TABLE OF CONTENTS

Chapter 1: Basic Safety & Health Policies

Introduction/Overview

Our company is dedicated to providing a healthy and safe place of employment for all our employees and for the public at large in all of our operations. We have established procedures and policies in line with government mandated safety regulations, industry best management practice and a focus on individual choice.

We all need to be familiar with the safety regulations, programs and policies established to protect us in the workplace. This manual will make that important responsibility easier to fulfill by providing a summary of the most essential information we need to know concerning the various aspects off our daily work routine.

We are under the jurisdiction of OSHA 1926 rules for Construction and OSHA 1910 rules for General Industry for our shop and our customer's facilities. This manual, references both standards.

TO: ALL EMPLOYEES SUBJECT: SAFETY PROGRAM

It is our company policy to provide a safe and healthy place to work with the prevention of accidents being our ultimate goal at all times.

As a member of our organization, you automatically accept a moral obligation to fellow employees and an economic obligation to the Company to see that operations under your care, custody, and control are carried out in an efficient and safe manner.

Along with other responsibilities, being safety conscious must always exist in your thinking and planning. Because of this obligation, you must not only prevent obvious unsafe acts on the part of those you work with, but you must anticipate potential hazards. After an accident occurs, it is too late to prevent it. All employees must recognize that working in an unsafe manner is counterproductive. Most important, each employee is encouraged to demonstrate leadership ability by setting a good example.

To make our approach to safety more effective and uniform throughout the organization, you will be given written information that outlines and formalizes our Safety Program.
We expect you to read this to help AMI in understanding and discharging our mutual responsibilities.

ALEXANDER MECHANICAL

Bill Alexander

Bill Alexander, President

THINK – WATCH – CONTROL

The **THINK – WATCH – CONTROL** program is a custom-built training tool designed to increase behavioral awareness and task-level hazard recognition. It is based off the concept that every individual, using their intellect (**THINK**), their vision (**WATCH**), and their ability to make personal choices (**CONTROL**) can minimize risk for themselves and those around them.

AMI teaches that to successfully manage safe production, we need to understand where problems come from/ There are three risk categories that can impact safe- production: Behaviors, Environment, and Conditions. These three categories cover nearly every aspect of risk in our daily work. How we deal with these three risk categories is what will define our success in safe production. AMI is centered on helping us find the solutions to eliminate/reduce injuries from occurring within those categories. The following outline is a summary of the basic principles of this program:

THINK:

- 'What if' (hazard identification)
- 'Mind on task'

WATCH:

- 'Eyes on task'
- 'Surroundings'

CONTROL:

- 'Tools and equipment'
- 'Line of fire' (body position)

SAFETY PROGRAM OUTLINE

This chapter establishes the basic safety program elements and responsibilities that will be implemented by ALEXANDER MECHANICAL. All branch specific policies and procedures shall meet or exceed the minimum standards listed below.

FOR CONSTRUCTION ACTIVITIES

The safety program of all operating units performing construction activities shall at a minimum include the following elements:

1. Behavioral awareness training for all management, shop employees and field employees (THINK – WATCH – CONTROL)

2. Safety orientation for all new project managers, foreman, field employees and shop employees

3. Written pre-job planning procedures

4. Written short interval scheduling procedures

5. Pre-task analysis

6. Toolbox Talks

7. Jobsite inspections/audits

8. Quarterly foremen safety/training meetings

9. A Drug and Alcohol Policy

10. A PPE Policy

11. A Driving/Fleet Policy

12. A Safety Committee

13. An Incident Review Committee

14. Accident investigation procedures

15. Branch specific injury reporting protocol and return to work procedures

16. Branch specific disaster preparedness plan

FOR SERVICE ACTIVITIES

The safety program of all operating units performing service activities shall at a minimum include the following elements:

1. Behavioral awareness training for all service technicians (THINK – WATCH – CONTROL)

2. Monthly service technician safety training meetings

3. Safety orientation for new service technicians and new managers

4. Pre-job planning of work considered non-routine, small construction or of elevated risk
5. Pre-task analysis

6. Toolbox Talks

7. Jobsite inspections performed through the application of the Observation Program

8. A Drug and Alcohol Policy

9. A PPE Usage Policy

10. A Driving/Fleet Policy

11. Accident investigation procedures

12. Branch specific disaster preparedness plan

13. Branch specific injury reporting protocol and return to work procedures

SAFETY AND LOSS CONTROL REPSONSIBILITIES

Effective implementation of a company safety program is the responsibility of our key managers and supervisors. The general and specific responsibilities assigned to each are listed below. It is essential that our entire team fulfill their assigned responsibilities.

Executive Leadership Team

General Responsibilities:

The Executive Leadership Team is responsible for all safety and loss prevention activities in the company. It is the responsibility of the Executive Leadership Team to promote a culture of employee safety through continuous coaching, motivating, and setting of clear expectations. Responsibilities also include the training of Department Managers, Project Managers, Foremen/Superintendents, and Service Mangers, as well as the monitoring of their safety performance and compliance.

Specific Responsibilities:

1. Ensures the safety program elements listed preciously (chapter 1, pages 5 & 6) are implemented at their specific location(s) and assigns responsibilities.

2. Includes safety performance as an element factored into the calculation of discretionary bonuses for Department Managers and Project Managers.

3. Includes safety performance as an element contained in the annual performance appraisal of applicable employees.

4. Reviews all reports of incident, accident and near-miss.

5. Reviews all jobsite inspection reports.

6. Establishes appropriate disciplinary policies related to safety rules and procedures.

DEPARTMENT MANAGER

General Responsibilities:
Department Managers are responsible for the safety and loss prevention activities of their assigned department, as well as compliance with OSHA.

Specific Responsibilities:

1. Implements and enforces the safety program elements listed above (chapter 1, page 5) within their department.

2. Ensures the Project Managers and Foremen meet their responsibilities regarding established safety policies and procedures.

3. Establishes a system to ensure each new and re-hired employee receives safety orientation training and the safety indoctrination package.

4. Member of the Safety Committee.

5. Member of the Incident Review Committee.

6. Attends the quarterly claim review.

7. Ensures discipline is administered to department employees in accordance to policy.

SAFETY MANAGER

General Responsibilities:
Safety Managers are responsible for administering an effective safety program that results in a reduction in frequency and severity of accidents and injuries, and associated costs.

Specific Responsibilities:

1. Prepares and presents appropriate safety training to employees and managers. This includes, but is not limited to: Toolbox Talks, orientations, monthly service training, quarterly foremen training and as-needed training.
2. Presents behavioral awareness training to all employees (THINK – WATCH – CONTROL).
3. Conducts safety orientation training for all newly hired or rehired construction workers, service technicians, construction foremen and managers.
4. Assists with pre-job safety meetings, facilitating managers and foremen to assure all known and potential hazards are addressed.
5. Schedules and conducts regular jobsite and shop compliance inspections.
6. Ensures accident investigation processes are in place and completed forms are submitted to the Executive Leadership Team in a timely manner. Assures preventative measures are implemented. Investigates near-miss incidents.
7. Ensures processes are in place that results in injured employees receiving initial medical attention in a timely manner and post-accident drug tests are performed.
8. Ensures return-to-work procedures are followed.
9. Ensures a Jobsite Specific Emergency Action Plan is created for every out-of- town construction project (see chapter 1, page 22).
10. Reviews loss trend information furnished by the Executive Leadership Team to determine trends in type, frequency, and severity of losses.
11. Communicates OSHA requirements to all levels of management.
12. Chairs the Safety Committee.
13. Chairs the Incident Review Committee.
14. Creates and administers branch specific disaster preparedness plans.
15. Acts as the designated Company spokesman during interaction with OSHA.
16. Manages branch specific Hazard Communication Programs.

PROJECT MANAGER

General Responsibilities:
Project Managers are responsible for safety and loss prevention activities on their assigned project(s). Responsibilities of Project Managers include the maintenance of all safety records for their projects as well as auditing Foremen/Superintendents' regular compliance with Company safety procedures.

Specific Responsibilities:

1. Conducts the Pre-Job Safety meeting and reviews safety procedures with the Foremen/Superintendents at the beginning of applicable projects. Establishes and communicates safety expectations. Completes the Pre- job Safety Plan form (See chapter 1, page 14).

2. Thoroughly reviews "Two-Week Look-Ahead" documents created by the Foremen and provides feedback (See chapter 1, page 18).

3. Ensures site employees have received applicable training.

4. Conducts safety audits during regular visits and tasks appropriate corrective action to improve deficiencies.

5. Confirms safety records on their project(s) are up to date, including:
    a. "Toolbox Safety Talk" documentation received from the Foremen
    b. Site safety inspection documentation received from the Foremen
    c. Two-week look-ahead documentation received from the Foremen
    d. "Trench Safety Daily Field Inspection Report" documentation received from the Foremen
    e. "Permit Required Confined Space Entry Report" documentation received from the Foremen
    f. Job specific permits or customer demands

6. Confirms the customer is aware of any unsafe work condition that is controlled by them but not promptly corrected and assures appropriate action has been taken to protect our employees.

7. Notifies the Safety Manager and participates in OSHA inspections on assigned projects

8. Ensures the manager responsible (See chapter 12) for completing accident investigations is notified immediately of an incident and provides the necessary support and information

9. Attends the Quarterly Foremen's Meeting

PROJECT FOREMAN/SUPERINTENDANT

General Responsibilities:
Foremen/Superintendents are responsible for the communication and enforcement of ALEXANDER MECHANICAL's safety program at their shop/project(s)

Specific Responsibilities:

1. Reports unsafe working conditions or practices which they cannot correct to the Project Manager immediately and takes appropriate action to protect employees.
2. Participates in the Pre-job Meeting conducted by the Project Manager.
3. Conducts weekly site safety inspections, completes the Construction Site Inspection Report See chapter 2, page 22), and forwards the completed form to the Project Manager.
4. Conducts "Toolbox Safety Talks" with employees and forwards written documentation to the Project Manager.
5. Conducts "Two-week Look-ahead" planning and forwards written documentation to the Project Manager.
6. Completes the required safety reports, including: Permit Required Confined Space Entry Report and Trench Safety Daily Field Inspection Report.
7. Follows the established branch incident reporting protocol (See chapter 12)
8. Indoctrinates new employees:
    a. Confirms that each new and re-hired employee has received safety orientation training and the safety indoctrination package.
    b. Confirms that each new and rehired employee has the proper training for the task.
    c. Informs new employees of safety procedures to be complied with, including injury reporting procedures.
    d. Informs new employees of any job hazards, including hazardous materials, and of precautions to be taken.
9. Communicates and enforces the branch specific PPE Policy. Obtains additional PPE as necessary and issues it to employees.
10. Cooperates with OSHA and loss control inspectors. Immediately notifies the Safety Manager and Project Manager when an OSHA inspector is on the job.
11. Attends the Quarterly Foremen's Meeting.

SERVICE MANAGER

General Responsibilities:
Service Managers are responsible for safety and loss prevention activities in their department, as well as compliance with OSHA and HAZCOM regulations. Responsibilities of Service Managers include the maintenance of all safety records for their department, as well as auditing Service
Technicians' regular compliance with Company safety procedures.

Specific Responsibilities:

1. Implements and enforces the safety program elements listed above (See chapter 1, page 5) within their branch
2. Indoctrinates new employees:
    a. Ensures that each new and re-hired employee receives safety orientation training and the safety indoctrination package.
    b. Informs new employees of safety procedures to be complied with, including procedures to be followed if an injury should occur.
    c. Ensures each new and re-hired employee is provided the necessary safety equipment for the position (i.e. fall arrest gear, lock-out equipment, etc.)
    d. Informs new employees of any job hazards, including hazardous materials, and of precautions to be taken.
3. Conducts the Pre-job Safety Meeting and reviews safety procedures with the Service Technician at the beginning of each project considered non-routine, small construction or is of elevated risk. Establishes and communicates safety expectations.
4. Monitors safety performance of individual Service Technicians through the application of the Observation Program. Takes immediate corrective action when performance indicators reflect a deficiency and applies discipline when applicable. See the Safety Department for more details on this program.
5. Ensures all service technicians attend monthly safety training and maintains written documentation of the sessions.
6. Ensures Service Technicians have received the applicable safety training for the required tasks.
7. Distributes "Toolbox Safety Talks" to Service Technicians.
8. Implements and enforces Company policies.
9. Investigates every accident/injury and assures the completion of all necessary forms, including:
    a. The First Report of Injury for all work-related injuries
    b. The Accident Investigation Report

PRE-JOB SAFETY PLANNING

On every applicable construction project, the Project Manager and the Job Foreman will jointly complete the “Pre-job Safety Plan” form. Prior to beginning work, the potential hazards must be evaluated and planned for. The completed plan should be periodically reviewed and updated as necessary. This template is available in Word, by clicking “ My Templates – Personal Templates – Pre-job Safety Plan “

PRE- JOB PLAN AND DISCUSSION

PROJECT NAME DATE

MEETING ATTENDEES:

PM Foreman
Safety Manager Superintendent
Other(s)

GENERAL JOB INFORMATION OVERVIEW

Owner GC
Is this job a CCIP or OCIP ? (Circle

One) Physical location jobsite

Anticipated Timeline Start Date: Duration:

Review of work

New Construction or Remodel? (Circle One) *If a remodel, produce and review asbestos survey
Present and review drawings
Review scope of work and timeline major production milestones Notes:

Review manpower needs
Total Alexander population anticipated Breakdown of workforce
Journeymen Apprentice
Helper Identify other Alexander departments working on this project and list PM Electrical
PM
Mechanical PM
Sheet Metal PM
Service PM

Review GC/Owner requirements or unique governmental compliance requirements Notes:

ALEXANDER MECHANICAL GENERAL SAFE-PRODUCTION ITEMS		
Verify the foreman has the following:		OSHA Postings
		First-Aid Kit(s)
		Fire Extinguisher(s)
		Safety Manual & SDS Book (review where each will be stored)
Review Emergency Action Plan (clinics and hospitals, emergency call list, etc.		
Review paperwork requirements and submittal process		
	Tool Box Talks	
	Jobsite Inspections	
Short Interval Schedule		
	Who will create	
	How will it be communicated	
Review PPE requirements / needs and essential surplus		
Confirm traditional training needs:		First-Aid/CPR Training
		Aerial Lift Training (if applicable)
		Does this job require OSHA 10 Hour for all field employees?
For out-of-town jobs, review plan to achieve 100% New Hire Orientation		
DISCUSS TRADITIONAL SAFE-PRODUCTION ISSUES		
Fall Protection Methods:		
Hole Cover Methods:		
LOTO Methods/Needs:		
Methods for Material Staging and Loading to the Building:		
Power and GFCI Requirements/Needs:		

Respiratory Protection Needs/Training: (If needed, verify required training & pulmonary testing has been achieved)		
Fire Prevention Methods:		Compressed Gas Storage
		Flammable Liquids Storage
		Hot Work

IDENIFY AND PLAN FOR EXCEPTIONAL HAZARDS

Create a proposed plan for the identified hazard(s). If an immediate plan cannot be created, a subsequent meeting may be needed. Confirm required training has been achieved. If training is needed, establish when and how it will be accomplished.

Hazard	Due Date	Person Responsible
Enclosed stainless-steel welding		
Confined space		
Cranes-lift plan/rigging/signaling		
Trenching/Excavation		
Scaffolding		
Unusual chemicals		
Unique Equipment/Tools		
Disposal of waste/Chemicals		

Notes:

SUBCONTRACTOR(S)

List by name and type

Method used for communicating Alexander safe-production expectations to all tiers of subs

Discuss non routine or high hazard challenges subs may face

SHORT INTERVAL SCHEDULING

On every applicable construction project, we will complete short interval scheduling (SIS). At ALEXANDER MECHANICAL, we identify SIS as a “two-week look ahead.” This two-week look ahead ensures all parties involved with the project, including the project manager, general superintendent, foreman, tradesmen, and others are familiar with upcoming tasks. This template is available in Excel, by clicking “My Templates – Personal Templates – Two Week Schedule.”

DATE:		JOB NUMBER																	
PREPARED BY:		JOBNAME:																	
	ACTIVITY DESCRIPTION	CREW	LFB CODE	MAN HOURS	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED			THU	FRI	SAT	SUN
1																			
	PRODUCTION GOAL:																		
2																			
3	PRODUCTION GOAL:																		
4	PRODUCTION GOAL:																		
5	PRODUCTION GOAL:																		
6	PRODUCTION GOAL:																		
7	PRODUCTION GOAL:																		
	PRODUCTION GOAL:																		
MATERIALS REQUIRED:																			
EQUIPMENT & TOOLS REQUIRED:																			
SPECIAL SAFETY CONSIDERATIONS:																			
ADDITIONAL COMMENTS:																			

Alexander Mechanical, Inc.

JOBSITE EMERGENCY ACTION PLAN

An Emergency Action Plan will be created for every applicable or out-of-town construction project. This plan will include information that will be used by field employees and management in the event of an emergency. It shall be posted on the project. This template is available in Word, by clicking "My Templates – Personal Templates – Jobsite Emergency Action Plan."

EMERGENCY ACTION PLAN

Project:

Physical Address:

Emergency Medical Care (Example: Emergency Room) Name: Address: Hours: Phone:	**Directions from the project**
Occupational Medical Clinic Name: Address: Hours: Phone: Main contact person:	**Directions from the project**
After Hours Medical Care (Example: Walk-in clinic that offers extended hours and weekend non-emergency care. Goal: To offer an opportunity outside of the ER.) Name: Address: Hours: Phone:	**Directions from the project**
Police/Sheriff Contact Emergency: 911 Non-Emergency:	**Ambulance** Emergency: 911
Company Contacts Project Manager: Regional Safety Manager: Corporate Safety Manager: ALEXANDER MECHANICAL: 816 833-0700	

Chapter 2: EMPLOYEE SAFETY TRAINING

INTRODUCTION/OVERVIEW

In order to maintain the safety standards desired by our organization, it is necessary to actively pursue an accident prevention program at all levels of our company. Training in hazard recognition and control is essential to prevent the occurrence of accidents.

This chapter presents an outline summary of the basic components of this training. Copies of the weekly ***Toolbox Safety Talks*** are also included.

EMPLOYEE TRAINING PROGRAM SUMMARY

1. Each new and re-hired employee will receive safety orientation training and a safety indoctrination package. This training will be presented by the responsible Safety Manager.
2. All field employees will receive behavioral awareness training (THINK – WATCH – CONTROL)
3. Service Technicians shall receive monthly safety training on trade-specific topics, such as; Lock-out/Tag-out, Confined Spaces, Driving Safety, Fall Protection, etc. This training will be presented by the responsible Safety Manager.
4. Each new and re-hired Foreman will receive foremen safety orientation training. This training will be presented by the responsible Safety Manager.
5. Each new hire and re-hired Project Manager will receive project manager safety orientation training. This training will be presented by the responsible Safety Manager.
6. All employees will receive reinforcement training using Toolbox Safety Talks. This training shall be repeated annually. The individual construction and service branches may utilize the topics provided in Chapter 2, page 4, or create their own utilizing the “How’d They Do It/How’d It Happen” or another applicable format. Topics will support the training provided in the programs listed in this manual.
7. Project Managers, Superintendents, and job Foremen will attend quarterly company safety meetings where selected safety topics will be reviewed. The safety responsibilities of the Foremen and Project Managers will be reviewed as necessary.
8. New employees will be asked to provide evidence of completion of safety training received from the union, other contractors, and outside training sources. The status of employee training will be maintained in the employee’s personnel file and updated as additional training is provided.

9. New employees will receive a written copy of the Company Safety Rules and Policies and will be asked to sign a receipt acknowledging that they have received and read them.
10. Supplemental training in essential safety topics will be provided at the time of hire by the Safety Manager or as needed.
11. Extensive training in fall protection, excavation safety, ladder safety, hazard communication, first aid, CPR, ariel lift safety, confined space hazards, lock- out/tag-out procedures, and fire safety will be provided through joint contractor association/local union training programs or internally by the responsible Safety Manager or insurance carrier's Risk Improvement Representative.
12. Jobsite inspections of safety conditions will be used to remind jobsite employees of potential safety hazards. A sample Construction Site Safety Inspection Report form is illustrated on the next page.
13. Targeted jobsite inspections are conducted by our Safety Managers, Project Managers, joint contractor association and insurance carrier's Risk Improvement Representative. These individuals will visit with employees about safety practices and violations and send written reports to the Executive Leadership Team of the Company.

CONSTRUCTION SITE SAFETY INSPECTION REPORT			
Job No.	Job Name	Foreman	Project Mgr.

Instructions: Make a weekly inspection of your jobsite and check each line item. Send to home office each week with your time sheets. If an unsafe condition exists that cannot be promptly corrected, take action to avoid exposing our employees to the hazard, them immediately notify your supervisor or project manager.

Fall Protection:	OK Safe	Not Safe	N/A	Disposition or Comments
Guard rails and toe boards wherever a wall of more than 6' is possible.				
Safety harness in use where required				
Housekeeping at Jobsite:	OK Safe	Not Safe	N/A	Disposition or Comments
General contractor's housekeeping				
Waldinger corporation's Housekeeping				
Scaffold and Ladders:	OK Safe	Not Safe	N/A	Disposition or Comments
Ladders in good repair				
Ladders tied off and at 4 to 1 slope				
Guard rails and outriggers on scaffolding as required				
Trenches:	OK Safe	Not Safe	N/A	Disposition or Comments
Shored properly or at proper slope				
Excavated material at least 2' from excavation				
Ladder within 25' at any point				
Personal Protection:	OK Safe	Not Safe	N/A	Disposition or Comments
Hard hats, appropriate shoes & clothing being worn.				
Safety glasses worn by all personnel at all times				
Goggles used for chipping, grinding, welding, etc.				
Bystanders shielded from welding flash				
Gloves worn for material handling				
Fire Prevention:	OK Safe	Not Safe	N/A	Disposition or Comments
Flammable materials storage and appropriate usage				
Welding cylinders secured and properly separated				
Fire extinguishers available, inspected within 1 year				

Electrical: Equipment	OK Safe	Not Safe	N/A	Disposition or Comments
Tools and cords in good condition and grounded				
Ground Fault Current Interrupters used and tested				
Portable welders grounded				
Lock Out / Tag Out procedures followed				
Trucks, Forklifts & Aerial Lifts	OK Safe	Not Safe	N/A	Disposition or Comments
Trucks properly serviced and road worthy				
Lift operators properly trained and have card				
Miscellaneous	OK Safe	Not Safe	N/A	Disposition or Comments
Is OSHA poster properly displayed?				
Emergency Telephone number properly displayed				
Is First Aid kit properly stocked				
Have all employees been instructed to report injuries?				
Has there been an accident or injury this week?				
If so, was it investigated and properly reported?				
Do our employees know where to find MSDS sheets?				
Has a Toolbox Talk been presented this week?				
Do all drivers of TWC trucks have a valid license?				
Report Submitted by:			Date:	

Table of Contents

33. Temporary Heating Devices
34. Work Lead Set-Up (Electric Arc Welding)

PROTECTIVE EQUIPMENT/EMERGENCY PLANNING

35. Workplace Fires – Fire Extinguishers
36. Workplace Fires – Proper Fire Extinguisher Use
37. Lighting – Illumination
38. Hand Injuries – Cut Resistant Gloves
39. Tool Tethering
40. Rollover Protective Structures
41. Unobserved Hazards & Signs, Signals, Barricades
42. Emergency Action Plans
43. Waste Management Plans

MISCELLANEOUS

44. Helicopter Picks
45. Power Transmission & Distribution
46. Fixed Scaffolds
47. Working Over Water
48. Extreme Heat on Building Rooftops
49. Workplace Violence

OCCUPATIONAL INJURIES AND ILLNESSES (RECORDKEEPING)

50. Recordable Injuries/Illnesses
51. Your Right to Report Injuries/Illnesses
52. How to Report Injuries/Illnesses

Training Documentation for Talk # _____

The undersigned workers have participated in safety training covered by the MCAA Toolbox Safety Talk that corresponds to the number in the space above.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Instructions for the Toolbox Safety Talk Presenter

PREPARATION

1. Select the most appropriate talk for the week.
2. Keep track of the talks you present so you don't inadvertently repeat them.
3. Print copies of the talk you plan to use (one for each participant).
4. Print a copy of the training documentation sheet and write in the number of the talk in the blank at the top.
5. Read the talk you plan to present several days ahead of time.
6. Make sure you understand all aspects of the topic you'll be presenting.
7. Anticipate the questions that are most likely to be asked and prepare your responses to them ahead of time.

PRESENTATION

1. Answer any questions from the previous week's talk that you were unable to answer during the presentation.
2. Give a copy of the new talk you will be presenting to each participant.
3. Present the content of the talk slowly and clearly.
4. Relate any experiences you've had that relate to the topic.
5. Ask the participants to share their own experiences that relate to the topic.
6. Write down any questions that you can't answer and any comments that you think would be useful to the company.
7. Have each participant sign the training documentation sheet.
8. File the training documentation sheet where you can access it quickly if needed.

FOLLOW-UP

1. Be sure to re-read the questions and comments that you recorded.
2. Find the answers to the questions you were unable to answer. Start the next week's talk by revisiting the topic and answering those questions.

TOPIC: Silica – General #1

PRIMARY POTENTIAL HEALTH HAZARDS

- SILICOSIS (Lung Disease – Inflammation and Scarring in the Lungs)
- LUNG CANCER (Malignant Lung Tumor(s))

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Cutting, boring, drilling, chipping, jackhammering, etc. into concrete
- Work in close proximity to other trades that are cutting, boring, chipping, jackhammering, drilling, etc. into silica containing materials such as concrete, brick, block, tile, etc.
- Work in close proximity to other trades performing sand blasting

SAFE WORK PRACTICES

- Wear a suitable respirator unless your company's competent person for silica informs you that overexposure will not occur even if you don't use respiratory protection.
- Before using any respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Use appropriate engineering controls, such as High Efficiency Particulate Air (HEPA)-filtered dust collection systems, the wet method, and/or local exhaust ventilation whenever they are available.
- Use only sharp masonry drill bits and saw blades when drilling or cutting into concrete.
- Never dry sweep, dry brush, or use compressed air to clean clothing or surfaces in affected work areas.
- Be sure not to eat, drink, smoke, or apply cosmetics in affected work areas.
- Wash your hands and face before eating, drinking, smoking, or applying cosmetics.
- If you have any questions or concerns about silica, immediately check with your company's *Competent Person* for silica.

TOPIC: Silica – Standard Drills/Hammer Drills #2

PRIMARY POTENTIAL HEALTH HAZARDS

- SILICOSIS (Lung Disease – Inflammation and Scarring in the Lungs)
- LUNG CANCER (Malignant Lung Tumor(s))

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Drilling, hammer drilling into concrete

SAFE WORK PRACTICES

- Whenever they are available, use standard drills and hammer drills fitted with a commercially available shroud or cowling, and an adequate dust collection system.
- Ensure that the dust collection system is designed for, and filtered by, High Efficiency Particulate Air (HEPA) filters.
- Before starting to work, make sure that the HEPA filter(s) is clean and that the dust collection system is working properly.
- Be sure to follow the tool/dust collection system manufacturers' instructions carefully to minimize dust emissions.
- When drilling holes to install pipe or duct hangers, make sure you clean out the holes with an approved HEPA filtered vacuum before installing the hangers.
- Use an exhaust ventilation system in conjunction with the dust collection system if visible airborne dust begins to accumulate while you're performing the work.
- If you have any questions or concerns about silica, immediately check with your company's *Competent Person* for silica.

TOPIC: Silica – Rig Mounted Core Drills/Saws #3

PRIMARY POTENTIAL HEALTH HAZARDS

- SILICOSIS (Lung Disease – Inflammation and Scarring in the Lungs)
- LUNG CANCER (Malignant Lung Tumor(s))

PRIMARY EXPOSURE FOR MECHANICAL CONSTRUCTION WORKERS

- Cutting/boring into concrete

SAFE WORK PRACTICES

- Use rig mounted core drills/saws with integrated water delivery systems.
- Make sure that the core drill/saw is working properly.
- Be sure to use only sharp bits/blades.
- Check to be sure that the water supply is being applied directly to the cutting surface.
- Confirm that the water flow rate is strong enough to adequately minimize visible dust emissions.
- Carefully follow the core drill/saw manufacturer's instructions to ensure that you are minimizing dust emissions as much as possible.
- Ensure that the core drill/saw's power cord is plugged into a Ground Fault Circuit Interrupter (GFCI), especially since water may accumulate near the cord.
- If you have any questions or concerns about silica, immediately check with your company's *Competent Person* for silica.

TOPIC: Silica – Hand-Held & Walk Behind Masonry Saws #4

PRIMARY POTENTIAL HEALTH HAZARDS

- SILICOSIS (Lung Disease – Inflammation and Scarring in the Lungs)
- LUNG CANCER (Malignant Lung Tumor(s))

PRIMARY EXPOSURE FOR MECHANICAL CONSTRUCTION WORKERS

- Cutting into concrete

SAFE WORK PRACTICES

- Wear a suitable respirator unless your company's *Competent Person* for silica informs you that overexposure will not occur without respiratory protection.
- Before using any respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Make sure that the saw you'll be using is working properly.
- Be sure to use only sharp saw blades made for cutting concrete.
- Use saws with integrated water delivery systems.
- Check to be sure that the water supply is being applied directly to the cutting surface.
- Confirm that the water flow rate is strong enough to adequately minimize visible dust emissions.
- Carefully follow the saw manufacturer's instructions to ensure that you are minimizing dust emissions as much as possible.
- If you have any questions or concerns about silica, immediately check with your company's *Competent Person* for silica.

TOPIC: Silica – Jackhammers & Powered Chipping Tools #5

PRIMARY POTENTIAL HEALTH HAZARDS

- SILICOSIS (Lung Disease – Inflammation and Scarring in the Lungs)
- LUNG CANCER (Malignant Lung Tumor(s))

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Jackhammering or chipping into concrete

SAFE WORK PRACTICES

- Wear a suitable respirator unless your company's *Competent Person* for silica informs you that overexposure will not occur without respiratory protection.
- Before using a respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Use a jackhammer or hand-held powered chipping tool fitted with either a water delivery system that supplies a continuous stream or spray of water at the point of impact, **or** a commercially available shroud or cowling, and an adequate dust collection system.
- When using the water delivery system, make sure the water flow rate is strong enough to minimize visible dust.
- When using the shroud, or cowling/dust collection system, ensure that the system is designed for, and filtered by, High Efficiency Particulate Air (HEPA) filters.
- Before starting to work, make sure that the HEPA filter(s) is clean and that the dust collection system is working properly.
- Whether using the water delivery system or the dust collection system, be sure to follow the manufacturer's instructions carefully to ensure the minimization of dust emissions.
- If you have any questions or concerns about silica, immediately check with your company's *Competent Person* for silica.

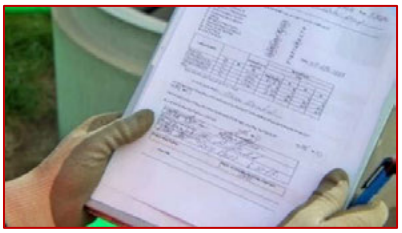
TOPIC: Confined Spaces – Permit vs. Non-Permit Spaces #6

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES & VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit, and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions



PERMIT-REQUIRED CONFINED SPACES

- All confined spaces are *Permit-Required* spaces unless your company's designated *Competent Person* and *Entry Supervisor* reclassify the spaces.

NON-PERMIT REQUIRED CONFINED SPACES

- The *Competent Person* performs a thorough hazard assessment inside the space, and in surrounding areas outside the space.
- No atmospheric hazards exist inside the space.
- If atmospheric hazards were identified inside the space, forced air ventilation alone removes the atmospheric hazards.
- Other hazards inside the space, if they were not altogether eliminated, remain isolated.
- No hazards are present in surrounding areas outside the space.
- Based on a thorough hazard assessment, the *Competent Person* recommends to the *Entry Supervisor* that the space be reclassified as a non-permit required space.
- The *Entry Supervisor* evaluates the recommendation, agrees that the space should be reclassified, and completes the procedures and paperwork required for reclassification.

SAFE WORK PRACTICES

- Even though a space is classified as a non-permit space, make sure that you continuously monitor the space for atmospheric hazards throughout entry operations.

TOPIC: Confined Spaces – General #7

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES AND VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions

SAFE WORK PRACTICES

- Treat every confined space as a *Permit-Required* space unless your company's designated *Competent Person* and *Entry Supervisor* reclassify the space as *Non-Permit Required*.
- Never enter any confined space until you have the appropriate confined space entry safety training. Carefully follow the safe work practices and procedures from the training.
- Before entering any confined space, make sure the *Competent Person* has tested the atmospheric conditions inside the space and informed you that it is safe to enter.
- Once you enter the space, continuously monitor the atmosphere inside for changes that could render the space unsafe.
- Use monitoring equipment with built-in hazard detection alarms. If an alarm sound, exit the space immediately and do not re-enter until the *Competent Person* informs you that it is safe to do so.
- If you have any questions or concerns about confined space entry, check with your company's *Competent Person* for confined space entry immediately.

TOPIC: Confined Spaces – Acceptable Entry Conditions #8

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES & VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions

ACCEPTABLE CONDITIONS WITHOUT ADDITIONAL PROTECTIVE MEASURES

- You have successfully completed the appropriate confined space entry safety training, and agree to carefully following the safe work practices/procedures from your training;
- Oxygen levels in the space are between 19.5% and 23.5%;
- Flammable gases/vapors/mists levels in the space are at or below 10% Lower Flammability Level (LFL);
- Toxic air contaminants in the space are at or below allowable/safe levels (parts per million (PPM));
- All physical hazards are eliminated or isolated;
- All other recognizable safety and health hazards are eliminated or isolated;
- Airborne combustible dust does not obscure vision at 5’ distance or less; and
- Your company’s designated *Competent Person* for confined space entry has informed you that it is safe to enter the space.

TOPIC: Confined Spaces – Common Gases/Hazards #9

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES & VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions

COMMON HAZARDOUS GASES/ISSUES IN MECHANICAL CONSTRUCTION

- Oxygen – Levels in confined spaces must be between 19.5% and 23.5%. Levels below 19.5% can lead to immediate organ damage and ultimately death. Also, since oxygen accelerates the rate of combustion, levels that are too high can make the space more susceptible to fires and explosions.
- Methane – Is highly flammable (it is the main constituent of natural gas). Methane is not considered to be toxic. However, it can displace oxygen in the lungs leading to asphyxiation and suffocation.
- Carbon Monoxide – Prevents efficient exchange of oxygen in the circulatory system and can be fatal.
- Hydrogen Sulfide – Is highly flammable, and is considered a toxic substance. It is an irritant that can cause respiratory failure over time if it goes undetected.

SAFE WORK PRACTICES

- Continuously monitor the atmosphere inside the space for hazardous gases.
- Use an appropriate, properly calibrated monitoring instrument with a built-in hazard detection alarm. If the alarm system(s) activates, evacuate the space immediately.

TOPIC: Confined Spaces – Atmospheric Monitoring #10

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES & VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit, and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions

SAFE WORK PRACTICES

- Use an appropriate direct read instrument to evaluate the atmosphere inside the space.
- Ensure that the equipment monitors oxygen levels, flammable gases/vapors/mists, and toxic air contaminants.
- Make sure the monitor is properly calibrated, equipped with properly functioning batteries/properly charged, and otherwise working correctly.
- Evaluate the atmosphere at all applicable vertical and horizontal levels concentrating on the immediate work areas.
- Continuously monitor the atmosphere inside the space for changes that could render the space unsafe for entrants.
- Always use monitoring equipment with built-in hazard detection alarms. If an alarm activates, exit the space immediately, and do not re-enter until the *Competent Person* informs you that it is safe to do so.
- If you have any questions or concerns about confined space entry, check with your company's *Competent Person* for confined space entry immediately.

TOPIC: Confined Spaces – Ventilation #11

PRIMARY POTENTIAL HEALTH AND PHYSICAL HAZARDS

- INSUFFICIENT OXYGEN – ASPHYXIATION – SUFFOCATION
- TOXIC AIR CONTAMINANTS – IMPAIRMENT – INCAPACITATION – DEATH
- FLAMMABLE GASES & VAPORS – FIRES & EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Entry into pipelines, ductwork, equipment housings, boilers, manholes, sewers, vaults, tunnels, shafts, vessels, pits, tanks, etc. that have limited or restricted means for entry or exit and are not designed for continuous human occupancy
- Hot work inside a confined space that could change what would otherwise be acceptable atmospheric conditions to hazardous atmospheric conditions

SAFE WORK PRACTICES

- Never enter a confined space that has a hazardous atmosphere, such as low oxygen levels, excessive levels of flammable gases or toxic air contaminants, etc. unless you are properly protected from all health and physical hazards in the space.
- Whenever it's necessary to eliminate or isolate atmospheric hazards inside a confined space, establish a system of continuous forced air ventilation.
- Make certain that the air supply for the ventilation system is from a clean source. For example, the ventilation system intake should not be anywhere near sources of carbon monoxide, such as gasoline or diesel fueled vehicles.
- Ensure that the forced air ventilation is being directed to the immediate work areas.
- Continuously monitor the space with a properly calibrated direct read confined space monitor to ensure that the ventilation system is performing efficiently and effectively.
- Use a monitor with a built-in hazard detection alarm. If the alarm activates, evacuate the space immediately, do whatever is necessary to prevent others from entering the space, and inform your company's designated *Competent Person* for confined space entry.
- If the ventilation system fails for any reason, evacuate the space immediately, do whatever is necessary to ensure that no one else enters the space, and inform the *Competent Person* immediately.

TOPIC: Zika Virus

#12

PRIMARY POTENTIAL HEALTH HAZARDS

- GUILLAIN-BARRÉ SYNDROME (Nervous System Illness/Nerve Cell Damage)
- MICROCEPHALY (Babies Born with Smaller than Normal Heads and Brains)
- OTHER BIRTH DEFECTS (Babies Born with Brain, Eye, Joint, and/or Muscle Damage)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Workplace exposure to mosquitos that are carrying the Zika virus, especially work in geographic areas with large populations of mosquitos where the Zika virus is prevalent.
- Be cautious everywhere, but be especially careful when working in California, Florida, New York, Texas, Puerto Rico, and the U.S. Virgin Islands.

SAFE WORK PRACTICES

- Do whatever is necessary to avoid mosquito bites.
- Wear long sleeve shirts and long pants.
- Stay inside of enclosed structures whenever possible.
- Air conditioned structures are best because mosquitos are cold blooded and are much less active in colder temperatures. An air-conditioned jobsite trailer would be a good place for breaks and lunches when working in or near mosquito infested areas.
- Whenever possible, remove standing water where it's found around the jobsite.
- When standing water can't be removed, avoid the areas where standing water exists as much as possible.
- The Zika virus can also spread by way of sex with an infected partner.
- If you contracted or may have contracted the Zika virus, be especially careful not to infect a female partner who is pregnant or trying to get pregnant.

TOPIC: Marijuana #13

POTENTIAL HEALTH HAZARDS

- DIFFICULTY BREATHING (Same Effect Experienced by Cigarette Smokers)
- INCREASED HEART RATE (For Extended Periods Increases the Risk of Heart Attack)
- MENTAL ILLNESS – DEPRESSION – ANXIETY – SUICIDAL THOUGHTS
- LOSS OF SOUND JUDGEMENT (Increases the Potential for Physical Hazards)
- KILLS IRREPLACEABLE BRAIN CELLS

WHAT YOU SHOULD KNOW ABOUT MARIJUANA USE IN GENERAL

- Marijuana is still illegal under federal law. It is still classified as a *Schedule I* drug (no currently accepted medical use and a high potential for abuse) by the federal Drug Enforcement Agency (DEA).

WHAT YOU SHOULD KNOW ABOUT MEDICAL MARIJUANA USE

- The *UA/MCAA Smart Dispatch Model Substance Abuse Testing and Treatment Program Policy* is based on U.S. DOT Drug Testing Regulations.
- Use of marijuana for medicinal purposes, even when prescribed by a medical doctor, is not considered by DOT to be a legitimate explanation for a positive marijuana drug test.
- There are currently no restrictions on testing for medical marijuana.
- There are currently no laws that require employers to accommodate on-duty drug use in the workplace.
- Despite the differences is state laws concerning medical marijuana, all states prohibit the use of marijuana on jobsites and while working.
- There are currently no laws prohibiting employers from taking disciplinary action against employees who are working while under the influence of medical marijuana.

WHAT YOU SHOULD KNOW ABOUT RECREATIONAL MARIJUANA USE

- Most states prohibit driving under the influence of marijuana.
- There are currently no laws prohibiting employers from taking disciplinary action against employees who are working while under the influence of recreational marijuana, even in states where recreational marijuana is legal.

TOPIC: Suicides in Construction (Mental Health) #14

FACTS

- Construction is the industry with the highest numbers of suicides.
- Suicide is the second leading cause of death for men between the ages of 25 and 54.
- More than 41,000 suicides occur annually.

SOME OF THE KEY THINGS TO WATCH FOR

- Thinking, talking or wishing about suicide and/or preoccupation with death
- Common signs of *depression,* such as fatigue, too much or too little sleep, stomach or back aches, irritability, trouble concentrating, anger/hostility, stress, indecision, etc.
- Common signs of *anxiety,* such as excessive worry, sleep problems, irrational fears, muscle tension, chronic indigestion, self-consciousness, panic, flashbacks, perfectionism, compulsive behaviors, self-doubt, etc.
- Thoughts or statements about hopelessness, helplessness, or worthlessness
- No sense of purpose or belonging
- Withdrawal from family, friends, hobbies, etc.
- Dramatic changes in mood
- Prescription painkiller (opioid) abuse
- Alcohol and/or non-prescription drug abuse
- Feelings of having no way out
- Recklessness (high risk behavior)
- Loss of interest in activities that were previously pleasurable
- Getting affairs in order, and or giving away prize possessions

WHAT TO DO

- If you suspect someone has suicidal tendencies approach the person in private.
- Be direct and ask him if he is thinking about suicide.
- If he answers yes, ask if he has thought about how he would do it.
- If he answers yes, ask him if he has what is needed to do it.
- If he answers yes, ask him if he has thought about when he would do it.
- If you believe that someone is suicidal, help them get help immediately.
- If you have thoughts of suicide, you can easily get help too.
- For immediate help call the **National Suicide Prevention Hotline at 1-800-273-8255**.

TOPIC: Skin Cancer

#15

FACTS

- Every year around 5 ½ million skin cancer cases are treated in the United States.
- The vast majority of skin cancer cases are attributed to Ultraviolet (UV) Radiation from the sun.
- It makes no difference whether you are dark complected. Dark skin does not block UV rays.
- It makes no difference whether it's cloudy outside. Cloud cover does not block UV rays.

TYPES OF SKIN CANCER

- Basal Cell Carcinoma – Most Common (Around 4 million cases diagnosed annually)
- Squamous Cell Carcinoma – 2nd Most Common (1 million+ cases diagnosed annually)
- Melanoma – 3rd Most Common (One person dies of melanoma every 54 minutes)

PRIMARY EXPOSURE FOR MECHANICAL CONSTRUCTION WORKERS

- Unprotected skin exposure to *UV Radiation* from the Sun.

SAFE WORK PRACTICES

- Work in shady areas as much as possible, even if you need to make your own shade.
- When shade is not an option, cover as much skin as possible with sun-safe clothing.
- Wear the widest brim hardhat that is available to you.
- Cover the back of your neck and ears with a hardhat compatible sun-safe neck shade.
- Protect any remaining exposed skin with, at a minimum, SPF 15 sunscreen.
- Reapply the sunscreen at regular intervals (follow the manufacturer's instructions).
- See a dermatologist for a skin check-up, especially if you have ever had a bad sunburn.
- Ask the dermatologist what to watch for in terms of warning signs, such as the appearance of a new mole, or changes to an existing mole.
- Follow the dermatologist's instructions for skin cancer prevention and make any recommended skin checkup appointments at regular intervals.

Toolbox Safety Talks for Mechanical Construction Workers – Volume VI

TOPIC: Prescription Opioid (Painkiller) Abuse #16

SOME OF THE POTENTIAL HEALTH AND PHYSICAL HAZARDS

- ADDICTION (Can Lead to Suicidal Tendencies)
- MENTAL IMPAREMENT
- INCREASED RISK OF FALLING

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Treatment for back, shoulder, and other musculoskeletal pain
- Treatment for bad headaches

WHAT YOU SHOULD KNOW ABOUT OPIOIDS IN GENERAL

- Opioids are prescription painkillers. Some of the more common opioids include: *Morphine*, *Oxycodone* (such as Oxycontin and Percocet) *Hydrocodone* (such as Vicodin and Zohydro), and *Methadone*.

WHAT YOU SHOULD KNOW ABOUT OPIOID USE AND ABUSE

- Opioids are highly addictive.
- Nearly 30% of all Emergency Room (ER) visits result in a prescription for an opioid.
- About 60% of patients who visit the ER with back pain receive an opioid prescription.
- Primary care doctors give opioid prescriptions to 35% of their patients who present with back pain.
- In most cases, acute pain (pain lasting less than 3 months) can be relieved more effectively and efficiently with a combination of two over-the-counter pain medicines as follows: 200 mg of ibuprofen and 500 mg of acetaminophen.
- There is no evidence that opioids are effective for treatment of chronic pain (pain lasting more than 3 months).
- The American Academy of Neurology recommends against using opioids for back pain, headaches, and fibromyalgia (widespread musculoskeletal pain).

SAFE WORK PRACTICES

- Avoid using opioids, especially for back pain, headaches and fibromyalgia.
- Ask your doctor about using alternative medications, such as ibuprofen and acetaminophen. Both are available in prescription doses.
- If you must use an opioid, such as immediately after an extensive surgical procedure, consult with your doctor about getting off the opioid as soon as you possibly can.

