align="center">Hard Hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear</p>
<p align="center">PPE CATEGORY 3</p> <p>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) Arc-rated arc flash suit Jacket (AR) Arc-rated arc flash suite pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket, parka, rainwear, or hard hat liner (AN)</p>	<p align="center">PPE CATEGORY 4</p> <p>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 suite pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket,</p>

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<p align="center">PROTECTIVE EQUIPMENT</p> <p align="center">Hard Hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear</p>

<p align="center">parka, rainwear, or hard hat liner (AN)</p> <p align="center">PROTECTIVE EQUIPMENT</p> <p align="center">Hard Hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear</p>

NOTES:

- Arc rating is defined in Article 100.
- Face shields are to have wrap-around guarding to protect not only the face, but the face, but the Forehead, ears, and neck, or, alternatively, an arc-rated arc flash suit hood is required to be worn.
- 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.


AN: as needed AR: as required SR: Selection required

4.10 Energized Electrical Work Permit

4.10.1 Work on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition shall be considered energized electrical work and shall be performed by written permit only.

4.11 Lighting


4.11.1 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.

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4.12 Extension Cords

- 4.12.1 Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- 4.12.2 Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- 4.12.3 Cords for use other than indoor appliances must have a rating of at least 14 amps.
- 4.12.4 Cords must have suitable strain relief provisions at both the plug the receptacle ends.
- 4.12.5 Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- 4.12.6 Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- 4.12.7 Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.
- 4.12.8 Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.
- 4.12.9 High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
 - 4.12.9.1 All extension cords shall be plugged into one of the following:
 - 4.12.9.2 A GFCI outlet;
 - 4.12.9.3 A GFCI built into the cord;
 - 4.12.9.4 A GFCI adapter used between the wall outlet and cord plug.
- 4.12.10 All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be remove from service and repaired or replaced.
- 4.12.11 Extension cords shall not be used on compressor skid to operated heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.

4.13 Outlets

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- 4.13.1** Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.

4.14 Multiple Outlet Boxes

- 4.14.1** Multiple outlet boxes must be plugged into a wall receptacle.
- 4.14.2** Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

4.15 Double Insulated Tools


- 4.15.1** Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three wire grounded supply cord connection.
- 4.15.2** Double insulated tools must not be altered in any way, which would negate the factory rating.

4.16 Switches, circuit breakers, and disconnects

- 4.16.1** All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet.
- 4.16.2** Circuit breaker panel boxes and disconnects must be labelled with the voltage rating.
- 4.16.3** Each breaker within a breaker panel must be labelled for the service it provides.
- 4.16.4** Disconnect switches providing power for individual equipment must be labelled accordingly.

4.17 Ladders

- 4.17.1** Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs.
- 4.17.2** Ladders must be either constructed of wood, fiberglass, or have non-conductive side rails.
- 4.17.3** Wood ladders should not be painted, which can hide defects, except with clear lacquer.
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4.17.4 When using ladders they shall be free from any moisture, oils, and greases.

4.18 Energized and Overhead High Voltage Power Lines & Equipment


- 4.18.1** A minimum clearance of 10 feet from high voltage lines must be maintained when operating vehicular and mechanical equipment such as forklifts, cranes, winch trucks, and other similar equipment.
- 4.18.2** When possible, power lines shall be de-energized and grounded or other protective measures shall be provided before work is started.
- 4.18.3** Minimum approach distance to energized high power voltages lines for unqualified employees is 10 feet.
- 4.18.4** Minimum approach distance for qualified employees shall be followed per 29 CFR 1910.333(c)(3)(i) Qualified – Table S5 Selection and Use of Work Practices - Approach Distances for Qualified Employees – Alternating Current).

4.19 Confined or Enclosed Work Spaces

- 4.19.1** When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source).
- 4.19.2** Protective shields, protective barriers or insulating materials as necessary shall be provided.