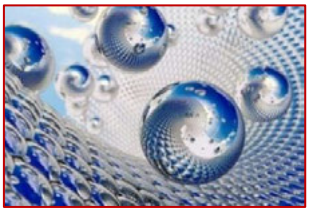
TOPIC: Nanomaterials in Mechanical Construction #17

POTENTIAL HEALTH HAZARDS

- Possible Risk of Toxicological Problems with Some Nanomaterials Used in Construction
- Possible Risk of Lung Problems Similar to Asbestos Related Problems, i.e. Lesions
- Possible Risk of Mesothelioma

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Work with, or in close proximity to, disturbed construction materials that contain nanomaterials, such as some boiler additives, certain types of HVAC equipment greases, coatings, lubricants, cements, adhesives, insulation, and patching compounds
- Welding fumes from nano-enabled steel/welding products
- Drilling, cutting, and boring into nano-enabled concrete

WHAT YOU SHOULD KNOW ABOUT NANOMATERIALS IN GENERAL

- Nanomaterials are often used to coat construction materials such as cement and steel products to make them more durable, and to enhance their performance.
- Our primary concern is the uncertain potential for respiratory illnesses associated with inhaling nanoparticles when they are disturbed during construction processes.
- There are currently no labeling requirements for nanomaterials.
- OSHA has not established a Permissible Exposure Limit (PEL) for nanomaterials.
- Nanomaterials can also be ingested and translocated throughout the body.
- The human health risks of nanomaterials are not well understood.
- Mechanical construction workers should limit their exposure to nanomaterials as much as possible until the health risks are better known.

SAFE WORK PRACTICES

- When needed and available, use tools with built in High Efficiency Particulate Air (HEPA) dust collection systems.
- Provide local exhaust ventilation in the affected work areas.
- If dust collection systems don't adequately reduce dust levels, use an appropriate air-purifying respirator with HEPA filters.
- Before using any respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.

TOPIC: Legionella

#18

POTENTIAL HEALTH HAZARDS

- LEGIONNAIRES DISEASE (Pneumonia – Lung Infection)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Inhalation of an aerosol of water that is contaminated with Legionella from equipment that uses evaporation to reject heat. Some possible sources include cooling towers, evaporative condensers, and fluid coolers.
- Hot-water systems with water heaters that operate below 60°C (140°F) and deliver water to taps below 50°C (122°F)
- Stagnant water in fire sprinkler systems
- Warm water at safety eye wash stations and in safety showers


SAFE WORK PRACTICES WHEN LEGIONELLA HAS NOT BEEN DETECTED

- When you are working where there could be a risk of exposure to Legionella, but where there is no known risk, you can voluntarily wear an N95 respirator (lightweight dust mask type respirator).
- When you wear this respirator voluntarily the typical respirator use requirements, such as medical clearance, fit testing, and respiratory protection training do not apply.

SAFE WORK PRACTICES WHEN LEGIONELLA HAS BEEN DETECTED

- When you are working where the presence of Legionella has been established, wear a half-face respirator with High Efficiency Particulate Air (HEPA) filters.
- Before using any respirator that you are required to wear (non-voluntarily use), be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Wear impervious disposable coveralls and gloves.
- When you are finished working, carefully follow your company's established decontamination procedures.

TOPIC: The Aging Construction Workforce #19

FACTS

- More than half of mechanical construction workers are 40 years old or older.
- Aging workers experience losses in strength, speed of movement, motor skills, balance, range of motion, tactile sensation in their feet and hands, hearing, and eyesight.
- Aging workers have less oxygen circulating throughout their musculoskeletal system than they did in the past. The result is quicker muscle fatigue, and longer muscle recovery time.
- Around 53% of Workers' Compensation (WC) claims for injuries in the mechanical construction industry are from workers 40 years old and older.
- Around 58% of WC claims for injuries from falls from elevations in the mechanical construction industry are from workers over 40 years old.

PRIMARY POTENTIAL PHYSICAL HAZARDS

- MUSKULOSKELETAL INJURIES AND/OR PAIN
- FALLS FROM LADDERS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Lifting and/or moving materials without using lifting and/or materials moving equipment
- Improper lifting/moving/lowering of heavy and/or bulky objects by hand
- Excessive bending, reaching, and ladder climbing

SAFE WORK PRACTICES

- Use equipment to lift and/or move heavy or bulky objects, such as forklifts, pallet jacks, wheelbarrows, carts, etc. whenever it is available and practical.
- When you must move heavy or bulky objects by hand, get someone to help you.
- Reduce the number of times you must bend by staging materials off the ground or floor somewhere around waist height. Use pipe racks, commercially available mobile tables, jobsite made temporary tables, stacked pallets, etc. to get the materials staged properly.
- Reduce the number of times you must reach by positioning yourself closer to the work whenever it is possible and practical.
- Reduce the number of times you climb up and down ladders by carefully planning your work ahead of time. Once you have the necessary measurements and the materials properly sized, make sure you have *everything* you need to complete the task before climbing back up the ladder.

TOPIC: Avoidable Bending #20

FACTS

- On average, mechanical construction workers bend somewhere around 50 times every hour while completing their work tasks.
- Based on a 250-day work year, that amounts to somewhere around 100,000 bends per worker per year.
- In a 30-year career, mechanical construction workers bend more than 3 million times while performing their daily work tasks.

PRIMARY POTENTIAL PHYSICAL HAZARDS

- BACK INJURY AND/OR PAIN

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Failure to pre-plan each task with the intention of reducing the number of times it will be necessary to bend to complete it
- Poorly established work areas that require *unnecessary* bending while welding, cutting, brazing, or performing any other mechanical construction task
- Picking up small items or lifting larger objects from the ground, floor, or anywhere lower than waist height

SAFE WORK PRACTICES

- Pre-plan each task carefully to reduce the number of times that you will need to bend to complete it.
- Have your materials staged off the ground or floor somewhere around waist height. Use pipe racks, commercially available mobile tables, jobsite made temporary tables, stacked pallets, etc. to have the materials staged properly.
- Whenever possible, position yourself so that you won't have to bend to complete the task. Sometimes doing so is as simple as making quick and easy adjustments to the immediate work area, adjusting your body position, or adjusting the work itself.

TOPIC: Avoidable Reaching #21

FACTS

- On average, mechanical construction workers reach (arms extended 20 inches or more away from the torso) somewhere around 100 times every hour while completing their work tasks.
- Based on a 250-day work year, that amounts to somewhere around 200,000 reaches per worker per year.
- In a 30-year career, mechanical construction workers reach more than 6 million times while performing their daily work tasks.

PRIMARY POTENTIAL PHYSICAL HAZARDS

- BACK and/or SHOULDER INJURY
- BACK and/or SHOULDER PAIN

PRIMARY EXPOSUES FOR MECHANICAL CONSTRUCTION WORKERS

- Failure to pre-plan each task with the intention of reducing the number of times it will be necessary to reach to complete it
- Poorly established work areas that require *unnecessary* reaching while welding, cutting, brazing, or performing any other mechanical construction task
- Poor body and/or work positioning requiring *additional unnecessary* reaching

SAFE WORK PRACTICES

- Pre-plan each task carefully to reduce the number of times that you will need to reach to complete it.
- Whenever possible, arrange the work area so that you can easily and safely position yourself to complete the work without reaching.
- Whenever it's feasible, position yourself so that you won't have to reach to complete the task. Sometimes doing so is as simple as moving the ladder closer to the work, taking a step or two up or down the ladder, or using alternative methods to access the work.

TOPIC: Avoidable Ladder Climbing #22

FACTS

- On average, mechanical construction workers climb ladders 25 times every hour while completing their work tasks.
- Based on a 250-day work year, that amounts to somewhere around 50,000 climbs per worker per year.
- In a 30-year career, mechanical construction workers climb ladders more than 1,500,000 times while performing their daily work tasks.

POTENTIAL PHYSICAL HAZARDS

- As the Number of Times You Climb Increases, the Risk of Falling Also Increases
- Concussion, Broken Bones, Punctures, Lacerations, Contusions, etc. from the Impact of Falling

PRIMARY OMISSIONS BY MECHANICAL CONSTRUCTION WORKERS

- Failure to pre-plan each task with the intention of reducing the number of times it will be necessary to climb a ladder
- Failure to use alternative methods to access the work whenever they are available and feasible

SAFE WORK PRACTICES

- Pre-plan each task carefully to reduce the number of times that you will need to climb a ladder.
- Whenever possible, use an alternate method of accessing your work area, such as using an aerial lift or a mobile work platform.
- When using a ladder, you may have to climb down to reposition it to provide better access or reduce your reach. When initially placing the ladder, try to place it to reduce the number of times you'll need to climb down to move it.
- Whenever possible, get all the necessary measurements in one trip up the ladder.
- Make all your cuts and assemble all the items you'll need.
- Before climbing back up the ladder, take the time to ensure that you have all of materials, tools, and equipment you need to complete the task.

TOPIC: Asbestos/Gaskets #23

POTENTIAL HEALTH HAZARDS

- ASBESTOSIS (Scarring of Lung Tissue with Shortness of Breath)
- LUNG CANCER (Uncontrolled Division of Abnormal Cells in the Lungs)
- MESOTHELIOMA (Cancer of the Pleura/Membrane Lining the Lungs)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Line breaking in older piping systems
- Grinding, filing, sanding, and/or wire brushing by hand to remove gaskets containing asbestos
- Use of any type of power tool to remove gaskets containing asbestos

SAFE WORK PRACTICES FOR REMOVING "INTACT" GASKETS

- "Intact" gaskets are gaskets that are in a non-friable (not able to crumble, pulverize, or be reduced to powder by hand pressure) condition.
- Before attempting to remove any gasket containing asbestos, complete at least two hours of asbestos awareness training that includes specific instruction on how to determine whether a gasket is intact and how to minimize fiber release while removing intact gaskets.
- To keep intact gaskets from becoming friable while removing them, use a gasket softener and a putty knife.
- When an intact gasket can't be successfully removed with a gasket softener and putty knife, do not attempt to remove it. Inform your supervisor immediately and follow his instructions.
- Likewise, if you discover a gasket that is in friable condition (not intact), do not attempt to remove it. Inform your supervisor immediately and follow his instructions.

TOPIC: Ammonia Refrigerant (Anhydrous Ammonia) #24

POTENTIAL HEALTH AND PHYSICAL HAZARDS

- CORROSIVE TO LUNGS
- CORROSIVE TO EYES
- CORROSIVE TO SKIN
- FROSTBITE (Exposure to Skin May Cause Frostbite)
- FLAMMABLE (Under the Right Conditions)
- EXPLOSIVE (Under the Right Conditions)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Uncontrolled release of ammonia from a mechanical compression system or ammonia storage tank. Ammonia is a liquid while it's under pressure, but it turns into a respirable vapor when released into the air.

SAFE WORK PRACTICES FOR WORK WITH ANHYDROUS AMMONIA

- Before working on ammonia compression systems, get the proper safety training and make sure you thoroughly understand the potential hazards and appropriate protective measures.
- Ensure that the work area is well ventilated before you start to work.
- Always wear the appropriate personal protective equipment.
- Protect your lungs, eyes, and face with a full-face respirator outfitted with the appropriate ammonia cartridges and pre-filters.
- Before using any respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Protect your hands with impermeable gloves designed for work with ammonia-like chemicals.
- Protect your body with a chemical-resistant coverall or chemical-resistant long-sleeve shirt and pants.
- Wear boots made of an impermeable material.
- When you are not working in close proximity to an emergency safety shower, keep a water source nearby to dilute the ammonia if it contacts your skin.
- After working with ammonia, wash your hands and face carefully before eating, drinking, smoking, or applying cosmetics.

TOPIC: Sulfuric Acid #25

POTENTIAL HEALTH HAZARDS

- CORROSIVE TO LUNGS
- CORROSIVE TO EYES
- CORROSIVE TO SKIN
- DEATH (May be Fatal if Inhaled in Large Enough Concentrations)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Inhalation of sulfuric acid vapors and/or unprotected contact with eyes or skin while working with substances containing sulfuric acid, such as battery fluid, drain cleaners, detergents, resins, etc.

SAFE WORK PRACTICES

- Ensure that the work area is well ventilated before you start to work.
- Always wear the appropriate personal protective equipment.
- If you could encounter exposure to sulfuric acid in an area that's not properly ventilated, wear the appropriate respirator.
- Before using any respirator, be sure you have the appropriate medical clearance, fit test, and respiratory protection training.
- Protect your eyes and face with splash-proof safety goggles and a face shield.
- Protect your hands with impermeable gloves designed for work with sulfuric acid-like chemicals.
- Protect your body with an appropriate chemical-resistant apron or coverall, or chemical-resistant long-sleeve shirt and pants.
- Keep emergency eye wash nearby and flush your eyes immediately if you get the acid in your eyes.
- If you get the acid on your skin, thoroughly rinse it with water.
- After working with the acid, wash your hands and face carefully before eating, drinking, smoking, or applying cosmetics.

TOPIC: LP Gas

#26

POTENTIAL HEALTH AND PHYSICAL HAZARDS

- SUFFOCATION (LP Gas Displaces Oxygen)
- FROSTBITE (Exposure to Skin May Cause Frostbite)
- FLAMMABLE (LP Gas is Extremely Flammable)
- EXPLOSIVE (LP Gas Can Form an Explosive Mixture with Air)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Undetected leaks of LP Gas used to fuel portable heaters and other types of construction equipment
- LP Gas containers placed too close to ignition sources, such as portable heaters, welding, cutting, grinding operations, etc.

SAFE WORK PRACTICES

- Before using LP Gas, carefully inspect the containers, valves, connectors, manifold valve assembly, and regulator to ensure that they are in good condition.
- Replace any defective parts, and follow your company's procedures for taking defective parts out of service.
- While inspecting the system, verify that all parts are the correct components for that system.
- If you find one or more system parts that are not compatible with the system, don't use them. Replace them with the proper part(s) before using the system.
- While inspecting the system, make sure that each LP Gas container and vaporizer has approved safety relief valves in place.
- Verify that the cylinder has an excess flow valve to minimize the flow of gas in case the fuel line becomes ruptured.
- Keep LP Gas cylinders away from ignition sources at all times.
- Wear safety glasses and standard work gloves when making connections with cylinders and system parts that are attached to a cylinder.
- Never store LP Gas inside a building.
- Always make sure there is a Class ABC fire extinguisher close by wherever LP Gas is used or stored.

TOPIC: Laser Tools

#27

POTENTIAL HEALTH HAZARDS

- SEVERE EYE INJURIES (Burning on the Retina)
- SKIN BURNS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Working with and/or around laser levels and/or laser measuring devices
- Unexpected/unknown reflection of laser light into eyes

SAFE WORK PRACTICES

- Make sure you receive laser safety training before operating a laser or working in close proximity to others who are using lasers.
- Never look directly into, or work in the path of, a laser beam.
- When working with a laser level or laser measuring device, always wear laser safety glasses or laser safety goggles (these are not standard sun protection safety glasses). Laser protective eyewear is specially designed to keep scattered laser beams and radiation from getting into your eyes.
- Be sure to choose the appropriate grade of laser eye protection depending on the specific wavelength of the laser. If you’re not sure about it, check with your supervisor before you start the work.
- When the laser is not being used, be sure to turn off or block the beam with beam shutters or caps.
- Be aware of other trades using lasers in your work area.
- If working in your immediate work area will expose you to laser light hazards, establish a temporary laser barrier or protective curtain for protection from the laser light while you are working.
- When establishing a temporary barrier or protective curtain is not practical, leave the area and ask your supervisor to temporarily move you to a different work area.

Toolbox Safety Talks for Mechanical Construction Workers – Volume VI

TOPIC: Cranes and Derricks #28

PRIMARY POTENTIAL PHYSICAL HAZARDS

- STRUCK BY FALLING LOAD
- STRUCK BY, OR CAUGHT IN BETWEEN, SWINGING LOAD
- ELECTROCUTION FROM CONTACT WITH OVERHEAD POWER LINES
- STRUCK BY OVERTURNING CRANE/DERRICK
- STRUCK AGAINST FROM OVERTURNING CRANE/DERRICK (Operators)

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Failure to adequately pre-plan and properly prepare for the lift
- Operating in unfavorable conditions, such as unprepared ground, high winds, etc.
- Exceeding the load capacity

SAFE WORK PRACTICES

- Whether you are the operator, rigger, or signal person, participate in a pre-planning process for all lifts to ensure that nothing critical is omitted.
- Be sure to identify any overhead power lines that could be inadvertently contacted during lift operations.
- Plan the operation so that no part of the crane/derrick will get closer than the minimum safe distance from the power lines, or have them de-energized ahead of time.
- Prior to starting the operation, make sure that a *Qualified Person* has inspected the crane and approved it for the lift.
- Ensure that the load capacity of the crane/derrick is posted and visible from the operator's station.
- Before starting the operation, check with your company's *Competent Person* for cranes/derricks to ensure that the proper ground preparations have been completed.
- If you are the operator, operate the crane/derrick only on firm, level, ground, and use mats whenever they are needed, especially when lifting heavy loads.
- Make sure that the outriggers are extended before lifting the load.
- Rope off or barricade the swing radius of the rotating superstructure.
- Prior to the lift, verify that the rated load capacity will not be exceeded.
- Whenever possible, position the boom point so that it is directly over the load.

TOPIC: Damaged Equipment #29

PRIMARY POTENTIAL PHYSICAL HAZARDS

- FALLS FROM ELEVATION
- STRUCK BY OBJECTS
- CAUGHT IN-BETWEEN OBJECTS
- ELECTRICAL SHOCK/ELECTROCUTION

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Use of damaged equipment, such as damaged ladders, chain falls, jacks, rigging equipment, generators, etc.
- Failure to immediately remove damaged equipment from service
- Failure to properly tag damaged equipment out of service so that no one else uses it

SAFE WORK PRACTICES

- Carefully inspect all your equipment each time before you use it.
- Start by making sure there are no missing parts or pieces.
- Look for broken, bent, cracked, burned, melted, charred, cut, abraded, torn, distorted, etc. parts and pieces.
- Watch for wear indicators, such as pronounced rounding of metal parts, red tracer yarn in some types of worn rigging slings, etc.
- When you come across damaged equipment, take it out of service immediately.
- Know your company's procedures for taking damaged/defective equipment out of service, including the protocol for attaching conspicuous damaged equipment warning tags to damaged equipment, and where to place the damaged items at the jobsite.
- Make sure that anyone else who could come across the damaged equipment can quickly and easily determine that it should not be used or placed back into service by carefully following your company's procedures for taking damaged/defective equipment out of service.

TOPIC: Disposal Chutes & Disposing of Waste Materials #30

POTENTIAL PHYSICAL HAZARDS

- FALLS FROM ELEVATIONS
- STRUCK BY FALLING OBJECTS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Accessing chutes that are not adequately equipped with fall prevention systems
- Activity in close proximity to waste dumpsters positioned directly under disposal chutes
- Activity near overhead floor openings where waste materials are dropped to the lower level

SAFE WORK PRACTICES

- Stay away from disposal chute access areas that present potential fall hazards and are not equipped with a fall prevention system, such as a guardrail system or an adequate physical barrier.
- If you see an unprotected potential fall hazard at a disposal chute access area, let your supervisor know about it immediately.
- Be sure to use a disposal chute any time you need to drop materials more than 20 feet below to a point outside the building.
- When dropping waste materials through floor openings to a lower level, set up a barricade around the waste materials landing area.
- Barricades should be at least 6 feet further out than the edges of the opening above.
- Make sure the barricades are at least 42” high.
- Keep a safe distance away from waste dumpsters that are directly under disposal chutes.
- Post warning signs to warn others about materials falling from overhead, and to keep them away from the barricaded waste materials landing zone.

TOPIC: Personnel & Materials Hoists #31

PRIMARY POTENTIAL PHYSICAL HAZARDS

- FALLS FROM ELEVATIONS
- STRUCK BY OBJECTS FALLING FROM OVERHEAD
- CAUGHT IN-BETWEEN

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Relying on others to ensure that personnel and/or materials hoists are safe for operation, and used for their intended/approved purposes

SAFE WORK PRACTICES

- The first time you use the hoist make sure the safe operation speeds, hazard warnings, and any special operation instructions (if applicable) are legibly posted on the car or platform.
- Evaluate material hoists' entrances and exits to determine whether there are full-length gates or bars in place, and that they are marked with contrasting colors, such as black and yellow stripes.
- If the entrances and exits don't have full-length gates or bars and color coding, don't use the hoist. Let your supervisor know about it immediately.
- Evaluate a personnel hoist's doors or gates to determine whether they are at least 6 feet 6 inches apart, and equipped with mechanical locks that can't be accessed/operated from the landing side of the hoist.
- If the doors or gates are closer than 6 feet 6 inches apart, and or there are no properly established mechanical door/gate locks in place, don't use the hoist. Let your supervisor know about it immediately.
- Before using any personnel hoist, make sure that an adequate overhead protective covering is secured in place to protect you and other hoist users from objects falling from overhead.

TOPIC: Motor Vehicles & Mechanized Equipment #32

POTENTIAL PHYSICAL HAZARDS

- STRUCK AGAINST (Operators)
- STRUCK BY

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Distractions away from, and omissions of, critical safety requirements while preparing vehicles or mechanized equipment for safe operation, or verification that they are safe to operate
- Distractions while operating vehicles or mechanized equipment
- Failure to use safety belts and other safety features

SAFE WORK PRACTICES

- Inspect the vehicle/mechanized equipment before you use it.
- If you find anything wrong with the vehicle or mechanized equipment, don't use it. Immediately follow your company's procedures for taking defective vehicles and mechanized equipment out of service.
- If your view becomes obstructed any time you're operating a vehicle or mechanized equipment, stop what you're doing. Render the vehicle/mechanized equipment safe and find a spotter outside the vehicle with an unobstructed view to help you move it safely with signals.
- Be sure to set the parking brake any time the vehicle or mechanized equipment is stopped or parked for any period.
- Set the parking brake and chock the wheels any time the vehicle or mechanized equipment is stopped on an incline, even if it is only a slight incline.
- Clean the windows and mirrors as needed to ensure that your visibility is as clear as possible.
- Always fasten your safety belt before the vehicle is moved, and make sure that any others in the vehicle have done so as well.

TOPIC: Temporary Heating Devices #33

POTENTIAL HEALTH AND PHYSICAL HAZARDS

- ASPHYXIATION – SUFFOCATION
- FIRES
- EXPLOSIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Work in areas with inadequate ventilation where temporary heating devices are being used
- Placing temporary heating devices close to flammable/combustible materials
- Use of temporary heating devices that are void of the necessary safety features

SAFE WORK PRACTICES

- When using any type of temporary heating device, make sure the work area has an adequate supply of fresh air.
- Before starting a temporary heating device that is fueled by LP Gas, check to be sure that it is equipped with an automatic shut-off device to stop the flow of gas in case the flame goes out.
- Avoid using solid fuel salamanders inside buildings or when working on scaffolds.
- When setting up temporary heating devices, be sure to place them at least 10 feet away from area covers that are flammable or combustible, such as plastic or canvas tarps, and any other flammable or combustible materials.
- Take the time to securely fasten area covers so that they can't displace or knock over temporary heating devices in high winds.
- While you are working, be sure to keep flammable and combustible materials, such as fuels, flammable and combustible chemical substances, wood, trash, etc. at least 10 feet away from temporary heating devices.

TOPIC: Work Lead Set-Up (Electric Arc Welding) #34

POTENTIAL PHYSICAL HAZARDS

- ELECTRIC SHOCK
- ELECTROCUTION

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Work cable not attached directly to the work
- Work cable attached too far away from the welding unit
- Work cable attached to a building column
- Performing welding operations in wet clothing

SAFE WORK PRACTICES

- When setting up to perform electric arc welding, attach your work lead directly to the work itself, and never to a building column, or steel bolt attached to a building column.
- Always attach your work lead as close to the weld as is practical.
- The exception to not connecting your work lead directly to the work itself is when the work is on a conductive work table. When that's the case, it's permissible to connect to the work table, but always as close to the weld as is practical.
- When there is no open pipe close enough to attach your work lead clamp correctly, use a high quality magnetic clamp designed specifically for welding on pipe (See photo above at right).
- If your shirt sleeves, pant legs, or any other parts of your clothing that will be in contact with the work are wet from heavy sweating or any other source, dry them out or change into dry clothing before you start to weld.
- Keep an extra pair of welding gloves with you at all times.
- Any time your welding gloves get wet, remove them immediately and let them dry out while using the spare pair of gloves.
- Always remember to:
    - Limit the connections so that the current will pass through as few connections as possible, and
    - Keep the welding circuit as short as is practical.

TOPIC: Workplace Fires – Fire Extinguishers #35

POTENTIAL HEALTH AND PHYSICAL HAZARDS

- ASPHYXIATION – SUFFOCATION
- BURNS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Hot work in close proximity to flammable or combustible materials and/or chemicals
- Unfamiliarity with fire extinguisher locations on each jobsite
- Unfamiliarity with the types and proper use of nearby fire extinguishers

Letter	Symbol	Type of Material	Examples of Materials
A		Common Combustibles	Wood, Paper, Cloth, etc.
B		Flammable Liquids and Gases	Gasoline, Propane and Solvents
C		Live Electrical Equipment	Computers, Fax Machines, etc.
D	D	Combustible Metals	Magnesium, Lithium, Titanium, Sodium, Aluminum Powder

Multi-Class Fire Extinguishers			
AB			
AC			
BC			
ABC			

SAFE WORK PRACTICES

- Make sure you're familiar with the different types of fire extinguishers and their intended use. (See the charts above.)
- Before starting work at a new jobsite locate the fire extinguishers in your work areas.
- Make sure that the fire extinguishers in your work areas are Class ABC extinguishers, fully charged, and recently inspected (the inspection tags on each extinguisher should show that a maintenance inspection was performed within a one year period).
- Ensure that there is a Class ABC fire extinguisher within 50 feet of any areas where there is more than 5 gallons of a flammable/combustible liquid, and/or 5 pounds of a flammable gas.
- When performing hot work, make sure you have a Class ABC fire extinguisher readily accessible to you.
- If a fire breaks out, warn others in the area and make sure that you or someone else calls 911 or the closest fire department for help.
- If the fire is small **AND** there is no chance of being overcome by smoke inhalation **AND** you can maintain a safe escape route while fighting the fire, use a fire extinguisher to extinguish the fire.
- If the fire starts to get out of your control, evacuate immediately.

TOPIC: Workplace Fires – Proper Fire Extinguisher Use #36

POTENTIAL HEALTH AND PHYSICAL HAZARDS

- ASPHYXIATION – SUFFOCATION
- BURNS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Staying to fight a fire in heavy smoke
- Staying to fight a fire without a guaranteed safe escape route
- Staying to fight a fire that appears to be getting out of control

SAFE WORK PRACTICES

- If a fire breaks out, warn others in the area and make sure that you or someone else calls 911 or the closest fire department for help.
- If the fire is small **AND** there is no chance of being overcome by smoke inhalation **AND** you can maintain a safe escape route while fighting the fire, use a fire extinguisher to extinguish the fire.
- To use the fire extinguisher correctly, start by pulling the pin.
- Get as close to the fire as you safely can.
- Aim the extinguisher nozzle low at the base of the fire.
- Squeeze the handle to start the flow of the extinguishing agent.
- Deliver the extinguishing agent sweeping the extinguisher nozzle from side to side until the fire is out.
- Watch the area carefully for at least 30 minutes to ensure that the fire does not start back up.
- If at any time while fighting the fire it starts to get out of your control, evacuate immediately.

TOPIC: Lighting – Illumination #37

PRIMARY POTENTIAL PHYSICAL HAZARDS

- SLIPS – TRIPS – FALLS
- STRUCK AGAINST OBJECTS
- CUTS – BRUISES – BURNS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Work in poorly lighted mechanical rooms
- Work in areas where light is blocked by ducts or other objects
- Work in confined spaces

SAFE WORK PRACTICES

- Before starting work, always make sure your work areas are lighted well enough for you to perform your work tasks safely.
- If your work area is not well lighted, obtain the lighting you need before getting started.
- If for any reason you can't get the lighting you need, inform your supervisor immediately.
- To measure illumination in foot candles, use a light meter when one is available.
- If a light meter is not available, you can use your phone to get a general idea of the illumination in your work area by downloading a light meter app that measures illumination in foot candles.
- Make sure that you have at least 5 foot candles of illumination in all your general mechanical construction areas.
- Ensure that you have at least 5 foot candles of illumination in tunnels, shafts, and underground work areas as well.
- In mechanical equipment rooms, make sure you have at least 30 foot candles of illumination.

TOPIC: Hand Injuries – Cut Resistant Gloves #38

POTENTIAL PHYSICAL HAZARDS

- CUTS
- ABRASIONS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Working around and/or handling materials with sharp edges, such as the open ends of steel pipe, ducts, pieces of sheet metal, etc.
- Working with and/or around tools with sharp blades
- Working around equipment with sharp edges

SAFE WORK PRACTICES

- Wear cut-resistant gloves when performing mechanical construction work.
- The only exception should be when you are wearing welding gloves while performing welding and cutting operations.
- Choose the type of cut-resistant gloves you'll need by the type of exposure you'll encounter at your next work task.
- Always remember that no class of cut-resistant gloves can completely protect your hands from all types of cut hazards.
- When selecting your cut-resistant gloves, keep in mind that you want to keep as much flexibility, dexterity, and tactile sensation as possible while providing your hands with the level of protection needed for the work task.
- When performing general mechanical construction work, use a set of gloves that provide Class 2 cut-resistance protection.
- When working with sheet metal, use a set of gloves that provides Class 4 cut-resistance protection.
- When using extremely sharp cutting tools, use a set of gloves that provides Class 5 cut-resistance protection.

TOPIC: Tool Tethering

#39

PRIMARY POTENTIAL PHYSICAL HAZARDS

- STRUCK BY FALLING OBJECTS
- HAND & WRIST FATIGUE/PAIN

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Tools dropped from ladders, aerial lifts, scaffolds, leading edges, etc.
- Difficult to open/use tethering connectors

SAFE WORK PRACTICES

- Tether your tools when working where others could walk underneath your overhead work area.
- Become familiar with, and always carefully follow, the manufacturer's instructions regarding safe tether selection and use.
- Be sure to choose tethers that are properly rated for the weight of the tools that they will be supporting.
- When you are not sure about the weight of a tool, take the time to weigh it before selecting your tether.
- When preparing to use a tether, never exceed the manufacturer's rated load capacity/safety factor.
- Make sure the lanyard attachment points are strong enough to safely support the force of the falling tools.
- When working with more than one tether at a time, use retractable tethers to prevent entanglement.
- Whenever practical, anchor the tether to a secure part of the structure.
- When using heavier tools, always anchor the tether to a secure part of the structure.
- Use quick release tethers when using smaller/lighter tools.

TOPIC: Rollover Protective Structures #40

PRIMARY POTENTIAL PHYSICAL HAZARDS

- STRUCK AGAINST
- CAUGHT IN-BETWEEN

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Use of mechanized materials and earth moving equipment without rollover protective structures in place
- Failure to use a safety belt while operating the equipment

SAFE WORK PRACTICES

- Make sure that all the mechanized equipment you use for moving materials, earth, etc., such as rough terrain forklifts, front end loaders, skid steer loaders, etc., are properly equipped with Rollover Protective Structures (ROPS).
- Always inspect the equipment, including the ROPS each time before you use it.
- Ensure that the manufacturer's name and address, the ROPS number, and the make and model or serial number of the equipment that the ROPS is designed for are permanently attached to the ROPS.
- Make sure that the ROPS on the equipment that you'll be using is designed for that piece of equipment.
- If a ROPS is not designed for the equipment you'll be using, don't use it. Inform your supervisor immediately.
- During your inspection, always check to ensure that a safety belt is in place and in good working condition.
- If you observe any problems, or have any concerns about the equipment, don't use it. Inform your supervisor immediately.
- Never remove a ROPS from the equipment unless you have the proper training, and intend to replace it before the equipment will be used again.
- Always wear your safety belt when operating the equipment.

TOPIC: Unobserved Hazards & Signs, Signals, Barricades #41

POTENTIAL PHYSICAL & HEALTH HAZARDS

- SLIPS – TRIPS – FALLS
- STRUCK AGAINST
- STRUCK BY
- EXPOSURE TO TOXIC OR HAZARDOUS SUBSTANCES

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Simultaneously working in the same area with several other trades
- Failure to observe signs, signals and/or barricades in the work areas

SAFE WORK PRACTICES

- Whenever you are working, watch carefully for signs, signals, and barricades that are there to warn you about hazards that may otherwise go unobserved.
- Always obey the signs, signals, and barricades when you see them.
- When you see a *Danger* sign, be instantly aware that the hazard is immediate and/or imminent.
- When you see a *Caution* sign, be aware that it's there to caution you about potential hazards, or against performing unsafe work practices.
- When you see a *Safety Instruction* sign, be aware that it is there to help ensure injury and non-injury incident prevention.
- When you see a *Notice* sign, pay close attention to its instruction.
- When you see *Accident Prevention* tags, be aware that the tool or equipment is defective and should not be used, or that there is a source of uncontrolled energy that could not be locked out.
- When you are installing or erecting a sign, signal, or barricade, make sure that it is clearly visible to those walking or working in the area, and make sure any writing is easily legible.

TOPIC: Emergency Action Plans #42

COMMON INCIDENTS THAT MAY TRIGGER IMPLEMENTATION

- FIRES
- HAZARDOUS CHEMICAL SPILLS
- EXCAVATION/TRENCH CAVE-INS
- CONFINED SPACE INCIDENTS
- SEVERE JOBSITE INJURIES
- TORNADOS – HURRICANES – FLOODS
- TERRORIST ATTACKS

PRIMARY RESPONSIBILITY FOR MECHANICAL CONSTRUCTION WORKERS

- Become familiar with the contents of your company's site-specific emergency action plans before an emergency occurs

SAFE WORK PRACTICES

- Make sure that you have read and understand your company's site-specific emergency action plan. If you have any questions about it, be sure to ask your supervisor.
- If you're working in an industrial process facility or any other established facility, make sure that you are familiar with its emergency action plan.
- Always know who to contact, and how to contact them immediately, if an emergency does occur. There will likely be various contacts depending on the type of emergency.
- No matter where you are working, ensure that you thoroughly understand the emergency evacuation routes and procedures.
- Know the name of the person who is responsible for accounting for all of the structure's occupants, and recognize where to meet up with him.
- Identify where you can quickly access all necessary emergency telephone numbers, and the location of the nearest working landline phone in case you can't get good cell phone reception where you are working.
- Know the address of your location and how to guide emergency response personnel to the site itself, and to the exact location of the emergency once on the site. Identify landmarks in route to the site, and at the site itself to help you guide the response team.
- Use landmarks, such as major road crossings, railroad tracks, water towers, conspicuous buildings, cranes, trailers, easily identified building entrances, etc.

TOPIC: Waste Management Plans #43

MOST COMMON MECHANICAL CONSTRUCTION WASTE MATERIALS

- METALS
- CARDBOARD PACKAGING
- PLASTIC SHEETING – SHRINK WRAP PACKAGING
- CONCRETE PIECES

PRIMARY RESPONSIBILITIES FOR MECHANICAL CONSTRUCTION WORKERS

- Become familiar with the contents of your company's waste management plan
- Become familiar with the facility's waste management plan where applicable

SAFE WORK PRACTICES

- Make sure that you have read and understand your company's waste management plan. If you have any questions about it, be sure to ask your supervisor.
- If you're working in an industrial process facility or any other established facility, make sure that your company's waste management plan is in sync with the facility's plan. If not, work with your supervisor to adjust your waste management practices accordingly.
- Understand the difference between hazardous and non-hazardous waste materials.
- Make sure that you have the proper training before working with any type of hazardous waste material.
- Be sure to store each different type of waste material, such as reusables, recyclables, and landfill bound materials, properly.
- Label all waste containers with clearly visible and legible labels to prevent improper mixing of reusable, recyclable, and/or landfill bound waste materials.
- Ensure that dumpsters, bins, receptacles, etc. are properly covered to prevent scattering of solid waste materials, and runoff of liquid waste.
- Inspect dumpster and recycling bin contents on a regular schedule, and remove materials that are in the incorrect dumpsters/bins.

Toolbox Safety Talks for Mechanical Construction Workers – Volume VI

TOPIC: Helicopter Picks #44

POTENTIAL PHYSICAL HAZARDS

- STRUCK BY
- CAUGHT IN-BETWEEN
- OBJECTS IN EYES
- EXCESSIVE NOISE LEVELS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Hooking the load
- Guiding the load
- Receiving the load
- Unhooking the load

SAFE WORK PRACTICES

- Make sure that you have the proper training before participating in a helicopter pick.
- Carefully and deliberately follow your company's helicopter pick procedures.
- Always wear reasonably snug fitting clothing that won't flap in the down wash.
- Wear a hardhat with chin strap, safety glasses with side shields, and hearing protection.
- Carefully inspect all rigging equipment prior to rigging the pick.
- If any rigging components are worn or damaged, don't use them. Immediately follow your company's procedures for taking defective equipment out of service and replace the damaged equipment before the pick.
- Ensure that you have a safe route of access and egress to and from the pick location.
- Check the work area and access/egress routes for housekeeping issues, and remove any potential slip, trip, and/or fall hazards.
- When working on rooftops, always ensure that an acceptable method of fall prevention or protection is in place.
- Ensure that there is a reliable system of constant communication with the pilot.
- When visibility is poor and it can't be corrected, use a communication system that does not involve signaling.
- Avoid performing initial rigging operations directly under a hovering helicopter.
- Perform only hooking/unhooking of the load while directly beneath a hovering helicopter.
- Use taglines to safely guide each suspended load, but be sure to follow your company's procedures for protecting yourself from static charges. The suspended load may have to be grounded, or you may have to wear specialized non-conductive gloves.

TOPIC: Power Transmission & Distribution #45

POTENTIAL PHYSICAL HAZARDS

- ELECTRICAL SHOCK
- ELECTROCUTION

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Work in close proximity to power transmission and distribution lines and/or equipment, and other energized parts providing electrical service to buildings and facilities

SAFE WORK PRACTICES

- Before starting work in a new area, especially in a mechanical room, evaluate the area looking for power transmission and distribution hazards.
- Locate all energized lines, circuits and equipment, including power communications, cable television, fire alarm circuits, etc.
- Treat all electrical equipment and powerlines as if they are energized.
- Maintain a safe distance from electrical equipment and powerlines at all times.
- Since safe approach distances vary depending on voltage, type of current (AC or DC), and whether there are exposed, energized conductors and/or circuit parts, be sure to check with your supervisor about safe approach distances to the electrical equipment and/or powerlines in your work areas.
- When you need to access a work area and can't do so without violating the safe approach distance, inform your supervisor so that he can get it powered down, tested, and locked out before you start to work in that area.
- If the electrical equipment or powerline can't be powered down, make sure that you get the specialized training and specialized protective equipment necessary to do the work safely in close proximity to the equipment/powerline.
- When preparing to operate mechanized equipment anywhere near powerlines, determine the minimum safe clearance distance, and never exceed it.

TOPIC: Fixed Scaffolds #46

POTENTIAL PHYSICAL HAZARDS

- FALLS FROM ELEVATIONS
- STRUCK BY FALLING OBJECTS
- ELECTRICAL SHOCK

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Setting up fixed scaffolds
- Getting on and off fixed scaffolds
- Working under fixed scaffolds

SAFE WORK PRACTICES

- Before starting work from any fixed scaffold for the first time, take the time to inspect it for obvious inadequacies.
- Check to ensure that the scaffolding system isn't set up too close to overhead powerlines or electrical equipment.
- Make sure that the scaffolding system is set up properly on a firm, level base.
- Look at the work areas on the scaffold to ensure they are properly planked or decked.
- When applicable, be sure that the scaffold's guardrail systems are in place, and properly installed.
- Evaluate the established methods of getting on and off the scaffold. If a method doesn't appear safe, don't use it. Inform your supervisor about it immediately.
- Look closely at the scaffold system's guys and ties to ensure that they are properly installed and in good condition.
- Find out from the designated *Competent Person* for scaffolds what the rated load capacity is for each particular scaffold, and make sure that it is never exceeded.
- Make sure that you are always protected by a fall prevention or protection system while working on fixed scaffolds. If there is no guardrail system in place, be sure to use a fall arrest system or some other acceptable form of fall protection.
- If any part of the fixed scaffold system appears damaged or inadequate, or if you're not sure about it, don't use it. Ask your supervisor about it immediately.

TOPIC: Working Over Water

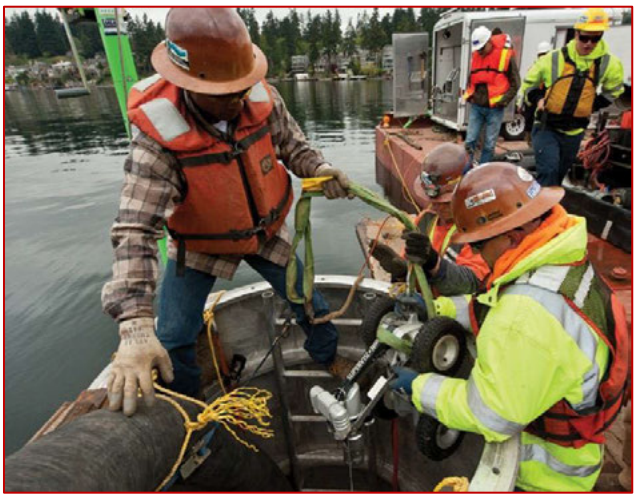
#47

POTENTIAL PHYSICAL HAZARDS

- FALLING
- DROWNING

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Pipe installation over water
- Pipe cleaning over water
- Pipe inspections over water



SAFE WORK PRACTICES

- Before starting to perform work over any body of water, become familiar with the potential hazards and the protective measures you'll need to protect yourself from falling in and drowning.
- When you are working over water where the danger of drowning exists, be sure to wear a U.S. Coast Guard approved life jacket or buoyant work vest.
- Always inspect your life jacket or life vest before and after each use.
- If you identify any defects in the device, don't use it. Immediately follow your company's procedures for taking defective equipment out of service.
- Before you start your work, make sure there are ring buoys readily available in conspicuous locations at least every 200 feet in the affected areas.
- Ensure that each ring buoy is attached to at least 90 feet of line.
- Check to ensure that at least one lifesaving skiff is always available, in good working condition, and easily accessible from any affected work areas.

TOPIC: Extreme Heat on Building Rooftops #48

POTENTIAL HEALTH HAZARDS

- HEAT STROKE
- HEAT EXHAUSTION
- HEAT CRAMPS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Installing heating, ventilation, and air conditioning equipment on building rooftops in the summer months
- Other mechanical construction work on building rooftops during the summer months

SAFE WORK PRACTICES

- Pay attention to the weather forecasts for heat and humidity.
- When extremely hot and/or humid weather is anticipated, plan ahead to protect yourself from overexposure to the heat and/or humidity.
- Start hydrating way ahead of time. Several days ahead is ideal if it's practical.
- Avoid drinking alcohol and other dehydrating beverages while you are in the process of getting super hydrated.
- Plan the work first thing in the morning, or in the late afternoon or early evening.
- Wear clothing that will keep you as cool as possible, but that will also protect you from UV radiation. When it's so hot that you can't wear a long-sleeve shirt, be sure to use sunscreen (at least SPF 15) on all exposed skin.
- Use commercial cooling products, such as hardhat cooling pads and cooling sweat bands, cooling vests, cooling towels, neck shades, etc.
- Stay in the shade as much as possible.
- Shade your work area with a tarp, free standing cover, or something similar whenever it's practical to do so.
- Take frequent breaks in shady, cool locations.
- Stay thoroughly hydrated throughout each workday involving exposure to extreme rooftop heat.

TOPIC: Workplace Violence

#49

POTENTIAL PHYSICAL HAZARDS

- GUN SHOTS – LACERATIONS – STRUCK BY OBJECTS

PRIMARY EXPOSURES FOR MECHANICAL CONSTRUCTION WORKERS

- Performing work at, or near existing facilities where people who are not related to the construction project are present
- Working around severely disgruntled or unstable individuals.

SAFE WORK PRACTICES

- Always be aware of the people around you, and specifically, their actions and statements. If someone appears to be excessively disgruntled, and or makes a statement about carrying out any type of physical threat, never assume that the threat is idle. Stop what you're doing and inform your supervisor immediately.
- Likewise, if someone's actions consistently appear to be those of an unstable individual, inform your supervisor immediately.
- Pay close attention to those who feel they have suffered a personal or professional loss, such as a relationship breakup, having been passed over for a promotion, involvement in a recent out-of-character altercation with a supervisor, etc.
- Keep your cell phone with you so that you can receive warning calls, or call for help if a workplace violence incident occurs.
- If you determine that a workplace violence incident is unfolding, assess the situation, believe everything you see and hear, and determine the best way for you to survive the situation.
- You should either get out of the area, hide or fight, in that order.
- If there is an active shooter and you believe you can get out of the area, move as quickly as you can. Leave your belongings behind and get where the shooter can't see you.
- If you can't run, try to find a good place to hide and call 911. It's best if the hiding place can be locked or barricaded.
- If you're trapped in a location with other victims, spread out to make hitting the targets harder for the shooter.
- Look for objects that you can use as weapons, and quietly develop an action plan. If other willing individuals are present, include them in the action planning.
- If you're cornered, attack the active shooter. The more individuals who are involved in a simultaneous attack, the better your chances of survival.

TOPIC: Recordable Injuries/Illnesses #50

WHAT DOES RECORDABLE MEAN?

- Recordable injuries/illness are work-related injuries/illnesses that meet established criteria, and therefore must be recorded on OSHA injury/illness recordkeeping forms or equivalent forms. Recordable injures/illnesses must also be reported to OSHA electronically.

WHAT ARE THE RECORDKEEPING FORMS?

- OSHA 300 Log – Detailed listing of all work-related injuries/illness in a calendar year
- OSHA 300 A Summary – Summary of all work-related injuries/illness from the 300 log
- OSHA 301 Incident Report Form – Description of each individual injury/illness

WHAT CONSTITUTES A RECORDABLE WORK-RELATED INJURY OR ILLNESS?

- The injury/illness must be work-related.

WHAT CONSTITUTES "WORK RELATED?"

- Injuries/illness are considered work-related if they occurred in the workplace itself (physical location).
- Injuries/illnesses are considered work-related if they occur in another location where the victim was working, or was present as a condition of employment.
- Injuries/illnesses are considered work-related if they are caused by equipment and/or materials used by the victim during the course of work.

TO BE WORK-RELATED

- The injury/illness must have resulted in *death*; or
- The injury/illness must have resulted in *days away from work*; or
- The injury/illness must have resulted in *restricted work*; or
- The injury/illness must have resulted in *transfer to another job*; or
- The injury/illness must have resulted in *medical treatment beyond first aid.*

TOPIC: Your Right to Report Injuries/Illnesses #51

WHAT DOES "REPORT" MEAN?