4.20 Enclosures, Breaker Panels, and Distribution Rooms

- 4.20.1** A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration.
 - 4.20.2** A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow.
 - 4.20.3** Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
 - 4.20.4** Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations.
 - 4.20.5** All enclosures and distribution rooms must have “Danger: High Voltage – Authorized Personnel Only” posted on the front panel and on entrance doors.
 - 4.20.6** Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.)
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4.21 Lock Out/Tag Out


- 4.21.1** No work shall be performed on (or near enough to them for employees to be exposed due to the dangers of tools or other equipment coming into contact with the live parts) live parts and the hazards they present.
- 4.21.2** If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged or both.
- 4.21.3** Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as live parts.
- 4.21.4** Per Carbon America policy all electrical will be outsourced and performed only by qualified and licensed electrical contractors who are familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools. Any equipment being made ready for maintenance will be locked out using Carbon America's Control of Hazardous Energy – Lock Out/Tag Out Program. Lockouts are performed by the HSE Manager, Shop Foreman or Branch Manager. Designated employees in some branches may be trained by local management to lock out equipment. If live sources are to be worked it will only be performed with the knowledge of local management. Only certified electricians may work on electric circuit parts or equipment.
- 4.21.5** Only authorized personnel may perform lock out/tag out work on electrical equipment and will follow Carbon America's Control of Hazardous Energy – Lock out/Tag Out Program.
- 4.21.6** Authorized personnel will be trained in lock out/tag out procedures.
- 4.21.7** Affected personnel will be notified when lock out/tag out activities are being performed in their work area.

4.22 Contractors

- 4.22.1** Only approved, certified, electrical contractors may perform construction and service work on Carbon America or client property.
- 4.22.2** It is the Manager/Supervisors responsibility to verify the contractor's certification.

4.23 Fire Extinguishers

- 4.23.1** Approved fire extinguishers must be provided near electrical breaker panels and distribution centers.

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4.23.2 Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

4.24 Electric Shock-CPR:

4.24.1 If someone is discovered that has received an electric shock and is unconscious, first check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.

4.24.2 When it is safe to make contact with the victim, begin CPR if the person's heart has stopped or they are not breathing.

4.24.3 Call for help immediately.

4.25 Electric Welders

4.25.1 A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.

4.25.2 A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor ampacity.

4.26 Equipment Grounding


4.26.1 All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a ½" bolt or larger, attached to a ground rod six feet or longer.

4.26.2 Equipment bonding jumpers shall be of copper or other corrosion-resistance material.

4.26.3 The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100 degrees F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.

4.27 Training

4.27.1 Employees are trained to understand the specific hazards associated with electrical energy. Employees shall be trained in safety-related work practices and procedural requirements as necessary to provide protection from the electrical hazards associated with their respective jobs.

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Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury.

- 4.27.2** Employees shall be trained in the skills and techniques to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment, to determine the nominal voltage of exposed energized electrical conductors and circuit parts, the approach distances specified in Table 130.2 (below), and the decision making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.


Limited Approach Boundary				
Nominal system voltage range, phase to phase	Exposed movable conductor	Exposed fixed- circuit part	Restricted approach boundary (allowing for accidental movement)	Prohibited approach boundary
0 to 50 volts	Not specified	Not specified	Not specified	Not specified
51 to 300 volts	10 ft. 0 in.	3 ft. 6 in.	Avoid contact	Avoid contact
301 to 750 volts	10 ft. 0 in.	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
751 to 15 KV	10 ft. 0 in.	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.
15.1 kV to 36 KV	10 ft. 0 in.	6 ft. 0 in.	2 ft. 7 in.	0 ft. 10 in.
36.1 KV to 46 kV	10 ft. 0 in.	8 ft. 0 in.	2 ft. 9 in.	1 ft. 5 in.
46.1 KV to 72.5 KV	10 ft. 0 in.	8 ft. 0 in.	3 ft. 3 in.	2 ft. 1 in.
72.6 KV to 121 KV	10 ft. 8 in.	8 ft. 0 in.	3 ft. 4 in.	2 ft. 8 in.
138 to 145 KV	11 ft. 0 in.	10 ft. 0 in.	3 ft. 10 in.	3 ft. 1 in.
161 KV to 169 KV	11 ft. 8 in.	11 ft. 8 in.	4 ft. 3 in.	3 ft. 6 in.
230 KV to 242 KV	13 ft. 0 in.	13 ft. 0 in.	5 ft. 8 in.	4 ft. 9 in.
345 KV to 362 KV	15 ft. 4 in.	15 ft. 4 in.	9 ft. 2 in.	8 ft. 0 in.

- 4.27.3** Employees shall be trained in safety related work practices that pertain to their respective job assignments.

- 4.27.4** Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized.

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- 4.27.5** Training shall be documented and maintained for the duration of the employee's employment. Documentation shall be made when the employee demonstrates proficiency, be maintained for the duration of the employee's employment, and contain each employee's name and date of training.