- To officially inform your employer about your work-related injury or illness

HOW ARE MECHANICAL CONSTRUCTION WORKERS INVOLVED?

- All employers that are affected by OSHA's rule on *Recording and Reporting of Occupational Injuries and Illnesses* are required to involve all their workers in the recordkeeping process.
- You must be informed by your employer about all your rights regarding the reporting of your work-related injuries/illnesses.
- You are expected to report all your work-related injuries/illnesses.

WHAT ARE YOUR RIGHTS AS A MECHANICAL CONSTRUCTION WORKER?

- You have the right to know how to report a work-related injury/illness.
- You have the right to a "reasonable procedure" for reporting your work-related injuries/illnesses.
- You and your representative have the right to access your employer's injury and illness records.
- You have the right to reporting procedures that do not deter or discourage you from accurately reporting your work-related injuries/illnesses.
- You have the right to report your work-related injuries/illnesses without retaliation.
- You have the right to know that your employer may not discharge or discriminate against you in any manner for reporting your work-related injuries/illnesses.

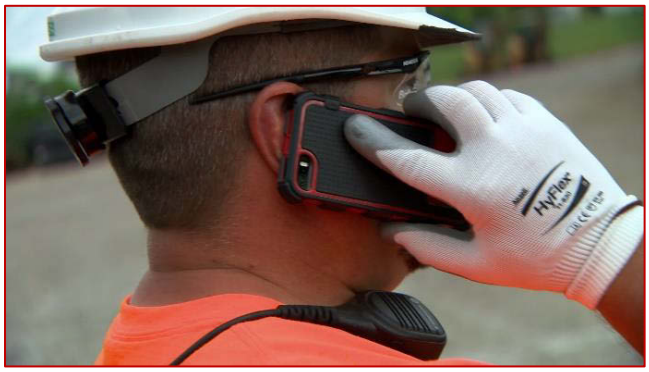
TOPIC: How to Report Injuries/Illnesses #52

WHICH INJURIES/ILLNESSES SHOULD YOU REPORT?

- Report all your work-related injuries/illnesses.
- If you're not sure whether an injury/illness is recordable, report it anyway. Your company's designated person will determine whether it's recordable.

WHO SHOULD YOU CONTACT TO REPORT YOUR INJURIES/ILLNESSES?

- Learn who your company has designated to receive information regarding work-related injuries/illnesses. It may be your foreman, a project manager, or your company's occupational safety and health professional.



WHAT INFORMATION SHOULD YOU REPORT WHEN IT'S APPLICABLE?

- Your name, address, birthdate, and date of hire
- The name, address, and telephone number of the physician or other health care provider who treated you
- Whether you were treated in an emergency room
- Weather you were hospitalized overnight
- The date the injury/illness occurred
- The time you began work the day the injury/illness occurred
- The time the injury/illness occurred
- What you were doing just before the injury/illness occurred
- A detailed description of what happened
- A detailed description of the injury/illness itself
- The type of object or substance that directly harmed you

Chapter 3: ACCIDENT INVESTIGATION

INTRODUCTION/OVERVIEW

The sole purpose of an accident investigation is to identify casual factors that directly or indirectly were responsible for the incident in question. This accident procedure is applicable to all personnel employed by the Company, regardless of the location of the jobsite.

EMPLOYEE TRAINING PROGRAM SUMMARY

The President will appoint the individuals responsible for completing accident investigations and submitting it to the Executive Leadership Team.

The responsibility of the Foreman or Service Technician is to follow the reporting protocol and communicate injuries/accidents as soon as practical to an individual listed on the "Incident Manager Call Tree" (See chapter 12). Even though others will be completing the written investigation, the Foreman or Service Technician will be an integral part of the process.

General Guidelines

If you are working at a remote location, there is a possibility the site foremen or site service technician may be required to complete a written investigation. If this is the case, you will be notified by your manager to complete the form. In those situations, the following general guidelines should be followed.

1. Investigate any injury or illness, that is either work-related, or one which the employee claims is work-related, and requires medical treatment other than first aid.

2. Begin the accident/illness investigations as soon as proper medical treatment for the injured has been secured. The affected employee's immediate supervisor/foreman shall facilitate in the completion of the investigation. The President will appoint the group of managers, or single manager, which is responsible for submitting accident investigations to the Executive Leadership Team.

3. Complete these investigation reports on the same shift the incident occurs. If it is not possible to complete the report on the same shift, it shall be completed as soon as practical.

Procedure

Follow these steps when conducting any investigation concerning work- related injuries or illnesses.

ACCIDENT/ILLNESS INVESTIGATION

1. Do not disturb the accident site until an adequate review has been conducted.

2. Interview any witnesses or potential witnesses.

3. Consider all aspects of accident/illness. In many cases accidents have multiple causes.

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

1. If you have questions, contact an individual listed on the "Incident Manager Call Tree" (See chapter 12).

2. Complete the Supervisor's Accident Investigation Report form. Remember the purpose of any accident/illness investigation is to prevent future accidents and not to affix blame. Avoid the use of such phrases as Employee's Carelessness or Be More Safety Conscious in the report. Statements like these do not really explain what happened and generally do not help determine the cause(s) of the incident. If more space is needed to properly explain any aspect of the investigation, write See Attached Sheets in the appropriate space on the form and continue the description/explanation on blank sheets of paper. The purpose of the report is to clearly explain what happened and to outline what, if any, corrective steps have been taken to avoid any reoccurrence.

3. Forward a copy of the Supervisor's Accident Investigation Report form to your immediate supervisor.

4. The Executive Leadership Team will file the completed investigation reports in either the employee's personnel file or in a master file separate from the OSHA 300 Log.

   A sample form is illustrated at the end of this chapter and a report template is available on the AMC network.

ALEXANDER MECHANICAL ACCIDENT/INCIDENT INVESTIGATION FORM

Date:			
Employee Name (Last, First MI)		Social Security Number	
Job Title		Age	Sex
Address	City	State	Zip Code
Project Name			
Address	City	State	Zip Code
Closest Intersection or Landmark			

Yes	No	Accident/Incident occurred inside structure	Yes	No	Accident/Incident occurred outside

Site conditions including weather (if applicable)		
Other conditions affecting Accident/Incident (if applicable)		
Date and Time Accident/Incident Occurred:	Time Accident/Incident was Reported:	Time Injured Worker Started Work:
Foreman's Name and Telephone Number:		
Describe the task being performed prior to accident/incident		
Describe the task being performed during the accident/incident		
Describe how the accident/incident occurred		
Describe how the injury occurred (if applicable)		

Nature of Injury, if applicable					
	Abrasion		Crush Injury		Hearing Loss
	Amputation		Cut		Heat Stress
	Asphyxiation		Dermatitis		Multiple Injury
	Bruise		Dislocation		Poisoning
	Burn (chemical)		Dust Diseases		Puncture
	Burn (heat)		Electric Shock		Sprain/Strain
	Cold stress		Fracture		Swelling
	Concussion		Other		
Part of Body Injured, if applicable					
	Abdomen		Eye		Knee
	Ankle		Face		Leg
	Arm		Finger		Multiple Parts
	Back		Foot		Neck
	Chest		Hand		Shoulder
	Ear		Head		Toe
	Elbow		Hips		Wrist
Incident Type, if applicable					
	Body Reaction		Fall on Same Level		Slips/Trips
	Caught In/Under/Between		Friction		Struck By
	Chemical Contact		Lifting		Struck Against
	Electrical Contact		Overexertion		Vehicle Accident
	Fall from Elevation		Property Damage		

Underlying Causes			
Unsafe Acts		*Unsafe Conditions*	
	Alcohol		Extreme Temperature Exposure
	Failure to follow safe work practices		Hazardous Environment
	Failure to use material handling equipment		Inadequate Maintenance
	Horseplay		Lack of Supervision
	Illegal Drugs		Limited Training/Lack of Experience
	Improper Lifting Technique		Missing Guards or Barriers
	Improperly Serviced Energized Equipment		Weather Conditions
	Operated Without Authorization		Poor Housekeeping
	Poor/Incorrect Work Technique		Poor Lighting
	Prescription Drugs		Protective Equipment Not Available
	Protective Equipment Not Used		Slippery Conditions
	Removed Safety Guards or Devices		Other
	Unsafe Equipment		
	Used Equipment/Tools in Unsafe Manner		
Personal Factors			
	Not Physically Fit or Suited to the Task		Lack of Knowledge
	Extreme Fatigue		Other
	Improper Motivation/Attitude		

Job Factors			
Tools and Equipment		*Standards*	
	Improper Adjustment/Repair/Maintenance		Inadequate Maintenance of Standards/Policies
	Improper extension of Service Life		Lack of Development of Standards/Policies
	Improper Substitution		Poor Communication of Standards
	Improper Use		Standards/Procedures/Rules Not Followed
	Inadequate Inspection and/or Monitoring		
	Poor Assessment of Needs and Risks		
	Poor Maintenance		
	Removal and Replacement of Unsuitable PPE		
	Tool or Equipment in disrepair		
	Tool or Equipment Unavailable		
Maintenance			
	Improper or Inadequate Adjustment		Poor Communication of Maintenance Requirements
	Improper Substitution of Parts		Other
	Inadequate Maintenance		

MEDICAL TREATMENT DATA (if applicable)			
Was the employee taken to a hospital or clinic?	Yes	No	Treatment Date
Name of Hospital or Clinic			Phone Number
Address			
Name of Healthcare Provider			Phone Number
Address			
Are there any work restrictions	Yes	No	
If yes, please describe what they are , why they were issued and the anticipated duration of the restrictions			

CORRECTIVE ACTION TO PREVENT RECURRENCE	
What corrective action will be taken immediately?	
What long-term corrective action will be taken to prevent recurrence?	
Signature of Employee	Date
Signature of Supervisor	Date

WITNESS REPORT		
Witness Name (First Last)		
Name of Injured Employee (if applicable)		
Describe the task being performed at the time of the accident/incident:		
Base on your observations, how did the accident/incident occur?		
Where did the accident/incident occur? (be specific)		
Were all safety rules being followed?	Yes	No
Were all required Personal Protection Equipment being used?	Yes	No
Were all required Safety Devices and Protective Systems being used or implemented?	Yes	No
If you answered NO to any of the above questions, please describe:		

Chapter 4: OSHA INSPECTION GUIDELINES

NOTIFICATION OF INSPECTION

As soon as you become aware that an OSHA inspection may be occurring on your jobsite, **notify your Safety Manager immediately.** If your Safety Manager cannot be reached, follow the instructions given in Chapter 12, "Incident Manager Call Tree". This call tree gives the names and phone numbers of the designated managers. These managers are considered the Company's "Designated Representative" during an OSHA inspection.

STEPS TO FOLLOW

1. Request to see the officer's credentials

2. *Ask the inspector to wait to start the inspection until the*
3. *Company's Designated Representative can be notified*

4. Request permission to inform the client, other contractors, subcontractors, and the main office that an inspection is underway at the jobsite.

PRE-INSPECTION

Before starting the inspection, the Compliance Officer (Inspector) will explain the nature and general scope of the inspection as well as outline the records he wants to review and the employees he wishes to question. Be polite, respectful, and cooperative. Also, be aware of and uphold the Company's right to a fair inspection.

Typically, OSHA will wait a "reasonable amount of time" (usually 1 hour) until the Designated Company Representative arrives. If you are working at a remote location, or if the Compliance Officer refuses to wait, there is the possibility that the site foremen or site service technician may be required to represent the Company during the inspection.

BASIC STEPS TO FOLLOW

1. Ask if this is a regularly scheduled inspection or one prompted by an employee complaint.

2. If the inspection is the result of an employee complaint, ask to be given a copy of the complaint.

3. Determine if the party filing the complaint requested that his name be withheld. If no such request was made, the inspector is allowed to disclose the name of the complainant. If the investigation involves a complaint the Compliance Officer generally may only inspect and interview concerning matters reasonably related to the complaint.

4. Determine if the complaint was filed by a present or past employee, by an employee or a customer, subcontractor, or material supplier, or by a person not directly employed around the workplace. The answers to these questions may be extremely important. In most cases, and inspection can be disallowed if the complaint was filed by someone other than a present employee or his representative, unless the complaint involves an imminent danger.

5. Ask the Compliance Officer if they will perform a "focused inspection". OSHA will conduct a focused inspection if they have determined that the "controlling employer", usually the general contractor, has an effective safety program and a competent person to implement the program. In a "focused inspection", the Compliance Officer will focus on four types of hazards:

    - Fall Hazards
    - Electrical Hazards
    - Struck by Hazards
    - Caught-in-Between Hazards

6. If none of these hazards are found, or if only non-serious hazards are found, but abated immediately, no citations will be issued, and the Compliance Officer will leave the site immediately.

7. In the event that the Compliance Officer is seeking to inspect without probable cause[1] or to make an unreasonable inspection of the jobsite, management may consider requesting that a search warrant be obtained. After a preliminary investigation, if you believe that a request is unreasonable, immediately communicate your concerns to an individual listed on the "Incident Manager Call Tree" (Chapter 12).

WALK-THROUGH INSPECTION

RIGHT TO ACCOMPANY THE OFFICER

The employer has the right to accompany the Compliance Officer during the inspection. This is a very important right. If it is not possible to have a Safety Manager or other management representative on site, you may be the only spokesman for the Company during the inspection and the eyes and ears of management for any contest proceedings later.

[1]**Probable cause** for an inspection exists if the employer has been selected for an inspection by a neutral process (a programmed inspection), if an accident has occurred, if an employee complaint has been filed, or if an Inspector has witnessed a violation from outside the premises. In all these situations (other than a programmed inspection), probable cause to inspect exists only to the extent and scope required to investigate the accident, complaint, or violation at issue. You may want to resist efforts to expand an inspection beyond the circumstances for which there is probable cause by requesting a search warrant.

When performing the walk-through inspection, be aware that any admission to an alleged violation of the OSHA Act can be used against us. Keep your answers short, professional and to the point. Do not engage in informal conversation with the Compliance Officer.

DOCUMENTATION

Remember to take notes. It is imperative that you take as complete a set of notes as possible, identifying areas visited, equipment and material examined, employees interviewed and a written description of each alleged hazard. There is nothing wrong with taking notes during the investigation.

The OSHA statute give the Compliance Officer authority to interview employees, privately if he wishes, and to examine machinery or equipment. The Compliance Officer is also permitted to take photographs, use a video camera, take samples, and to use other reasonable information gathering techniques. You should take pictures and samples as you accompany the Compliance Officer so as to have a record of the proceedings, which duplicates the officers as closely as possible.

POST INSPECTION

POST INSPECTION CONFERENCE

After the Compliance Officer completes the inspection, a closing conference is conducted with the employer's representative. The inspector is to **informally** advise the employer of any apparent violation.

This closing conference is important. Any admission to an alleged violation of the OSHA Act can be used against us. **Do NOT express any opinion regarding the alleged violation during the closing conference.**

CITATION

RECEIPT OF THE CITATION

Should the Company be cited, it will receive a Safety Order by mail along with a cover letter outlining the posting requirements. If the Safety Order is sent to the jobsite, forward it **immediately** to an individual listed on the "Incident Manager Call Tree" (Chapter 12)

CONTESTING A CITATION

From the day the Safety Order is received at the jobsite or the office, the Company has fifteen (15) working days in which to contest. Therefore, this is a time sensitive process.

Chapter 5: ASBESTOS

INTRODUCTION/OVERVIEW

When the Company's scope of work involves asbestos abatement, a properly trained or certified contractor must conduct this asbestos abatement. This chapter summarizes the basic requirements of OSHA Standard 1926.58.

DEFINITION/DESCRIPTION

Asbestos is a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Depending on the chemical composition, fibers may range in texture from coarse to silky.

Asbestos fibers are carried into the body as airborne particles. The fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's alveoli (air sacs), they cannot be removed. Years of exposure to asbestos has caused a number of disabling and fatal diseases. Among these diseases are asbestosis, an emphysema-like condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer, caused by ingesting asbestos-contaminated food.

For the purposes of OSHA Standard 1926.58, asbestos includes chrysolite, amosite, crocidolite, tremolite, anthophyllite and actinolite.

DETERMINATION OF ASBESTOS/NON-ASBESTOS - SAMPLING PROCEDURE

Any insulation of unknown composition must be handled as if it were asbestos until it has been tested to confirm that it is not asbestos.

All suspect insulation must be evaluated to determine whether asbestos is present. The inspection must be performed by a person certified by the State as an ***Asbestos Hazard Evaluation Specialist***. This person is responsible for obtaining the samples necessary to make a determination of whether or not asbestos is present.

The sample is not to be taken when other persons are in the immediate area unless they are also wearing personal protective equipment.

The personal protective equipment required includes:

- A half mask respirator with HEPA cartridges - minimum respiratory protection required.
- Tyvek coveralls and gloves.
- After the sample is taken, the sample area needs to be covered with Mastic or Duct Tape, depending on the surfaces to be covered.

EXPOSURE LIMITS

The Permissible Exposure Limit (PEL) for airborne asbestos is 0.1 fibers per cubic centimeter (0.1 f/cc) as an 8-hour, time weighted average (TWA).

The Excursion Limit (Short Term Limit) for airborne asbestos is 1.0 fiber per cubic centimeter as an average during a 30-minute period of time.

The Action Level for airborne asbestos is 0.1 fibers per cubic centimeter based on an 8- hour, time-weighted average. This is the level of exposure, which triggers the monitoring, medical and training requirements of OSHA Standard 1926.58.

MONITORING -OSHA Standard 1926.58 (F)

Employers who have a workplace or work operation covered by this Standard must perform initial monitoring to determine the airborne concentrations of asbestos to which employees may be exposed.

If employers can demonstrate through test results that employee exposures are below the Action Level, then monitoring is not required.

Within all regulated areas, the employer must conduct daily monitoring unless all workers are equipped with supplied air respirators (positive pressure).

If daily monitoring within the regulated area indicates, by reliable measurements, that employee exposures are below the Action Level, then no further monitoring is required for those employees whose exposures, as determined by such monitoring, are below this Action Level.

REGULATED AREA -OSHA Standard 1926.58

The employer must establish a Regulated Area wherever the concentrations of asbestos exceed the PEL. Only authorized personnel may enter regulated areas.

All persons entering a regulated area must be supplied with a respirator. No smoking, eating, drinking or applying cosmetics is permitted in a regulated area.

Warning signs must be posted at all approaches to regulated areas. These signs must include the following information:

DANGER - ASBESTOS

CANCER AND LUNG DISEASE HAZARD *AUTHORIZED PERSONNEL ONLY* RESPIRATORS AND

PROTECTIVECLOTHING ARE REQUIRED IN THIS AREA

Warning labels must be affixed to all asbestos products and containers, including waste containers. The label must include the following information:

DANGER CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD

Whenever feasible, the employer should establish negative-pressure enclosures before beginning asbestos removal, demolition, and renovation.

CONTROL METHODS – OSHA Standard 1926.58(G)

To the extent possible, engineering and work practice controls must be used to reduce employee exposure to within the PEL. The employer and employee must implement one or any combination of the following control methods to be in compliance with this OSHA Standard.

- Local exhaust ventilation equipped with high efficiency particulate (HEPA) filter dust collection system.
- Asbestos vacuum cleaners equipped with HEPA filters.
- Enclosures or isolation of asbestos dust-producing processes.
- Use of wet methods, wetting agents, or removal encapsulants during asbestos handling, mixing, removal, cutting,application, and clean-up.
- Prompt disposal of asbestos-containing wastes in lock-tight containers.

Chapter 6: BLOODBORNE PATHOGENS

INTRODUCTION/OVERVIEW

One of the major goals of the Occupational Safety and health Administration (OSHA) and our company is to promote safe work practices in an effort to minimize the incidence of illness and injury experienced by employees.

To this end, OSHA has enacted the Bloodborne Pathogens Standard, codified as 29 CFR 1910.1030. The purpose of the Bloodborne Pathogens Standard is to "reduce occupational exposure to Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and other bloodborne pathogens" that employees may encounter in their workplace. In the event that our employees are working in an environment where they may be exposed to Bloodborne Pathogens, the following procedures will be implemented.

EXPOSURE CONTROL PLAN

Our Exposure Control Plan has been established to comply with both the letter and intent of the OSHA Bloodborne Pathogens Standard. The objective of this plan is twofold:

- To protect our employees from the health hazards associated with bloodborne pathogens.
- To provide appropriate treatment and counseling should an employee become exposed to bloodborne pathogens.

Our Exposure Control Plan can be reviewed by our employees at any time. Employees are informed of this right of ready access to the plan during education/training sessions. The major components of our Exposure Control Plan are summarized below.

EXPOSURE CONTROL PLAN - MANAGEMENT

There are three major categories of responsibility that are central to the effective implementation of the Exposure Control Plan. These are:

- Operations Manager
- Supervisors.
- Or Employees MANAGER

The Operations Manager will be responsible for overall management and support of the Company's Bloodborne Pathogens Compliance Program as well as for providing information and training to all employees who have the potential for exposure to bloodborne pathogens. Activities that are delegated to the Manager typically include, but are not limited to:

1. Overall responsibility for implementing the Exposure Control Plan.

2. Working with management and other employees to develop and administer any additional bloodborne-pathogens-related policies and practices needed to support the effective implementation of this plan.

3. Looking for ways to improve the Exposure Control Plan, as well as to revise and update the plan when necessary.

4. Collecting and maintaining a suitable reference library on the Bloodborne Pathogens Standard and bloodborne pathogens safety and health information.

5. Knowing current legal requirements concerning bloodborne pathogens.

6. Acting as company liaison during OSHA inspections

7. Conducting periodic audits of company jobsites to maintain an up-to-date Exposure Control Plan.

8. Maintaining an up-to-date list of facility personnel requiring training (in conjunction with facility management).

9. Developing suitable education/training programs.

10. Scheduling periodic training seminars for employees.

11. Maintaining appropriate training documentation such as Sign- in Sheets, Quizzes, etc.

12. Periodically reviewing the training programs with the Exposure Control Officer, Department Managers and Supervisors to ensure that new information is added when appropriate.

SUPERVISORS

Supervisors are responsible for exposure control in their respective areas. They work directly with the Operations Manager and our employees to ensure that proper exposure control procedures are followed.

EMPLOYEES

As with all Company activities, our employees have the most important role in our bloodborne pathogens compliance program, because the ultimate execution of much of our Exposure Control Plan rests in their hands. In this role they must do things such as:

- Know what tasks they perform that have occupational exposure.
- Attend the bloodborne pathogens training sessions.
- Plan and conduct all operations in accordance with our work practice controls.
- Develop good personal hygiene habits.

EXPOSURE DETERMINATION

One of the keys to implementing a successful Exposure Control Plan is to identify exposure situations employees may encounter. In order to facilitate the identification of these conditions, we have prepared the following lists.

- Job classifications in which ***all*** employees have occupational exposure to blood borne pathogens.
- Job classifications in which ***some*** employees have occupational exposure to bloodborne pathogens.
- Tasks and procedures in which occupational exposure to bloodborne pathogens occur. (These tasks and procedures are performed by employees in the job classifications shown on the two previous lists.)

  The Operations Manager will work with supervisors to revise and update these lists as tasks, procedures, and classifications change.

EXPOSURE CONTROL PLAN - TYPES OF CONTROL

There are a number of areas that must be addressed in order to effectively eliminate or minimize exposure to bloodborne pathogens. By rigorously following the requirements of OSHA's Bloodborne Pathogens Standard in the following five areas, our employees' occupational exposure to bloodborne pathogens will be eliminated or minimized as much as is possible. Each of these areas is reviewed with our employees during their bloodborne pathogens related training.

UNIVERSAL PRECAUTIONS

Treat all human blood and body fluids such as semen and vaginal secretions as if they are known to be infectious for HBV, HIV and other bloodborne pathogens.

When it is difficult or impossible to differentiate between body fluid types, assume all body fluids to be potentially infectious.

The Operations Manager is responsible for overseeing the Universal Precautions aspect of this Plan.

ENGINEERING CONTROLS

The use of Engineering Controls to eliminate or minimize employee exposure to bloodborne pathogens is a key aspect of the Plan. Employees use cleaning, maintenance and other equipment that is designed to prevent contact with blood or other potentially infectious materials.

The Operations Manager periodically works with supervisors to identify the tasks and procedures performed on company premises where engineering controls can be implemented or updated.

The following Engineering Controls are to be made available wherever a risk of exposure to bloodborne pathogens exists:

- Hand washing facilities (or antiseptic hand cleansers and towels or antiseptic towelettes).

- Secondary containers, which are leak-proof, color-coded or labeled with a biohazard warning label, and puncture-resistant, if necessary.

WORK PRACTICE CONTROLS

The following Work Practice Controls are to be implemented and monitored wherever a risk of exposure to bloodborne pathogens exists:

1. Employees must wash their hands immediately, or as soon as feasible, after removal of potentially contaminated gloves or other personal protective equipment.

2. Employees must wash their hands, and any other exposed skin, with soap and water as soon as possible after any contact of body areas with blood or any other infectious materials. They also must flush exposed mucous membranes with water.

3. Eating, drinking, smoking, applying cosmetics or lip balm and handling contact lenses is prohibited in work areas where there is potential for exposure to bloodborne

pathogens.

4. All procedures involving blood or other infectious materials should be performed carefully so as to minimize splashing, spraying, or other actions generating droplets of these materials.

5. Specimens of blood or other materials are to be placed in designated, appropriately labeled, leak-proof containers for handling and storage.

6. All procedures involving blood or other infectious materials should be performed carefully so as to minimize splashing, spraying, or other actions generating droplets of these materials.

7. Specimens of blood or other materials are to be placed in designated, appropriately labeled, leak-proof containers for handling and storage.

8. If outside contamination of a primary specimen container occurs, that container is to be placed within a second, appropriately labeled, leak-proof container for handling and storage. (If the specimen can puncture the primary container, the secondary container must be puncture resistant as well.)

9. Equipment which becomes contaminated is to be examined prior to servicing or shipping and decontaminated as necessary, unless it can be demonstrated that decontamination is not feasible.

10. An appropriate biohazard warning label is to be attached to any contaminated equipment, identifying the contaminated sections.

11. Information regarding the remaining contamination is to be conveyed to all affected employees, the equipment manufacturer, and the equipment service representative prior to handling, servicing or shipping.

12. All procedures involving blood or other infectious materials should be performed carefully so as to minimize splashing, spraying, or other actions generating droplets of these materials.

13. Specimens of blood or other materials are to be placed in designated, appropriately labeled, leak-proof containers for handling and storage.

14. If outside contamination of a primary specimen container occurs, that container is to be placed within a second, appropriately labeled, leak-proof container for handling and storage. (If the specimen can puncture the primary container, the secondary container must be puncture resistant as well.)

15. Equipment which becomes contaminated is to be examined prior to servicing or shipping and decontaminated as necessary, unless it can be demonstrated that decontamination is not feasible.

16. An appropriate biohazard warning label is to be attached to any contaminated equipment, identifying the contaminated sections.

17. Information regarding the remaining contamination is to be conveyed to all affected employees, the equipment manufacturer, and the equipment service representative prior to handling, servicing or shipping.

When a new employee is hired, or an employee changes jobs within the Company, the following process takes place to ensure that they are trained in the appropriate work practice controls:

1. The employee's job classification and the tasks and procedures that they will perform are checked against the Job Classifications and Task Lists to determine if the employee falls in a category where occupational exposure occurs.

2. If the employee is transferring from one position to another within the Company, the job classifications and tasks/procedures pertaining to the previous position are also checked against these lists.

3. Based on this crosschecking, the new job classifications and/or tasks and procedures which will bring the employee into occupational exposure situations are identified.

4. The employee is then trained by the Branch Manager or another instructor regarding any work practice controls that the employee is not experienced with.

Personal Protective Equipment (PPE) is an employee's last line of defense against bloodborne pathogens. The Company provides, at no cost to employees, the Personal Protective Equipment that they need to protect themselves against such exposure. This equipment includes, but is not limited to:

- Gloves.
- Safety glasses.
- Goggles.
- Face shields/masks.
- Respirators.

The Operations Manager, working with project managers and supervisors, is responsible for ensuring that all departments and work areas make available to employees the appropriate personal protective equipment.

All employees receive training in the use of the appropriate personal equipment for their job classifications and the tasks/procedures they perform. Initial training about personal protective equipment is given at hire. Additional training is provided, when necessary, if an employee takes a new position or takes on additional job functions within the scope of their current position.

To determine whether additional training is needed, the employee's previous job classification and tasks are compared to those for any new job or function that they undertake. Any needed training is provided by their supervisor working together with the Branch Manager.

To ensure that personal protective equipment is not contaminated and is in the appropriate condition to protect employees from potential exposure:

- All personal protective equipment is inspected prior to being used and replaced as needed to maintain its effectiveness.
- Single-use, personal protective equipment (or equipment that cannot, for whatever reason, be decontaminated) is disposed of by forwarding that equipment to appropriate environmental services.
- Any garments penetrated by blood or other infectious materials are removed immediately, or as soon as feasible.
- All potentially contaminated personal protective equipment is removed prior to leaving a work area.
- Gloves are worn whenever employees anticipate hand contact with potentially infectious materials or when handling or touching contaminated items or surfaces.
- Disposable gloves are replaced as soon as practical after contamination or if they are torn, punctured or otherwise lose their ability to function as an exposure barrier.
- Utility gloves are decontaminated for reuse unless they are cracked, peeling, torn, or exhibit other signs of deterioration, at which time they are disposed of.
- Masks and eye protection (such as goggles, face shields, etc.) are used whenever splashes or sprays may generate droplets of infectious materials.
- Protective clothing (such Tyvek Coveralls) is worn whenever potential exposure to the body is anticipated.

HOUSEKEEPING

Maintaining a jobsite in a clean and sanitary condition is an important part of our Exposure

Control Plan. It is essential to clearly designate the areas to be cleaned and/or decontaminated, to set the times when this cleaning is to be performed, and to specify the cleansers and disinfectants to be used.

The janitorial/cleaning staff plays an important role by following these practices.

1. All equipment and surfaces are cleaned and decontaminated with approved cleansers and disinfectants after contact with blood or other potentially infectious materials; i.e., after any spill of blood or infectious materials and at the end of the work shift if the surface may have been contaminated during that shift.

2. Protective coverings, such as plastic trash bags or wrap, aluminum foil or absorbent paper, are removed and replaced as soon as feasible when overtly contaminated and at the end of the work shift if they may have been contaminated during the shift.

3. All trash containers, pails, bins, and other receptacles intended for use are routinely inspected and cleaned and are decontaminated as soon as possible when they have been visibly contaminated.

4. Potentially contaminated broken glassware is picked up using mechanical means (such as dustpan and brush, tongs, forceps, etc.).

On-site management is responsible for establishing the cleaning and decontamination schedule and making sure it is carried out.

Regulated waste (such as used bandages, feminine hygiene products and other potentially infectious materials) is handled as outlined below.

- Discarded or bagged in containers that are closeable (minimum requirement) and leak-proof if the potential for a fluid spill or leakage exists.
- Waste containers are kept upright, routinely replaced, and not allowed to overfill.

VACCINATION PROGRAM

To provide as much protection as possible against the possibility of Hepatitis B infection, the Company has implemented a vaccination program. This program is available, at no cost, to all employees who have occupational exposure to bloodborne pathogens.

The vaccination program consists of a series of three inoculations over a six-month period. As part of their bloodborne pathogens training, our employees have received information regarding Hepatitis vaccination, including its safety and effectiveness.

The Branch Manager is responsible for setting up and operating our vaccination program.

Vaccinations are performed under the supervision of a licensed physician or other healthcare professionals.

To ensure that all employees are aware of our vaccination program, it is thoroughly discussed in our bloodborne pathogens training. We also have posted ***Vaccination Program Notices*** in prominent places.

EXPOSURE INVESTIGATION

Should an employee be involved in an incident where exposure to bloodborne pathogens may have occurred, make sure that the employee receives medical consultation and treatment (as required) as expeditiously as possible.

The Branch Manager and supervisor are to investigate every exposure incident that occurs on company premises. This investigation is initiated within 24 hours after the incident occurs and involves gathering the following information:

1. The date and time of the incident.

2. The precise location of the incident.

3. The type of materials (blood, etc.) that were involved in the incident.

4. The source of the material.

5. The type of work that was being performed at the time of the incident.

6. How the incident was caused. Was it an accident? Was it the result of unusual circumstances such as equipment malfunction, power outage, etc.?

7. What type of personal protective equipment was being used at the time of the incident?

8. What actions have been taken as a result of the incident? Employee decontamination? Clean-up? Notification of appropriate authorities?

After this information is gathered and evaluated, a written summary of the incident and its causes is prepared, and recommendations are made for avoiding similar incidents in the future.

POST-EXPOSURE EVALUATION AND FOLLOW-UP

In order to ensure that our employees receive the best and most timely treatment should an

exposure to bloodborne pathogens occur, the Company has established a comprehensive post-exposure evaluation and follow-up process.

We recognize that much of the information involved in this process must remain confidential, and we will do everything possible to protect the privacy of the people involved.

As the first step in this process, we provide an exposed employee with the following confidential information:

- Documentation regarding the routes of exposure and circumstances under which the exposure incident occurred.
- Identification of the source individual (unless not feasible or prohibited by law).

Next, if possible, we test the source individual's blood to determine HBV and HIV infectivity. This information will also be made available to the exposed employee, if it is obtained. At that time, the employee will be made aware of any applicable laws and regulations concerning disclosure of the identity and infectious status of a source individual.

Finally, we collect and test the blood of the exposed employee for HBV and HIV status.

Once these procedures have been completed, an appointment is arranged for the exposed employee with a qualified healthcare professional to discuss the employee's medical status. This includes an evaluation of any reported illnesses, as well as any recommended treatment.

To assist the healthcare professional, we forward a number of documents to them, including the following:

1. A copy of the Bloodborne Pathogens Standard.
2. A description of the exposure incident.
3. The exposed employee's relevant medical records.
4. Other pertinent information.

Healthcare Professional's Written Opinion

After the consultation, the healthcare professional provides our company with a written opinion evaluating the exposed employee's situation. We, in turn, furnish a copy of this opinion to the exposed employee.

In keeping with this process' emphasis on confidentiality, the written opinion will contain only the following information:

- Whether Hepatitis B Vaccination is indicated for the employee.
- Whether the employee has received the Hepatitis B Vaccination.
- Confirmation that the employee has been informed of the results of the evaluation.
- Confirmation that the employee has been told about any medical conditions resulting from the exposure incident which require further evaluation or treatment.

All other findings or diagnoses will remain confidential and will not be included in the written report.

Medical Record Keeping

To ensure that we can make available as much medical information as possible to the participating healthcare professional, our company maintains comprehensive medical records on our employees. The Branch Manager is responsible for setting up and maintaining these records, which include the following information:

1. Name of employee.
2. Social security number of the employee.
3. A copy of the employee's Hepatitis B Vaccination status, including the dates of any vaccinations and any medical records related to the employee's ability to receive a vaccination.
4. Copies of examination results, medical testing and other follow-up procedures which took place as a result of an employee's exposure to bloodborne pathogens.
5. A copy of the information provided to the consulting healthcare professional as a result of any exposure to bloodborne pathogens.

As with all information in these areas, it is important to keep the information in these medical records confidential. The Company will not disclose or report this information to anyone without our employee's written consent (except as required by law).

Information And Training

Having well informed and educated employees is extremely important when attempting to eliminate or minimize our employees' exposure to bloodborne pathogens. Consequently, all

employees who have the potential for exposure to bloodborne pathogens undergo a comprehensive training program and are furnished with as much information as possible on this issue.

Employees will be retrained at least annually to keep their knowledge current. Additionally, all new employees, as well as employees who change jobs or job functions, will be given any additional training their new position requires at the time of their new job assignment.

The Operations Manager is responsible for seeing that all employees who might be exposed to bloodborne pathogens receive this training.

TRAINING TOPICS

The topics covered in our training include, but are not limited to, the following:

1. The Bloodborne Pathogens Standard.
2. The epidemiology and symptoms of bloodborne diseases.
3. The modes of transmission of bloodborne pathogens.
4. The Company's Exposure Control Plan (and where employees can obtain a copy.)
5. Appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials.
6. A review of the use and limitations of methods that will prevent or reduce exposure including Engineering Controls, Work Practice Controls and Personal Protective Equipment.
7. Selection and use of personal protective equipment including:

    a. Types available.
    b. Proper use.
    c. Location.
    d. Removal.
    e. Handling.
    f. Decontamination.
    g. Disposal.

8. Visual warnings of biohazards including labels, signs, and color- coded containers.

9. Information on the Hepatitis B Vaccine, including its:

    a. Efficacy.
    b. Safety.
    c. Method of administration.

d. Benefits of vaccination.
e. The Company's free vaccination program.

10. Actions to take and persons to contact in an emergency involving blood or other potentially infectious materials.

11. The procedures to follow if an exposure incident occurs, including incident reporting.

12. Information on the post-exposure evaluation and follow-up, including Company provided medical consultation.

TRAINING METHODS

Our Company's training presentations make use of several training techniques including, but not limited to, those listed below. Also, because we feel that employees need the opportunity to ask questions and interact with their instructors, time is specifically allocated for these activities in each training session.

- Classroom-type atmosphere with personal instruction.
- Videotape programs.
- Training manuals/employee handouts.
- Employee review sessions.
- Professional consulting.

RECORD KEEPING

To facilitate the training of our employees as well as to document the training process, we maintain training records containing the following information:

- Dates of all training sessions.
- Contents/summary of the training sessions.
- Names and qualifications of the instructors.
- Names and job titles of employees attending the training sessions.

These training records are made available, for examination and copying, to our employees and their representatives, as well as OSHA and its representatives. Records stay in employee files for no less than three years.

Chapter 7: COMPRESSED GAS CYLINDERS

INTRODUCTION/OVERVIEW

Compressed Gas Cylinders may contain oxygen, acetylene, nitrogen, ammonia, chlorine, hydrocarbons, breathing air, or other gases. Given below are some basic guidelines our employees and supervisors must follow regarding the storage, use and handling of compressed gas cylinders (OSHA 1926.350)

STORAGE OF CYLINDERS

1. Do not remove the product identification label or change the cylinder color.

2. Keep cylinders away from sources of heat. If stored in buildings, keep away from highly combustible materials, stoves, radiators, etc.

3. Store securely. Cylinders should be securely placed on a level surface to prevent tipping over and should not be piled near elevators, gangways, or other places where they are likely to be knocked over.

4. Do not store cylinders of oxygen close to cylinders of acetylene or other fuel gas.

5. Protect cylinders stored in the open from the elements, both from accumulations of ice and snow and from the direct rays of the sun, particularly when it is hot outside.

6. Close valves on empty cylinders.

7. Keep all valve protecting caps in place when cylinders are not in use.

8. Store cylinders so as to avoid possible destruction or obscuring of coloring, tags, and other means of identifying the contents.

9. While in use, keep valve key wrench in place on valve spindle.

10. Separate stored oxygen cylinders from fuel-gas cylinders and other combustible materials, especially oil or grease, by no less than 20 feet or by a noncombustible barrier at least 5 feet high having a fire- resistance rating of at least one-half hour.

11. Oxygen and fuel gas cylinders can be left together on bottle carts when in regular use.

USE OF CYLINDERS

1. Gas cylinders are exposed to many dangers at the construction site. Select a location for setting up cylinders which will be exposed to as little contact as possible from moving equipment, materials and the like.

2. Place cylinders in a rack, chain them, or otherwise positively secure them against tipping over.

3. When in use, do not open the valve more than 1-1/2 turns to allow for quick closing.

4. Use cylinders in the order received from the supplier. When the cylinder is nearly empty, the valve should be closed, and the cylinder marked accordingly.

5. Prevent cylinders from coming into contact with electric wires.

6. Shield from sparks or flame when welding and cutting.

7. Never store tools, materials, or anything else on top of cylinders, even temporarily.

8. Oxygen under pressure forms an explosive mixture with oil and grease. Regulations, values, gauges or fittings must not have any oil, grease, or lubricant used on them; nor are they to be handled with greasy hands or gloves.

9. Never expose oxygen cylinders to oil sprays or mists.

10. Never use oxygen as a substitute for compressed air.

11. Never take cylinders into “confined spaces”.

HANDLING CYLINDERS

1. Whenever a cylinder is being moved, be sure valve protection cap is in place and closed.

2. Never use valves or caps for lifting.

3. When raising or lowering, use suitable sling, boat, cradle or platform.

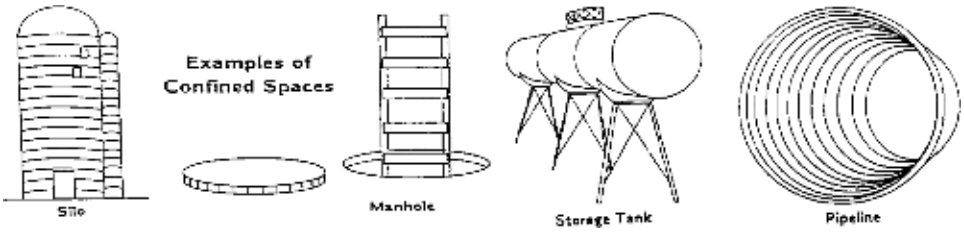
4. Always handle carefully. Do not drop or jar.

5. Do not lift with electric magnets.

6. Move cylinders by tilting and rolling on bottom edge; avoid dragging and sliding.

7. When moving with hand truck, be sure cylinders are securely held in place.

Chapter 8: CONFINED SPACES – QUICK FACTS



Non-Permit Required Confined Space (See Page 6)

A "non-permit" space does not have any of the following four (4) hazards:

1) Contains or has the potential to contain bad air
2) Has sloping walls or floors that could entrap an entrant
3) Has free flowing granular product or liquids that could engulf an entrant
4) Has additional uncontrolled concerns (i.e. hazardous energies, fall hazards, etc.)

Atmospheric testing must be done before entering a non-permit required confined space. When atmospheric testing and inspection shows there is not hazard present or likely to be present, the space can be entered using normal safety practices.

Permit Required Confined Space (See Page 8)

If one or more of the four hazards listed above are present, the confined space is considered permit required. Permit required confined spaces require specific procedures be implemented before entry can be allowed (See Appendix A). Contact you Safety Department Representative or Project Manager before entering. **Note:** If the hazards present in a confined space can be positively controlled or eliminated, the space can be classified as a non-permit. Always attempt to reclassify confined spaces containing hazards whenever feasible by positively controlling the hazards.

Do…	Do Not…
Pre-plan before entering a confined space.	Enter or stay in a space if the air monitor alarms for any reason.
Use an air monitor to check the space before entering. Test from top to bottom of the space. Continue to test the space once inside.	Enter a space that contains free flowing granular product or liquids unless you have taken steps to avoid engulfment.
Assure that potential sources of energy are locked out before entering (water, electrical, hydraulic, pressurized lines, etc.).	Enter a space that contains inward sloping walls or floors unless you have a taken steps to avoid being trapped.
Ventilate when performing work that can affect air quality (welding, using chemicals etc.). Point the air directly at the worker.	Enter a space that previously contained hazardous materials without assuring it has been cleaned.
Coordinate entry with the customer or general contractor.	Enter a space that contains dust that reduces visibility below 5-feet.

CONFINED SPACES – PREENTRY PLANNING GUIDE

Work Aspects	Potential Hazards	Action/Control
1. Existing air inside the space	Air may be oxygen deficient, flammable or toxic	Test the air using a monitor before entering, test the air continuously once inside, ventilate if needed.
2. Hazardous energy or unexpected start up	Electrocution, caught in, sudden release of energy	Lock out all potential sources of energy before entering (water, electrical, hydraulic, pressurized lines, etc.), coordinate entry with the customer or GC.
3. Internal configuration of the space	Floors or walls that slope could cause a person to become trapped	Utilize personal fall arrest system, use temporary planking or scaffolding etc.
4. Liquid or free flowing granular product found inside the space	Product could engulf a person causing suffocation	Do not enter the space; call your Safety Department Representative or Project Manager.
5. Affects caused by the work process	Welding, grinding, painting, cleaning, etc. can affect air quality	Use ventilation, point directly at the employee when possible. Review product MSDSs before using in the space.
6. Previous use of the space	Space may have contained flammable or toxic chemicals	Clean spaces previously containing toxic / hazardous product. Do not enter if existing dust reduces visibility below 5ft.
7. Fall hazards	Falls through holes, to same or lower level, onto machinery, etc.	Utilize hole covers, guard rails, personal fall restraint, or personal fall arrest systems.
8. Lighting issues	Poor visibility	Install appropriate temporary lighting.
9. Wet surfaces	Slip/trip/fall and electrocution	Use fan, keep walkway dry, use fall protection. Use GFCI for all power tools.
10. Entry and exit	Fall potential	Use ladders, steps, or personnel / material winch (typically mounted on tripod).
11. Fire protection needs	Fire or smoke inhalation	Remove/cover combustible items when performing hot work. Provide extinguisher. Notify 911 of emergencies.

INTRODUCTION / OVERVIEW

If employees are required to work inside a mechanical tunnel, crawl space, boiler, duct or breeching, pipeline, pit, pumping station, sewer manhole, septic tank, sewage digester, silo, storage tank, utility vault, or similar type enclosure, they are working in a Confined Space. (OSHA 1910.46 and 1926.1203-1926.1213)

Our company policy requires that we prepare a pre-job safety plan before starting each new project to identify potential hazards. We expect our managers and supervisors to strictly enforce this safety policy and to take whatever steps are necessary to safeguard our employees from the potential hazards of associated with confined spaces. After reading this section, if you are unsure whether you are working in a confined space or have confined space questions, contact your Safety Department Representative.