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1.0 Policy Statement

- 1.0.1** It is the policy of Carbon America to provide all employees with a safe and healthful work environment free from recognized hazards. It is also policy to maintain and actively support a comprehensive employee safety and health program.
- 1.0.2** Carbon America will comply with the OSHA **Fall Protection** standard, 29 CFR 1910 Subpart D and 29 CFR 1926.501, 502 and Subpart M, through implementation of this written program.

1.1 Purpose

- 1.1.1** Prevent fall related incidents.
- 1.1.2** Ensure fall hazards at the jobsite or workplace are identified and adequate controls implemented.
- 1.1.3** Provide a model for adequate and effective Fall Protection Training.
- 1.1.4** To inform employees of the contents of the OSHA Fall Protection Standard (29 CFR 1926 Subpart M).
- 1.1.5** To inform employee of the contents of the OSHA Fall Protection Standard (29 CFR 1910 Subpart D).

1.2 References

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1.2.1 29 CFR 1910 Subpart D

1.2.2 29 CFR 1926 Subpart M

1.3 General Requirements

1.3.1 Application

1.3.1.1 This Fall Protection Program applies to all employees involved in work operations with actual or potential fall exposures.

1.3.1.2 Sub-contractors of Carbon America shall also comply with requirements of this written program OR have their own written program meeting at least the minimum requirements of the OSHA Fall Protection Standard (29 CFR 1926 Subpart M).

1.3.2 Responsibilities

1.3.3 Management

1.3.3.1 Ensure necessary and adequate fall protection equipment is available.

1.3.3.2 Ensure periodic reviews of this written program are conducted.


1.3.3.3 Ensure periodic audits of employees utilizing fall protection are conducted. If deviations or inadequacies are identified, management will take necessary action to correct.

1.3.3.4 Ensure an adequate level of training is provided for all employees covered by this program.

1.3.3.5 Enforcement.

1.3.3.5.1 Management shall hold each Supervisor/Foremen accountable for individual performance and their employees' performance ensuring adherence to the zero tolerance expectation regarding fall protection violations (i.e. fall protection violations are simply not acceptable).

1.3.3.5.2 Accountability is established through implementation of the Company's corrective action (discipline) policy.

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1.3.3.6 Ensure an investigation is conducted for all incidents involving fall-related incidents. Causes and deficiencies should be identified and corrective actions implemented to prevent recurrence.

1.3.4 Supervisors/Foreman

1.3.4.1 Ensure the requirements found within this program are being followed through periodic audits.

1.3.4.2 Ensure employees are provided with necessary and adequate fall protection equipment.

1.3.4.3 Enforcement.

1.3.4.3.1 Supervisors/Foremen shall hold each employee accountable to the zero tolerance expectation regarding fall protection violations (i.e. fall protection violations are simply not acceptable).

1.3.4.3.2 Accountability is established through implementation of the Company's corrective action (discipline) policy.

1.3.4.4 Ensure that all employees covered by this program have access to and review this written program.


1.3.5 Employees

1.3.5.1 Employees shall comply with the requirements stated in this program. Failure to comply shall result in disciplinary action according to the Company's corrective action (discipline) policy.

1.3.5.2 Employees shall not circumvent any procedure or device intended to protect them from fall related hazards.

1.4 Fall Protection Plan

1.4.1 Fall Protection is required when employees are working on an unguarded surface 6 feet or more above a lower level; however, Carbon America will adopt a more strict

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requirement if a condition of contract or at the request of the host employer (customer).

1.4.2 Fall hazards should be identified during a Pre-Job Hazard Analysis and/or the Job Safety Briefing and Hazard Assessment; however, due to the ever-changing scope and nature of work in our business, hazardous conditions (fall hazards) may present themselves at any time. Therefore, periodic inspections by a competent person will be conducted to ensure controls are established and affected employees shall be trained to recognize such hazards.

1.4.3 Fall Protection Competent Person - “one who is capable and qualified to identifying existing and predictable fall hazards in the surroundings or working conditions which are dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.”

1.4.3.1 The competent person is typically the site foremen and will be assigned to:

1.4.3.1.1 Recognize fall hazards.

1.4.3.1.2 Warn employees if they are unaware of a fall hazard or acting in an unsafe manner.


1.4.3.1.3 Be on same working surface and in visual sight.

1.4.3.1.4 Stay close enough for verbal communication.

1.4.3.1.5 Not have other assignments that would take monitor's attention from the monitoring function.

1.4.4 If possible, conventional fall prevention and protection methods shall be utilized on all applicable job sites and projects.