TRAINING REQUIREMENTS

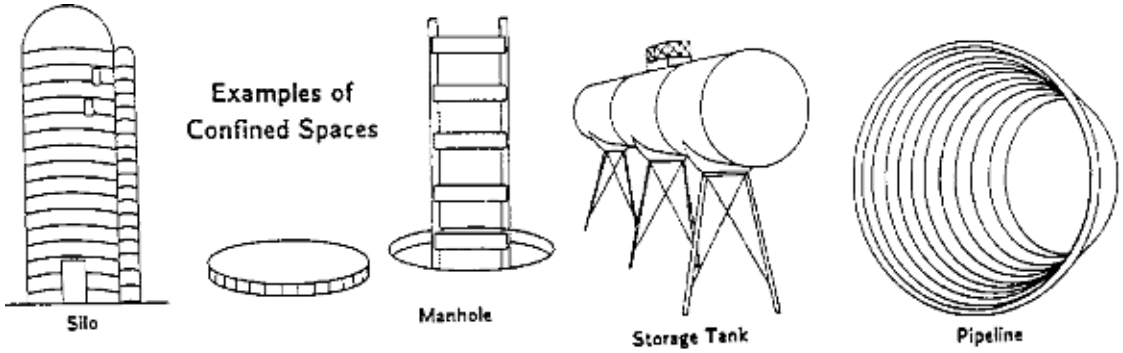
Our policy will be to train our employees in confined space procedures through formal training programs and supplement the training with Toolbox Safety Talks. When working in a facility covered by the General Industry standard, we will comply with the customer's written program and training as long as it meets or exceeds the requirements of this policy.

IDENTIFYING A CONFINED SPACE

A confined space is defined as a space that:

- Is large enough and so configured that an employee can enter
- Has limited or restricted openings for entry or exit
- Is not designed for continuous worker occupancy

Confined spaces are not designed for workers to enter and perform work on a routine basis. They are designed to store a product, enclose materials, or to transport products or substances. Means of egress for confined spaces are usually limited in size or location. Openings can be small in size and difficult to move through easily. In some cases, openings may be very large, for example open-topped spaces such as pits, degreasers, or large diameter pipes.



ATMOSPHERIC HAZARDS ASSOCIATED WITH CONFINED SPACES

Because of the lack of natural air movement, the atmosphere in a confined space may be extremely hazardous. This characteristic of confined spaces can result in oxygen-deficient atmospheres, flammable atmospheres, and/or toxic atmospheres.

- Oxygen-deficient atmosphere: Has less than 19.5% available oxygen (O2). Any atmosphere with less than 19.5% oxygen shall not be entered. The oxygen level in a confined space can decrease because of work being done, such as welding, cutting, or brazing or, it can be decreased by certain chemical reactions (rusting) or through bacterial action (fermentation). Air monitoring will identify these potential changes.

- Flammable atmospheres: There are two elements that make up a flammable atmosphere: oxygen and the proper mixture of a flammable gas, vapor, or dust. Most types of dust are explosive in the proper mixture. Flammable atmospheres can be caused by dust that is created by grinding, using compressed air to clean, sanding, etc. Do not enter a space or create an environment where dust causes visibility to be reduced below 5-feet.

  Air monitors used to evaluate air in confined spaces typically measure flammable gases/vapors. Air monitors measuring flammable gases/vapors will display the percent (%) of the lower explosive limit (LEL) of whatever flammable gas/vapor exists in the area. LEL is the minimum mixture of a flammable gas/vapor that will burn or explode. If an air monitor measures 100% on the LEL sensor it means, there are flammable gases/vapors present in a high enough concentration that with any ignition source the space will burn or explode.

If a source of ignition (e.g., a sparking or electrical tool) is introduced into a space containing a flammable atmosphere, an explosion can result. An oxygen-enriched atmosphere (above 23.5%) will cause combustible materials to become more flammable and burn violently when ignited (including clothing and hair). Never use pure/compressed oxygen to ventilate a confined space as it will create. an oxygen-enriched environment. Only ventilate using fans that push in fresh, outside air.

- Toxic atmospheres: Most substances (liquids, vapors, gases, mists, solid and dusts) should be considered hazardous in a confined space. Toxic environments

  can be created by a product stored in the space, the work being performed in a confined space, or from the areas adjacent to the confined space. Work being performed, such as welding, cutting, brazing, painting, scraping, sanding, degreasing, etc. can result in the creation of toxic atmospheres. Common toxic hazards include hydrogen sulfide (sewer gas) or carbon monoxide. Consult with owners / managers of the confined space you are entering for information on other special toxic concerns; review these hazards with your Safety Department Representative if you need assistance.

CLASSIFICATIONS OF CONFINED SPACES

Any space meeting the definition previously described is considered a confined space. There are two different classifications of confined spaces: Non-permit and permit required. When determining the classification of a confined space, analyze for the presence of four (4) specific hazards:

1. Atmospheric: Contains or has the potential to contain a hazardous atmosphere (e.g. sewer gas, lack of oxygen, inert welding gases, etc.).

2. Engulfment: Contains or has the potential to contain free flowing solids or liquids that could engulf a person (e.g. corn in a silo, water in a large pipe).

3. Entrapment: Has converging walls or an internal configuration that could cause entrapment (e.g. gravity bins, hoppers, etc.)

4. Other: Contains other serious safety or health hazards that could cause death or serious injury (e.g. hazardous energies or a fall hazard).

A non-permit confined space: Does **not** contain any of the four (4) hazards listed above, or the hazard(s) have been positively controlled.

A permit required confined space: Contains **one** or more of the above listed hazards and they are not positively controlled.

NOTE: If the above-mentioned four (4) hazards are positively controlled or eliminated, the space can be reclassified as a non-permit confined space. Best management practices dictate that we should implement necessary control practices to allow for the reclassification of the space whenever it is feasible.

There are significantly different requirements between working in a non-permit confined space versus a permit required confined space. Once you determine which type of confined space you have you can then use the following information to facilitate safe work practices. The requirements for a permit required confined space can be found in Appendix A of this chapter. The entry requirements for a non-permit confined space immediately follows.

NON-PERMIT CONFINED SPACE PROCEDURE

In a non-permit confined space, once you have proven that all of the four (4) hazard categories listed above are positively controlled or were never present, the confined space can be entered by workers following normal safety practices. The only requirement is that the air is monitored before entering and periodically thereafter to ensure conditions have not unexpectedly changed. It is strongly encouraged that atmospheric monitoring is performed on a continuous basis while work is being performed inside a non-permit confined space. No additional action is required (e.g. Special training programs, rescue teams, standby attendants, etc.).

Before entering into the space: Examine the space for the four (4) hazard categories previously explained.

- Use an air monitor to test the atmosphere. It is necessary to test all areas (top, middle, and bottom) of the non-permit confined space with a properly calibrated air monitor. Do not enter the space while conducting testing. If testing reveals an oxygen deficiency or the presence of toxic gases or vapors the space must be ventilated and re-tested before workers enter. Determine if continuous ventilation is required to maintain a safe atmosphere.

- Evaluate the possibility of exposure to all physical hazards, particularly entrapment, engulfment and fall hazards. See Chapter 14 for Fall Protection requirements.

- Isolate potential energy hazards. Isolation of a non-permit confined space is a

process in which the space is removed from service by locking out the electrical sources to necessary equipment / systems, by blanking and bleeding pneumatic / hydraulic / steam lines, by disconnecting belt and chain drives and mechanical linkages on shaft-driven equipment, and by securing mechanical moving parts within confined spaces. See Chapter 9 for details on Lockout / Tagout.

- Review the following “Non-Permit Confined Space Pre-Entry Checklist”. This checklist is not a permit. The purpose of this checklist is to help you verify the space is a non-permit confined space and that all entrants understand the same information.

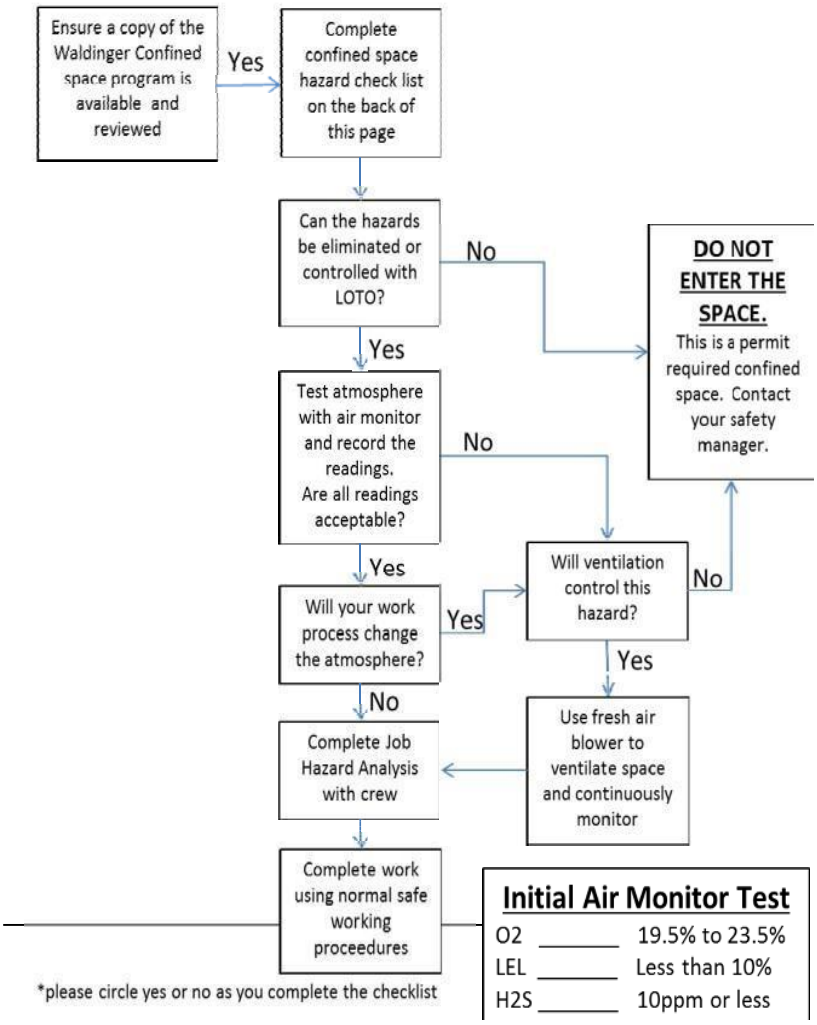
Once inside the space:

- Continuously monitor the operation for hazardous conditions.

Take immediate action to remove employees from danger should any hazards occur. Do not re-enter the space until the space has been reevaluated and reclassified as a permit required space in accordance with the standard.

Confined Spaces are:

-Large enough and so configured that an employee can enter it &
-Has limited or restricted means for entry or exit; &
-Are not designed for continuous employee occupancy



*please circle yes or no as you complete the checklist

Pre-Entry Hazard Assessment

Verify all of the following conditions by checking yes or no. Contact your safety manager if you check yes on any of them

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to self-rescue, injury, or acute illness.

	Yes	No
Flammable gas, vapor or mist		
Airborne combustible dust, visibility less than 5'		
Oxygen level below 19.5% or above 23.5%		
Any other toxic substances present		

Physical Hazards: An existing or potential hazard that can cause death or serious physical damage.

	Yes	No
Explosives or items that have the potential for explosion		
Machinery that has the potential to start or move		
Electrical energy that we are not in control of		
Hydraulic or pneumatic energy that is not positively controlled		
Radiation		
Hot or cold temperature extremes		
Engulfment from liquids or flowing solid material		
Noise levels above the permissible exposure limit		
Inwardly converging walls or floor that may trap the entrant		
Other chemicals that could cause serious physical damage		

If any of these are present please contact your safety manager to discuss the hazard and if any controls are available before proceeding with the entry.

Necessary equipment

- [x] Air monitor
- [x] Signage
- [x] Barricade or danger tape
- [x] Emergency contact list
- [ ] Harness
- [ ] Lanyard
- [ ] Lock out/tag out
- [ ] Respirator
- [ ] Fire extinguisher
- [ ] Lighting
- [ ] Additional PPE
- [ ] Ladder
- [ ] Fresh air blower
- [ ] Communication equipment
- [ ] Hot work permits
- [ ] Retrieval tripod

APPENDIX A

PERMIT REQUIRED CONFINED SPACE PROCEDURE

RESPONSIBILITIES

This program applies to all employees who may enter a permit required confined space, as well as supervisors or anyone that may act as an attendant. The specific responsibilities established under this program are as follows:

Supervisor – The entry Supervisor is responsible for the following:

- Know the hazards which may be encountered during entry, including the mode of exposure, signs or symptoms and consequences of exposure.
- Verifies emergency plans and checks that appropriate entries have been made on the permit; that all tests specified are complete, systems are safe, and procedures and equipment are in place before allowing entry.
- Terminates the entry and cancels the permit when entry operations are completed or if a new hazardous condition exists.
- Verifies that rescue services are available, they have been notified of the entry, and the means to summon them are operational.
- Notifies the employer if rescue services become unavailable.
- Remove unauthorized personnel who enter or attempt to enter the permit space during entry operations.
- Ensures that procedures for entry and work operations are conducted in accordance with entry procedure and permit requirements.
- Completes the hazard assessment checklist and permit/non-permit flowchart

Entrant – Each entrant must know the following:

- The hazards which may be encountered including the mode, signs, symptoms and consequence of exposure.
- Proper use of all equipment used inside the permit space.

- Communication with the attendant is necessary to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate.
- Alert the attendant and other entrants whenever:
  - They recognize warning signs or symptoms of exposure to a hazard.
  - They recognize a prohibited condition.
- Exit from the space quickly, whenever:
  - An order to evacuate is given by the attendant or entry supervisor.
  - The entrant recognizes signs or symptoms of exposure to a dangerous situation.
  - The entrant recognizes a prohibited condition.
  - An evacuation alarm is activated.

<u>Attendant</u> – Each attendant is responsible for:

- Knowing the hazards faced during entry, including the mode, signs, symptoms and consequences of exposure.
- Aware of the possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintaining an accurate count of authorized entrants, and to identify those listed as authorized on the permit.
- Remain outside the permit space until relieved by another attendant.
- Communicate with authorized entrants as necessary to monitor entrant status and to alert entrant of the need to evacuate.
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain inside and to order an immediate evacuation under any of the following conditions:
  - Detection of a prohibited condition,
  - Detects behavioral effects of hazard exposure in an authorized entrant,
  - A situation outside the space which could endanger the entrants,

- If the attendant cannot effectively and safely perform the duties of the attendant.

- Summon rescue and other emergency services as soon as the attendant

- determines the entrants need assistance in escaping from permit space hazards.
- determines the entrants need assistance in escaping from permit space hazards.
- Take the following actions when unauthorized persons approach or enter a permit space when entry is underway.
  - Warn person to stay away from the permit space.
  - Advise the persons they must exit immediately if they have entered the permit space.
  - Inform the authorized entrants and entry supervisor that unauthorized persons have entered the permit space.
- Perform **non-entry** rescues as specified on the emergency action plan, such as winching entrants out with entry tripod.

- Perform no other duties which may interfere with the attendant's primary duty of monitoring and protecting the authorized entrants.

ENTRY PROCEDURE

A permit required confined space can be reclassified to a non-permit confined space once all of the four (4) hazard categories have been eliminated or positively controlled (see Page 5 of this program for explanation). As a matter of policy, we should avoid situations where it is necessary for our employees to enter a permit required confined space. If the hazards that define a permit required confined space cannot be completely eliminated or positively controlled, the following comprehensive safety program must be implemented. Notify your Safety Department Representative before entry into any permit required confined space.

COORDINATION WITH HOST EMPLOYER OR GENERAL CONTRACTOR

When our employees work in facilities containing permit required confined space(s) that are controlled by the host employer, our representative shall coordinate all permit required confined space entry requirements with a properly authorized representative of the host employer or controlling contractor. As a minimum, the following information shall be exchanged/determined:

- The host employer shall advise our representative of all applicable facts including the hazards identified in the permit required confined space; the experiences that the host employer has had with the space and, if appropriate, the reason(s) why a space is classified as a permit required confined space.

- Any precautions or procedures that have been implemented by the host employer for the protection of their employees.
- Coordinate all entry operations to protect both the host employer employees and our employees or employees of another contractor who are working near the confined space to be entered and implement measures to prevent unauthorized entry.

- Our authorized representative shall obtain from the host employer any available information regarding the permit space hazards and any entry operations mandated by the host employer.
- Our authorized representative shall debrief the host employer at the conclusion of the entry operation regarding the permit required confined space program followed, and of any hazards encountered or created in the permit spaces during entry operations and actions taken to protect the safety of the assigned entry personnel.

REQUIRED ENTRY EQUIPMENT

Our authorized representative shall ensure that necessary equipment is available on location, that the equipment is in proper operating conditions, and that personnel operating/using the equipment have been properly trained. The following items of equipment shall be available, at no cost to the employee:

- Air Monitor: This properly calibrated instrument shall not be taken into a confined space that may contain hazardous gases; rather sampling lines (probes) must be used so the permit required confined space attendant can monitor the atmosphere. Monitors shall be capable of measuring (at a minimum) oxygen, combustible gas, carbon monoxide and hydrogen sulfide. Our employees who are designated to use testing or monitoring equipment shall be properly trained to know how to properly use the gas detection equipment. NOTE: All testing equipment must be calibrated according to manufacturer's specifications before use.

- Communication Equipment: Appropriate communications equipment shall be used to maintain contact between authorized entrants and the attendant, to monitor the status of the entrant(s) and to alert them if the need arises for

them to evacuate the space. The type of communications shall be based on the conditions in the permit space and may include one or more of the following:

- Visual (observation)
- Voice
- Telephone
- Two-way radio
- Other means as appropriate

- Ventilation Equipment: Ventilating by a blower or fan may be necessary to remove harmful gases and vapors from a confined space. A common method of ventilating a space is to use a large hose with one end attached to a fan and the other end lowered into the confined space. The air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be. The air intake shall be placed in an area that will draw in only fresh air. Ventilation shall be continuous to keep hazardous atmospheres from reforming.

- Personal Protective Equipment: Our standard PPE policy shall be followed. In addition, certain conditions may require additional protection such as: protective clothing, hearing protection, respiratory protection, body harness, etc.

- Lighting Equipment Appropriate lighting equipment shall be provided within and outside the permit space to allow our employees to enter safely, perform the required work and exit the confined space. Some of the precautions that shall be taken when selecting lighting are as follows:

  - If the atmosphere inside the confined space is classified as flammable/explosive, the electrical equipment used shall conform to Article 500, National Electric Code.

  - All personnel entering the confined space shall be provided with a flashlight or glow stick as a means of alternative lighting in case main task lighting malfunctions.

- Barrier and Shields: Appropriate barriers and shields shall be used to isolate the confined space from personnel who are not directly involved in the entry operations. High visibility warning tape may be used to keep unauthorized personnel at a safe distance. If the confined space is located in an area accessible to public, barriers that keep pedestrian and vehicular traffic away from the entry operation shall be erected.

- Entry and Exit Equipment: Ladders and other types of equipment that provide safe entry and exit to the authorized entrants from the confined space shall be available at the entry location. Necessary precautions shall be taken to ensure that this equipment

- does not interfere with the ventilating equipment.

- Retrieval Equipment: A full body harness and retrieval line system shall be worn by all entrants. A retrieval system will allow the attendant to perform non-entry rescue of the confined space entrants. Since conditions and space characteristics vary from one situation to another, the necessary equipment shall be selected based on the potential hazards and possible contingencies expected to occur during the entry operations.

PRE-ENTRY PREPARATIONS

- General Requirements:

  - Implement all measures necessary to prevent unauthorized entry.
  - Identify and evaluate the hazards that may be encountered in the permit space.
  - Specify acceptable entry conditions.
  - Conduct preliminary purging, inerting, flushing or ventilating of the permit space as appropriate to eliminate or control atmospheric hazards.
  - Provide barriers to control pedestrian and vehicle traffic to protect the entrants from external hazards.

- Train and Educate:

  We will provide training to all our employees before their initial work assignment in a permit required confined space. Upon completion of the training we will issue a certificate of training to those employees who successfully complete the training. Appendix B provides the training syllabus to be followed in training of our employees. Considering the fact that there are a large variety of confined spaces with their own unique requirements, our employees shall receive additional instructions that cover the specifics of a particular permit space prior to entry into the space.

- Test Atmosphere:

  Before a permit required confined space is entered by our employees it shall be tested with a calibrated, direct reading air monitor to determine if acceptable entry conditions exist. If the permit required confined space is large or is part of a continuous system (e.g. a sewer), pre-entry testing shall be performed to the extent feasible, and if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized

entry personnel are working. The standard acceptable conditions for entry are:

ITEM	*ACCEPTABLE CONDITION*
Oxygen	19.5% Minimum. 23.5% Maximum.
Flammable Gasses	No greater than 10% of the Lower Flammability Limit (LFL).
Hydrogen Sulfide	No greater than 10 parts per million
Carbon Monoxide	No greater than 25 parts per million
Acutely Toxic Substances	Cannot exceed permissible exposure limit (PEL) for the substance as established by OSHA in Subpart Z of 29 CFR 1910.
Flammable Dusts	Must not reduce vision to five feet or less. Note: Fire/explosion hazard does not take respiratory health hazard or PEL into consideration.

Please note: If the above conditions cannot be met, a site-specific plan shall be created listing the minimum acceptable conditions that must be maintained for the entrant and the safety measures that will be incorporated. Your Safety Department Representative must be included in the creation of this plan.

- Isolate Energy Sources: Before any permit required confined space is entered by our employees, the space shall be removed from service and shall be completely protected against the release of energy and/or material(s) into the space. This means that all energy sources leading to the permit space, or located within, which are potentially hazardous to the entrants shall be locked out, tagged, relieved, disconnected, and/or restrained. The objective for isolating all energy sources is to prevent unexpected or accidental start-up or release of stored energy that could cause injury to workers within the confined space. Energy sources include the following:
    - Electrical
    - Mechanical
    - Hydraulic
    - Thermal Radioactive Sources
    - Gravity
- Implement Fire Protection: To preclude the possibility of fires occurring in the permit required confined space that could become a hazard to the workers inside, the following precautions shall be taken as a minimum:
    - Access and egress to and from the confined space shall be

maintained clear of any obstructions at all times.

- If welding or cutting is to be performed in the confined space, combustible materials that cannot be removed shall be covered with flame-retardant materials.
- Flammable liquids (i.e. acetone, thinner, etc.) shall be stored in UL or FM approved containers. The amount of flammable liquid(s) brought into the confined space shall not exceed the amount needed to perform the work each day.
- Properly rated fire extinguishers shall be immediately available.
- Cylinders containing oxygen, acetylene or other fuel gases shall not be taken inside the confined space.
- All rags, brushes, wipes, gloves, etc., shall be stored in metal containers with lids.
- A person shall be posted during all welding, burning and heating operations to monitor for fires, and ensure that after the work has ceased or at the end of a work shift there are no fire conditions present.
- All flammable gas equipment, hoses, torches, etc., shall be free of defects and inspected by the user prior to such operations and are adequately protected to prevent ignition.
- To eliminate the possibility of fire in enclosed spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch shall be positively shut whenever the torch is left unattended for long periods of time, such as during lunch breaks. At the end of a work shift, the torch and hose shall be removed from the confined or enclosed space. Open end fuel gas and oxygen hoses shall be immediately removed from the enclosed spaces when they are disconnected from the torch or other gas-consuming device.

PREPARING THE ENTRY PERMIT

An entry permit shall be prepared to authorize entry into any permit required confined space. An entry supervisor shall be designated for each specific confined space entry operation. The entry supervisor shall be the only person that can sign the entry permit to authorize entry. The entry permit includes the following information:

- Description of the confined space to be entered.
- The purpose of the entry and known space hazards.

- The date and the authorized duration of the entry.
- The names of all authorized entrants, eligible attendant(s) and the name(s) of the individual(s) designated as entry supervisor(s). If the individual serving as entry

  supervisor is someone other than the entry supervisor who originally authorized

  entry, space for the names of both entry supervisors and their signatures shall be provided.
- The measures to be taken to isolate the permit space and to eliminate or control

  permit space hazards (i.e. locking out or tagging of equipment and procedures for

  purging, making inert, ventilating, flushing, etc.).

- Statement as to what constitutes acceptable entry conditions.

- The results of initial and periodic tests performed, together with the names or initials of the individuals doing the test and the time when the test was conducted.

- The rescue and emergency services that are to be summoned, the means (i.e. telephone, etc.) and the number(s) to be called to summon these services.

- The communication procedures to be used by the authorized entrants and the attendant to maintain contact during entry.

- Personal protective equipment used by entrants, testing and monitoring equipment used, alarm system and rescue equipment that will be available on site.

- Additional permits, i.e. hot work, etc., that have been issued for work inside the space.

- Any other information pertinent to a specific confined space to ensure employee safety.

The completed permit shall be made available at the time of entry to all authorized entrants. This shall be accomplished by reviewing the permit with all entrants so that they are made aware that all pre-entry preparations have taken place. The duration of the entry permit must not exceed the time required to complete the assigned task or job identified on the permit.

If hazardous conditions are detected during entry, entrants must immediately leave the confined space and the space must be evaluated to determine the cause of the hazardous condition. The entry supervisor shall terminate entry and cancel the entry permit when:

- The entry operations covered by the permit have been completed.
- A condition arises which is not covered under the permit. The circumstances of the situation must be noted on the cancelled permit and should be used in revising the permit space program.
- We must retain a cancelled permit for at least one year and perform a review of all cancelled permits within 12 months and ensure that this program is protecting employees during entry operations.

PHYSICAL ADDRESS OF CONFINEDSPACE _____

DATE & TIME ISSUED:_____ DATE & TIME EXPIRES: _____

SUPERVISOR IN CHARGE_____ PURPOSE OF ENTRY_____

RESCUE PROCEDURE _____

COMMUNICATIONS PROCEDURES _____

MATERIALS TO BE TAKEN INTOSPACE _____

IS THE FOLLOWING COMPLETE?	DATE/ TIME	IS THE FOLLOWING COMPLETE	DATE/ TIME
1. LOCKOUT-PNEUMATICS/ HYDRAULIC/ ELECTRICAL		9. FULL BODY SAFETY HARNESS FOR ENTRANT(S)	
2. ENTRANT(S) AND ATTENDANT ARE TRAINED		10. RETRIEVAL EQUIPMENT INSPECTED	
3. ACCESS AND EGRESS IS APPROPRIATE		11. ADDITIONAL PPE REQUIRED	
4. VENTILATION EQUIPMENT IS AVAILABLE		12. RESPIRATOR(S) (FILTER OR AIR PURIFYING)	
5. AREA SECURED (POST & FLAG)		13. FIRE EXTINGUISHER PROVIDED	
6. AIR MONITOR CHARGED AND CALIBRATED		14. LIGHTING	
7. COMMUNICATION PLAN DISCUSSED		15. BURNING AND WELDING PERMIT	
8. EMERGENCY PLAN REVIEWED		16. MSDS REVIEWED OF CHEMICALS THAT WILL BE USED IN THE SPACE.	

NOTE: FOR ITEMS THAT DO NOT APPLY, ENTER "N/A" IN "DATE" SPACE.

Continuous air monitoring is to be performed while employees are inside the space. Confined space attendant will record the initial air monitor results and additional results every two hours.

TESTS TO BE TAKEN	PERMISSIBLE EXPOSURE LIMITS		TIME	TIME	TIME	TIME	TIME	TIME	TIME
% OF OXYGEN	19.5 – 23.5%	Reading >>							
LOWER FLAMMABLE LIMIT	UNDER 10%	Reading >>							
CARBON MONOXIDE	35ppm*	Reading >>							
HYDROGEN SULFIDE	10ppm* 4ppm**	Reading >>							
OTHER		Reading >>							

APPROVALS:

1. _____ SAFETY DEPARTMENT

2. _____ SITE MANAGER / AREA SUPT.

3. _____ HOST EMPLOYER REPRESENTATIVE

ENTRY SUPERVISOR:_____ AIR MONITORING BY: _____

We have reviewed the work authorized by this permit, the information herein and understand the safety procedures and instruct ions received.

ENTRANTS: _____ _____ _____

ATTENDANT: _____

TELEPHONE NUMBERS: _____ FIRE DEPT. _____ AMBULANCE _____ RESCUE SERVICE

THIS PERMIT WAS CANCELLED ON:_____ DATE ENTRY SUPERVISOR: _____ SIGNATURE

Completed forms shall be maintained with project documents. Submit to Project Manager.

***PERMIT REQUIRED* CONFINED SPACE ENTRY PERMIT**

RESCUE AND EMERGENCY

We will rely on the expertise of local Fire and Rescue services in the event that it becomes necessary to enter a permit required confined space to perform a rescue. Our employees are only authorized to perform non-entry rescues.

- Planning
  - Before the entry into the permit required confined space is allowed, the local Fire Department shall be notified of our intent to rely on their services for rescue.
  - The Fire Department's ability to respond in a timely manner will be evaluated to ensure they can respond when summonsed
  - A description of the space shall be given to the Fire Department and they shall be given the opportunity to observe the space.
  - A phone shall be immediately available to the attendant outside of the confined space.
  - The entry permit shall be maintained by the attendant which includes:
    - The phone number for the Fire Department.
    - The physical address of the Permit Required Confined Space.
- General requirements:
  - A full body harness and retrieval line shall be worn by all entrants of a permit required confined space. One end of the retrieval line shall be hooked to the "D" ring on the back of the harness worn by the entrant. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in a manner that will allow rescue to begin immediately. This will allow lifting or dragging of unconscious or incapacitated entrants by retrieval lines. Since conditions and space characteristics vary from one situation to another, the necessary equipment shall be selected based on the potential situations that could occur during the entry operations.
  - A retrieval device must be provided when entry to the space is made through a top opening. The device must be designed for this purpose. Where overhead structures are not provided for attaching the hoist/winch, a tripod system or similar mechanism shall be used for lifting entrants.
- Emergency Procedures
  - The attendant shall notify all entrants to exit the space immediately.

- The attendant shall attempt to rescue unconscious or incapacitated entrant(s) from the confined space by non-entry means, such as retracting the lifeline attached to the affected entrant(s).
- If the attendant cannot retrieve the entrant, the attendant shall call emergency services at the number listed on the entry permit and report the emergency.
- No employee, including the attendant or anyone else, shall under any circumstances enter the permit required confined space in an attempt to perform a rescue.

APPENDIX B

PERMIT REQUIRED CONFINED SPACE TRAINING SYLLABUS

PURPOSE

Each person assigned to a permit required confined space entry team must be certified in the duties to be performed. This training syllabus has been developed to ensure that training throughout our company meets both the intent of the law and that programs remain consistent from project to project.

TRAINING FACILITATOR

Facilitators performing the training must be competent either through education or experience in permit required confined space entry. Training facilitators must have thorough knowledge of confined spaces, hazards associated with toxic atmospheres, monitoring equipment, personal protective equipment, and emergency rescue planning. In addition, facilitators must know bleeding and purging, lockout/tagout, ventilation, and toxicological effects.

PROGRAM SYLLABUS

All of our employees who are involved in permit required confined space entry shall attend this training program.

Training will be provided:

- Before an employee is assigned to duties involving permit required confined spaces.
- When there is a change in the employee's assigned duties which may involve a permit required confined space.
- Whenever there is a change in operations presenting different hazards not previously discussed.
- When an employee's job performance shows deficiencies.

NOTE: Each employee will participate in all sections of this program. Upon successful completion of this program a certificate will be issued. Refresher training shall be completed annually for participants of permit required confined space entries.

DEFINITIONS APPLICABLE TO CONFINED SPACES

Confined Space – A space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means of entry or exit.
- Is not designed for continuous employee occupancy.

Permit Required Confined Space – A confined space which has one or more of the following four (4) hazards:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.
- Contains any other recognized serious safety or health hazards.

Non-Permit Confined Space - A space that either:

- Does not contain any of the four (4) hazards found in a permit required confined space
- Had previously contained one or more of the four (4) hazards found in a permit required confined space, but the hazards have been positively controlled or eliminated.

Entrant – Any person authorized to enter a permit required confined space.

Entry Supervisor – Designated person (foreman, crew chief, etc.) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned; authorizes entry, oversees entry operations and terminates entry when required.

Attendant – Any person authorized to stay outside of a confined space to maintain contact to those within.

Emergency Rescue Plan – A written program establishing emergency procedures to follow during an emergency.

HAZARDOUS MATERIALS, VAPORS, AND GASES

Oxygen – Oxygen levels of 20.9% is considered normal regardless of evaluation, temperature or humidity.

- A level below 19.5% or above 23.5% is considered dangerous.

- When monitoring oxygen levels in permit required confined spaces, the level must be maintained between 19.5% and 21.5%. Any reading outside of this range must be investigated to ascertain the reason for the potential hazard, i.e. leaks in valves/blinds, etc.

- Spaces which have oxygen below 19.5% or above 21.5% must be ventilated and rechecked before entry.

Combustible – permit required confined spaces are monitored for their % concentration of an explosive limit. This range is the range in which a gas or vapor can ignite if there is a source such as a spark, flame, even static electricity.

- The permit space shall be monitored for the percent of the lower explosive limit. If the permit required confined space exceeds 10% of the lower explosive limit, the space must be evacuated.
- The source of the gas or vapor shall be found and blocked prior to re-entry.
- Flammable atmospheres caused by dust can be created by grinding, using compressed air to clean, sanding, etc. Do not enter a space or create an environment where dust causes visibility to be reduced below 5-feet.
- Ventilation must be accomplished with intrinsically safe fans/blowers.

Toxic Atmospheres – There are numerous toxic materials, gas and vapors. Gases and vapors such as carbon monoxide, hydrogen sulfide, and sulfur dioxide can be measured by an air monitor. OSHA has specific Permissible Exposure Limits (PEL) established for these and other chemicals. Entry into a space in which atmospheric concentration is in excess of the PEL is prohibited. Locate and block the source of contaminant and ventilate the space prior to entry.

- Material Safety Data Sheets (MSDSs) are provided by manufacturers of chemicals. We maintain copies of MSDSs for each hazardous chemical at the job site readily available to all employees. Before one of our employees enters a permit required confined space containing toxic material, they should first review the MSDS of that material to become familiar with the symptoms and the way the toxic material can enter the body. In addition to entry personnel, the attendants shall also become thoroughly familiar with the signs and symptoms of the toxic materials in the performance of their duties.

ATMOSPHERIC MONITORING EQUIPMENT

Employees shall be trained on the use of the model of air monitor being utilized during the entry. The following shall be discussed:

- How to operate the monitor.
- Capabilities and limitations.
- The uses of the various control buttons.
- Locations in the permit required confined space where measurements are to be taken (Discuss the stratification of gases).
- Use of probes.
- The types of alarms.
- Discuss what to do when alarm sounds.

VENTILATION

Local ventilation may be required when a toxic material is applied, or when material is being cut, burned or welded. This ventilation typically will consist of dilution air pointed directly at the entrant. Ventilation can also be suction applied. General ventilation provides clean air to the space at a pre-established rate.

When various toxic materials are applied as a coating, cleaner, etc., the air inside a permit required confined space can become potentially dangerous. The Material Safety Data Sheets for these materials shall be reviewed and the signs and symptoms noted. These materials must be noted on the confined space entry permit.

RESPONSIBILITIES

Supervisor – The entry Supervisor is responsible for the following:

- Know the hazards which may be encountered during entry, including the mode of exposure, signs or symptoms and consequences of exposure.
- Verifies emergency plans and checks that appropriate entries have been made on the permit; that all tests specified are complete, systems are safe, and procedures and equipment are in place before allowing entry.
- Terminates the entry and cancels the permit when entry operations are completed or if a new hazardous condition exists.
- Verifies that rescue services are available, they have been notified of the entry, and the means to summon them are operational.
- Remove unauthorized personnel who enter or attempt to enter the permit space during entry operations.
- Ensures that procedures for entry and work operations are conducted in accordance with entry procedure and permit requirements.
- Completes the hazard assessment checklist and permit/non-permit flowchart

Entrant – Each entrant must know the following:

- The hazards which may be encountered including the mode, signs, symptoms and consequence of exposure.
- Proper use of all equipment used inside the permit space.
- Communication with the attendant is necessary to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate.
- Alert the attendant and other entrants whenever:
  - They recognize warning signs or symptoms of exposure to a hazard.
  - They recognize a prohibited condition.
- Exit from the space quickly, whenever:
  - An order to evacuate is given by the attendant or entry supervisor.
  - The entrant recognizes signs or symptoms of exposure to a dangerous situation.
  - The entrant recognizes a prohibited condition.
  - An evacuation alarm is activated.

Attendant – Each attendant is responsible for:

- Knowing the hazards faced during entry, including the mode, signs, symptoms and consequences of exposure.
- Aware of the possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintaining an accurate count of authorized entrants, and to identify those listed as authorized on the permit.
- Remain outside the permit space until relieved by another attendant.
- Communicate with authorized entrants as necessary to monitor entrant status and to alert entrant of the need to evacuate.
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain inside and to order an immediate evacuation under any of the following conditions:

- Detection of a prohibited condition,
- Detects behavioral effects of hazard exposure in an authorized entrant,
- A situation outside the space which could endanger the entrants,
- If the attendant cannot effectively and safely perform the duties of the attendant.

- Summon rescue and other emergency services as soon as the attendant determines the entrants need assistance in escaping from permit space hazards.

- Take the following actions when unauthorized persons approach or entera permit space when entry is underway:
  - Warn person to stay away from the permit space.
  - Advise the persons they must exit immediately if they have entered the permit space.
  - Inform the authorized entrants and entry supervisor that unauthorized persons have entered the permit space.

- Perform **non-entry** rescues as specified on the emergency action plan, such as winching entrants out with entry tripod.

- Perform no other duties which may interfere with the attendant's primary duty of monitoring and protecting the authorized entrants.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Mandatory PPE in a permit required confined space includes:

- Hard Hat
- Eye Protection
- Gloves
- Safety Harness
- Rescue/Retrieval Equipment

Based upon the known or potential hazards, additional Personal Protective Equipment such as:

- Chemical gloves
- Protective Clothing
- Face Protection
- Respiratory protection may be required

NOTE: At this point the facilitator shall ensure that all persons being certified are competent in the use, application, and maintenance of the Personal Protective Equipment listed.

EMERGENCY PROCEDURES

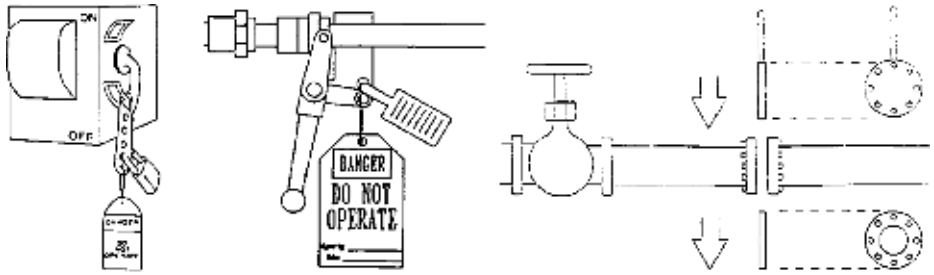
Emergency procedures must be developed specifically for each project. These procedures must be provided to all individuals involved in the permit required confined space entry and reviewed during this session of the training program.

Based on class size, need, and time, the facilitator should separate the class into groups and practice a mock entry to a confined space. Each mock case study should have different hazards and conditions. Participants should be required to function in the capacity of entrant, attendant, and entry supervisor. Each group should discuss with the other groups their responsibility and planned actions.

NOTE: It should be stressed that no employee shall, under any circumstances, enter the permit required confined space in an attempt to perform a rescue. Our employees
are authorized only to perform non-entry rescues. Local emergency services shall be called if it becomes necessary to enter the space to perform a rescue

Chapter 9: LOCK OUT / TAG OUT - QUICK FACTS

Lockout / Tagout (LOTO) is a method of controlling hazardous energy during the servicing, cleaning or maintenance of machines, power tools or equipment. Sources of energy includes: Spring, mechanical, hydraulic, gravity, electrical, pneumatic, etc. The purpose of this program is to protect against accidental start up or release of hazardous energies.



Examples of Lockout

Method of Blanking Hydraulic/Pneumatic Lines

Sequential Steps LOTO

1. **Notify** the customer and all affected employees that the equipment is going to be locked out and why.
2. **Shut down** the equipment by its normal procedure. This is usually done by the "stop" or "off" push button/lever or the control switch at the breaker of the motor.
3. **Disconnect** or switch "off" the energy sources (e.g. Main breaker, line valves, etc.)
4. **Lock and tag** out the energy sources.
5. **Release stored energy**. Relieve all potentially hazardous stored energy (spring, hydraulic, gravity, mechanical, electrical, pneumatic, etc.).
6. **Check** to assure the equipment is de-energized. Try to start the equipment using normal start-up procedures to ensure all sources of energyare controlled. CAUTION: Remember to return all controls to the "off" position after this check.

Do…	Do Not…
LOTO all equipment capable of movement or accidental start-up before performing work.	LOTO controls only, rather LOTO main energy sources whenever possible
Notify everyone that will be affected by the LOTO.	Allow any person to work without installing their own personal lock.
Assure all workers protected by LOTO of a system have applied their own lock and tag.	Allow anyone else to remove a lock or tag other than the person that installed it.
Require all workers to maintain personal control of the key that operates their lock.	Enter electrical enclosures unless trained and authorized to do so.
After installing the LOTO, test the equipment using normal start-up methods to assure that it is dead.	Use tagout only unless it is the last resort. Discuss first with your Safety Department Representative.

(1) LOCKOUT TAGOUT – PREPLANNING GUIDE

Risk Assessment	Potential Hazards	Action / Control
1. Competent Person	Accidents / Incidents. Legal requirement.	Assure proper training of all authorized employees before using lockout/tagout system (LOTO).
2. Pre-task planning	Not all sources of energy controlled	Determine the type(s), source(s), and magnitude of all energy to be controlled, including electrical, hydraulic, spring, steam, gravity systems, etc.
3. LOTO equipment	Improper/inadequate LOTO device(s)	Assure LOTO device is designed for the purpose and positively controls the energy.
4. Notify customer and affected employees of planned LOTO	Accidental start up	Make sure everyone affected by the lockout is notified of the shutdown.
5. Group LOTO method	Control	All members of the work group must add their own locks to the LOTO device and maintain personal control of their lock – one key per lock.
6. De-Energize equipment or machinery when performing maintenance, service or cleaning	Electrocution, Caught in Moving Part(s), Sudden Release of Energy	All potentially hazardous stored or residual energy must be made safe by blocking, discharging, disconnecting or bleeding.
7. Test to assure machine, equipment, or system is dead and stored energy is released	Accidental start up	After installing LOTO, test using regular start procedures to assure that all sources of energy are dead.
8. Tagout only	Lack of physical control/no lock	Tagout-only offers a false sense of security. Call the safety department for help.

INTRODUCTION/OVERVIEW

The control of hazardous energy sources, be it electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or gravity, must comply with OSHA Standards 1910.147 and 1926.417. The purpose of this chapter is to present the uniform procedures employees must follow to ensure that the proper requirements for the LOTO of potentially hazardous energy sources have been met before any work or inspections are performed.

There are certain servicing operations which, by their very nature, must take place without de-energization, such as operational testing and troubleshooting of machines or equipment. Locking out or tagging out cannot be performed during those operations, since both lockout and tagout require that equipment be de-energized. Additionally, Lockout/tagout is not required when certain tasks are conducted during normal operations, such as minor adjustments or voltage reading requirements for inspections, when those activities do not increase the risk of injury to employees.

TRAINING REQUIREMENTS

1. Employees who may be exposed to these hazards will be trained in the implementation of this procedure by formal training programs and supplemented by Toolbox Talks. Certification of training is required under General Industry Standards (OSHA 1910.147.c.7).
2. Training of our personnel shall be conducted in accordance with OSHA Standard 1910.147. Retraining may be required when a given job description changes, when equipment changes, or when deficiencies or defects in the established procedures are discovered through inspections or audits.

3. Failure to comply with stated procedures shall subject an employee to disciplinary measures.

DEFINITIONS

Hazardous Energy - All types of energy that can operate machinery and equipment such as electricity, air, liquids, and steam. The application of steam under pressure for use in heating is capable of inflicting damage and/or injury and is subject to lockout requirements.

Lockout Device - Any device that uses positive means such as a lock, either key or combination type, to hold the energy-isolating device in a safe position, thereby preventing the energizing or release of energy from machinery or equipment.

Tagout - The placement of a tagout device on energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed. Lockout and tagout devices must be substantial enough to minimize early or accidental removal. Locks must be substantial to prevent removal except by excessive force or special tools such as bolt cutters or other metal cutting tools. Locks and tags must clearly identify the employee and company who apply them. Tags must also warn against hazardous conditions if the machine or equipment is energized and must include a legend such as **DO NOT START, DO NOT OPEN, DO NOT ENERGIZE, DO NOT OPERATE.**

Energy-Isolating Device - Any mechanical device that physically prevents the transmission or release of energy. These include, but are not limited to, manually- operated, electrical circuit breakers, disconnect switches, line valves, and blocks.

Energy Control Procedure - A written document that contains those items of information an authorized employee needs to know in order to safely control hazardous energy during servicing or maintenance of machines or equipment.

Energy Control Program - A program intended to prevent the unexpected energizing or the release of stored energy in machines or equipment. The program consists of energy control procedures, an employee training program and periodic inspections.

Authorized Employee - A qualified employee who performs servicing or maintenance on machines and equipment. Lockout or tagout is used by those employees for their protection.

Affected Employee - One who does not perform the servicing or implement the lockout but who works in the area where such service is being performed. This employee does not need to know how to perform lockout but must be able to recognize when lockout is being used, the purpose of this procedure, and the importance of not attempting to start- up or use equipment, which has been locked out.

Main Disconnect - The device that is used to isolate the piece of equipment

from its supply of energy.

Local Start/Stop Device - The control device located near the equipment that is used to start-stop that equipment.

Remote Start/Stop Device - Located away from and in some cases out of sight of the equipment it controls.

Steps for Applying Lock-Out / Tag-Out

1. **Notify** all affected persons that the equipment or systems are going to be shutdown, locked out / tagged out, and why.

2. **Shut down** the equipment or system by its normal procedure. Whenever possible control equipment or systems at a main control point such as an electrical disconnect or pneumatic / water / steam valve instead of a control switch.

3. **Disconnect** the energy source(s).

4. **Lock and tag** out the disconnect for the energy source(s).

5. **Release stored energy.** Make sure all stored energy is dissipated and that all moving parts have stopped. Some machinery takes several seconds to come to a complete stop after it is shut down.

6. **Check** to assure the equipment or system is de-energized. Ensure that no personnel are exposed. Try to start the equipment or system, using normal start- up procedures, to make sure all sources of energy are controlled. Caution: Remember to return all controls to the "off" position after this check.

NOTE: Do not enter an electrical enclosure unless trained and qualified to perform duties within such areas and aware of the potential hazard.

PROCEDURES FOR CONTROLLING ENERGY SOURCES

- Lockout / Tagout (LOTO) is the company's preferred method of energy isolation. Tagout alone should only be used when lockout devices cannot be installed. Tags are not a positive control method and allow the opportunity for equipment or a system to be turned on. Contact your Safety Department Representative prior to using Tagout alone to control energy sources as they can assist with

- finding potential lockout devices.

- Prior to starting work, each individual must verify that isolation and de- energization have been achieved. Examples of this verification process include, but are not limited to, visual inspection, blank list, and trying the start button.

- Electrical Lockout/tagout is required on jobs involving electrically driven equipment and/or electrical circuits. Jobs involving electric Lockout/tagout

include but are not limited to work on mechanical parts of pumps, compressors, fans, blowers, or other rotating equipment. Exceptions are noted for testing, troubleshooting machines or equipment.

  - Work on electric motors or power circuits.
  - Electrically operated valves, when valves need to be made inoperable for valve work or line work such as blanking.
  - Pipe work when electrically heat traced.
  - Elevator work.
  - Building circuits 110 Vac, 220 Vac, 440 Vac.
  - Scaffolding in and around fan areas.
  - Blanking of a pump or compressor.

- Suitable lengths of chain or cable lockout devices can be used to secure most valves. Handwheels can be secured by passing the chain through the handwheel and the valve yoke or around piping. Chain ends are snugged up with one or more locks through the links. A multi-person lockout hasp can also be used to secure the chain to allow more than one person to apply their LOTO. Plug type valves with handles will be secured with ball valve lockout devices.

- Chain operated valves must be secured so that the chain operator will not allow the valve wheel handle to open.

- Motor operated valves (MOVs) must have their source of power disconnected (e.g., air, hydraulic fluid, electrical supply must be disconnected).

- Blanks and blinds properly isolated mean the piece of equipment or system is separated from any energy source (e.g., air, water, steam, hydrocarbon products).

- A blank properly installed downstream of the isolating valve is an

- acceptable isolation method; actually, blanking is a preferred isolation method.

- If two block valves with a bleeder valve between the valves are between the source of the hazard and the piece of equipment to be worked on, and the valves hold securely, a blank is not required (double block and bleed). However, the two block valves (closed) and the bleeder valve (open) must be chained, locked and tagged in their respective positions. Inspect the bleeder valve to make sure it is open and not plugged with scale or sludge.

- If a block and bleed valve is between the source of the hazard and the equipment to be worked on, a blank is not required. The same requirements for double block and bleed outlined above must be followed.

- A break in line is a line disconnected or broken with steps taken to prevent material from passing through the break. Bleeder valves, if available, must be checked frequently to ensure it is open. All valves must be locked and tagged **Do Not Operate**.

GROUP LOCKOUT / TAGOUT

Before group work begins, the lockout procedure will be reviewed with each group member.

- One authorized employee will be designated as the lead person for the application of LOTO (typically the foreman).

- Each employee involved in LOTO must affix their own lock and tag to the machine, equipment, or system when work begins and remove it when work is completed. Each tag must have that person's name on it to identify whose it is. If large groups need to LOTO multiple pieces of equipment, a gang lockout box may be the best option to reduce the number of locks and tags necessary. Contact your Safety Department Representative if you need assistance with large group LOTO.

- If there will be more than one crew, department, or group involved in the activity, a single authorized employee must be designated to coordinate all affected workforces and to ensure continuity of protection.

SHIFT CHANGES

Many servicing and maintenance operations may extend across one or more work shifts. In such cases it is crucial that energy control procedures ensure that all hazardous energy is continuously maintained in a safe, controlled and de- energized condition.

1. The lock and tag of at least one employee on the arriving shift shall be applied before the locks and tags of the departing shift are removed.

2. The departing crew will inform the arriving crew of the status of the equipment and the work in progress.

STEPS FOR REMOVING LOCKOUT / TAGOUT

1. **Replace** all equipment and system guards, covers, and other safety protections back in place and remove all tools.

2. **Notify** all affected persons that the equipment or systems are going to be turned back on.

3. **Remove** lock(s) and tag(s) from the LOTO point(s). If group LOTO was performed, the lead person shall be the <u>last</u> to remove his lock and tag so they can verify everything is in acceptable condition before anything is turned back on. Only the person who applied the lock and tag is allowed to remove it.

   The only time a lock and tag may be removed by someone other than who applied it is when outstanding circumstances prevent an employee from returning to remove it themself and a piece of equipment or system must be turned back on. If this situation arises, the lock and tag needing removed may only be removed by the group lockout lead person or job foreman <u>and</u> only after the lead person or foreman has communicated with the original owner of the lock and tag to verify their work is complete and it is safe to remove the lock and tag.

4. **Check** the equipment or system one last time prior to re-energizing it to verify everything is secured and control switches are inappropriate, safe positions so the system can be re-energized.

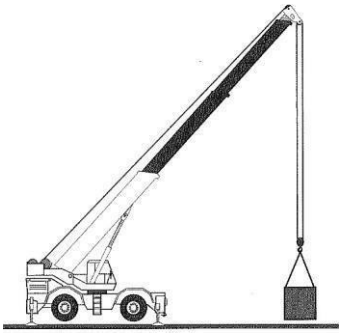
5. **Re-Energize** the equipment or system using normal start-up procedures.

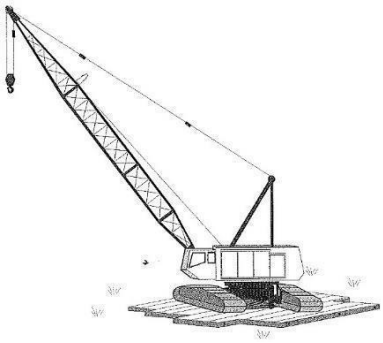
II. Periodic Inspections

An Authorized Employee other than (Alexander Mechanical's) utilizing the energy control procedures being inspected will periodically inspect the procedures to ensure that the requirements are being followed.

Periodic inspections will be performed at least annually. This inspector will correct any deviations or inadequacies identified during the inspection. The inspector will review with (Alexander Mechanical) Authorized Employee (Safety Officer) responsibilities under the energy control procedures being inspected.

Chapter 10: CRANES & RIGGING QUICK FACTS





Do…	Do Not…
Know the weight of all loads	Assume a crane or piece of rigging has adequate capacity
Inspect cranes & rigging prior to use	Enter the swing radius of a crane while it is in operation
Use a tagline to control loads (unless a greater hazard is created)	Position yourself between a load and other objects
Have a trained and designated signal person	Use damaged rigging or other equipment
Use the appropriate rigging hitch to provide adequate load control	Walk or stand under a load at any time
Complete a lift plan	Rely solely on a crane company to perform a safe lift; be active in planning

Cranes & Rigging Planning Guide

Risk Assessment	Potential Hazards	Action/Control
1. Crane selection	Tip over or structural failure of crane	Know load weights, communicate with crane company, discuss & understand crane capabilities
2. Crane set-up	Tip over, structural failure, caught between, overhead loads.	Know what the crane is sitting on top of (underground utilities, tunnels, etc.), understand the boom configuration & counter-weight installed to ensure the correct load chart is being used, plan your swing path, guard the swing radius
3. Rigging selection	Rigging failure, caught between, falling loads	Ensure rigging has adequate capacity for items to be rigged, do not load in excess of its recommended safe working load, get correct rigging, inspect rigging before use to verify acceptable condition, destroy & dispose of damaged rigging, and when not in use shall be removed from the immediate work area
4. Rigging the load	Rigging failure, falling loads, rigging damage,	Use rigging hitches that provide the greatest load control, ensure load is secure and items will not come loose, use a tag line on all loadsto provide a control point
5. Hoisting the load	Overhead and falling loads, damage to rigging or the load	Stay out from under loads being hoisted at all times, stay out from between the load and other objects, provide clear signals to the crane operator from a designated signal person, use tag lines to control the load
6. Setting the load	Caught between, strains / sprains	Stay out from under the load, do not muscle the load – have the crane move it, communicate with all helping before final placement
7. Crane signals	Miscommunication, damage load / building, injuries	Clarify signals with operator, signal clearly so the operator can see / hear you, give the operator distances when possible

INTRODUCTION/OVERVIEW

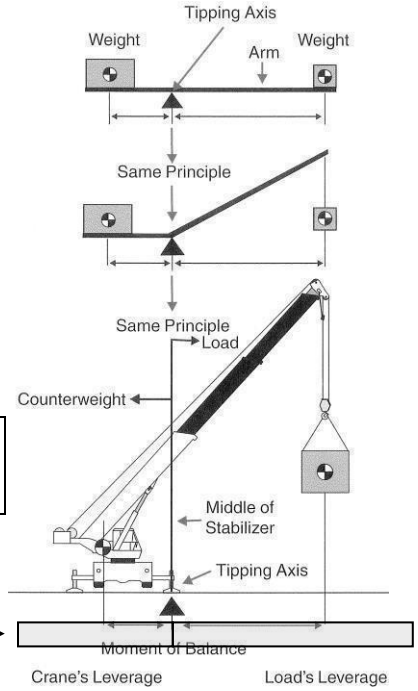
Alexander Mechanical employees take part in material handling with cranes & rigging to varying degrees. The mishandling of materials and misuse of hoisting equipment is a significant hazard and is the cause of many accidents and injuries in the workplace. Whenever possible, mechanical means should be used to move materials in order to avoid employee injuries such as muscle pulls, strains, and sprains. Cranes are commonly used to handle large pieces of equipment such as roof top units, while rigging is frequently used in a variety of material handling and hoisting applications. This manual section will assist with the selection, set up, and use of crane and rigging equipment.

Cranes support our ability to efficiently perform work. They are generally the largest, most expensive, and most critical pieces of hoisting equipment we work with and have the most catastrophic results when an accident occurs. Knowledge of crane basics is critical to all who work with or around them to ensure they are managed effectively. The following is an overview of cranes that will assist with obtaining the appropriate crane for the task and working safely with them on the job.

BASIC PRINCIPLES OF CRANES

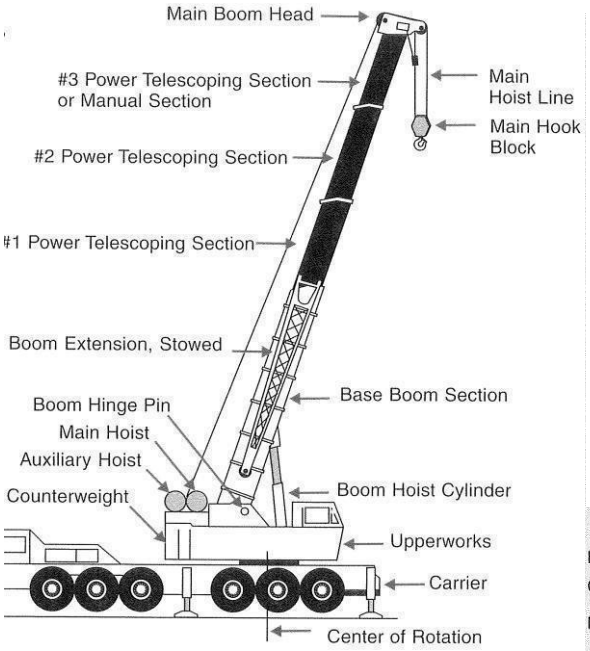
Cranes operate on the basic principle of leverage, similar to a playground titter-totter. If the leverage on the load side of a tipping axis is greater than the leverage on the crane side, the crane will tip over. Also hazardous with cranes is the possibility of structural failure due to overloading. All cranes have load charts that must be used to identify safe operating capacities. Load charts will be explained shortly in the "Crane Operations" section.

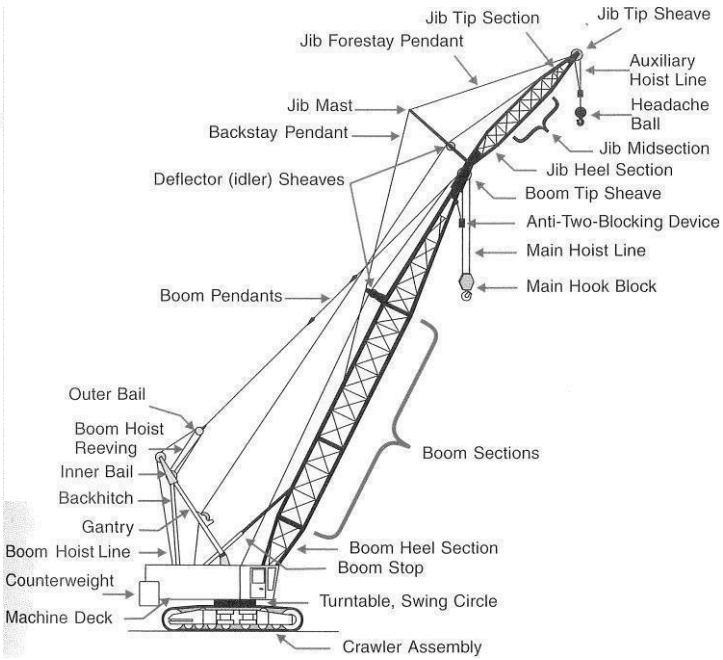
Leverage = weight x distance *(from tipping axis to center of gravity of the load)*

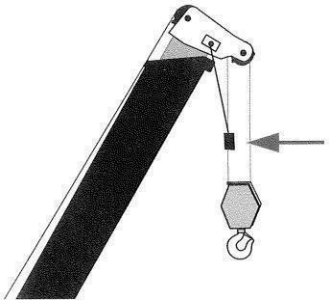


BASIC CRANE TYPES & PARTS

Cranes operate on a simple principle (leverage) but are elaborate configurations of structures, cables, and drive trains. Cranes have varying levels of mobility and function depending on their design. Commonly used cranes may have rough-terrain tires, all- terrain tires, or crawler tracks. Booms are typically a power telescoping boom or a fixed length lattice type. Below are two cranes to help identify common parts.





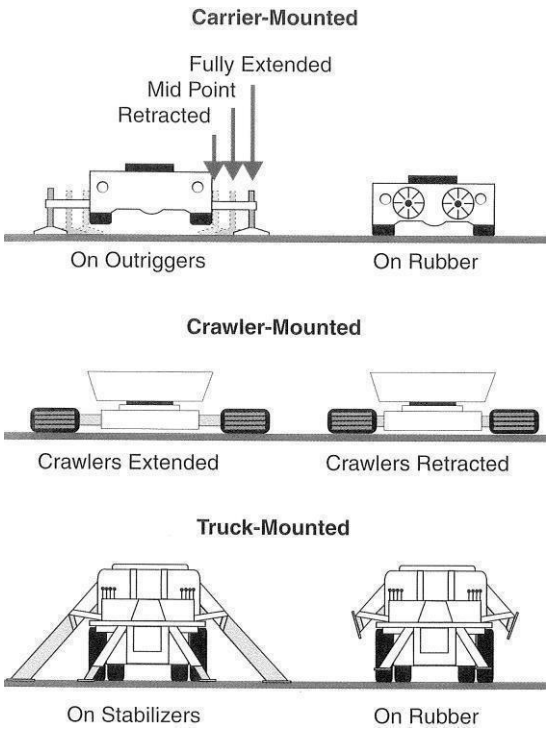


critical crane safety component that is required on <u>ALL</u> cranes utilized Alexander Mechanical is an anti-two-block device. An anti-two-block is device safety component that either shuts down the boom/hoist line ions or sounds an alarm at the operator's controls when the headache or load block is about to contact the boom tip. Anti-two-block devices and will continue to prevent numerous crane accidents related to

m & hoist line functions.

CRANE SET-UP

Cranes are dynamic pieces of equipment and can often be set-up in many different configurations depending on use and environment. Identified below are some important set-up factors that need to be considered when renting/utilizing a crane. 3rd party cranes will be required to provide their own A/D Director, which will be verified and documented by the Alexander Mechanical Foreman prior to crane set-up.



n a crane is setting up for work, one of the first factors considered is what will support it during work. Even minor rigging of a crane can significantly reduce its capacity and possibly lead to a crane overturning.

Ensure sub-surface utilities, backfilled soils, and other non-visible components are considered and communicated with the operator.

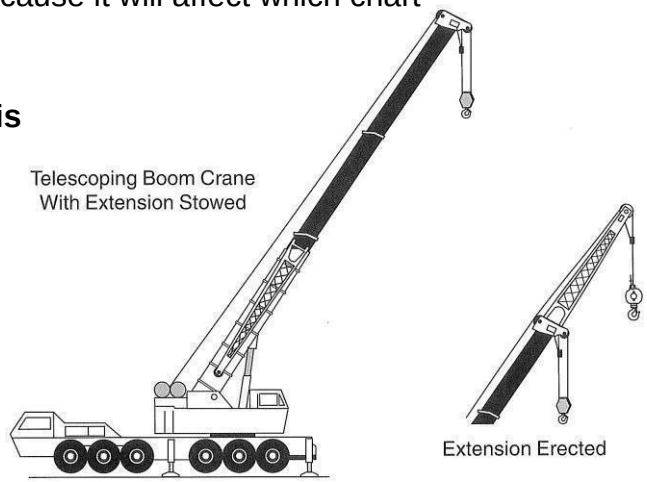
Operators need to use cribbing, mats, or plates or outrigger pads to increase stability and prevent ng.

note, as shown to the left, that crane outriggers and stabilizers can be set-up in several different configurations. This is important to understand because it will affect which chart

the o

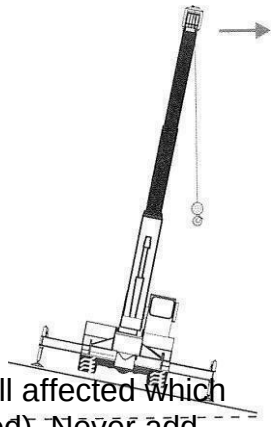
e is

affected).



Crane booms, similar to outriggers and tracks, ca be configured in different lengths and with different attachments. Again, this is important because it will affect which load chart the operator uses (i.e. capacity of the crane is affected

Also important to a crane's capacity is how level the crane is. It is the operator's responsibility to level the crane, but it needs to be understood our employees that cranes out of level, generally more than 1%, need to have lifting capacities de- rated per the manufacturer's instructions. Ensure the crane is level or capacity has been de-rated.



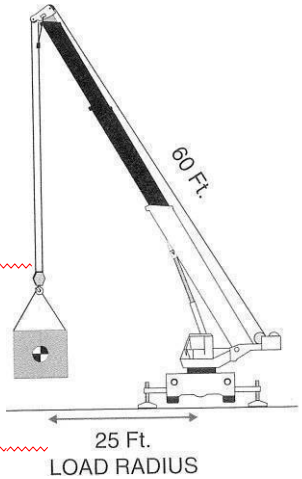
Another critical set-up factor for cranes is the amount of counterweight connected to the crane. Nearly all cranes have the ability to operate with different amounts of counterweight.
Differences in the amount of counterweight installed on a crane will affected which load chart the operator will use (i.e. capacity of the crane is affected). Never add extra counterweight to a crane or hold it down with other equipment in an attempt to increase capacity, structural failure of the crane can occur.

When a crane is set up for operation, the operator is required to protect the swing radius of the crane to prevent workers being struck by the rotating structure. Swing radius protection can be achieved using danger tape, rope, cable, or other physical barriers.
Additionally, the operator is required to inspect the crane prior to hoisting any loads including a test of the anti-two block device.

CRANE OPERATIONS

Operating a crane is a complex task and it is necessary to understand basic factors to ensure safe and successful hoisting.

The primary factor to ensure a crane does not tip over or have a structural failure during operation is to <u>operate within the capacity of the crane per the appropriate load chart</u>.
As previously mentioned, the crane's set-up dictates which load chart will be used.
Once using the appropriate load chart, the <u>load radius</u> (i.e. distance from the crane pivot pin to where the load is being set) will determine the crane's capacity.



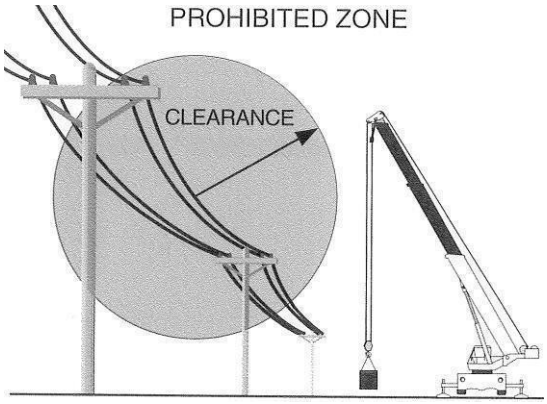
Radius in Feet	Main Boom Length in Feet (Power Pinned Fly Retracted)				
	36	44	52	60	68
10	130,000 (67)	106,700 (71.5)	101,600 (74.5)	100,000 (77)	96,700 (79)
12	120,000 (63)	106,700 (68.5)	101,600 (72)	96,500 (75)	87,850 (77)
15	103,450 (57.5)	103,450 (64)	95,300 (68.5)	84,900 (72)	79,180 (74.5)
20	80,650 (47)	80,650 (56.5)	80,650 (62.5)	70,550 (68.5)	64,310 (70)
25	62,200 (34)	62,200 (48)	62,200 (55.5)	60,150 (61)	54,000 (65.5)
30		48,450 (38)	48,450 (48.5)	48,450 (55.5)	46,650 (60.5)
35		39,500 (24.5)	39,500 (40.5)	39,500 (49.5)	39,500 (55.5)
40			31,220 (30.5)	31,220 (42.5)	31,220 (50)
45			24,800 (14.5)	24,800 (34.5)	24,800 (44)

<u>Prior</u> to each lift using a crane, the Lift Plan Template should be completed by foreman, project manager, or other person in charge along with the crane operator. The template is intended to help identify weights, crane capacities,

and the lift path so all parties are communicating for a safe and productive lift. Planning of each lift is critical to ensure operations are completed safely and efficiently. The Lift Plan Template is located in Appendix A at the end of this section (Chapter 10, page 22).

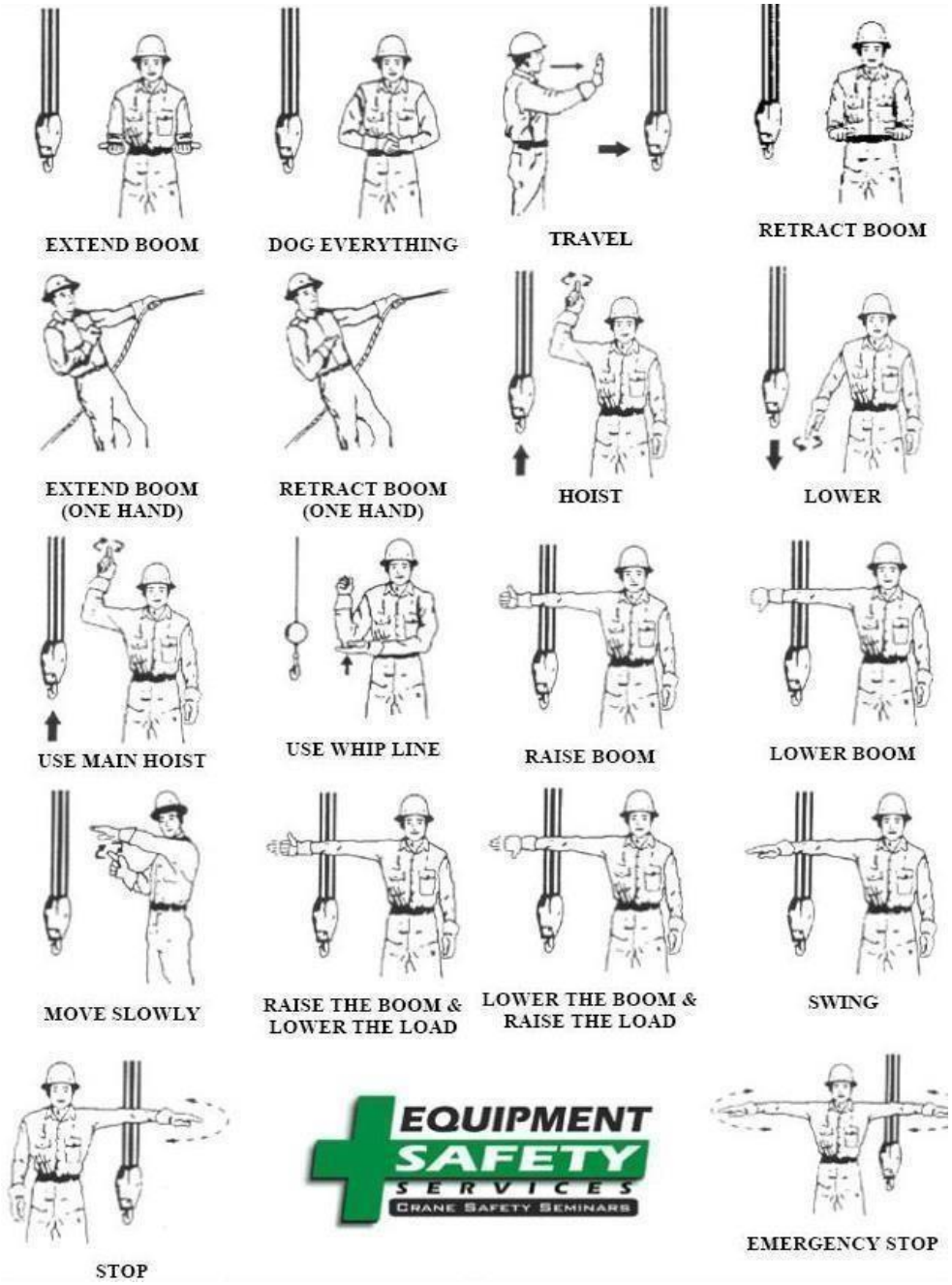
The following minimum clearance distances are required from overhead power lines at all times while the crane is in operation. If there is a need to operate within these minimum clearance distances the lines must be de-energized and grounded by the utility provider. Call your Safety Department Representative for further assistance.

Required clearance distances from overhead power lines	
Up to 50kV	10 feet
Over 50kV to 200kV	15 feet
Over 200kV	Contact Safety Depar tment



- Tag lines will be used on all loads unless their presence creates a greater hazard. Tag lines should be attached to the load to keep it from rotating and swinging out of control during the lift.
- Use the number of tag lines and properly trained tag line operators that are necessary to control the load safely.
- Make sure that all tag line operators and anyone else in the lift area is wearing a hardhat.
- Do <u>not</u> wrap the tag line around your body, arm, hands, or other or you may be injured by unexpected movement of the load.

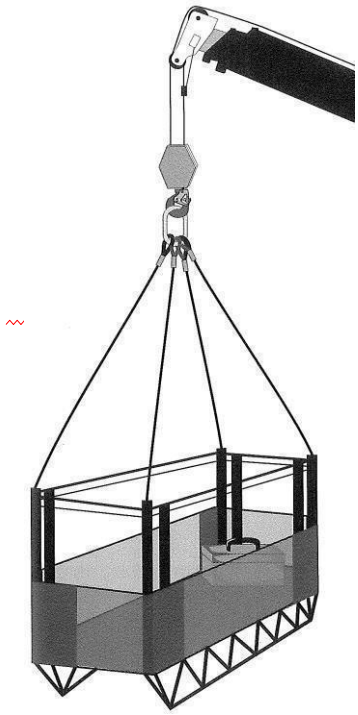
- Signals to the crane operator will be given by one designated person who has met the Qualification Requirements of OSHA 1926.1428(c) and deemed competent by Alexander Mechanical according to OSHA 1926.1419-1421. Below is a table of standard crane hand signals that are to be used when communicating with a crane operator.
  - Any person may give the emergency stop signal if an emergency is recognized while making a lift to stop the hoisting activity.
  - Review crane signals with the crane operator prior to the lift to ensure consistent communication


EXTEND BOOM
DOG EVERYTHING
TRAVEL
RETRACT BOOM
EXTEND BOOM (ONE HAND)
RETRACT BOOM (ONE HAND)
HOIST
LOWER
USE MAIN HOIST
USE WHIP LINE
RAISE BOOM
LOWER BOOM
MOVE SLOWLY
RAISE THE BOOM & LOWER THE LOAD
LOWER THE BOOM & RAISE THE LOAD
SWING
STOP
EQUIPMENT SAFETY SERVICES
CRANE SAFETY SEMINARS
EMERGENCY STOP

HOISTING EMPLOYEES IN A PERSONNEL PLATFORM

Hoisting personnel using a crane man basket is a last resort option for accessing work, only after all other safe access possibilities have been exhausted. If it is determined that using a personnel platform is the only safe method of access, the following requirements must be followed:

- Only personnel platforms designed and manufactured for hoisting of personnel may be used which are required to:
  - Maintain a strength design factor of 5:1
  - Have a suspension system to minimize tipping (i.e. 4-leg rigging bridle for a square personnel platform)
  - Be equipped with guardrails including a mid-rail, toe board, and mesh or solid plate between the floor and the mid-rail.
  - Be equipped with a grabrail inside of the guardrail
  - Have a permanently attached identification plate showing the platform weight and capacity
  - Have an inward swinging access gate (if equipped with a gate)



- Crane used for hoisting a personnel platform must:
  - Be equipped with a positive-acting anti-two- block device (i.e. crane hoisting functions will stop if two-block is contacted)
  - Be equipped with a boom angle indicator
  - Have controlled lowering capabilities (i.e. no free fall allowed)
  - Have hoist lines able to lift 7 times the max intended load (standard line) or10 times the max intended load (rotation resistant line)
  - Have all capacities in the load chart for how the crane is set up de-rated by 50% (i.e. all capacities in load chart must be halved)
  - Have a lockable hook latch on the headache ball/load block or have the ability to secure/wire the hook latch in the closed position.

- Rigging utilized for hoisting a personnel platform must:
  - Not ever be used for any other purpose
  - Have a master link or shackle for even load distribution
  - Have wire rope eyes fabricated with thimbles

- Have lockable latches on hooks

- Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service. Before hoisting any personnel, a proof test and trial lift must be completed to the following requirements:
  - Proof test must be performed at each new set-up location with 125% of the personnel platform capacity, evenly distributed, and held suspended in the air for at least 5 minutes (this verifies no problems will occur when in use)
  - Trial lift, which can be combined with the proof test, required the basket to be positioned at each work location by the crane operator (practice for the operator at placing the personnel platform)
- Personal fall arrest must be utilized by all persons in the platform. Utilize a manufacturer's designated anchor point on the personnel platform or anchor to a fall protection strap placed in a choke configuration above the headache ball.

- Hooks used in the connection between the hoist line and the personnel platform (including hooks on overhaul ball assemblies, lower load blocks, bridle legs, or other attachment assemblies or components) must be: a) Of a type that can be closed and locked, eliminating the throat opening. b) Closed and locked when attached.

- Constant communication via radio must be maintained at all times between the operator and the personnel platform occupants.

- Before any personnel are allowed to leave the personnel platform (at an elevated position) the operator must be notified, and the platform must be secured to the structure (unless unsafe to do so). Individuals exiting the basket must maintain 100% fall protection at all times including while transferring.

- While a personnel platform is in use, no lifts may be made with the crane's other hoist line, no exceptions.

- No personnel are allowed to be in a personnel platform while a crane is traveling.

- The requirement for safety latches (AKA throat latches) is only specified in OSHA 1910.18(j)(2)(ii), which states that "Safety latch type hooks shall be used wherever possible."
- OSHA compliance officers may use the OSHA general duty clause identified as paragraph 5(a)(1) of the Williams-Steiger Act whenever a hazard is created by a

- hoisting operation where the hoist is not provided with a throat latch. The compliance officer may support the 5(a)(1) citation by calling attention to 1910.181.(j)(2)(ii).
- A second alternative would be to cite the general duty clause 5(a)(1) and support it with the industry practice
- where the use of safety or throat latches is fairly common

RIGGING

Rigging is the application of various components to hoist materials, equipment, or other objects with the help of a crane, forklift, chain fall, or other hoisting device. Components include a variety of equipment including slings made of wire rope, chain, or synthetic fibers; it also includes extra hardware such as shackles, hooks, spreader bars and other specialty pieces. Following good rigging practices will ensure the safety of employees and of items being hoisted. Only trained and authorized employees who have received training outlined in OSHA 1926.753 and 1926.1400 and are considered Qualified Riggers and will be deemed competent to perform rigging duties in the assembly/disassembly process or to attach/detach lifting equipment to loads or lift loads.

Slings are generally one of 4 types: chain, wire rope, synthetic web, or synthetic round. Each type has its own particular advantages and disadvantages. Factors that should be taken into consideration when choosing the best sling for the job include the size, weight, shape, temperature, and sensitivity of the material to be moved, as well as the environmental conditions under which the sling will be used.

- Visually inspect all pieces of rigging equipment before use and use them within their stated working load limits (WLL).

CHAINS

Chains are commonly used because of their strength and ability to adapt to the shape of the load. Misuse of chain slings could damage the sling, resulting in sling failure and possible injury to an employee.

- Only chains specifically designed and tagged for lifting shall be used for such purposes. When inspecting chain slings, pay special attention to any stretching, deformity, or wear of links as well as for any nicks and gouges.

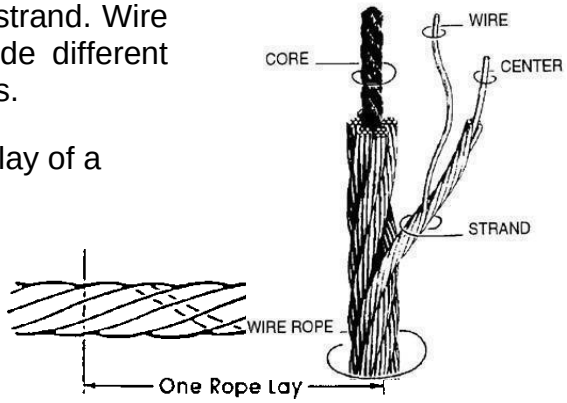
- A manufacturer's tag with rated capacity must be permanently attached.

- Chain slings are the best choice for lifting materials that are very hot. They can be heated to temperatures of up to 1000°F; however, their WLL may need to be reduce if exposed to consistent high heat situations; consult the manufacturer.

- Chain slings and accessories must never be welded on or modified.

WIRE ROPE

A second type of sling is made of wire rope. Wire rope is composed of individual wires that have been twisted to form strands. The strands are then twisted to form a wire rope often around a core strand. Wire rope slings have different construction to provide different levels of flexibility, strength, and use requirements.



Wire rope may be further defined by the lay**.** The lay of a wire rope can mean any of three things:

1. *One complete wrap of a strand around the core.* See figure to the right.

2. *The direction the strands are wound around the core.* Wire rope is referred to as right lay or left lay. A right lay rope is one in which the strands are wound in a right- hand direction like a conventional screw thread (see figure to the right) and left is opposite.

Right Lay

3. *The direction the wires are wound in the strands in relation to the direction of the strands around the core.* In regular lay rope, the wires within the strands are laid in one direction while the strands in the rope are laid in the opposite direction. In lang lay rope, the wires within the strands are laid in the same direction as the strands in the wire rope are laid. See figure below.

Right Lay, Regular Lay

Right Lay, Long Lay

Left Lay, Regular Lay

Left Lay, Long Lay

WIRE ROPE SLING SELECTION

When selecting a wire rope sling to give the best service, there are four characteristics to consider: strength, ability to bend without distortion, ability to withstand abrasive wear, and ability to withstand abuse.

- **Strength** - The strength of a wire rope is a function of its size, grade, and construction. It must be sufficient to accommodate the maximum load that will be applied. The working load limit (WLL) is the maximum amount of weight the sling is designed to lift and is designated by the manufacturer. **WLLs are NEVER to be exceeded at any time; your safety will be at risk.** WLLs are listed with a design factor in mind to compensate for abuse, misuse of equipment, mis- calculation of weights, etc. Again, WLLs of any rigging equipment are NEVER to be exceeded.

- **Fatigue** - A wire rope must have the ability to withstand repeated bending without the failure of the wires from fatigue. It often occurs when wire ropes make small radius bends. The best means of preventing fatigue failure of wire rope slings is to use blocking or padding to increase the radius of the bend.

- **Abrasive Wear** - The ability of a wire rope to withstand abrasion is determined by the size, number of wires, and construction of the rope. Smaller wires bend more readily and therefore offer great flexibility but are less able to withstand abrasive wear. Conversely, the larger wires of less flexible ropes are better able to withstand abrasion than smaller wires of the more flexible ropes.

- **Abuse** - All other factors being equal, misuse or abuse of wire rope will cause wire rope slings to become unsafe long before any other factor. Abusing a wire rope sling can cause serious structural damage to the wire rope, such as kinking or bird caging which reduces the strength of the wire rope. (In bird caging, the wire rope strands are forcibly untwisted and become spread outward.) Therefore, in order to prolong the life of the sling and protect the lives of employees, the manufacturer's suggestion for safe and proper use of wire rope slings must be strictly adhered to.

Wire Rope "Bird Cage"

WIRE ROPE SLING INSPECTION

All slings and hardware must be visually inspected before each use. Wire rope slings should be inspected before each day's use and removed from service if the following conditions exist:

- If ten randomly distributed wires in one lay length are broken, or five wires in one strand of a rope lay are damaged
- If there are any broken wires within one lay length of end fittings or any wires are broken in the wire rope core
- If a wire rope is kinked causing the outer strands to be flattened and pushed into the wire rope core area (similar to a folded piece of cardboard)
- If any indication of heat damage such as welding or blue or brown coloring from excessive heat
- If the wire rope displays heavy corrosion (such as rust damage)
- If there is a reduction in wire rope diameter by more than 1/3
- If accessories such as collars, hooks, master links, etc. are damaged, stretched, or displaced

Wire Rope Field Lubrication and Storage

Although every rope sling is lubricated during manufacturing, to lengthen its useful service life it must also be lubricated in the field. There is no set rule on how much or how often this should be done. It depends on the conditions under which the sling is used. The heavier the loads, the greater the number of bends, or the more adverse the conditions under which the sling operates, the more frequently lubrication will be required.

Wire rope slings should be stored in a well-ventilated, dry building or shed. Never store them on the ground or allow them to be continuously exposed to the elements because this will make them vulnerable to corrosion and rust. And, if it is necessary to store wire rope slings outside, make sure that they are set off the ground and protected.

Synthetic Web Slings

Synthetic web slings are created with woven fibers to come in a variety of lengths and having a loop or “eye” on each end of the sling. Synthetic web slings offer a number of advantages and flexibility for our rigging purposes.

- Synthetic slings must have a permanently attached and legible capacity tag

with the working load limits (WLL). Width, thickness, and color of synthetic web slings must never be used as an indicator of a WLL; only reference capacity tags when using synthetic web slings!

Synthetic web slings offer the following qualities:

- Flexibility – can conform to any shape or contour to hold a load tight.
- Load protection – will not mar, deface, or scratch highly polished or delicate surfaces.
- Long life – have some resistance to mildew, rot, or bacteria and have good abrasion resistance.

Synthetic web slings must be inspected prior to each day's use and removed from service if any of the following conditions exist:

- If the sling capacity tag is missing or cannot be read
- If any type of chemical or heat burns are present (may be visible or the synthetic websling may feel stiff or crunchy)
- If more than 10% of the synthetic web sling's cross-sectional area has been affected by a cut, abrasion, pinching, snags, etc. or if a cut exposes a manufacturer's colored warning thread.
- If there is an appearance of stretching of the synthetic fibers
- If the surface of the sling is heavily damaged from abrasion that looks like peeling or a bunch of fluffy fibers
- If there are broken or worn stitches.
- If there has been any type of modification or repairs
- If any attached fittings are bent, modified, appear to be heat damaged, or heavy abrasion.

Synthetic Round Slings

Synthetic round slings are an endless loop sling (no end "eyes") created with a woven fiber core and an outer protective sleeve. Synthetic round slings offer a number of advantages and flexibility for our rigging purposes.

- Synthetic round sling must have a permanently attached and legible capacity tag with the working load limit (WLL). Color of synthetic round slings must never be used as an indicator of a WLL; only reference capacity tags when using synthetic web slings!

Synthetic round slings offer the following properties:

- Flexibility - can conform to any shape or contour to hold a load tight
- Load protection - will not mar, deface, or scratch highly polished or delicate surfaces.
- Long life – An outside covering protects the internal, structural core yarns allowing for high resistance to abuse and a long life

Synthetic round slings must be inspected prior to each day's use and removed from service if any of the following conditions exist:

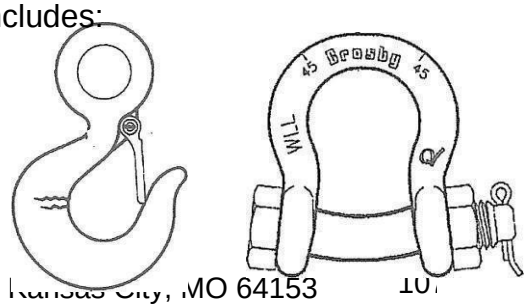
- If the sling capacity tag is missing or cannot be read
- If there has been any type of modification or repairs
- If the exterior cover is damaged to the point of exposing the core yarns
- If the yard core feels like it is overly dense or bunched up in one or two spots
- If there is a knot in the sling that cannot be removed or has cause permanent distortion
- If any type of chemical or heat burns are evident on the sling cover or core
- If any attached fittings are bent, modified, appear to be heat damaged, or have heavy abrasion

RIGGING ACCESSORY HARDWARE

Rigging accessory hardware, we use may vary widely but most regularly will include lifting eyes, hooks, shackles, and spreader bars. Just like slings and chains, all accessory hardware we use must be designed for overhead lifting and rated to identify the working load limit (WLL). Every piece of accessory hardware must be marked in some fashion to identify the WLL (exception is eye bolts designed for overhead lifting which are not generally marked, rather load rating is based off shank diameter). The WLL of accessory hardware is often identified in tons (i.e. WLL 3T). 1 ton is equal to 2,000 pounds.

Similar to slings, accessory hardware must be visually inspected prior to use. Key items to look for when inspecting accessory hardware includes:

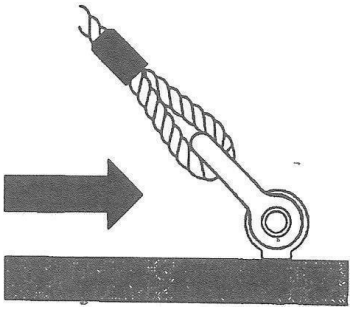
- Designed load ratings must be present and legible (e.g. WLL).
- Excessive wear of components.



- Look for cracks or deformities.

- Missing pieces such as a self-closing latch on a hook or a cotter pin on a bolttype shackle.

- Any modifications to equipment including replacement of the manufacture's shackle pin with a standard bolt (not allowed) or welding on a piece of hardware (can modify the manufacturer's heat tempering of the metal and cause hardware to fail; remove from service immediately).



The following are some basic rigging hardware use requirements that must be followed:

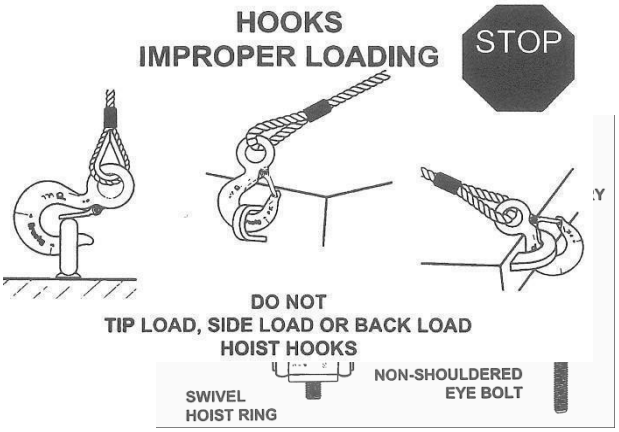
- Be sure all hardware being used for overhead lifting is designed for this purpose and has a known and adequate weight capacity for the task. Eye bolts used for lifting are particularly important because they are rarely marked with a lifting capacity; purchase only from reputable rigging suppliers who can verify eye bolts are designed for overhead lifting, testing, and capacities.

Use only shouldered eye bolts if there will be any type of angular load applied during a lift. Ensure eye bolt capacities are de-rated per the manufacturer's specifications for the angle at which they are being pulled.

- Align eye bolts so any angular pull is in the plane of the eye (see picture to theright).

- Ensure screw-type shackles pins are snugged up hand tight and bolt-type shackles pins are being used with a cotter key to retain the nut.

- Ensure loads on hooks are positioned in the base of the hook. Do not tip load, side load, or back load a hook as failures can occur.



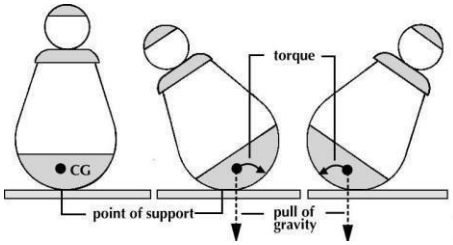
SAFE RIGGING PRACTICES

Once the sling has been selected (based upon the characteristics of the load and the environmental conditions surrounding the lift) and inspected prior to use, the next step is learning how to use it **safely.** There are four primary factors to take into consideration when safely lifting a load including:

1. the size, weight, and center of gravity of the load
2. the rigging hitches to be used and each sling's capacity for hitches to be used
3. the number of sling legs to be use and the angle the slings make with the horizontal plane

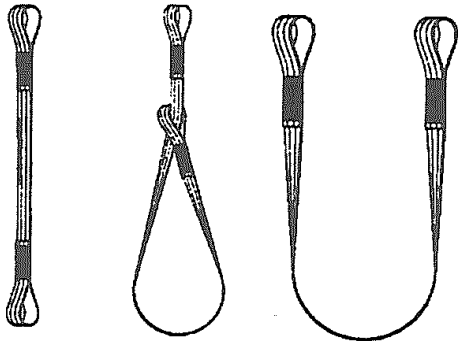
SIZE, WEIGHT, AND CENTER OF GRAVITY OF THE LOAD

The center of gravity (CG) of an object is that point at which the entire weight may be considered as concentrated. In order to make a level lift, the crane hook must be directly above this point. While slight variations are usually permissible, if the crane hook is too far to one side of the center of gravity, dangerous tilting will result in causing unequal stresses in the different sling legs.