1.4.4.1 Conventional fall prevention methods include standard guardrail systems, controlled access zones, and warning line systems, and personal fall arrest systems. Personal Fall Arrest Systems include the use of approved fall protection equipment such as a harness and shock-absorbing lanyard, safety nets, retractable lanyards, horizontal and vertical lifelines, etc.

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1.4.4.2 If conventional methods cannot be used, a written site-specific fall protection plan will be developed and approved by the Safety Department (for example, controlled access zones, safety monitor, etc.) See Attachment 1.

1.4.5 Provisions shall be in place that provide for prompt rescue of employees involved in a fall-related incident.


1.5 Fall Protection Requirements

1.5.1 Fall Protection shall meet requirements of applicable OSHA, ANSI, ASTM, etc. standards.


1.5.2 Fall protection is required 100 percent of the time when exposed to a fall in excess of 6 feet or when required by additional rules. In some circumstances, contracts might require a more stringent policy of 4 foot when exposed to fall heights. Employees are expected to comply with the more stringent policy. One hundred percent fall protection is required whether climbing, traveling from Point A to Point B, connecting structural steel, or erecting scaffolds or other temporary platforms. No employee or work operation is exempt from the 100 percent fall protection requirement.

1.5.3 When not protected by any other means of fall protection such as safety nets or scaffold with proper guardrails, employees shall use full body harnesses, shock absorbing lanyards with double locking snap hooks, and an adequate anchorage (fall arrest equipment). To achieve 100 percent fall protection, employees may need to use a double lanyard system and/or vertical or horizontal lifelines, retractable lifelines, or other such approved devices.

1.5.4 Prior to each use, employees shall visually inspect all fall protection equipment for cuts, cracks, tears or abrasions, undue stretching, overall deterioration, mildew, operational defects, heat damage, or acid or other corrosion. Additional items may need to be inspected as required by the manufacture of the equipment. Equipment showing any defect shall be withdrawn from service.

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- 1.5.5** Employees shall rig fall arrest equipment so that they can neither free fall more than 6 feet nor contact any lower object. Anchorage points for fall arrest equipment shall be capable of supporting 5,000 pounds per employee and located above the employee's body harness attachment points shall be independent of any anchorage being used to support or suspend scaffolds or other platforms.
- 1.5.6** When vertical lifelines are used, each employee shall be protected by a separate lifeline. The lifeline shall be properly weighted at the bottom and terminated to preclude a device such as a rope grab from falling off the line.
- 1.5.7** Horizontal lifelines should be limited to two persons at one time between supports. Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person. The horizontal lifeline shall be designed to maintain a safety factor of at least two.
- 1.5.8** Prior to each use, employees shall visually inspect all fall arrest equipment for cuts, cracks, tears or abrasions, undue stretching, overall deterioration, mildew, operational defects, heat damage, or acid or other corrosion. Equipment showing any defect shall be withdrawn from service.
- 1.5.9** Fall Protection is required is all scissor and man lifts or any other mechanical means to perform elevated work.
- 1.5.10** All fall arrest equipment subjected to impacts caused by a free fall or by testing shall be removed from service.
- 1.5.11** Employees shall not use fall arrest equipment until they have been properly trained in its use.
- 1.5.12** Fall arrest equipment shall not be used for any other purpose, such as tow ropes or hoist lines.
- 1.5.13** Stairs, ladders, or ramps shall be provided for all access ways where there is a change in elevation greater than 19 inches.
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1.5.14 Any accidents/incidents regarding fall protection will include an investigation on the effectiveness of the fall protection and corrections, if necessary, implemented.

1.6 Guardrails

1.6.1 Proper guardrails shall be installed on open sides of all floors, walkways and runways where the fall distance exceeds 4 feet.

1.6.2 When guardrails are used for fall protection, they shall consist of a top rail, intermediate rail, and toe board. The top rail shall have a vertical height of 42 inches, the midrail shall be at 21 inches, and the toe board shall be at 4 inches. Guardrail systems shall be capable of supporting a force of at least 200 pounds applied within 2 inches of the top edge. Guardrail systems shall be constructed so that there are no openings greater than 19 inches.


1.6.3 When wood railings are used, the post shall be of at least 2 inch by 4 inch stock spaced not to exceed 8 feet, the top rail shall be of at least 2 inch by 4 inch stock, and the intermediate rail shall be of at least 1 inch by 6 inch stock.

1.6.4 If pipe is used, it shall be at least 1-1/2 inch nominal diameter. If structural steel is used, it shall be of 2 inch by 2 inch by 3/8 inch angles or equivalent.