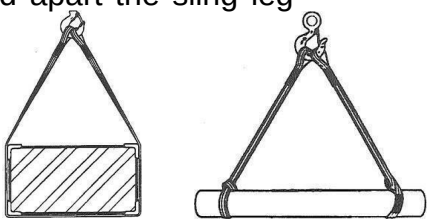
RATED CAPACITY OF SLINGS & RIGGING HITCHES

Slings can be configured in 3 basic hitches including a vertical leg, a choke, and a basket. All slings have capacities designated by the manufacturer for each of these 3 basic rigging hitches and must have a tag on the sling indicating those capacities. All capacities provided by the manufacturer are figured assuming the legs of each hitch (vertical, choke, basket) are 90 degrees from the horizontal (see figure to right).



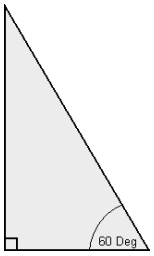
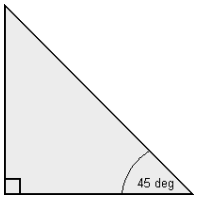
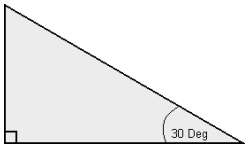
Vertical Choke Basket

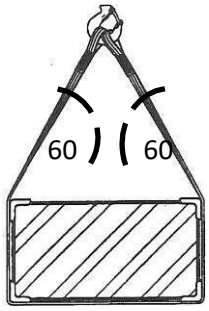
Choke and basket hitches are only occasionally used with hitch legs 90 degrees from horizontal in our work. Most often a basket hitch is used around an object and the sling eyes are connected back to the crane hook placing the sling legs at angles less than 90 degrees from the horizontal. In addition, it is common to use multiple choke hitches on a pipe or a bundle of material for improved load control. When the 2 choke hitches are used together and are spread apart the sling leg angles are less than 90 degrees from horizontal which places increased tension on the legs (see images to right). Any time sling legs are used at angles less than 90 degrees from horizontal there is increased sling tension due to vector forces. Due to increased sling tension, sling capacities need to be de-rated as noted in the following table.



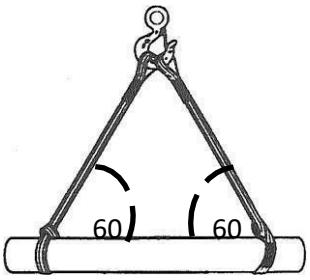
NUMBER OF SLING LEGS AND ANGLE FROM THE HORIZONTAL

As the angle formed by the sling leg and the horizontal plane decreases, the rated capacity of the sling also needs to be de-rated because of the increased tension on the sling legs. The smaller the angle between the sling leg and the horizontal, the greater the stress on the sling leg and the smaller (lighter) the load the sling can safely support. The effect is the same whether a single sling is used in a basket hitch or multiple slings are used. Any time slings are used at any angle other than vertical the following tables can be used to guide you to approximate de-rated capacities. Contact your safety department representative if there are any sling capacity questions.

Capacity reductions for sling angles less than 90 degrees from horizontal. *Capacity reduction is per sling used, see examples below.	Angle	60 degrees	45 degrees	30 degrees
	Reduction Multiplication Factor	0.85 (i.e. 85%) 	0.70 (i.e. 70%) 	0.50 (i.e. 50%) 



Example #1: A sling is set up in a basket hitch around an item. The capacity tag on the sling indicates a vertical hitch capacity of 4,400 lbs., a basket hitch capacity of 8,800 lbs., and a choke hitch capacity of 3,200 lbs. The basket hitch around the item has horizontal sling angles of 60 degrees (see right). Multiplying the "reduction multiplication factor" from the capacity reduction table above (0.85 for 60 degree angles) by the sling basket hitch capacity of 8,800 lbs. (from the capacity tag) we get an actual basket hitch capacity of 7,480 lbs. when used in this 60 degree angle configuration.



Example #2: Two slings are used in choke hitches around a bundle of pipe. The capacity tag on each sling indicates a vertical hitch capacity of 4,400 lbs., a basket hitch capacity of 8,800 lbs., and a choke hitch capacity of 3,200 lbs. The slings around the pipe bundle have horizontal sling angles of 60 degrees (see right). Multiplying the "reduction multiplication factor" from the capacity reduction table above (0.85 for 60-degree angles) by the sling choke hitch capacity of 3,200 lbs.
(from the capacity tag) we get an actual choke hitch capacity of 2,720 lbs. per sling when used in this 60-degree angle configuration. Total lifting capacity of the two slings combined is 5,440 lbs. (2,720 lbs. x 2).

PROPER CARE AND USAGE OF SLINGS

Proper care and usage are essential for maximum service and safety. Slings are also subject to damage resulting from contact with sharp edges, slings must be protected from sharp bends and cutting edges by means of cover saddles, padding, or wood blocking, as well as from unsafe lifting procedures such as overloading.

Before making a lift, check to be certain that the sling is properly secured around the load and that the weight and balance of the load have been accurately determined. If the load is on the ground, **do not** allow the load to drag along the ground. This could damage the sling. If the load is already resting on the sling, ensure that there is no sling damage prior to making the lift.

Next, position the hook directly over the load and seat the sling squarely within the hook. This gives maximum lifting efficiency without bending the hook or over stressing the sling.

After the sling is properly attached to the load, there are a number of good lifting techniques that are common to all slings:

- Make sure that the load is not lagged, clamped, or bolted to the floor.

- Guard against shock loading by taking up the slack in the sling slowly. Apply power cautiously so as to prevent jerking at the beginning of the lift and accelerate or decelerate slowly.

- Check the tension on the sling. Raise the load a few inches, stop, and check for proper balance and that all items are clear of the path of travel. Never allow anyone to ride on the hood or load.

- Keep all personnel clear while the load is being raised, moved, or lowered. Crane or hoist operators should watch the load at all times when it is in motion.

- Finally, obey the following **NEVERS**:
    - Never allow more than one person to control a lift or give signals to a crane or hoist operator except to warn of a hazardous situation.
    - Never raise the load more than necessary.
    - Never leave the load suspended in the air longer than necessary
    - Never work under a suspended load or allow anyone else to do so. All employees shall be kept clear of loads about to be lifted and clear of suspended load.

Chapter 11: ELECTRICAL SAFETY

(1) Electrical Planning Guide

Work Aspects	Potential Hazards	Action/Control
Locating a power source	Incorrect voltage or current rating, environmental conditions	Utilize power sources that coincide with tool and equipment ratings, avoid power sources that expose you to other hazards (trips, falls, chemical, etc.), if it looks dangerous – stay away.
Connecting to a power source	Circuit protection Vs. personal protection, exposure to energized electrical parts	Use a ground fault circuit interrupter (GFCI) at all times at the power source, test your GFCI before each use, connect only to power sources with equipment grounding
Getting power to your work location	Cord routing, cord damage, hazards to others	Avoid running cords on the floor or in walkways, protect cords from foot and equipment traffic, avoid passing cords through doors and windows – protect by rigid means if necessary, position cords as to not cause hazard (trips, falls, etc.) to others
Using electricity for work	Electrical shock, falls, tripping,	Ensure corded electrical tools have a grounding conductor or are double-insulated, inspect tool and cord condition, route cords as to not present a trip hazard to you or others
Maintaining electrical tools and cords	Electrical shock, tool malfunction,	Inspect cords and tools daily prior to use, review cords for missing grounding pins, damaged plug prongs, pulled strain relief, and damaged cord sheathing, verify proper tool operation, tag damaged tools out of service until repaired

INTRODUCTION/OVERVIEW

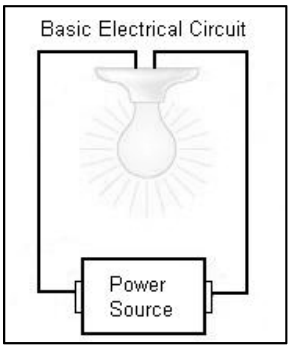
Electricity is one of the most commonly used energy sources to complete work in the construction industry, and it is also one of the most dangerous. Injuries such as burns (both internal and external) from electrical shock and fatalities from electrical shock (electrocution) are common to all construction workers, not just electricians. Electrical systems can also cause fires in addition to injuries. The hazards of electricity are often not easily recognized because they are essentially invisible. This section is intended to teach you the basic electrical hazards and how we (as employees) are required to manage them. Conductive apparel shall not be worn unless the items are rendered non- conductive by covering, wrapping, or other insulating means.

Training

Training of our personnel shall be conducted in accordance with OSHA Standard 1910.147. Retraining may be required when a given job description changes, when equipment changes or when deficiencies or defects in the established procedures are discovered through inspections or audits. Employees will be trained in safety related work practices that pertain to their respective job assignments. Trained/qualified employees must adhere to the approached distances in Table S5 when working in the vicinity of overhead lines. Any unqualified employee shall maintain safe clearance distance (at least 10ft) when working in an elevated position near energized overhead lines.

BASIC PRINCIPLE OF ELECTRICITY

Electricity is the flow of electrons out from a power source with the intention of performing "work" in some type of tool, equipment, or device, then returning back to the same power source they originated from. This path of electricity out from and back to its source is known as an electrical circuit. A person has the potential to sustain an electrical shock when they become part of a circuit and electricity flows through them while it's trying to get back to the power source.



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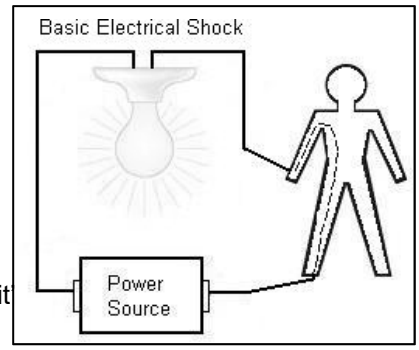


The primary objective with electrical safety is preventing electricity from flowing through a person (electrical shock). Alternative objectives with electrical safety include the prevention of fires, and/or injuries from events related to electrical incidents such as falling from a ladder after sustaining an electrical shock or tripping on something after the lights turn off due to a circuit being overloaded and tripping a circuit breaker.

PREVENTION OF ELECTRICAL SHOCK

There are 3 primary ways to keep users of electrical tools & equipment from sustaining an electrical shock, which include:

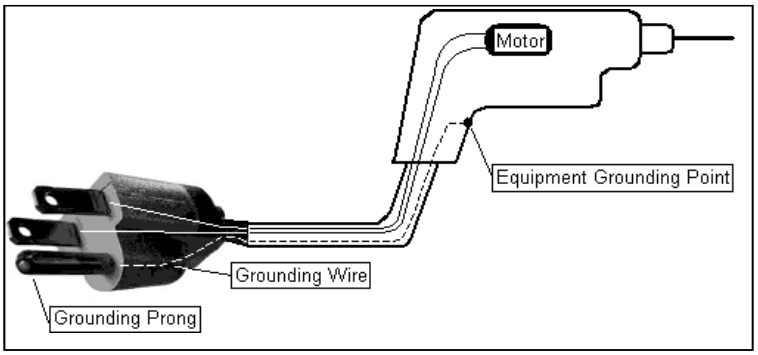
1. Grounding

2. Double-insulating

3. Ground fault circuit interrupters (GFCI) GROUNDING

The method of electrical protection which bonds the conductive parts of a tool or equipment (such as the metal on a drill case) to a wire that provides a low resistance path back to the power sources. By having a low resistance path back to the power source through the grounding wire any stray electricity (such as an electrical short from a power wire to the case of a tool) that could energize the conductive parts of a tool or equipment is safely carried back to the power source. Grounding can easily be identified on standard 120-volt tools by the round, third prong on the power plug.

An “assured equipment grounding conductor program” is an option available to contractors by OSHA Standards as an alternative to using GFCIs (to be explained shortly). An assured equipment grounding conductor program includes a scheduled test of extension cord and tool/equipment grounding conductors to be sure they are connected and continuous; this program also includes documentations of testing. An assured equipment grounding conductor program is viewed by ALEXANDER MECHANICAL as an option that, overall, provides less reliable electrical protection than the use of GFCIs. Grounding will be monitored through general tool inspection by all employees and the tool cribs. The grounding prong on extension



cords and tool/equipment power cords must be examined daily, prior to use of the cord or tool/equipment. Any cord or tool/equipment power plug that is missing a grounding prong must be immediately removed from service and repaired.

DOUBLE-INSULATING

The method of electrical protection that many tool and equipment manufactures use to eliminate the need for equipment grounding. To be rated as a double- insulated, tools are required to be designed so that any internal electrical failure (such as an electrical short from a power wire to the case of a tool) does not expose the tool user to dangerous levels of electricity. Double-insulating is typically achieved through the use of internal wires that have reinforced insulation and the use of plastic tool cases instead of metal. Double-insulated tools do not require a grounding conductor and therefore only have a power plug that has 2 prongs. Any tool that is double insulated will say "double- insulated" on the manufacturer's tool tag and/or it will have the universal symbol denoting double-insulated.

Double-Insulated Symbol

- Double-insulated tools must be inspected daily before use. Damaged tools must be tagged out of service until repaired.

GROUND FAULT CIRCUIT INTERRUPTERS (GFCI)

GFCIs are electrical devices that are designed to protect people from electrical shock by sensing any differences in the amount of electricity flowing out from and back to a power source. The amount of electricity flowing out from and back to a power source through the electrical wires should always be the same, a difference in this supply and return amount of electricity typically represents a "ground fault" which is electricity flowing back to the power source BUT not through the intended path (hot & neutral electrical wires).

An example of a ground fault is an employee touching an extension cord that has a cut on it which exposes the internal "hot" wire; the electricity that flows from the hot wire, through the employee, through the earth/building/water/etc. and back to the power source is a ground fault. GFCIs will trip (turn the power off) when there is a difference in electricity flow out from & back to a power source (through the hot & neutral wires) of approximately 5 milliamps (0.005 amps; circuit breakers generally trip starting at 15 amps). Ventricular fibrillation, which is your heartbeat getting out of rhythm and possibly causing death, can occur from an electrical shock as low as 100 milliamps (0.1 amps). A properly functioning GFCI can save your life or other

injury in the event of a ground fault. Understand that GFCIs operate independently of equipment/tool grounding so they will work even if a tool/equipment is double-insulated.

- A GFCI must be used at all times by all construction and service employees on all 120-volt tools and equipment, regardless of use location. Use of a GFCI applies to all power sources including temporary power panels, permanent building power, and generators.

- GFCIs being used must be in place at your power source (electrical outlet). If the electrical outlet has an integrated GFCI such as at a temporary electrical panel or in a bathroom, a portable GFCI pigtail is not required. If the electrical outlet does not have an integrated GFCI, a portable GFCI pigtail must be used.

- GFCIs must be tested daily, prior to use, to verify they are working correctly. GFCIs are tested by pressing the "test" button which simulates a ground fault; you should hear/see the GFCI trip. Reset the GFCI by pressing the "reset" button. Be aware that all electrical tools, equipment, and lights plugged into the GFCI will turn off when the "test" button is pressed.

- If a GFCI you are using is frequently tripping during use, try the following:
  - Inspect extension cords and tools for potential problems that could be causing a ground fault (i.e. cut cords)
  - Reduce the amount of extension cord being used after the GFCI
  - Reduce the number of tools/equipment being used after the GFCI
  - Review the situation with an electrician so the problem can be identified. If a GFCI is tripping, it is doing so for a reason. Do not ignore it!

ELECTRICAL CORDS, TOOLS, EQUIPMENT

Not all cords, tools, and equipment are designed to withstand the abuse and conditions that we deal with in the construction and service industry and the selection of appropriate items is essential to having adequate electrical protection. In addition, ensuring the condition of our cords, tools, and equipment is inspected by all employees who use it will continue to verify our electrical protection.

- Extension cords purchased and used for construction, service, or shop use must be designed for hard or extra hard usage and be a 3-wire type (contains a grounding wire/prong). Flat, home-type extension cords or extension cords made out of non-metallic sheathed cable (i.e. Romex) are not allowed.

- Standard knockout boxes (aka: 4-square or 1900 boxes) with outlets are not allowed to be installed on the end of extension cords as they are not listed/rated for this installation

- “Power strips” (aka: re-locatable power taps) are not allowed in any shop, construction site, or other application except for office environments with computer system set-ups.

- All tools must have a grounding conductor or be double-insulated.

- Position cords out of walk paths or overhead when possible to reduce trip hazards. If suspending a cord overhead, do so with non-conductive materials such as zip- strips, Panduit straps, pull string, etc. Bare wire may not be used to suspend cords overhead as it can cut through cord sheathing and cause a ground fault.

- Extension cords, tool, and equipment must be inspected daily. Ladders shall have non-conductive side rails. If any of the following conditions exist, the item must be tagged out of service and discarded or repaired by a qualified person:
  - The exterior cord sheathing is cut through exposing the inner insulated wires (AMC does not allow damaged extension cord sheathing is not allowed be repaired; if desired, cut the damaged area out of the cord and create 2 shorter extension cords by installing new cord caps (explained shortly) or disposed of the cord)
  - Cord plug missing a grounding prong (not applicable if the tool is double- insulated)
  - The cord or tool strain relief has been pulled loose.
  - Guards are missing from portable lights, hand tools, or other equipment
  - Indications of other internal electrical damaged

- Extension cords must be protected from pinch point damage, such as in door and window frames, by some type of rigid means.

- “Cheaters” which allow a 3-wire plug to connect to a 2-wire outlet (no grounding conductor) are not allowed at any time. Only power sources with grounding are allowed to be used.

- All extension cords, tools, and equipment that have been repaired by a qualified person must be tested to verify correct electrical polarity and continuity of the grounding conductor from the tool case to the grounding prong (on applicable equipment).

Cord Cap Replacement:

Cord caps may be replaced on extension and tool cords but only by a trained and qualified person. Cord caps must be Underwriter’s Laboratory (UL) listed, be a water- resistant type and provide secure strain relief after installation. Cord caps must match the manufacturer’s extension and tool cord electrical ratings (voltage and current ratings). Examples of

reputable brands include Hubbell and Levinton. Contact your safety department representative if you have any question.

LOCKOUT / TAGOUT (ELECTRICAL)

Personal control of electrical circuits using lockout / tagout procedures is essential to your safety. Each employee who has the potential to be affected by the accidental or unexpected start-up of an electrical circuit(s) must individually lock and tag out those electrical circuits. Examples of potential electrical lockout / tagout situations include:

- Working on or in a piece of equipment that could start up if an electrical circuit was turned on such as a fan on a condensing unit.
- Working in an electrical panel or on electrical circuits (electricians)
- Working on a roof top unit where the electrical disconnect is in a remote location

The only time lockout / tagout is not mandatory for the control of electrical circuits is when a single employee is working on/with a piece of equipment, electrical system, etc. and they have direct visual and physical control over the electrical circuit disconnecting means at all times (if you cannot see the electrical disconnecting means, you do not have **100%** visual control over it). Examples of such situations might include:

- Service techs working alone on a small roof top unit where the power disconnecting is on the roof, at the unit, and in their visual and physical control
- An electrician working on temporary panel outlets where the disconnecting breaker is in their immediate visual and physical control

For detailed instructions on how to perform lockout / tagout, lockout devices, and more see the “Lockout / Tagout” section of this safety manual (Chapter 9).

EXPOSURE TO ENERGIZED ELECTRICAL PARTS

The goal of ALEXANDER MECHANICAL is to minimize, to the extent of our ability, all employee exposures to energized electrical parts. We will take all possible steps to prevent or reduce our need to be exposed to energized electrical parts. Only qualified persons may work on energized parts. Employees will utilize electrical personal protective equipment such as

electrically insulated gloves, tools, and other arc flash protection equipment for all necessary exposures to energized electrical parts over 50 volts. Examples of necessary energized electrical part exposures may include trouble-shooting HVAC equipment or working on equipment that is sensitive to being shut down such as a critical piece of equipment in a hospital setting. Your Safety Department Representative can assist you with determining the correct personal protective equipment should you have a need to work on energized electrical parts. Examples of electrical personal protective equipment includes insulated gloves with leather protectors, arc flash shields, and arc flash rated clothing or suits.

Other Electrical Awareness Facts:

- When working under overhead lines maintain a safe distance of at least 10 feet if you are not qualified to work in such areas.
- The distance of 10 feet shall also be maintained for vehicles and mechanical equipment from energized overhead lines.
- If clearance distance is not provided lines shall be deenergized and grounded.
- All qualified employees must adhere to the approach distances as stated in the following table when working in the vicinity of overhead lines.

Nominal voltage in kilovolts	**Distance:** Phase to ground exposure
0.05 to 1.0	Avoid contact
1.1 to 15.0	2'-1" (0.64m)
15.1 to 36.0	2'-4" (0.72m)
36.1 to 46.0	2'-7" (0.77m)
46.1 to 72.5	3'-0" (0.90m)
72.6 to 121	3'-2" (0.95m)
138 to 145	3'-7" (1.09m)
161 to 169	4'-0" (1.22m)
230 to 242	5'-3" (1.59m)
345 to 362	8'-6" (2.59m)
500 to 550	11'-3" (3.42m)
764 to 800	14'-11" (4.53m

TABLE S-5 - APPROACH DISTANCES FOR QUALIFIED

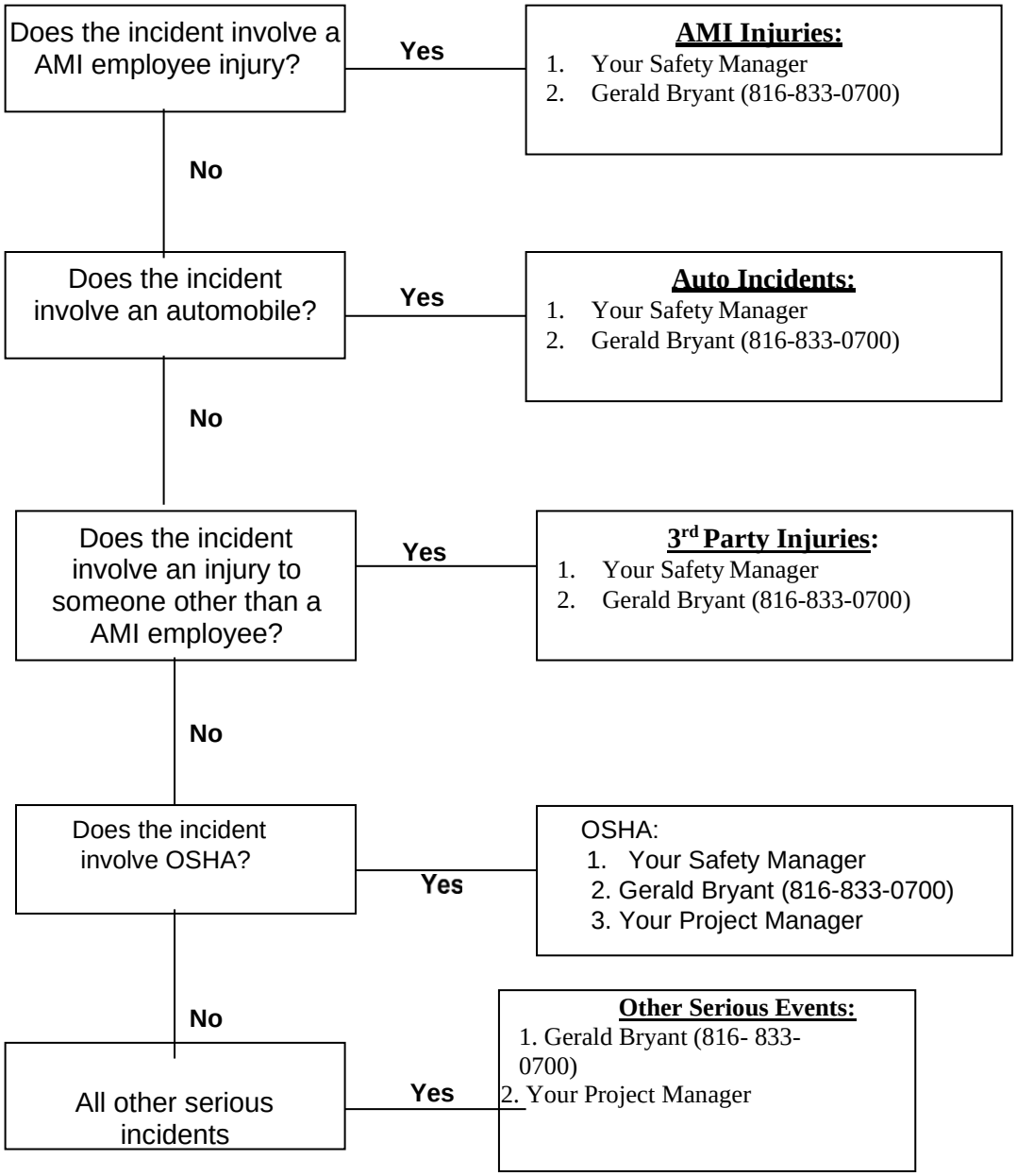
EMPLOYEES - ALTERNATING CURRENT

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).

Chapter 12: EMERGENCY PROCEDURES

GENERIC INCIDENT MANAGER CALL TREE:

Instructions: When utilizing the call tree below to contact an incident manager follow the questions and yes/no answers on the left side of the page until you get to the appropriate incident manager group. Call each incident manager two times, one call after another, prior to moving on to the next on the list.



INTRODUCTION/OVERVIEW

How we respond to the challenges presented by an emergency situation could mean the difference between life and death; not just for us personally, but for many others as well. This section reviews both incident management procedures for incidents that occur in the field, as well as disaster plans for office personnel.

INCIDENT MANAGEMENT PROCEDURES

All branches shall have procedures in place that provide guidance to employees, should an incident occur. An incident is an unanticipated event outside the normal daily operations/tasks of Alexander employees (e.g. employee injury, auto accident, non-employee injury, serious safety near miss, miss, OSHA inspection). To effectively manage incidents that occur during the course of business it is important we maintain consistency on how incidents are managed.

The Division President will ensure a select group of individuals ("incident managers") within each branch are overseeing the management of all incidents from inception to conclusion. These "incident managers" shall be provided training and the necessary documents to complete the task.

The Safety Manager will also ensure that an "incident management call tree" is created and communicated to our field supervisors. This is a flowchart that outlines the types of reasonably anticipated events that could occur and gives direction to the branch employees regarding which "Incident Manager" should be contacted.

OFFICE DISASTER PROCEDURES

No one likes to think about disasters. We tend to think they won't happen to us. But the truth is that disasters do happen--often when we least expect them. It's important that we all take the time now, before a disaster or emergency strikes, to familiarize ourselves with the policies and procedures to follow in the event of an emergency.

Disasters are of two basic types: Those that require evacuation of the building (e.g. fires, bomb threats, floods) and those that require taking shelter within the building (e.g. tornadoes, civil disturbance).

Over the years we've learned that inadequate egress provisions are often responsible for more deaths and injuries than the original emergency. That is why we will review the basic requirements essential to providing a safe means of egress from fire and other emergencies, and where to take shelter in case of severe weather.

FIRE PROTECTION & PREVENTION

Prevention of fire is the responsibility of each individual. Everyone must be aware of potential fire hazards and take appropriate steps to reduce or eliminate the hazard.

Hand fire extinguishers are strategically located throughout the office and shop areas with signs identifying locations. In the office areas, the principal concern is Class "A" fires; in the shop areas it could be any of "A", "B", or "C." Type ABC fire extinguishers are provided in both areas.

During working hours, all emergency exit doors are to be unlocked or fitted with panic bars.

Hazardous accumulations of combustible materials must be controlled so that a fast- developing fire, rapid spread of toxic smoke, or an explosion will not occur.

REPORTING

When the building is occupied during day or nighttime working hours, any fire that could possibly get out of control must be reported to the City Fire Department (call 911) by the person who detects the fire.

Both the shop and the office must be evacuated for any fire that could possibly get out of control, or that produces a significant amount of smoke.

EVACUATION

In the event it is necessary to evacuate the building due to a bomb threat, fire or other calamity, all personnel will be notified. If the smoke alarm system is activated, everyone must leave the building immediately without waiting for an announcement.

ASSEMBLY WITHIN THE BUILDING

In the event of a tornado in the immediate area, all employees will be notified to take cover. The receptionist will monitor the weather radio. In the event of a general area tornado warning, the highest-ranking officer in the building will be notified and kept informed of any new reports. In the event of a tornado reported in the immediate area, or at the discretion of the officer, employees will take shelter. Please note that the designated area should be as far away from glass as possible because of the possibility of flying glass.

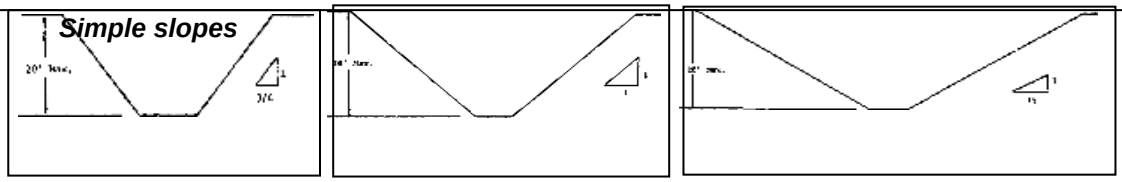
If it is impossible for you to reach any designated area, we suggest you "hide" under a desk or table and cover your head.

During any evacuation, it is recommended that you look around to see if everyone is aware of the warning - particularly visitors. Direct them to a designated safe area.

FINALLY -- DO NOT PANIC!

One tornado and one fire drill will be conducted each year. They will be scheduled by the Office Services Manager with concurrence of the Branch Manager. During these drills, please follow the procedures that have been outlined above. Remember, these procedures are for **your** benefit.

Chapter 13: EXCAVATIONS / SHORING/ TRENCHING – QUICK FACTS



Type A 3/4:1 **Type B 1:1**

Type C 1.5:1 **Competent**

Person: A Competent Person is trained and capable of identifying existing and predictable hazards and has the authority to take prompt corrective action.

- **Inspections:** The Competent Person must perform a manual and a visual inspection before daily production begins or when conditions change. Our inspection form can be found on page 14 of this section.

Trenching numbers to know:

18 Inches	If excavating within a range of 18-inches from an underground utility, you must first discover the line by hand digging.
2 Feet	Keep spoil piles back a minimum of 2 feet from the edge of the excavation.
3 Feet	Ladders must extend 3 feet beyond the top of the excavation.
4 Feet	Access and egress must be provided at a depth of 4 feet or more (ladder, stairs, earthen ramp).
5 Feet	Employees working in excavations 5 feet deep or more shall be protected by use of an adequate protection system. Types of systems include shoring, shielding, sloping or benching.
10 Feet	Equipment shall maintain a distance of 10 feet from overhead power.

Width equation: Use the following equation when calculating how wide the top of the trench shall be when only using sloping/benching for protection:

Soil type	Equation	Example: 7' deep with a 2' bottom
A	1.5 X depth + the bottom width	1.5 X 7 + 2 = 12.5' at the top
B	2.0 X depth + the bottom width	2.0 X 7 +2 = 16' at the top
C	3.0 X depth + the bottom width	3.0 X 7 + 2 = 23' at the top

Do…	Do Not…
Inspect excavations before production begins or when conditions change.	Allow employees to stand underneath suspended loads, pipe or materials.
Maintain eye contact with all equipment operators when within equipment swing radius or path.	Undermine the support of adjacent structures when digging (poles, sidewalks, building).
Have all underground utilities located before digging begins. Call 811 - 48 hours in advance.	Allow water to accumulate in the trench when workers are present.
Keep access and egress within 25 feet of travel for all employees.	Allow the trench box or support system to ride more than 2 feet off of the bottom.
Read the tabulated data before using shoring or shielding equipment.	Stand, work or install ladders outside of the protective system.

EXCAVATION PLANNING GUIDE

Risk Assessment	Potential Hazards	Action / Control
1. Competent Person	Legal requirement. Injury to others.	Assure proper training of all designated Competent Persons. Competent person must perform daily inspection see page 14.
2. Utility locates	Damage to underground utility installations. Injury to personnel.	Call 811 – 48 hours before locates are needed. Relocate utilities when marks become faded or are destroyed.
3. Tabulated data	Improper use of shielding or shoring.	Read the tabulated data to assure the protection system is appropriate for the design and installed/used properly.
4. Protective systems	Improper protection. Cave-in.	Assure the protection system design is based on actual site conditions and known soil types. No work shall be allowed to be performed outside of the protective system.
5. Atmosphere	Air may be oxygen deficient, flammable or toxic.	Air monitors shall be used when hazardous atmospheres exist or could exist. Examples: landfill, contaminated soil, fuel storage, using gas powered tools inside of trench, etc.
6. Heavy equipment	Struck-by. Damages to utilities.	Bidirectional machines with an obstructed rear-view shall be equipped with a backup alarm. Equipment shall not operate within 10-feet of overhead power.
7. Access/Egress	Fall hazard. Emergency egress.	When > 4 feet, a means of access/egress shall be installed within 25 feet of all workers. Access/egress shall only be installed inside the protection system.
8. Pipe placement	Caught in. Struck-by.	Trench workers shall maintain visual contact with equipment operators at all times. Trench workers shall not stand under lifted loads or in the swing radius of equipment.
9. Water accumulation	Excavation/Trench integrity.	Employees are prohibited from working in excavations with accumulated or accumulating water. Water shall be removed or controlled by pumps, diversion ditches, drainage ditches or other means.
10. Stability of adjacent structures	Structure failure. Cave-in.	Support affected poles, walls, buildings, etc. Do not undermine pavement, sidewalks,roads, etc. when digging.
11. Barricade	Vehicle or pedestrian incident	Barricade excavation whenever difficult to visually detect (high grass, left open overnight) or when exposed to pedestrians.

INTRODUCTION/OVERVIEW

Our company policy is to have a trained Competent Person present any time excavation work is in progress and whenever employees are working in excavations.

OSHA Standard 1926.650-652 with appendices A, B, C and D covers all open excavations and defines excavations to include trenches.

TRAINING REQUIREMENTS

The Competent Person will be trained and certified by a qualified trainer. Other affected employees will receive general excavation safety training through formal training programs, and regular Toolbox Talks.

DEFINITIONS

Aluminum Hydraulic Shoring: A pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bank: A mass of soil rising above a digging level.

Benching (Benching system): 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.

Cave-in: 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.

Competent Person: One who is trained and 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.

Cross braces: 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.

Excavation: Any man-made cut, cavity, trench, or depression in an earth surface that is formed by earth removal.

Faces or sides: The vertical or inclined earth surfaces formed as a result of excavation

work.

Hazardous Atmosphere: 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.

Lagging: Boards which are joined, side-by-side, lining an excavation.

Protective System: 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.

Sheeting: The members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield System): A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

Shoring (Shoring system): 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.

Sloping (Sloping System): A method of protecting employees from cave-ins is to form sides of an excavation that are inclined away from the excavation. 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.

Stable Rock: 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.

Support System: A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated Data: Tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation): 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.

Trench Box: See "**Shield**".

Trench Shield: See "**Shield**".

Elevated walkways are used over excavations, there must be an adequate guardrail system place.

Uprights: 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.

Wales: 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.

GENERAL REQUIREMENTS

- **Protection of employee(s):** All employees working in excavations 5 feet deep or more shall be protected against cave-in, falling rock, soil, or material by use of an adequate protection system. Protection systems are discussed on page 15 of this section.
- **Underground utilities and structures:** Before trenching or excavation begins, underground utilities must always be physically located and protected. To receive locates, call 811 anywhere in the country. The call will be routed to the nearest One Call Center. The call must be placed at least 48 hours in advance from the date you intend to dig, drive equipment into the ground, or engage in any earth- moving activities.
- Gas, electric, water, sewer and phone: Do not machine dig within *18 inches* of located utilities. If you are excavating within this range, you must first discover the line by hand digging.
- Fiber Optic lines: When excavating within 15 feet of a fiber optic line, a “standby” member of the locate company, or the utility owner, may need to be present. Before excavation begins, call the owner of the fiber optic line to discuss their “standby” requirements.
- Utility damage: Immediately evacuate the area and protect your personnel if any utility is damaged by the work activity. Call 811 to notify the utility owner of the damage. Do not re-enter the work area until give the “all clear” from the utility owner.

Inspections: The **competent person** shall inspect the excavation, protective system and adjacent areas:

- Daily, prior to any employee being allowed to enter the trench.
- After any rain event.
- After any other hazard increasing event.

Inspections shall focus on evidence of a situation that could result in possible cave-in, failure of protective system, hazardous atmospheres or any other hazard that workers may be subject to injury or death.

If any evidence of actual or potential failure is discovered, all work shall cease, and exposed employees shall exit the excavation until it is made safe. The competent person shall complete the Excavation and Trench Daily Inspection report that is included in this

section (page 14). This report shall be filled out daily prior to any work beginning and must

be maintained on site in a 3-ring binder until excavation is complete.

- **Access and Egress:** A ladder, earthen ramp, or other safe means of egress must be provided in all trenches greater than 4 feet in depth. Access and egress must be provided in such a manner that employees are not required to travel more than 25 feet laterally. Ladders shall be located inside of the confines of the protection system. Ladders shall extend 3 feet above the top of the excavation. Earthen ramps, if used, shall be constructed at such a slope/degree that employees can walk up or down the ramp without using their hands to assist them.

- **Excavated Material (Spoil pile):** Excavated material must be kept at a minimum of 2 feet from the edge of the excavation. Loose rock or clumps of soil adhering to the face of the trench shall be cleaned off by the excavator before employees are allowed to enter. Trench boxes shall be positioned so that a minimum of 18 inches of the top of the box is not backfilled.

- **Water Accumulation:** Employees of ALEXANDER MECHANICAL is prohibited from working in excavations where there is accumulated water, or in an excavation where water is accumulating. The competent person shall monitor water removal or control by using pumps, diversion ditches, drainage ditches or other means.

- **Adjacent Structures:** Anytime the stability of adjoining buildings, walls, sidewalks, poles, driveways or other structures is endangered by the excavation operation, support systems must be used to ensure the stability of the structure. Support systems may include shoring, bracing, underpinning, depending on the structure and the proximity to the excavation

- **Barricades:** Excavations must be flagged and / or barricaded whenever the trench is difficult to visually detect (i.e. high grass, lack of lighting, left open overnight etc.), or when there is a potential for pedestrian exposure.

- **Hazardous Atmospheres:** Where a hazardous atmosphere exists, or could reasonably be expected, the air in the excavation must be tested by a competent person before any employee can enter. Examples of situations where testing shall be considered includes: Landfill areas, areas where hazardous materials are stored nearby, areas where contaminated soils are discovered, if using gasoline or diesel-powered equipment in the trench, or if performing tasks that could affect the quality of the air. Review Chapter 8: Confined Spaces whenever a hazardous atmosphere exists or could reasonably exist.

- **Exposure to Vehicular Traffic:** Employees exposed to vehicular traffic shall be required to wear a high visibility vest with reflective material (DOT Type II).

- **Heavy Equipment:** Employees shall not be allowed under raised loads. All bidirectional machines or machines with an obstructed view to the rear shall be equipped with reverse signal alarm. Equipment shall not be allowed to operate within 10-feet of energized

overhead electrical lines.

- **Contaminated Soil:** Contaminated soils shall not be used for backfilling. Consult with an environmental engineer for any questions regarding proper procedures, classification of contamination and proper disposal of soil.

SOIL CLASSIFICATION

Soil classification is used to determine the stability of the soil and what level protective system must be utilized to provide protection for employees entering the excavation.

Soil is classified by stability, with stable rock being the most stable, "Type A" being slightly less stable down to "Type C", being the most unstable. Cohesive soil consists of clay (fine grained soil), or soil with high clay content. Cohesive soils do not crumble and are plastic when moist. Granular soils are gravel, sand or silt (coarse grained) with little or no clay content. Granular soil is difficult to mold when moist and crumbles easily.
The classifications are defined as follows:

- **Stable Rock:** Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

- **Type A Soil:** Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) or greater. Examples of cohesive soils are clay, silty clay, sandy clay and clay loam. Cemented soils such as caliches and hardpan are also considered Type A. Type A soils are not commonly found in the Midwest. **NO** soil is Type A if **ANY** of the following exist:
  - The soil is fissured or shows open cracks.
  - The soil is subject to vibration from heavy traffic, pile driving or similar effects.
  - The soil has been previously disturbed.
  - The soil is submerged, or water is freely seeping

- **Type B Soil:** Any cohesive soil with an unconfined compressive strength greater than .5 tsf, but less than 1.5 tsf. Also includes, granular cohesionless soils including crushed rock, silt, silt loam, sandy loam, silty clay loam and sandy clay loam. The following can also be considered Type B soil:
  - Previously disturbed soils except those which would otherwise be classified as type C.
  - Soil that may meet the unconfined compressive strength required for type A but is fissured or subject to vibration.

- **Type C:** Cohesive soil with an undefined compressive strength of 0.5 tsf or less, or granular soils including gravel, sand and loamy sand. This soil is unstable and the most dangerous. With Type C soil, any of the following exists:
- Any submerged soil or soil from which water is freely seeping.
  - Submerged rock that is not stable.
  - Any excavation showing signs of distress. Symptoms of distress include fissures, slumping of soil from the topside of the trench, bulging on the bottom side or trenches left open long enough to allow soils to dry.

METHODS OF SOIL ANALYSIS AND CLASSIFICATION

Soil classification must be based on the results of at least **one visual** and at least one **manual analysis.** Soil classification is the responsibility of the designated competent person. If the competent person does not perform the required visual and manual test, the soil is automatically classified as "Type C," and must be protected as such.

Note: When initially classifying soil, the competent person must consider the time the trench will be left open. A trench left open for a long period of time will cause the soils to dry and become distressed. Therefore, if the excavation will be left open for greater than 24-hours, and it is likely that drying will occur, the trench should be reclassified to the next lower classification (example: Type A to Type B, Type B to Type C).

If a system is layered, meaning there is more than one classification throughout the soil,

the weaker classification should be chosen. If any properties, factors, or conditions change after the classification, the soil must be reclassified to reflect the changed circumstances.

- Visual Tests: Visual testing is conducted by a competent person 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. The visual tests are as follows:

  - Examine the samples of soil that are excavated and the sides of the excavation. Determine if the soil is cohesive or granular. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily is granular.

  - Examine the wall of the open excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil fall off a vertical side, the soil could be fissured. Small spalls are often evidence of moving ground and are potentially hazardous situations.

  - Observe the area adjacent to the excavation and the excavation itself for evidence of existing utilities or other underground structures to identify previously disturbed soil.

- Look for any sources of vibration adjacent to or within the excavation that could affect the stability of the excavation.

- Observe the sides and bottom of the excavation for evidence of water seepage or accumulation of rain.

- Manual Tests: A manual analysis is needed to determine properties of the soil that will assist in classifying the soil properly.

- **Plasticity:** Conducted by molding a moist or wet sample of soil into a ball and attempting 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 a 2" length of 1/8" thread can be held on one end without tearing, the soil is cohesive.

- **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.
- **Thumb Penetration:** The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. This test should be conducted on an undisturbed soil sample, such as a large clump of soil found in the spoil pile.

- **Type A Soils** with an unconfined compressive strength of 1.5 tsf or greater can be indented by the thumb. However, it takes a great deal of effort to do so.

- **Type B Soils with** an unconfined compressive strength between .5 tsf and 1.5 tsf can be more easily indented but remains intact.

- **Type C Soils** with an unconfined compressive strength of .5 tsf or less can be easily penetrated several inches by the thumb and can be molded by light pressure.

- **Other Strength Tests:** A Pocket Penetrometer is a mechanical device that estimates the unconfined compressive strength of soils. It operates much like, and is the size of, a tire pressure gauge. Employees must be properly trained in the use of the instrument before using.

PROTECTIVE SYSTEMS

Protective systems are used for 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. Excavations that are 5 feet or deeper require a protective system to be in place prior to employees entering the excavation. Protective systems for excavations that are 20 feet or deeper must be designed by a Registered Profession Engineer. Protective systems include shoring, shielding sloping and benching systems. **Please note**: Drawings and tables are presented in Appendix A that can serve as easy reference when selecting a protective system.

- **Shoring and shielding systems** (Trench shields, hydraulic shoring, etc.):

- Read the Tabulated Data for shield the system before installing. The system shall not be subject to loads exceeding the design capacity.

- The sides of shields shall be backfilled in order to restrict movement from sudden lateral loads. Only the top18-inches on the shield shall not be backfilled. This is necessary to stop material that could roll from the face of the excavation.

- Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by the shield. Ladders shall be placed inside of the protective system, not outside.

- Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

- Shields shall not be allowed to ride more than 2 feet off the bottom of the trench.

- Final removal of protective systems must begin and progress from the bottom. Backfilling must progress together with the removal of the support system.

- **Benching and sloping**: Before an excavation can be protected using benching or sloping, the classification of soil must first be determined. If the competent person decides not to classify the soil, it then must be treated **and protected** as Type C soil. When relying on benching or sloping for protection, the slopes shall be constructed as follows:

- Stable Rock: Vertical (90 degrees)

- Type A Soil: Benched or sloped at a ¾(H):1(V) - (53degrees)

- Type B Soil: Benched or sloped at a 1(H):1(V) – (45degrees)

- Type C Soil: Sloped at a 1.5(H):1(V) – (34 degrees). Type C soil can only be sloped, it cannot be benched.

- **Width chart**: When using benching or sloping for protection, the following chart can be used to calculate the necessary width of the trench at the top. This chart is based off of the following equations:

  Type A soil: Top width = (1.5 X depth) + the bottom width Type B soil: Top width = (2.0 X

  depth) + the bottom width Type C soil: Top width

  = (3.0 X depth) + the bottom width

Depth of Trench	The **Width of Trench at the top** shall be: (Assuming the bottom width is 2-foot)		
	Soil Type A Dug at ¾(H):1(V)	Soil Type B Dug at 1(H):1(V)	Soil Type C Dug at 1.5(H):1(V)
6	11	14	20
8	14	18	26
10	17	22	32
12	20	26	38
14	23	30	44
16	26	34	50
18	29	38	56
20	32	42	62

RESCUE

Injuries such as a fall, struck-by, caught in, electrocution, as well as non- occupational injuries such as heart attack, seizure, etc. may necessitate emergency rescue from an excavation. Therefore, before work begins it is necessary to establish off-site medical and emergency services. Phone numbers, along with the physical address of the jobsite, shall be posted.