1.6.5 If wire rope is used for railings, it shall have a diameter of at least 1/2 inch and be stretched taut to allow no more than a 3 inch deflection.

1.6.6 Guardrail systems shall be constructed so that when a 200 pound force is applied in a downward direction, it will not deflect to a height less than 39 inches. If wire rope is used for top rails, it shall be flagged at no more than 6 foot intervals with high visibility material.

1.6.7 Proper guardrails shall be installed on open sides of all walkways and runways where the fall distance exceeds 4 feet.

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1.6.8 Proper guardrails shall be installed on all open sided floors where the fall distance exceeds 4 feet.

1.6.9 Manila or synthetic rope shall not be used as guardrail.

1.6.10 Employees shall not stand or sit on guardrails.

1.7 Personal Fall Arrest

1.7.1 Employees shall not use fall arrest equipment until they have been properly trained in its use by a qualified person.


1.7.2 All personal fall arrest equipment (full body harnesses, double locking/shock absorber retractable lanyards/lifelines, etc.) shall be inspected before each use. In addition, a competent person (other than the user) shall inspect the equipment at least monthly.

1.7.3 The use of traditional style fall protection lanyards are not acceptable on Carbon America sites. Only double locking/shock absorber retractable lanyards are to be used.

1.7.4 Employees shall attach fall arrest equipment so that they can neither free fall more than 6 feet nor contact any lower object. Anchorage points for fall arrest equipment shall be capable of supporting 5,000 pounds per employee and located above the employee's body harness attachment point where practicable. Anchorage points shall be independent of any anchorage being used to support or suspend scaffolds or other platforms.

1.7.5 When vertical lifelines are used, each employee shall be protected by a separate lifeline. The lifeline shall be properly weighted at the bottom and terminated to preclude a device such as a rope grab from falling off the line.

1.7.6 Horizontal lifelines should be limited to two persons at one time between supports. Horizontal lifelines shall be designed, installed, and used under the supervision of a

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qualified person. The horizontal lifeline shall be designed to maintain a safety factor of at least two.

- 1.7.7 Employees should store all fall protection equipment in a cool, dry place not subjected to direct sunlight.
- 1.7.8 All fall protection equipment subjected to impacts caused by a free fall or by testing shall be removed from service.
- 1.7.9 Fall protection equipment shall not be used for any other purpose, such as tow ropes or hoist lines.
- 1.7.10 Foremen shall ensure that fall protection is available and used as required for all employees they are responsible.
- 1.7.11 If an employee ever feels that any piece of his or her fall protection equipment is unacceptable or unsafe, he/she must contact his/her supervisor, who will immediately turn the equipment in for replacement. Harnesses, lanyards, hooks, etc., shall be visually inspected for the condition of rivets, buckles, stitching, D-rings, tabs, frayed or broken strands, cuts and abrasions, burns, rot, soundness of latching and locking mechanisms, and general appearance. Any piece of fall protection equipment that does not pass inspection will be immediately destroyed and replaced. Any piece that is subjected to loading will be immediately destroyed and replaced.

1.8 Hole Covers

- 1.8.1 All floor openings or floor holes shall be protected by guardrails or hole covers.
- 1.8.2 Hole covers shall be strong enough to support 2 times the maximum intended load, secured against displacement, and properly labeled.
- 1.8.3 If the cover is subject to vehicular traffic, it shall be capable of supporting at least two times the axle load of the largest vehicle expected to cross over it.

1.9 Ladders

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1.9.1 Fall protection shall be provided for all fixed ladders.

1.9.2 Step Ladders. Employees shall not stand on either of the top two steps of a step ladder (refer to manufacturer's requirements). When using step ladders near handrail, the handrail shall be raised or other provisions implemented to control the fall hazard.

1.9.3 Extension Ladders. Employees shall always maintain 3-points of contact when climbing extension ladders and may climb to a maximum height of 24-ft without fall protection; when climbing ladders to a height greater than 24-ft, fall protection is required.

1.9.4 Refer to the Carbon America Ladder Safety Program for additional requirements.

1.10 Training

1.10.1 Fall protection training shall be provided for each employee who might be exposed to fall hazards.

1.10.2 Initial Training.


1.10.2.1 Employees shall be trained on recognizing fall protection hazards (for example: unprotected edges, elevated work, aerial lift equipment, ladders, stairways, etc.) and methods to prevent falls through fall protection.

1.10.2.2 Before employees are allowed to use a particular fall protection method or system, they shall be trained on proper use and limitations of the method or system. The employee's supervisor is responsible for ensuring that employees received fall protection training.

1.10.3 Periodic Training

1.10.4 Fall protection training and review is encouraged on a routine basis and shall be discussed during each relevant pre-job briefing.

1.10.5 Written fall protection training records shall include:

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1.10.5.1 Employee Name

1.10.5.2 Training Location

1.10.5.3 Signature of person providing training.

1.10.6 Re-Training


1.10.6.1 Re-training shall be conducted when the following are noted:

1.10.6.2 Deficiencies in training.

1.10.6.3 Work place changes.

1.10.6.4 Fall protection systems or equipment changes that render previous training obsolete.

1.11 At least annually refresher awareness training shall be conducted, when employees are using fall arrest systems.

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2.1 SCOPE

2.1.1 Open holes are created throughout the construction process and must be addressed immediately to protect our employees from falling through, tripping in, or stepping into them and tools or materials falling through potentially causing injury. Implementation of an Open Hole Protection Program will increase employee safety from fall and/or injury hazards as a result of uncovered and unprotected holes. Holes are considered any gap or void 2 inches (5.1cm) or more in its least dimension, in a floor, roof, or other walking / working surface.

2.2 POLICY


2.2.1 All projects shall protect employees from open hole hazards (floor opening >2" or 5.1 cm) through the use of covers and barricades.

2.3 PROGRAM REQUIREMENTS

2.3.1 The project manager will be responsible for implementation of the program.

2.3.2 Superintendent's responsibilities include:

2.3.2.1 Review of construction phase(s) at project pre-meetings to identify the creation of open holes, identify type of protection needed, and Coordinate with support crews to ensure immediate covering of open hole when they are created.

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2.3.2.2 Ensure material is available to provide protection (wood, steel plating, fall protection) Create a detailed, written plan (Job Hazard Analysis), to include:

2.3.2.2.1 Hazards associated with open holes

2.3.2.2.2 Engineering controls needed to control or eliminate the hazards

2.3.2.2.3 Size and type of material needed for protection Fall protection plan for working around open holes that pose a fall hazard to employees

2.3.2.2.4 Means of signing and securing covers and barricades

2.4 DEFINITIONS

2.4.1 "Holes" are considered any gap or void 2 inches (5.1cm) or more in its least dimension, in a floor, roof, or other walking / working surface.

2.4.2 "Floor opening" An opening measuring 12 inches or more in its least dimension, in any floor, platform, pavement, or yard through which persons may fall; such as a hatchway, stair or ladder opening, pit, or large manhole.


2.5 PROGRAM PROCEDURES

2.5.1 Project management should ensure that the various construction phases of a project are analyzed for potential open-hole hazards. These hazards should be eliminated during the pre-operation hazard analysis process.

2.5.2 Removal of any wall or floor opening will follow the permit process by opening and closing of the permit with documentation to ensure that the opening has been properly secured and does not pose any further hazards.

2.5.3 Permit documentation will be kept onsite or readily available for the duration of the job.

2.6 COVERS AND BARRICADES

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2.6.1 Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

- 2.6.1.1** Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
- 2.6.1.2** All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- 2.6.1.3** All covers shall be secured to prevent unintentional displacement.
- 2.6.1.4** Covers must be clearly and permanently marked “OPEN HOLE - DO NOT REMOVE” or similar wording.

2.7 Covers and Barricades Criteria

- 2.7.1** Wood: Hole covers in areas of personnel traffic, with dimensions of less than 24x24”, all holes will be covered with a ¾ inch plywood, secured from movement. These covers will support two times the weight of employees (200 pounds), equipment and materials that may be imposed on the cover at one time.
- 2.7.2** Steel plates: If the hole will have vehicle or equipment traffic, loading steel plates will be used and secured in place. All road plates will be properly sized and rated
- 2.7.3** Guardrails: If a guardrail is used to secure an opening, it must be constructed to meet or exceed OSHA standards. When guardrails are used, covers are not required.
- 2.7.4** Barricades: If barricades are used to isolate an open hole it must form a continuous barrier around the opening of the hole. Signage, warning employees of the hazard inside the barricade shall be used. All barricades shall be of rigid construction, rope and tape are not acceptable.

2.8 FALL PROTECTION

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Section	Title		Revision	Revision Date
2	Open Holes		0	05/11/2022

- 2.8.1** Fall protection shall be provided and used when working inside a barrier or guardrail that is protecting an uncovered floor opening that is greater than 12” in its least dimension and more than 6’ above the floor below.