If an excavation failure partially buries a worker, never attempt to pull the victim out using a rope, belt or sling. In addition, never use heavy equipment to excavate someone that is buried. If a trench collapse does occur:

- Shut down all equipment that might cause vibration (with the exception of dewatering equipment).
- Order all exposed individuals out of the trench. Do not allow anyone to re-enter the trench for any reason.
- Do not remove hand tools, personal protective equipment, or other material from the scene that might help identify the location of the victim.
- Notify emergency services. Send someone to the road to meet the incoming rescue vehicles.
- Appoint someone to gather and retain critical tools that emergency services may need, such as: shovels, spades, rope, plywood, lumber, buckets, etc.
- If necessary, reroute traffic to eliminate vibration. Secure the area.

Manual Test Performed
**Pocket Penetrometer_____
Thumb Penetration

Protection System(s) used:
1) Sloping or Benching
Stable Rock 90° _____

ALEXANDER MECHANICAL inc

TRENCH SAFETY DAILY FIELD INSPECTION REPORT

Project Name:_____Job #: _____
Inspection By (Authorized Competent Person) _____
Excavation Location:_____
Excavation Depth:_____Excavation Width: _____
Date:_____Time:_____Rain Fall (within24 hours): _____
Current Weather Conditions: _____

Excavations, adjacent areas, and protective systems inspected prior to start of work	Y	N	NA
All affected underground utilities located/marked	Y	N	NA
All equipment, spoils & materials located proper distance back (2') from edge of excavation	Y	N	NA
Employees protected from water accumulation	Y	N	NA
Employees protected from loose rock, spoils, or material capable of falling/ rolling into excavation	Y	N	NA
Traffic in area rerouted from trenching operations with barricades	Y	N	NA
High visibility vests provided and worn by all employees exposed to traffic	Y	N	NA
All ladders or means of access and egress are contained within an approved protective system	Y	N	NA
Will barricades or warning systems be installed at the end of the workday	Y	N	NA
Surface encumbrances removed or supported	Y	N	NA
Employees prohibited from working or walking under suspended loads	Y	N	NA
Employees prohibited from working on the faces of sloped or benched excavations above others	Y	N	NA
Ground workers able to maintain eye contact with equipment operator	Y	N	NA
Shoring/shielding systems installed properly (e.g. Top 18-inches not backfilled, the system is not riding greater than 2-feet off the bottom of the excavation)	Y	N	NA

Air Monitoring: Atmospheres in excavations should be tested if a hazardous atmosphere exists or could reasonably be expected (e.g. Landfills, contaminated soils, use of gas-powered tools, etc)
Are hazardous atmospheres present? Y or N If yes, pleaseexplain: _____
_____
% of Oxygen:_____% of LEL:_____Other: _____

Soil Types: Soil Classification shall be made based on the results of at least on visual and one manual test.

Check Soil Type:
Stable Rock: _____
Type A: _____
Type B: _____
Type C: _____

Manual Test Performed
**Pocket Penetrometer_____
Thumb Penetration
Dry Strength _____
Plasticity _____
***Pocket Penetrometer is the #1 preferred way for manual test of soil*

Protection System(s) used:
2) Sloping or Benching
Stable Rock 90° _____
Type A – ¾:1 _____
Type B – 1:1 _____
Type C – 1-1/2:1 _____

Visual Test: (inspect for)
Fissured Ground Y or N_____
Layered Soil Y or N_____
Disturbed Soil Y or N_____
Seepage Y or N_____
Vibration Y or N_____
Sloughing/caving Y or N

Equipment on Site/Used
_____
_____
_____
_____
Reg. Professional Engineer

2) ***Shoring/Shielding***
Timber _____
Hydraulic _____
Trench Box _____
Trench Shield _____
Design using Tabulate Data
(If > 20')

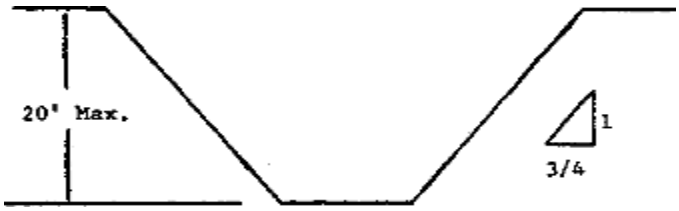
Observations and additional Comments: _____
_____

Appendix A

Example protective systems:

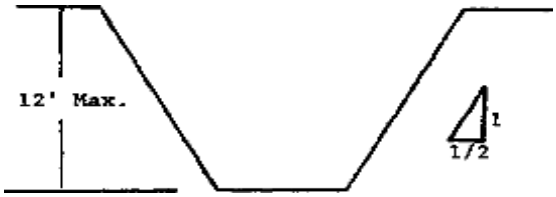
TYPE A SOILS

1. Type A excavations 20 feet or less in depth shall have a maximum slope of 3/4:1



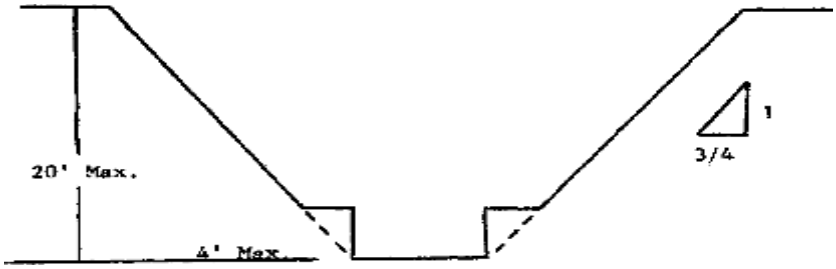
Type A Soil

2. Type A excavations which are open 24 hours or less and which are 12 feet or less in depth shall have a maximum slope of 1/2:1



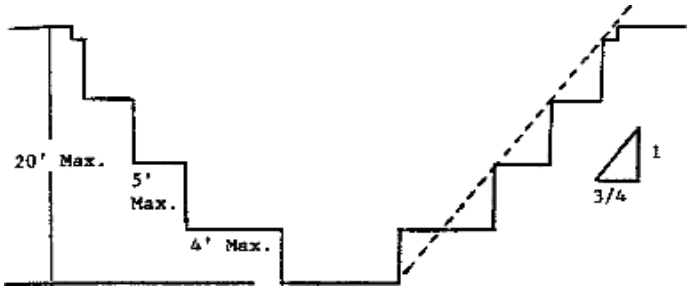
Type A Soil

3. All benched Type A excavations 20 feet or less in depth shall have a maximum slope of 3/4:1 and maximum bench dimensions as follows:



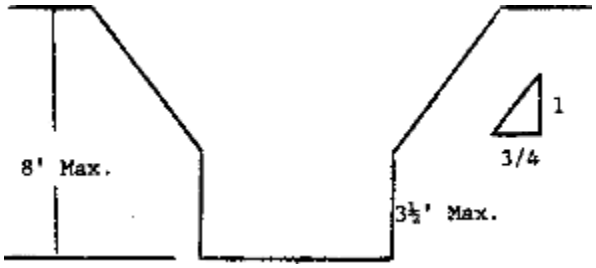
Type A Soil

1. Multiple bench systems in Type A soil shall be constructed as follows:



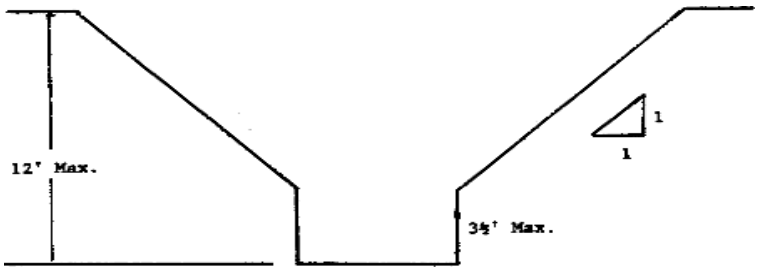
Type A Soil

2. All Type A soil excavations 8 feet or less in depth, which have unsupported vertically sided lower proportions, shall have a maximum vertical side of 3
½ feet.



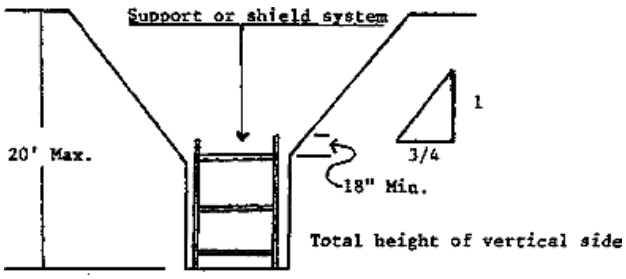
Type A Soil

3. All Type A soil excavations more than 8 feet but less than 12 feet in depth, which have unsupported vertically sided lower portions, shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3
½ feet.



Type A Soil

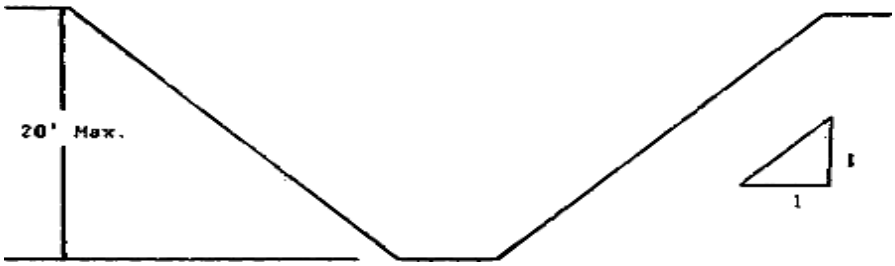
4. All Type A soil excavations 20 feet or less in depth, which have vertically sidedlower portions that are supported or shielded, shall have a maximum allowable slope of 3/4:1. The support or shield system must extend 18 inches above the top of the vertical side.



Type A Soil

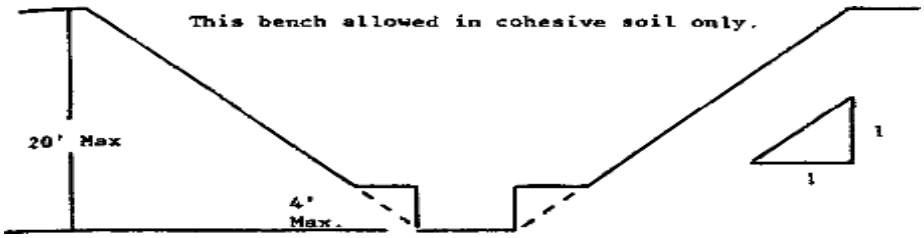
TYPE B SOILS

1. All Type B soil excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



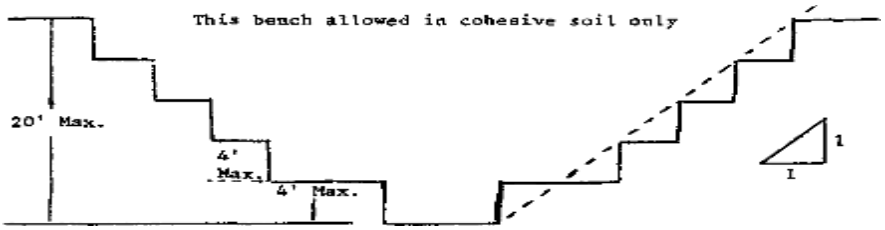
Type B Soil

2. All benched excavations in Type B soil 20 feet or less shall have a maximum slope of 1:1 and maximum bench dimensions as follows:



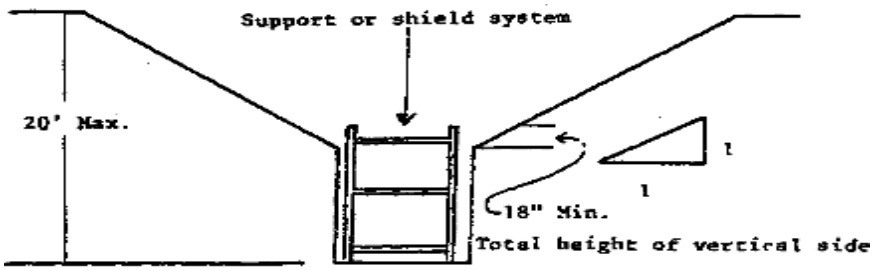
Type B Soil

3. Benching techniques in Type B soil shall be designed as follows:



Type B Soil

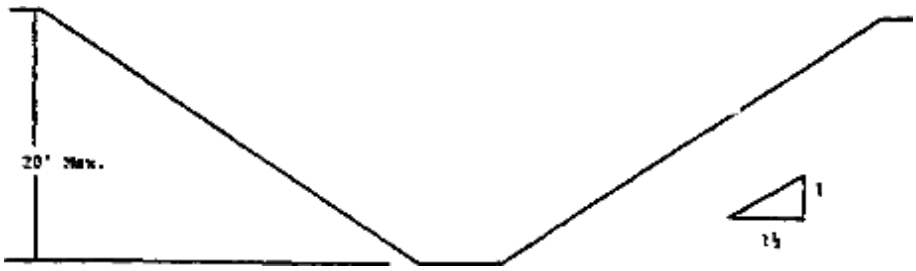
4. Type B soil excavations 20 feet or less in depth, which have vertically sided lower portions, shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



Type B Soil

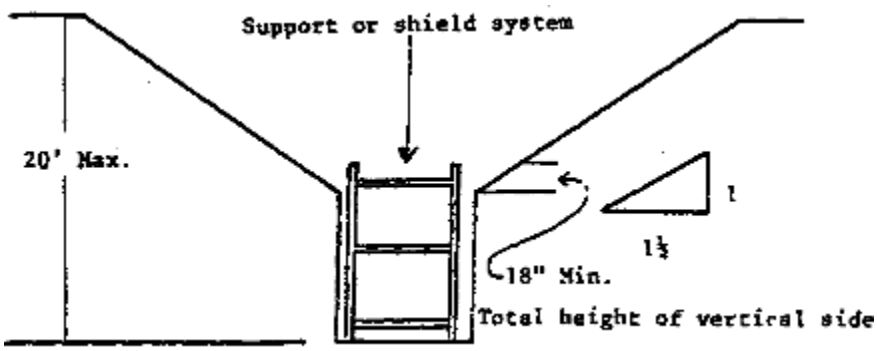
TYPE C SOILS

- All Type C soil excavations 20 feet or less in depth shall have a maximum allowable slope of 1 ½:1.



Type C Soil

- All Type C soil excavations 20 feet or less in depth, which have vertically sided lower portions, shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 ½:1.



Type C soil

NOTE: Benching of Type C soil is not allowed. Type C soil can only be sloped.

Shoring Tables – Taken from OSHA Subpart P, Appendix D

SHORING IN **TYPE A** SOIL

Aluminum Hydraulic Shoring

Vertical Shores
For Soil Type A

Depth of Trench (feet)	*Hydraulic Cylinders*				
	Maximum Horizontal Spacing (feet)	*Maximum Vertical Spacing (feet)*	*Width of Trench (feet)*		
			Up to 8	*Over 8 Up to 12*	*Over 12 Up to 15*
Over 5 Up to 10	8	4	2 inch Diameter	2 inch Diameter Note (2)	3 inch Diameter
Over 10 Up to 15	8				
Over 15 Up to 20	7				
Over 20	Note (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (1): See Appendix D, Item (g)(1)
Note (2): See Appendix D, Item (g)(2)

SHORING IN **TYPE B** SOIL

Aluminum Hydraulic Shoring

Vertical Shores
For Soil Type B

Depth of Trench (feet)	*Hydraulic Cylinders*				
	Maximum Horizontal Spacing (feet)	*Maximum Vertical Spacing (feet)*	*Width of Trench (feet)*		
			Up to 8	*Over 8 Up to 12*	*Over 12 Up to 15*
Over 5 Up to 10	8	4	2 inch Diameter	2 inch Diameter Note (2)	3 inch Diameter
Over 10 Up to 15	6.5				
Over 15 Up to 20	5.5				
Over 20	Note (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (1): See Appendix D, Item (g)(1)
Note (2): See Appendix D, Item (g)(2)

SHORING IN **TYPE C** SOIL

Aluminum Hydraulic Shoring

Waler Systems
For Soil Type C

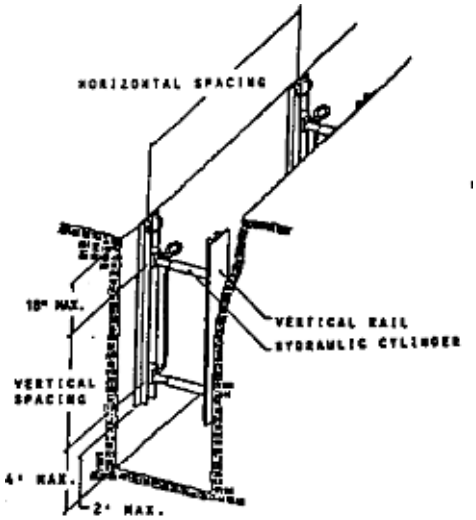
Depth of Trench (feet)	Wales: Vertical Spacing (feet)	Wales: Section Modulus (in^3)	Hydraulic Cylinders, Width of Trench (feet): Up to 8 — Horiz. Spacing	Up to 8 — Cylinder Diameter	Over 8 Up to 12 — Horiz. Spacing	Over 8 Up to 12 — Cylinder Diameter	Over 12 Up to 15 — Horiz. Spacing	Over 12 Up to 15 — Cylinder Diameter	Timber Uprights, Max. Horiz. Spacing (on Center): Solid Sheet	2 ft.	3 ft.
Over 5 Up to 10	4	3.5	6.0	2 in	6.0	2 in Note(2)	6.0	3 in	3×12	—	—
		7.0	6.5	2 in	6.5	2 in Note (2)	6.5	3 in			
		14.0	10.0	3 in	10.0	3 in	10.0	3 in			
Over 10 Up to 15	4	3.5	4.0	2 in	4.0	2 in Note(2)	4.0	3 in	3×12	—	—
		7.0	5.5	3 in	5.5	3 in	5.5	3 in			
		14.0	8.0	3 in	8.0	3 in	8.0	3 in			
Over 15 Up to 20	4	3.5	3.5	2 in	3.5	2 in Note(2)	3.5	3 in	3×12	—	—
		7.0	5.0	3 in	5.0	3 in	5.0	3 in			
		14.0	6.0	3 in	6.0	3 in	6.0	3 in			
Over 20	Note(1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (1): See Appendix D, Item (g)(1)
Notes (2): See Appendix D, Item (g)(2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

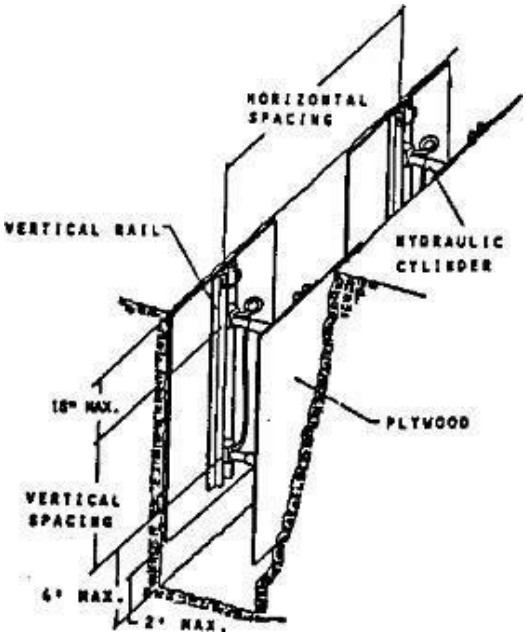
ALUMINUM HYDRAULIC SHORING - TYPICAL INSTALLATIONS

From OSHA Subpart P, Appendix D

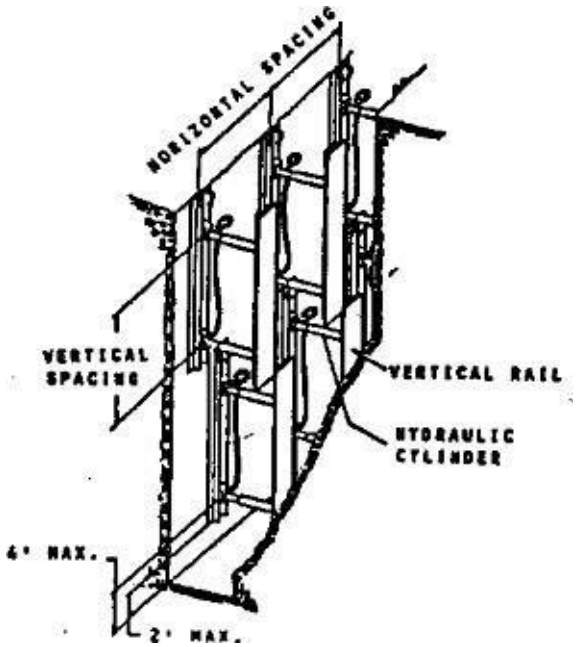
Vertical Aluminum Hydraulic Shoring (Spot Bracing)



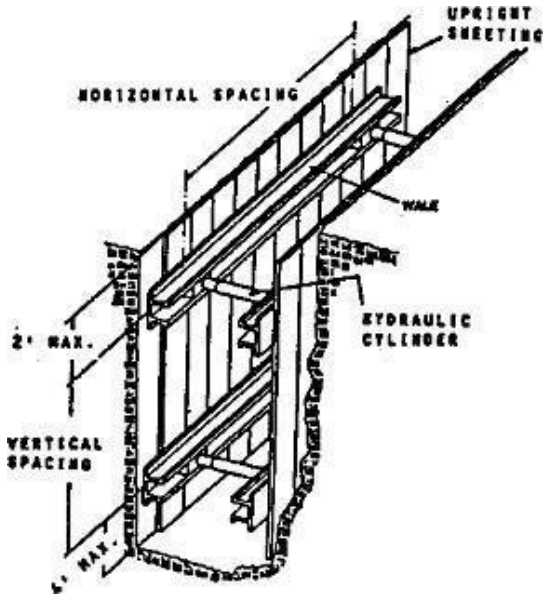
Vertical Aluminum Hydraulic Shoring (With Plywood)



Vertical Aluminum Hydraulic Shoring (Stacked)

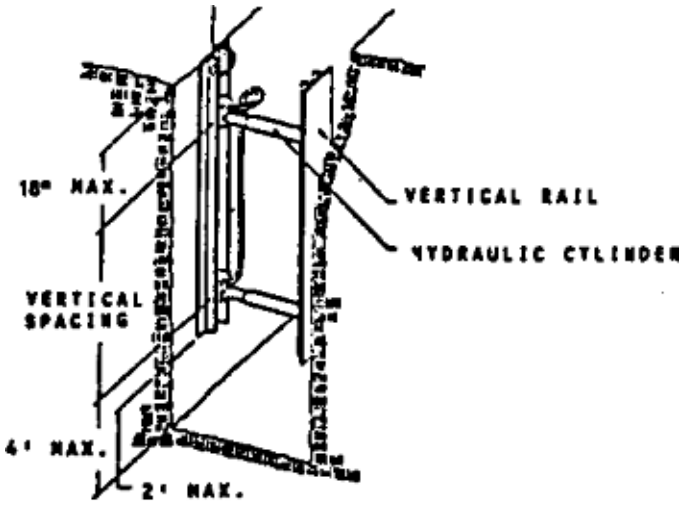


Aluminum Hydraulic Shoring - Typical Waler System

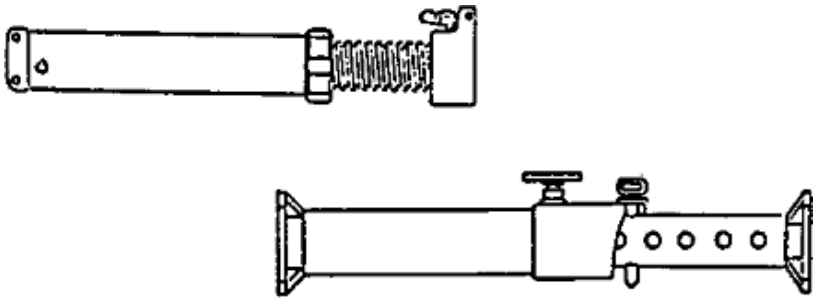


From OSHA Subpart P, Appendix E

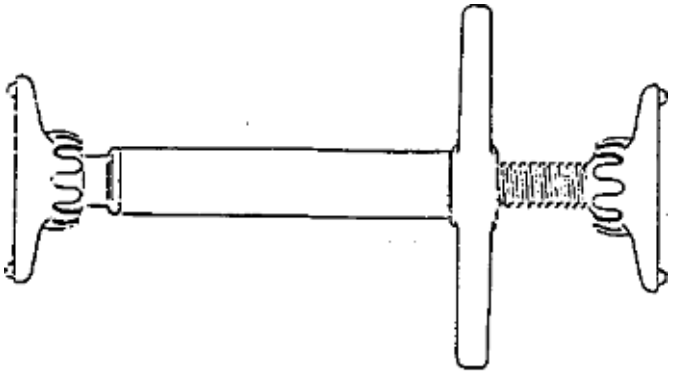
Aluminum Hydraulic Shoring



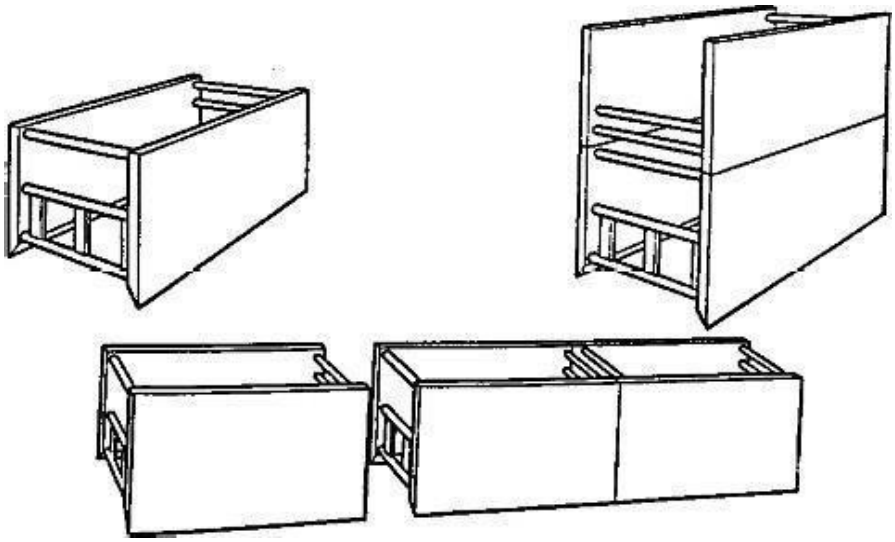
Pneumatic/hydraulic Shoring



Trench Jacks (Screw Jacks)



Trench Shields



Chapter 14: FALL PREVENTION / PROTECTION – QUICK FACTS

Falls happen quickly and without warning; see the table to the right to understand how quickly a persons will fall 6'. It is very important to safe production that we carefully plan and implement fall protection in our work to protect our employees from the unexpected event of a fall. Understanding fall protection may your life or the life of one of your crew members. If you have any questions or need assistance with fall protection contact your safety department representative.

Fall	Time (Seconds)	Speed (Miles/Hour)
1'	0.25 sec	5.48 mph
2'	0.35 sec	7.67 mph
3'	0.43 sec	9.43 mph
4'	0.50 sec	10.96 mph
5'	0.56 sec	12.28 mph
6'	0.61 Sec	13.37 mph

Do…	Do Not…
Use a method of fall protection when exposed to a fall greater than 6' in construction or 4' in shops/service	Think you can catch yourself if you fall, this thought can injure or kill you.
Plan fall protection in advance to ensure efficient safe production	Wait until the day you need fall protection to determine and order what you will need
Use passive means of fall protection such as guardrails or covers whenever possible before using personal fall restraint or arrest	Use personal fall restraint or arrest equipment until you have thoroughly inspected it
Have a rescue plan in place to allow for quick retrieval of a fallen individual	Rely solely on the capabilities of 911 or an emergency response team (i.e. fire dept.)
Use appropriately rated equipment designed for fall protection use (i.e. full body harness, connecting devices, anchor points)	Allow more than one person to attach to any personal fall arrest anchor point unless it is rated for multiple people
Know your potential free fall distance so you do not strike an object or level below you	Use a sling designated for overhead lifting as an anchor point

Fall Protection Planning Guide

Work Aspects	Potential Hazards	Action/Control
1. Identifying fall hazards	Falls, falling material	Identify fall hazards during safe production planning, determine options for fall protection & select appropriate method, communicate fall protection plan with crew
2. Guard rails	Falls, lack of maintenance, cuts, falling material	Ensure adequate installation (i.e. strength, height, toe boards), maintain regularly, plan for material access points
3. Hole covers	Falls, falling material, trips, equipment tip over	Select appropriate material for strength, secure cover so it doesn't move, identify by writing "hole" or "cover", protect employees from fall while installing / removing cover
4. Warning lines	Falls, trips	Install along all fall hazards that are not protected by guard rails or covers, minimum of 6' back from fall hazard
5. Personal fall restraint	Falls, misuse of equipment	Use anchor that is 2x as strong as the force of a person tripping & falling against it, set up components to not allow the user to fall over the edge
6. Personal fall arrest	Falls, suspension trauma, misuse of equipment, striking objects after falling	Only use equipment rated for fall protection, inspect equipment prior to use, anchor points must hold 5,000 lbs. or be pre-engineered as fall protection anchors, choose system components to limit fall distance, set up system to avoid a swing fall
7. Safety monitors	Falls, miscommunication	Last resort option, call safety department representative prior to use, monitor must have authority to instruct person being monitored, monitor can have no other task other than watching person being monitored

INTRODUCTION/OVERVIEW

Falls from elevations are one of the most common and most serious hazards in all industries. Falls happen quickly and unexpectedly, killing hundreds of people each year and injuring thousands more. Fall hazards exist when employees are exposed to changes in elevations such as working next to a roof curb, roof edge, floor hole, material access point, or mechanical shaft in the construction or service industries. Fall hazards also exist in general industry type locations (i.e. fabrication shops, offices, tool cribs) such as at loading docks or on elevated storage platforms.

HAZARDS OF FALLS

Falls are a top hazard in many industries, including construction. Fall hazards exist when there are any changes in elevation. Fall happen quickly and unexpectedly, it is extremely unlikely you would be able to catch yourself if you began to fall. The easiest way for all employees to keep from falling is to stay away from the hazard. Often people choose to position themselves in an unfavorable position next to a fall hazard when they may be able to accomplish their task in a different way and not be exposed to the fall. If we have no option but to be next to a fall hazard, some type of fall protection is necessary.

The height threshold for when some type of conventional fall protection must be implemented varies slightly between construction and general industry. Because of frequently changing work environments and variability of tasks needing to be accomplished, employees in the construction industry are allowed to be exposed to changes in elevation up to 6’ in height before some method of fall prevention or protection is needed. General industry environments, such as fabrication shops and offices, only allow employees to be exposed to changes in elevation up to 4’ in height before some method of fall protection is required. Falls which occur greater than industry recognized height will be reported and investigated by Safety.

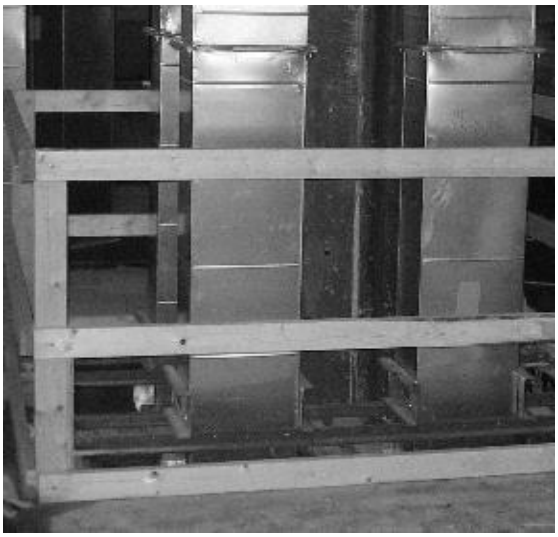
TRAINING REQUIREMENTS

All employees need to be trained in the recognition of fall hazards and the fall protection options traditionally used. All employees who have a need to wear personal fall restraint or personal fall arrest equipment must be trained in the following areas:

1. Inspecting personal fall restraint/arrest equipment
2. Putting on personal fall restraint / arrest equipment
3. Using personal fall restraint / arrest components correctly
4. Identifying anchor points
5. Understanding the potential for suspension trauma and possible rescue methods (when using personal fall arrest)
6. Retrain when employer feels worker does not understand or haveskill required, changes in workplace, change in fall protection system.

FALL PROTECTION OPTIONS

There are many different options available to protect our employees when there are exposures to falls. Fall protection options include guard rails, hole covers, safety nets, controlled access zones, fall restraint, personal fall arrest, and safety monitors. Conventional fall protection options and requirements are explained in the following section. Contact your safety department representative if you need assistance with determining suitable solutions for employee fall protection.



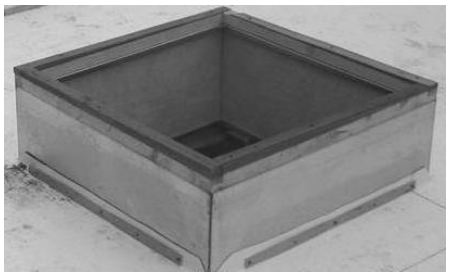
GUARD RAILS

When installed properly, guard rails provide passive fall protection to employees working around the potential fall hazard. Guard rails are a preferred method of fall protection whenever possible because it does not require ongoing action by employees. Once guard rails are securely installed, employees can work freely around the previous fall hazards. The following are requirements for the use of guard rails as fall protection:

- Guard rails shall consist of a top rail, mid rail, and toe board.
- The top of the top rail shall be at 42” (+/- 3”) from the walking/working surface. Mid rails shall be halfway between the top rail and the walking/working surface. Toe boards shall be placed at the base of the guard rail system and in contact with the walking/working surface.
- Guardrails shall be constructed to withstand, without failure or deflection below the required heights, a force of a least 200 pounds applied in any downward or outward direction.
- Guard rails shall never be used as an anchor point for personal fall arrest.
- If guard rails are constructed of wood, upright posts should be no more than 8’ apart.
- If wire rope is used to construct guard rails, some type of flagging is required every 6’ on the top rail to provide visual identification.
- Guard rails shall be surfaced to prevent injury from punctures or lacerations.
- At hoisting areas, a removable guard rail or doors shall be in place to protect open edges when hoisting is not taking place. When hoisting is taking place and employees are within 6’ of the hoisting area fall exposure, personal fall arrest or fall restraint must be used to protect the employee.
- Ladder access openings shall be provided with a gate or have an off- set guard rail so that a person cannot walk directly into the opening beside the ladder access.
- Stair flights having four or more risers shall be equipped with guardrails.
- Guard rails must be inspected regularly to ensure verify their stability.

HOLE / OPENING COVERS

Covers are often an alternative to guard rails for openings within a building. A **hole** is an opening less than 12" in dimension but greater that 2" through which materials could easily fall but not likely a person. An **opening** is greater than 12" in dimension through which a person could likely fall (picture to the right). The following are requirements for the use of hole / opening covers:



- Covers shall protect the entire opening (picture to the right).
- Covers shall be securely fastened to keep from accidently or easily being removed

- Covers must withstand two times the maximum intended weight load. Typical covers are made of ¾" plywood, heavy gauge sheet metal, or plate steel.
- Covers must be marked with the word "hole" or "cover" to notify others of the hole / opening underneath. If the cover is too small to identify by writing, mark it with high visibility paint recognizable by others.
- If covers are placed in areas where non-construction individuals may encounter them (i.e. on a public side walk or in a retail store) they must be recessed into the hole opening or if the cover is positioned over the hole, edges must be beveled at 45 degree angles (if using plywood covers).
- Another form of fall protection is required to protect our employee(s) from a fall when employees are installing or removing covers on an opening (i.e. greater than 12" wide) unless the installation or removal process can be done in such a way as to not expose our employee(s) to the fall hazard. For example, if an opening cover can be removed by pulling it off while moving your body away from the opening; you are not exposed to the fall hazard.

SAFETY NETS

Safety nets are a method of fall protection that is less frequently used when compared to other options but is a potential way we can protect from a fall. The following are requirements for the use of safety nets:

- Consult with your safety department representative prior to the use of safety nets for fall protection.
- Safety nets must be installed as close as possible under the walking/working surface where the fall hazard exists, but not greater than 30'.
- Safety nets shall project out from the work surface as noted in the table to the right:
- Safety nets shall have sufficient clearance underneath them to prevent contact with surfaces or structures below.
- Safety nets must be tested after installation by dropping a 400lbs bag of sand with a diameter of 30" from the highest level which a fall hazard exists. Drop tests must be retested every 6 months unless a competent person certifies the net is in compliance
- Inspect nets and remove any debris that has fallen into the net daily.

Vertical distance from work surface to net:	Required net projection out from work surface
< 5'	8'
5' – 10'	10'
>10'	13'

CONTROLLED ACCESS ZONES

A controlled access zone is a method of fall protection in which the leading- edge fall hazard area is isolated from other, non-hazardous adjacent areas. Workers who have been trained on the hazards of working inside the controlled access zone can work freely without the use of guard rails, personal fall arrest, or other traditional methods of fall protection. Controlled access zones are only allowed for operations such as overhand bricklaying and related activities. Controlled access zones must be identified by a control line that restricts access to the area. Control lines must be placed between 6' and 25' from the leading edge; distance might be increased up to 60' with pre-cast erection activities. Control lines must be placed parallel to all leading-edge fall hazards. Employees of ALEXANDER MECHANICAL are not to be in controlled access zones established by others unless we are protected from a fall by some traditional means (i.e. personal fall restraint, personal fall arrest, etc.) regardless of the lack of fall protection equipment being used by

others.

WARNING LINES

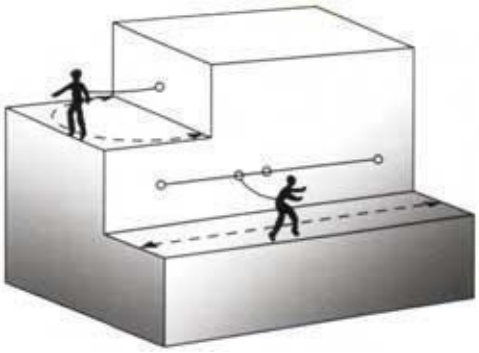
Warning lines are a method of fall protection that are used when a fall hazard exists, such as a roof edge, that cannot or is not protected by a guard rail, net, or cover. Warning lines are used in conjunction with other personal fall protection methods. The function of a warning line is to identify where an exposure to the unprotected fall hazard begins. Employees working on the non-exposure side of a warning line can work freely without fall protection but once the warning line is crossed and they are in the fall hazard exposure area, they must be protected from a fall by other means such as personal fall restraint, personal fall arrest, or a safety monitor. The following are requirements for the use of warning lines:

- Warning lines must be erected parallel to fall hazards that are not protected by other means such as guard rails, nets, or covers.
- Warning lines must be located 6' or greater from the fall hazard.

- Warning lines must be a substantial material such as rope, cable, braided nylon tape, or something similar that will not break if an employee walks into it.
- Warning lines must be stretched between stanchions and at a height between 34"-39".
- Warning lines must be flagged every 6' or less to help with visibility.

PERSONAL FALL RESTRAINT

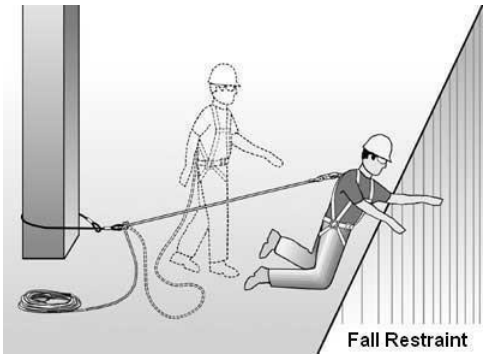
Personal fall restraint is the use of equipment to limit a person's travel so they cannot physically fall off of an open edge. Personal fall restraint is a popular alternative to personal fall arrest because anchor point strength requirements are much less. Personal fall restraint is an excellent option for finished / existing roofs in both construction and service work.



Personal fall restraint systems are comprised of 3 components including:

1. Full body harness: equipment worn by an employee to hold them back from the leading edge.

2. Connecting devices: equipment used to connect a person's full body harness to an anchor point and to limit their movement so they cannot reach a leading edge (i.e. rope & rope grab, lanyard, etc.)



3. Anchor points: the point of a personal fall restraint system that provides the strength to restrain an individual's movement and to support the forces of the entire system in the event of a fall towards a leading edge (i.e. trip and fall forward while walking towards a leading edge). Anchor points are also commonly referred to as a tie- off point.

The following are requirements for the use of personal fall restraint:

- Fall restraint must be set up so a person may not, at any time while wearing the system, be able to get their body over any fall hazard leading edge.

- Anchor points for fall restraint must be able to withstand two times the potential force on the system such as if the wearer was to trip and fall forward while wearing the system.

- Employees connecting to a fall restraint system will do so using a full-body harness; body/positioning belts are not allowed for any type of fall protection at ALEXANDER MECHANICAL.

- Fall restraint system components can vary widely, again the primary goal being an employee cannot get their body over the fall hazard leading edge. Frequently used because of ease of adjustment is a rope and rope grab. If using a rope and rope grab for fall restraint, ensure the system is adjusted in a way that the user cannot reach the leading edge. Contact your safety department representative if you need assistance implementing a fall restraint system.

PERSONAL FALL ARREST

When the work we are required to do places us next to a fall hazard and we are not able to be protected by other means such as guard rails, hole covers, or fall restraint, employees will need to utilize personal fall arrest. Personal fall arrest systems connect the user to an anchor point to catch the person should they accidently fall off the leading edge. Personal fall arrest components manufactured to meet OSHA and American National Standards Institute (ANSI) requirements will limit the impact force on a person to safe level. It is critical that employees utilizing personal fall arrest be trained in the use of the equipment; misusing personal fall arrest equipment can be just as hazardous as not using any fall protection, be sure to train thoroughly.

Personal fall arrest systems are comprised of 3 components including full body harnesses, connecting devices, and anchor points. Each component category is explained below along with specific requirements that relate to the component category. The following are general requirements for the use of personal fall arrest

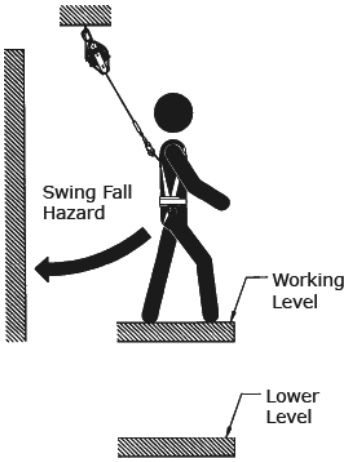
- All fall protection equipment must be inspected prior to each day's use. See Appendix A for a fall protection equipment inspection guide for assistance with inspections.

- All fall protection equipment must meet OSHA, ANSI Z359.1. and ANSI A10.14 standards (manufacturer's equipment labels should indicate this or contact them directly for documentation).

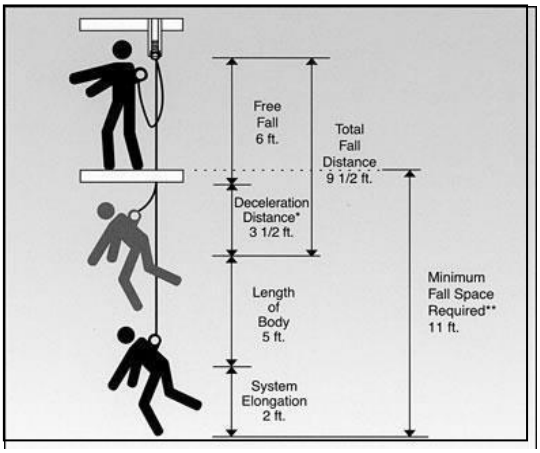
- Personal fall arrest systems must be implemented so a person will not swing and hit an adjacent structure (swing fall).

- No personal fall arrest equipment shall beused for material hoisting.

- Any personal fall arrest equipment that is subjected to an impact load must immediately be removed from service and not used again until inspected by a competent person and determined to be undamaged and suitable for re-use.
  Consult with the equipment manufacturer on use after an impact, many products are not allowed to be reused.



- Personal fall arrest systems must be implemented so a person will not fall and strike objects or levels below before the system stops their fall. Keep in mind that lanyards can



- extend up to 42” beyond their original 6’ length in the event of a fall (shock absorber stretch). Self- retracting lifelines are manufactured to engage (stop a fall) in no more than 42” although most typically engage in 12”-18”.

- A rescue plan must be in place before any use of personal fall arrest. Individual suspended in personal fall arrest for long periods of time can sustain suspension trauma which can be fatal. See the end of this section for more information on suspension trauma.

Full body harness: equipment designed specifically to spread the impact forces of a fall across the wearer’s body to minimize harm.

- Employees must wear a body harness that is the correct size for their physique, ensure all connectors are securely fastened, and it is adjusted to fit them snuggly. Body belts are not acceptable for any use at any time.

- Connecting devices must only be attached to the back D-ring on the full body harness. Side D-rings (on select harnesses) are to be used for work positioning only.

- The harness back D-ring should be located toward the wearer’s upper back, approximately between his/her shoulder blades.

Connecting devices: equipment used to connect a person's full body harness to an anchor point and designed to limit impact forces on a person by absorbing forces of a fall (i.e. shock absorbing lanyard) or through limiting a person's fall to a minimal distance (i.e. self-retracting lifeline).

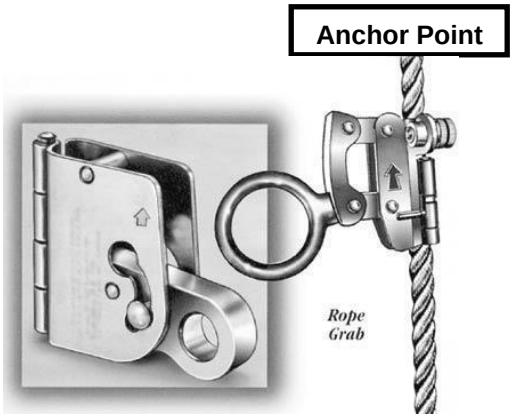
- All connecting device (i.e. shock absorbing lanyards, self-retracting lifelines, vertical lifeline ropes, etc.) snap hooks must be the double action (locking) type so the snap hook keeper cannot be opened without a second action (see picture to the right).

- Each employee must be connected to an independent connecting device and anchor unless the equipment is rated for more than one person by the manufacturer.

- When using shock absorbing lanyards with a shock pack, connect the end of the lanyard with the shock absorbing pack to the back of the user's harness.

- Do not connect/tie any device (i.e. lanyard, self-retracting lifeline, vertical lifeline rope, etc.) back to itself unless the manufacturer has rated it for such use. Snap hooks with keepers that are not rated for tie-back can fail in the event of a fall. If you need a tie-back lanyard be sure to purchase one that is manufactured with a snap hook or carabineer rated for such use.

- When using vertical lifelines (i.e. rope & rope grab) ensure the rope grab is installed in the correct orientation per the manufacturer's instructions; rope grabs will arrest a fall only if they are installed in the correct direction. Rope grabs typically have an arrow on them pointing in the direction towards the anchor point end of the rope (see picture to the right)



- Never tie a knot in the rope of a vertical lifeline, lanyard, or self-retracting lifeline.
  Knots will decrease the strength of a connecting device and can cause a failure of the connecting device.

- Protect connecting devices against cuts and abrasions where necessary

Anchor points: the point of a personal fall arrest system that provides the strength to support the impact forces of the entire system in the event of a fall from an elevated surface. Anchor points are also commonly referred to as a tie-off point.

- Anchor points must be capable of supporting 5,000lbs or be designed, installed and used as part of a complete fall protection system engineered to withstand two times the maximum intended load.

- Only one employee shall be connected to any one anchor point unless it is rated for more than one person.

- Guard rails must not be used as anchor points.

- Anchor points must be used at shoulder height or above to limit free-fall of an employee to less than 6'. Having anchor points at this level also helps to maintain adequate clearance distance between the fall hazard and the level/objects below that a person could strike as their personal fall arrest equipment is stopping their fall.
- Horizontal lifelines (HLLs) used as an anchor point for a personal fall arrest system must maintain a safety factor of at least two. Pre- engineered horizontal lifelines are available for purchase from many fall protection manufacturers which will remove the guess work of having an adequate system. Contact your safety department representative if you have questions regarding HLLs.

SAFETY MONITORS

When all other conventional fall protection options have proven to be infeasible, using a safety monitor is our final alternative. A safety monitor is an employee who is designated to monitor other employees who are working in immediate proximity to a fall hazard. The role of the safety monitor is to assist other employees in the recognition of hazards in an attempt limit the possibility of an employee falling. Safety monitors is a minimally effective method of fall protection that will only

be used by ALEXANDER MECHANICAL as a final option. A call must be placed to your safety department representative prior to using a safety monitor as a method of fall protection so the necessity can be discussed. The following are requirements for the use of safety monitors:

1. The safety monitor shall be able to recognize fall hazards and have the authority to direct the employees being monitored.

2. The safety monitor shall be on the same working surface as exposed employees and have visual and verbal contact with the employees being monitored.

3. The safety monitor shall have no other responsibilities that could take his/her attention away from the employees being monitored.

4. The safety monitor shall warn the employees when it appears the employee is unaware of a fall hazard or is acting in an unsafe manner.

III. APPENDIX A

PERSONAL FALL RESTRAINT / ARREST EQUIPMENT INSPECTION GUIDE

The following information is a basic guide to inspecting personal fall restraint / arrest equipment. Refer to the manufacturer's instructions for product inspection specifics or contact your safety department representative.

FULL BODY HARNESS

Components:	**Items to check for:**	**Remove from service if:**
Hardware (buckles, D-rings, etc.)	Not bent, cracked, corroded, broken, modified, or any other damage	Damaged, deformed, or alteration is present on any hardware
Webbing	Frays, cuts, burns, abrasion, tears, or other damage that could reduce its strength. If applicable, review impact indicator tags/stitching that would indicate the harness has taken an impact.	Cuts or holes greater than 1/16" on critical support areas such as leg straps, d-ring area, shoulder straps, etc. Any damage that could affect the structural integrity of the harness
Stitching	Pulled, cut, broken, or otherwise damaged stitches	More than 2 damaged stitches in the same stitch pattern.
Labels	Manufacturer tag must be present and legible to show size, serial number, date of manufacture, and other information	Tags are missing or you cannot read the manufacturer tags

*Note: Harnesses can be cleaned using mild detergent and water (do not use bleach); rinse and dry thoroughly. Do not pressure wash harnesses to clean them.

LANYARDS

Components:	Items to check for:	Remove from service if:
Snap hooks	Locking (double-action) snap hooks, bent/damage/modified parts, damage hook gate, excessive wearing	Snap hooks are not of locking type, gate won't close or lock correctly, any stretching / bending / modifications / excessive wearing are present.
Webbing/Rope/Cable	Cuts, frays, broken fibers / wires, burns, abrasion, modification, knots,	Any cuts / burns in webbing, more than 2 broken stitches, knots that have affected structural integrity, modifications
Energy absorber (i.e. shock absorbing pack)	Previously impacted, cuts, burns, secured to other components	Any visible impact is present, damage to connection points, cuts / burns / other damage to the energy absorber

*Note: "bungee" lanyards typically have an energy absorber built into the structure of the lanyard and do not have a visible energy absorbing "pack". Consult with the manufacturer on the inspection of internal energy absorbing systems.

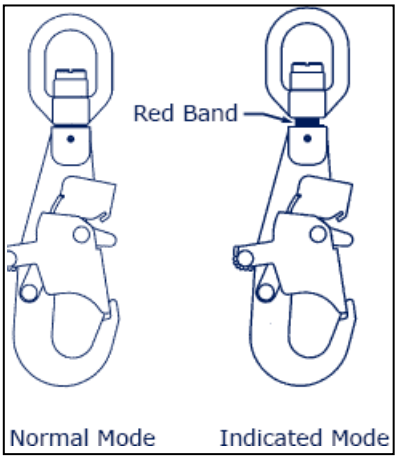
ANCHOR POINTS

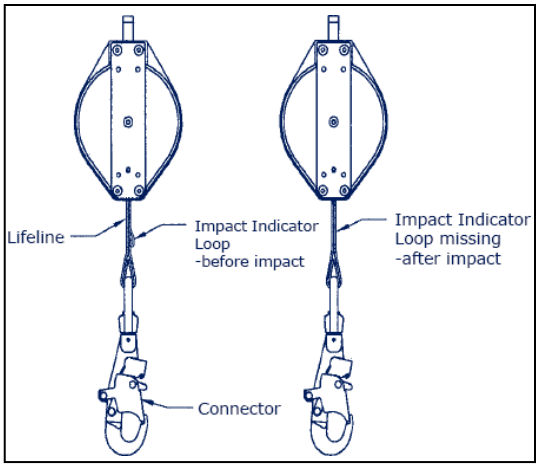
Components:	Items to check for:	Remove from service if:
D-rings	Not bent, cracked, corroded, broken, modified, or any other damage	Damaged, deformed, or alteration is present on any hardware
Structural body	Cuts, frays, broken fibers / wires, burns, abrasion, modification, knots,	Cuts in structural webbing, damaged D-ring connections, damaged pivot points, missing parts, modifications

SELF-RETRACTING LIFELINES (SRL)

Components:	Items to check for:	Remove from service if:
Case	Case integrity, fasteners, labels, anchorage point	Case is broken, case has been opened, case anchor point is damaged or missing
Cable/Web lifeline	Cuts, frays, kinks, knots, impact indicators, retracting function, impact lock function	Web lifeline is cut / knotted / frayed / burned, cable lifeline if 3 broken wires in one strand in one lay / 6 random wires in one lay / kinks / bird-caging, retracting mechanism does not pull lifeline back into case, locking mechanism does not catch when lifeline is pulled sharply, impact indicator has been pulled showing the unit has been impacted (see figure below table)
Hooks	Locking (double-action) snap hooks, bent/damage/modified parts, damage hook gate, excessive wearing	Snap hooks are not of locking type, gate won't close or lock correctly, any stretching / bending / modifications / excessive wearing are present

Retractable Impact Indicators:





ROPES & ROPE GRABS

Components:	Items to check for:	Remove from service if:
Hooks	Locking (double-action) snap hooks, bent/damage/modified parts, damage hook gate, excessive wearing	Snap hooks are not of locking type, gate won't close or lock correctly, any stretching / bending / modifications / excessive wearing are present
Ropes	Stretching, flexibility, broken / frayed / cut yarns, burns, knots, excessive soiling or paint / caulk build-up,	Impacted by a fall or other (recognizable by yarn strands being extremely tight because of the impact), knots that cannot be un-done, excessive or concentrated damage to rope yarns, build-up of caulk / paint / etc. that will hinder rope grab movement,
Rope Grabs	Detention pin (if rope grab is type that opens to attached to rope), rope locking mechanism & lever, mechanical parts,	Detention pin is missing (for rope grabs that open), rope locking mechanism or lever that does not function or lock, any modification to the unit, any deformation causing the unit to not function properly

*Note: Ropes can be cleaned using mild detergent and water (do not use bleach); rinse and dry thoroughly. Do not pressure wash rope to clean them.

IV. APPENDIX A

SUSPENSION TRAUMA

Suspension trauma, also known as “orthostatic intolerance”, is a condition that can occur after an individual has fallen and is suspended in their personal fall arrest harness. When a person is suspended in an upright position, the body will naturally begin to pool blood in the lower extremities of the body because the legs are not moving and assisting with pushing blood back to the heart. As blood pools in the lower extremities there will begin to be a shortage of blood returning to your heart and lungs to get oxygen for your body’s organs. Over time, with too little blood oxygenated blood moving to your body’s organs, you will pass out. If the body’s organs go without blood for too much time they will begin to shut down and you can die or have serious permanent injury. Serious internal injuries or death can happen in under 30 minutes of being suspended.

Rescue of fallen employees who are suspended in their fall protection equipment is a life and death situation. **ALWAYS** have a rescue plan in place of how you are going to get a fallen individual down. Calling emergency services (i.e. 911) is not always the answer for rescue as it might take them too much time to arrive before damage begins to a fallen individual or they may not have equipment suited to reach the individual. If we are solely relying on emergency services for rescue assistance, we must contact them ahead of time so they can visit our work site and be of the parameters we are dealingwith.

If a fall does take place and an individual is suspended, they can decrease the rate of suspension trauma progression by moving their legs, flexing their calves, or if possible, using their legs to push off of a building or other object to help push blood back towards their heart. If in a situation where it is known that rescue may not be a quick process, suspension trauma straps can be attached to an employee’s harness.
Suspension trauma straps are small packs that can be attached to the side of a body harness and deployed to make a standing loop in the event of a fall. The standing loop allows an employee to stand up, take pressure off their groin so blood can flow easier, and allow for legs to be flexed and push blood back to the heart (see picture to the right).

Most fall protection manufacturers make a version of suspension trauma straps. Contact your safety department representative if you need more information or assistance with a rescue plan.

Chapter 15: FIRE PROTECTION/PREVENTION

INTRODUCTION/OVERVIEW

Some very disastrous fires occur on construction jobs. Most of them are caused by a violation of basic, commonsense fire safety precautions. Listed below are nine simple fire prevention regulations our employees and supervisors must adhere to at the jobsite. This summary outline is then expanded upon with information taken directly from OSHA Standards 1910.155, 1910.157, and 1926.150.

1. **RUBBISH** Cleanup prevents fires. Remove all rubbish and debris daily.

2. **HEATERS** Use only safe, U.L. or F.M. approved heaters. These should be in good condition, insulated from the floor and sturdy enough that they won't be knocked over by a careless act. They must be placed well away from flammable materials, vented to the outside or placed in an adequately vented area.

3. **FLAMMABLE LIQUIDS** Store in U.L. approved containers. Do not store in "GI" cans or open containers. Shut off all vehicle and equipment engines before fueling. No smoking is permitted in the area. Welding and cutting operations are also prohibited. Do not keep temporary heaters in the area where these liquids are stored.

4. **FIRE EXTINGUISHERS** Provide the required number of extinguishers. Make certain they are the correct type for the hazard and that their location is properly marked. Check and inspect them periodically. Every individual on the job should know both where the fire extinguishers are located and how to use them. It is too late for instruction after the fire starts.

5. **WELDING AND CUTTING** Keep all fire extinguishing equipment nearby and in a state of readiness. Remove or cover all flammables in the area. Watch where the sparks are going. Check for smoldering sparks or fires both during the operation and about one-half hour later.

6. **NO SMOKING -** Smoking is strictly forbidden. Take special care to check for butts at break and quitting time.

7. **EXITS AND EXIT SIGNS** Provide at least two means of exit. These must be remote from each other and not able to be blocked at the same time. Erect an extra ladder or two if need be. Exit signs are cheap. It's better to have too many than none at all.

8. **ACCESS** Make certain that a fire lane is kept clear at all times so fire equipment can reach the building.

9. **WHAT TO DO IN CASE OF FIRE** Actuate the fire alarm on the jobsite if applicable and call the fire department. Second, evacuate all personnel as quickly as possible. Third, direct the fire department to the fire. Before the fire department arrives, try to put the fire out yourself if possible. However, remember that your men are construction workers and not firemen. Even if you have a fire brigade, they must be concerned with their own safety above all else.

TRAINING

All employees will be familiarized with the general principles of fire extinguishers' use and the hazards involved with firefighting upon initial employment and at least annually thereafter. (OSHA 1926.150c) Training at the time of employment will be via videotape.

Annual training will be via Toolbox Talks.

PORTABLE EXTINGUISHERS – 1926.150

GENERAL REQUIREMENTS

General requirements regarding portable fire extinguishers include:

1. Mount, locate and identify extinguishers so that they are readily accessible to employees in accordance with the following requirements.

    a. At least one size 2A extinguisher for every 3,000 square feet of protected building area.

    b. Within 100 feet of any point.

    c. On each floor of a multi-story building near each stairway.

    d. One size 10B extinguisher within 50 feet of area where more than 5 gallons of flammable liquid is stored.

2. Use only approved extinguishers.

3. Never use carbon tetrachloride or chlorobromomethane extinguishing agents; these are prohibited.

4. Maintain extinguishers in a fully charged and operable condition and keep in their designated places at all times except during use.

5. Permanently remove all soldered or riveted shell inverting type extinguishers from service.

6. Perform a visual Monthly inspection of all Extinguishers

7. **Perform annual maintenance inspection and attach a tag with date of last inspection.**

OSHA STANDARDS -

FIRE PROTECTION

SUBPART F

PORTABLE FIRE SUPPRESSION EQUIPMENT

SCOPE, APPLICATION AND DEFINITIONS

Class A fire. A fire involving ordinary combustible material such as paper, wood, cloth and some rubber and plastic materials.

Class B fire. A fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

Class C fire. A fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

Class D fire. A fire involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.

Dry chemical. An extinguishing agent primarily composed of very small particles of chemical, e.g., sodium bicarbonate, potassium bicarbonate, monoammonium phosphate.

Dry powder. A compound used to extinguish Class D fires.

Extinguisher rating. The numerical rating given to an extinguisher which indicates the extinguishing potential of the unit based on standardized test developed by Underwriters' Laboratories, Inc.

Fire brigade. An organized group of employees who are knowledgeable, trained, and skilled in at least basic firefighting operations.

Halon 1211. A colorless, faintly sweet smelling, electrically nonconductive liquefied gas ($CBrC1F_2$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromochlorodifluoromethane.

Halon 1301. A colorless, odorless, electrically nonconductive gas ($CBrF_3$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromotrifluoromethane.

Incipient stage fire. 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.

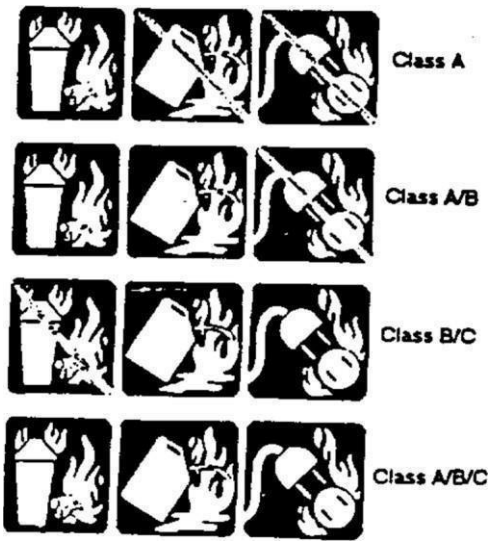
Interior structural firefighting. The physical activity of fire suppression, rescue, or both, inside buildings and enclosed structures.

CLASSIFICATION OF PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers are classified to indicate their ability to handle specific classes and sizes of fires. Labels on extinguishers indicate the class and relative size of fire that they can be expected to handle.

Class A extinguishers are used on fires involving ordinary combustibles, such as wood, cloth, and paper. Class B extinguishers are used on fires involving liquids, greases, and gases. Class C extinguishers are used on fires involving energized electrical equipment. Class D extinguishers are used on fires involving metals such as magnesium, titanium, zirconium, sodium, and potassium. The recommended marking system to indicate the extinguisher suitability according to class of fire is a pictorial concept that combines the uses and non-uses of extinguishers on a single label. This system is illustrated in the figure shown on the next page.

The first set (row) of symbols illustrated in the figure is a label for use on a Class A extinguisher. The symbol at the left (which depicts a Class A fire) is blue. Since the extinguisher is not recommended for use on Class B or C fires, the remaining two symbols (which depict Class B and Class C fires) are black, with a diagonal red line through them. The second set (row) of symbols illustrated in the figure is a label for use on a Class A/B extinguisher. The two left symbols are blue. Since the extinguisher is not recommended for use on Class C fires, the symbol on the far right (which depicts a Class C fire) is black, with a diagonal red line through it. The third set of symbols is a label for use on Class B/C extinguishers. The two right symbols are blue. Since the extinguisher is not recommended for use on Class A fires, this symbol is black, with a diagonal red line through it. The fourth set of symbols is a label for use on Class A/B/C extinguishers. All symbols on this label are blue.



Letter shaped symbol markings are also used to indicate extinguisher suitability according to the class of fire. Extinguishers suitable for more than one class of fire should be identified by multiple symbols placed in a horizontal sequence.

Extinguishers suitable for Class A fires should be identified by a triangle containing the letter **A**. If colored, the triangle should be green.

Extinguishers suitable for Class B fires should be identified by a square containing the letter **B**. If colored, the square should be colored red.

Extinguishers suitable for Class C fires should be identified by a circle containing the letter **C**. If colored, the circle should be colored blue.

Extinguishers suitable for fires involving metals should be identified by a five-pointed star containing the letter **D.** If colored, the star should be colored yellow.

Class A and Class B extinguishers carry a numerical rating to indicate how large a fire an experienced person can put out with the extinguisher. The ratings are based on reproducible physical tests conducted by Underwriters Laboratories, Inc. Class C extinguishers have only a letter rating because there is no readily measurable quantity for Class C fires which are essentially Class A or B fires involving energized electrical equipment. Class D extinguishers likewise do not have a numerical rating. Their effectiveness is described on the faceplate.

Class A Ratings

An extinguisher for Class A fires could have any one of the following ratings: 1- A, 2-A, 3- A, 4-A, 6-A, 10-A, 20-A, 30-A, and 40-A. A 4-A extinguisher, for
example, should extinguish about twice as much fire as a 2-A

extinguisher. Class B Ratings

An extinguisher for Class B fires could have any one of the following ratings: 1-B, 2-B, 5-B, l0-B, 20-B, 30-B, 40-B, and up to 640-B.

Class C Ratings

Extinguishers rated for Class C fires are tested only for electrical conductivity. However, no extinguisher gets a Class C rating without a Class A and/or Class B rating.

Class D Ratings

Class D extinguishers are tested on metal fires. The agent used depends on the metal for which the extinguisher was designed. Check the extinguisher faceplate for the unit's effectiveness on specific metals.

COMMON FIRE EXTINGUISHING AGENTS

WATER

Properties

- Removes heat
- Effective on Class A fires
- Non-toxic

A. Disadvantages

- Conducts electricity
- May spread Class B fires
- Freezes in cold climates
- May carry

pollutants as run-off water

CARBON DIOXIDE (CO_2)

B. Properties

- Reduces oxygen to less than 15%
- Effective on Class B and C fires
- No residue
- Relatively inert

C. Disadvantages

- Generally, >35% concentration by volume required for total flooding systems
- Toxic to humans at >4% by volume
- Not the best agent for smoldering deep-seated fires (maintain concentration for >20 minutes)
- Dissipates rapidly - allows reflash
- Has a cooling/chilling effect on some electronic components
- Vapor density = 1.5 (collects in pits and low areas)

DRY CHEMICAL

D. Properties

- Interrupts chemical reactions

- Sodium bicarbonate (baking soda)
- Very effective on Class B and C fires
- Not considered toxic

E. Disadvantages

- Leaves a residue
- Obscures vision
- Not good on deep-seated Class A fires
- Absorbs moisture and may cake within container
- May be irritating
- Nozzle pressure may cause burning

liquids to splash MULTIPURPOSE DRY CHEMICAL

F. Properties

- Interrupts chemical reactions
- Ammonium phosphate
- Effective on Class A, B, and C fires
- Non-conductive

G. Disadvantages

- Obscures vision
- More irritating than ordinary dry chemical
- Nozzle pressure may cause burning

liquids to splash HALON 1301

H. Properties

- Interrupts chemical reactions
- Bromotrifluoromethane
- Effective on Class A, B, and C fires
- Not acutely toxic at <10% by volume
- Generally used at <7% by volume
- No residue
- No chilling effect on electronic parts and components

I. Disadvantages

- Acutely toxic at >10% by volume (anesthetic and cardiac effects)
- Delayed effects and effects of chronic exposure not well known
- Toxic decomposition products are generated by fire
- Vapor density = 5 (collects in pits and low areas)

J. Decomposition Products

- Hydrogen fluoride (H**F**)
- Hydrogen bromide (HBr)
- Bromine (Br_2)
- Carbonyl fluoride (COF_2)
- Carbonyl bromide ($COBr_2$)

HALON 1211

K. Properties

- Interrupts chemical reactions

- Bromochlorodifluoromethane
- Effective on Class A, B, and C fires
- No residue
- May be sprayed (Boiling Point = 25°F)
- Used in portable fire extinguishers

L. Disadvantages

- Acutely toxic at >5% by volume (dizziness, impaired coordination and cardiac effects)
- Must be used at >5% by volume
- Toxic decomposition products are generated by fire
- Vapor density = 5.7 (collects in pits and low areas)

M. Decomposition Products

- Hydrogen bromide (HBr)
- Hydrogen chloride (HC1)
- Hydrogen fluoride (HF)
- Bromine (Br_2)
- Chlorine ($C1_2$)
- Fluorine (F_2)
- Carbonyl bromide ($COBr_2$)
- Carbonyl chloride ($COC1_2$)
- Carbonyl fluoride (COF_2)

PORTABLE FIRE EXTINGUISHERS
Table 18-1B.

Extinguishing Agent	Extinguisher Type & Size	Approximate Present Classification
Chemical Solution (Soda-Acid)	1¼, 1½ gallon	1-A
	2½ gallon	2-A
	17 gallon	10-A
	33 gallon	20-A
Water	1½, 1¾ gallon (pump or pressure)	1-A
	2½ gallon (pump or pressure)	2-A
	4 gallon (pump or pressure)	3-A
	5 gallon (pump or pressure)	4-A
	17 gallon (pressure)	10-A
	33 gallon (pressure)	20-A
	5 12-quart or 6 10-quart water filled pails; 55-gallon water filled drum with 3 fire pails; 25 to 55 gallon water filled bucket tank with 5 or 6 fire pails	2-A
Loaded Stream	1 gallon	1-A
	1¾ and 2½ gallon	2-A, ½-B*
	33 gallon	20-A
Foam	1¼ and 1½ gallon	1-A, 2-B
	2½ gallon	2-A, 4-B
	5 gallon	4-A, 6-B

Extinguishing Agent	Extinguisher Type & Size	Approximate Present Classification
Foam - (Continued)	17 gallon	10-A, 10-B
	33 gallon	20-A, 20-B
Carbon Dioxide	6 or less lbs of carbon dioxide	1-B, C
	7½ lbs of carbon dioxide	2-B, C
	10 to 12 lbs of carbon dioxide	4-B, C
	15 to 20 lbs of carbon dioxide	4-B, C
	25 & 26 lbs of carbon dioxide	6-B, C
	50 lbs of carbon dioxide	10-B, C
	75 lbs of carbon dioxide	12-B, C
	100 lbs of carbon dioxide	12-B, C
Dry Chemical	4 to 6¼ lbs of dry chemical	4-B, C
	7½ lbs of dry chemical	6-B, C
	10 to 15 lbs of dry chemical	8-B, C
	20 lbs of dry chemical	16-B, C
	30 lbs of dry chemical	20-B, C
	75 to 350 lbs of dry chemical	40-B, C
Wetting Agent	10 gallons	6-A
	20 gallons	12-A
	50 gallons	30-A

FIRE EXTINGUISHER CHART

KIND OF FIRE	APPROVED TYPE OF EXTINGUISHER						
DECIDE THE CLASS OF FIRE YOU ARE FIGHTING. . . ↓	. . .THEN CHECK THE COLUMNS TO THE RIGHT OF THAT CLASS →	MATCH UP PROPER EXTINGUISHER WITH CLASS OF FIRE SHOWN AT LEFT						
		FOAM Solution of Aluminum Sulphate and Bicarbonate of Soda	CARBON DIOXIDE Carbon Dioxide Gas Under Pressure	SODA ACID Bicarbonate of Soda Solution and Sulphuric Acid	PUMP TANK Plain Water	GAS CARTRIDGE Water Expelled by Carbon Dioxide Gas	MULTI-PURPOSE DRY CHEMICAL	ORDINARY DRY CHEMICAL
CLASS A FIRES — USE THESE EXTINGUISHERS → ORDINARY COMBUSTIBLES • WOOD • PAPER • CLOTH ETC.		A B	X	A	A	A	A B C	X
CLASS B FIRES — USE THESE EXTINGUISHERS → FLAMMABLE LIQUIDS, GREASE • GASOLINE • PAINTS • OILS, ETC.		A B	B C	X	X	X	A B C	B C
CLASS C FIRES — USE THESE EXTINGUISHERS → ELECTRICAL EQUIPMENT • MOTORS • SWITCHES ETC.		X	B C	X	X	X	A B C	B C

HOW TO OPERATE

FOAM: Don't Play Stream into the Burning Liquid. Allow Foam to Fall Lightly on Fire.

CARBON DIOXIDE: Direct Discharge as Close to Fire as Possible. First at Edge of Flames and Gradually Forward and Upward

SODA-ACID, GAS CARTRIDGE: Direct Stream at Base of Flame

PUMP TANK: Place Foot on Footrest and Direct Stream at Base of Flames

DRY CHEMICAL: Direct at the Base of the Flames. In the Case of Class A Fires, Follow Up by Directing the Dry Chemicals at Remaining Material That is Burning

Important! Using the wrong type of extinguisher for the class of fire may be dangerous!

Chapter 16: FORKLIFT

INTRODUCTION/OVERVIEW

The safe operation of forklifts and aerial lifts on and around our shop and jobsites is essential. To help prevent injury to fellow workers and the public at large, only trained and authorized persons may operate this equipment on our jobsites. This chapter reviews the basic safety rules and procedures these qualified operators must know and practice.

(OSHA 1910.78 revised 12-1-98, 1926.20.b.4)

Powered Industrial Trucks

TRAINING

1. Before any person can be authorized to operate a forklift or aerial lift, they must earn the designation "qualified" by being formally trained by an approved trainer. Training must include demonstrations by the trainer and practical exercises by the trainee. See the Appendix on page 16-2 for the OSHA training topics.

2. **Qualified** means that employees will **satisfactorily** demonstrate their ability to safely perform operational skills in operating a lift. Satisfactorily means that all questions asked by the trainer are answered, and that questions answered incorrectly will be reviewed.

3. Training will be provided only by approved trainers.

4. The Company will arrange for the training of lift operators and will maintain a current list of trained and qualified operators. Written certification of training is required.

5. Since there may be specialized forklifts and aerial lifts to operate, additional training may be required to operate and perform safe lifts with such specialized equipment.

6. The equipment operator's supervisor must formally evaluate in writing the operator's performance in the workplace at least once every 3 years.

7. Refresher training must be provided whenever any deficiencies in performance are noted or if workplace conditions change.

General Safety Regulations for Operators of All Lifts

1. Never operate a forklift or aerial lift unless trained and authorized to do so.
2. Wear appropriate personal protective equipment when operating lifts (hardhat, safety glasses, gloves, appropriate footwear).
3. Inspect daily and before each use.
4. Ensure that the Operation and Safety Manual is stored on the equipment.
5. Turn at a safe speed - smoothly and gradually.
6. Be cautious on wet or slippery pavement.
7. Never refuel with engine running.
8. Do not exceed the rated capacity of the forklift or aerial lift.
9. Never leave a piece of equipment running while unattended. Unattended is considered to be 25 feet from the truck.
10. Block/chock the wheels whenever a forklift or aerial lift is left on an incline.
11. Never let a gasoline/propane/diesel engine idle in an enclosed area.

Specific Safety Regulations for Forklift Operators (OSHA 1910.178)

Operate at a safe speed (at posted speed limits when applicable).

1. Start/stop slowly to prevent load from shifting or spilling.
2. Maintain a safe distance behind other vehicles - three, fork- truck lengths minimum.
3. Sound the horn when approaching intersections, blind spots or other dangerous locations. Don't pass other vehicles.

4. Use mirrors (if there are any) mounted at corners and in blind spots to see pedestrians and on-coming vehicles.

5. Never allow any person to ride in or on the forklift. **NO RIDERS!**

6. Never raise or lower the load while traveling.

7. Keep arms and legs inside the cab of the forklift at all times.

8. Watch for pedestrians.

9. Stay alert for overhead structures.

10. Never turn a forklift sideways on a ramp.

11. Always drive a loaded forklift with the load on the uphill side.

12. Drive with the load tilted back and the forks raised only enough to clear the road.

13. Block and tie round objects so that they won't roll.

14. Use special racks when transporting compressed gas cylinders; acetylene/oxygen must not be transported on the forks (lying down).

15. Never allow any person to stand or pass under the elevated portion of any truck, whether loaded or unloaded.

16. Park the forklift carefully. Make sure the forks are on the ground, the brakes are set, the engine is off, and the keys removed.

17. **Never** use a forklift as an elevator unless an approved personnel platform with handrails and toe board is securely fastened to the forks.

REQUIRED FORK TRUCK-RELATED TRAINING TOPICS:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate
- Differences between the truck and the automobile

- Truck controls and instrumentation: where they are located, what they do, and how they work
- Engine or motor operation
- Steering and maneuvering
- Visibility (including restrictions due to loading)
- Fork and attachment adaptation, operation, and use limitations
- Vehicle stability
- Any vehicle inspection and maintenance that the operator will be required to perform
- Refueling and/or charging and recharging of batteries
- Operating limitations
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.
- Inspection prior to each shift daily; Exterior carriage, forks, hydraulics, oil, coolant, and fuel levels. Inspect tires, boom frame, and overhead guard.
- Interior inspected; gauges, breaks, frame leveling, boom, steering, horn, lights and backup alarm.

Chapter 17: AERIAL LIFT SAFETY

(a) SPECIFIC SAFETY REGULATIONS FOR AERIAL LIFT OPERATORS (OSHA 1926.453)

1. Operate the aerial lift only on surfaces for which it is designed.
2. Verify that guardrails are properly installed, and the gate is closed, including the mid-rail chain, before raising the lift.
3. Wear a safety belt or body harness with lanyard connected to a factory installed anchor point (not the guardrail) when operating boom/Scissor type aerial lifts.
4. Do not lift heavy pipe or other material with the lift unless factory designed to do so. Arrange for a separate hoisting method. **Never** exceed the rated lifting capacity of the aerial lift.
5. Do not operate the lift within 12 feet of electrical power lines.
6. Do not use ladders or other makeshift devices on the platform to obtain greater height.
7. Do not climb up or down extensible, articulating, or scissor arms.
8. Do not use the work platform as a “dead man” in performing work operations, which produce an excessive horizontal force.
9. Use outriggers in accordance with the manufacturer’s recommendations.
10. Report all malfunctions to your supervisor.
11. Do not lay tools or other materials on the operator console.

ALEXANDER MECHANICAL inc

AERIAL LIFT PRE-USE INSPECTION FORM

AERIAL LIFT PRE-USE INSPECTION CHECKLIST		
Operator Print Name:	Aerial or Scissor Lift ID#	
Unit Type: Scissor Lift / Articulating Boom /Man Lift / Other:	Date:	Location of Use:

#	Inspection Item and Description	P/F/NA
1.	Operating and emergency controls are in proper working condition, EMO button or Emergency Stop Device.	
2.	Functional upper drive control interlock (i.e. foot pedal, spring lock, or two hand controls)	
3.	Emergency Lowering function operates properly	
4.	Lower operating controls successfully override the upper controls	
5.	Both upper and lower controls are adequately protected from inadvertent operation.	
6.	Control panel is clean & all buttons/switches are clearly visible (no paint over spray, etc.)	
7.	All switch & mechanical guards are in good condition and properly installed	
8.	All Safety Indicator lights work	
9.	Drive controls function properly & accurately labeled (up, down, right, left, forward, back)	
10.	Motion alarms are functional	
11.	Safety decals are in place and readable	
12.	All guard rails are sound and in place, including basket chains	
13.	Work platform & extension slides are clean, dry, & clear of debris	
14.	Work platform extension slides in and out freely with safety locking pins in place to lock setting on models with extension platforms.	
15.	Inspect for defects such as cracked welds, fuel leaks, hydraulic leaks, damaged control cables or wire harness, etc.	
16.	Tires and wheels are in good condition, with adequate air pressure if pneumatic	
17.	Braking devices are operating properly	
18.	The manufacturer's operations manual is stored on the unit	
19.	Oil level, Hydraulic Oil Level, Fuel Level, Coolant Level	
20.	Battery Charge	
21.	Outriggers in place or functioning. Associated alarms working	

Safety Precautions (Have, Look For, or be Aware of)	Check to Confirm
Personal Protection in use. (Harness, Lanyard, Hardhat etc.)	
In windy conditions see manufacturer guidelines **or if not in guidelines then ...if lift begins to rock in the wind lower the lift**	
Floor conditions: Drop offs, holes, uneven surfaces, and sloped floors.	
Housekeeping: Debris, floor obstructions, cords, construction material and supplies.	
Electrical power cables or panels, (minimum 10 feet away). If larger lines or wet conditions contact Facilities Utilities Department for guidance.	
Chemical lines, gas lines, drain lines, utilities	
Overhead obstructions	
Loads (do not exceed capacity)	
Watch for vehicular and pedestrian traffic. Set up barricades if necessary	
If the Aerial lift fails any part of this inspection, remove the key and report the problem to your supervisor. Do not operate. If anything has been jerry-rigged notify your supervisor at once.	

INSPECTION GUIDELINES

Equipment inspections are required every day and before use. Remember that battery charging installations must be located in areas designated for that purpose. Facilities for flushing and neutralizing spilled electrolyte must also be provided.

Before **each** start-up, check the following:

1. Engine oil level.
2. Radiator water level/battery level.
3. Fuel level.
4. Any damage or leaks.
5. Tires (condition).
6. Lights.
7. Horn.
8. Any warning lights.
9. Gauges and instruments - hour meter.
10. Steering.
11. Brakes, parking and regular.
12. Hydraulic controls.
13. Any electrical connections.
14. Propane tank (if unit is a propane operated unit). Is it properly secured?
15. Condition of forks.
16. Check operation of lifting rack by raising and lowering the forks or platform.

APPENDIX A

WORKPLACE-RELATED TOPICS

- Surface conditions where the vehicle will be operated
- Compositions of load to be carried and load stability
- Load manipulation, stacking, and unstacking
- Pedestrian traffic in areas where the vehicle will be operated
- Narrow aisles and other restricted places where the vehicle will be operated
- Hazardous (classified) locations where the vehicle will be operated
- Ramps and other sloped surfaces that could affect the vehicle's stability
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

Chapter 18: HAND & PORTABLE POWER TOOLS

INTRODUCTION/OVERVIEW

Tools are such a common part of our lives that it is all too easy to forget that they may pose serious hazards. All tools are manufactured with safety in mind, but tragically a serious accident often occurs before steps are taken to search out and avoid or eliminate tool-related hazards.

In the process of removing or avoiding the hazards, we all must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards from occurring. Our company, as employer, is responsible for the safe condition of tools and equipment used by employees. Our employees have the responsibility of properly using and maintaining tools.

This chapter summarizes the basic safety rules we must practice when operating different types of tools so as to avoid the potential hazards hand and portable power tools present. See OSHA 1926.300 for more specific requirements.

BASIC SAFETY PRECAUTIONS

1. Our employees will be trained in the use of all tools. They should understand the potential hazards as well as the safety precautions required to prevent those hazards from occurring.

2. Appropriate personal protective equipment, e.g., safety goggles, gloves, etc., should be worn due to hazards that may be encountered while using portable power tools and hand tools.

3. Safety requires that floors be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand and portable power tools.

4. Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum, or wood will provide for safety.

HAND TOOLS

DEFINITION

Hand tools are non-powered. They include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

POTENTIAL HAZARDS (EXAMPLES)

1. Using a chisel as a screwdriver may cause the tip of the chisel to break and fly, hitting the user or other employees.

2. If a wooden handle on a tool such as a hammer or an ax is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker.

3. A wrench might slip if its jaws are sprung.

4. Impact tools such as chisels, wedges, or drift pins are unsafe if they have mushroomed heads. The heads might shatter on impact, sending sharp fragments flying.

POWER TOOLS

GENERAL PRECAUTIONS

Power tools can be hazardous when improperly used. The following general precautions should be observed by power tool users.

1. Never carry a tool by the cord or hose.

2. Never yank the cord or the hose to disconnect it from the receptacle.

3. Keep cords and hoses away from heat, oil, and sharp edges.

4. Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.

5. Keep all observers at a safe distance away from the work area.

6. Secure work with clamps or a vise, freeing both hands to operate the tool.

7. Avoid accidental starting. The worker should not hold a finger on the switch button while carrying a plugged-in tool.

8. Maintain tools with care. They should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories.

9. Be sure to keep good footing and maintain good balance.

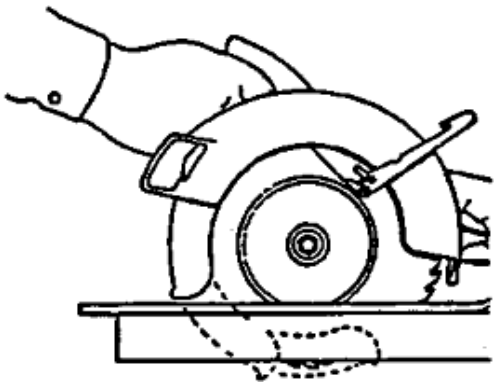
10. Wear the proper apparel. Loose clothing, ties, or jewelry can become caught in moving parts.

11. Remove all damaged portable e l e c t r i c tools f r o m u s e . Tagthem "**DEFECTIVE TOOL**" and return them to tool crib.

SPECIFIC PRECAUTIONS

N. Guards

Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded if such parts are exposed to contact by employees.



Guards, such as the one pictured above, should be provided to protect the operator from the hazards presented by the following components.

1. Point of operation
2. In-running nip points
3. Rotating parts
4. Flying chips and sparks

Safety guards must never be removed when a tool is being used. For example, portable circular saws must be equipped with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except when it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work.

O. Safety Switches

The following hand-held power tools must be equipped with a momentary contact on-off control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than 2 inches in diameter, disc and belt sanders, reciprocating saws, saber saws, and other similar tools. These tools also may be equipped with a lock-on control, provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

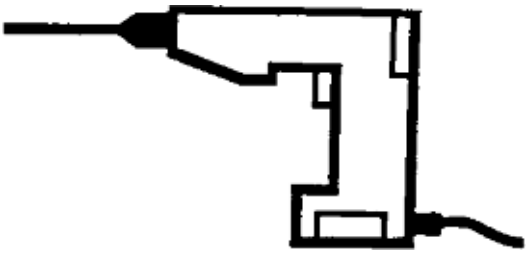
The following hand-held power tools may be equipped with only a positive on-off control switch: platen sanders, disc sanders with discs 2 inches or less in diameter; grinders with wheels 2 inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks 1/4 inch wide or less.

Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released.

P. Electric Tools

Employees using electric tools must be aware of several dangers; the most serious is the possibility of electrocution.

Among the chief hazards of electric- powered tools are burns and slight shocks which can lead to injuries or even heart failure. Under certain conditions, even a small amount of current can result in fibrillation of the heart and eventual death. A shock also can cause the user to fall off a ladder or other elevated work surface.



To protect the user from shock, tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool's metal housing. The other end is grounded through a prong on the plug. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong should never be removed from the plug.

Double insulation is more convenient. The user and the tools are protected in two ways: by normal insulation on the wires inside and by housing that cannot conduct electricity to the operator in the event of malfunction.

Practice the following safety precautions when using electric tools.

1. Operate electric tools within their design limitations.
2. Wear gloves and safety footwear when using electric tools.
3. Store tools in a dry place when not in use.
4. Do not use electric tools in damp or wet locations.
5. Keep work areas well lighted

Q. Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.

There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Practice the following safety precautions when operating pneumatic tools.

1. Equip all pneumatic tools that shoot nails, rivets, or staples and that operate at pressures more than 100 pounds per square inch with a special device to keep fasteners from being ejected unless the muzzle is pressed against the work surface.

2. Use the proper eye protection when using pneumatic tools; **it is required**. Face protection is recommended for employees working with pneumatic tools.

3. Use proper hearing protection. Noise is another hazard when working with tools such as jackhammers.

4. Regularly inspect pneumatic tools to see that they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.

5. Equip all airless spray guns that atomize paints fluids at high pressures (1,000 pounds or more per square inch) with automatic or visual manual safety devices that will prevent pulling the trigger until the safety device is manually released.

6. Install a safety excess flow valve at the source of the air supply on all air hoses more than one-half inch in diameter so that the air automatically shuts off in case the hose breaks.

7. Take the same precautions with an air hose that are recommended for electric cords since the hose is subject to the same kind of damage from accidental striking and presents similar tripping hazards.

8. Install a safety clip or retainer to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.

9. Install screens to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

10. Never point compressed air guns toward anyone. Users should never "dead-end" it against themselves or anyone else.

11. Since heavy jackhammers can cause fatigue and strains, use heavy rubber grips to reduce these effects by providing a secure handhold.

12. When operating a jackhammer, use safety glasses and safety shoes that protect against injury if the hammer slips or falls; **it is required**. A face shield should also be used.

R. Liquid Fuel-Powered Tools

Liquid fuel-powered tools usually use gasoline. The most serious hazard with fuel- powered tools comes from fuel vapors that can burn or explode and give off dangerous exhaust emissions.

The worker must be careful to handle, transport, and store the gas or fuel in approved flammable liquid containers and in accordance with proper procedures for flammable liquids.

Practice the following safety precautions.

1. Before the tank for a fuel-powered tool is refilled, shut down the engine and allow it to cool in order to prevent accidental ignition of hazardous vapors.

2. If a fuel-powered tool is used inside a closed area, provide effective ventilation and/or personal protective equipment so as to avoid breathing carbon monoxide.

3. Keep fire extinguishers readily at hand in the area.

S. Powder-Actuated Tools

Powder-actuated tools operate like a loaded gun and should be treated with the same respect and precautions. In fact, they are so dangerous that they must be operated only by specially trained employees with operator certification from the tool manufacturer.

Practice the following safety precautions.

1. Never use this type of tool in an explosive or flammable atmosphere.

2. Before using the tool, inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.

T. Powered Abrasive Wheel Tools

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments.

Be sure to follow these safety precautions.

1. Before an abrasive wheel is mounted, inspect it carefully. Sound- or ring- test it to be sure that it is free from cracks or defects. To test, wheels should be tapped gently with a light non-metallic instrument. If they sound cracked or dead, they could fly apart in operation and so must not be used. A sound and undamaged wheel will give a clear metallic tone or "ring".

2. To prevent the wheel from cracking, be sure it fits freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer's recommendations. Care must be taken to assure that the spindle wheel will not exceed the abrasive wheel specifications.

3. Due to the possibility of a wheel disintegrating (exploding) during start- up, never stand directly in front of the wheel as it accelerates to full operating speed.

4. Equip all portable grinding tools with safety guards to protect workers not only from the moving wheel surface but also from flying fragments in case of breakage.

5. Always use eye protection.

6. Always turn the power off when not in use.

7. Never clamp a hand-held grinder in a vise.

Chapter 19: HAZARD COMMUNICATION PROGRAM

PURPOSE

To communicate to our employees the chemical hazards to which they are exposed.

OBJECTIVES

To safeguard our employees' health by providing a management guide for compliance.

To provide our employees with the necessary information concerning health and physical hazards of the chemical materials in use.

To comply with OSHA Title 29, 1910-1200.

TRAINING

Workers to be Trained:

1. All employees routinely exposed to hazardous materials through use, handling, or transportation.

2. Orientation training for all employees who are newly hired, assigned, or transferred to a department where he will be routinely exposed to hazardous materials shall be trained for the materials in use in their workplace.

3. On projects where no one takes general responsibility for coordinating hazardous communication, our project foreman will advise other contractors of the location of our hazardous communication program and advise them of precautionary measures that need to be taken to protect personnel on the jobsite during normal operating conditions and in foreseeable emergencies. Our project foreman will also advise other contractors of availability of Safety Data Sheets.

Training of employees will consist of:

1. Explanation of Right-To-Know Law, including employees' rights and responsibilities.

    a. Introduction to the written Hazard Communication Program.

    b. Availability of SDSs and interpretation of the 16 sections.

    c. Labeling procedures, including pictograms.

    d. Physical, health, simple asphyxiation, combustible dust, pyrophoric gas as well as hazards not otherwise classified in the workplace.

    e. Protective procedures (methods, observations).

    f. Personal Protective equipment.

    g. Procedures for non-routine tasks.

    h. Emergency response procedures

SCOPE

1. This compliance program will provide the means for the transmission of information to apprise employees of the chemical products to which they are exposed. Each branch manager will designate a hazard communication coordinator to oversee this program. It will include the following:

2. Chemical inventory of products used or stored on company property.

3. Appropriate labels on containers of hazardous chemicals used.

4. Safety Data Sheets (SDSs) will be available for hazardous chemical products on the property.

5. Employees will be trained to recognize and interpret labels, warnings, coding and signs affixed to containers.

6. Employees will be trained in the use of Safety Data Sheets, their location and availability, in order to avoid and/or mitigate potentialhazards.

7. This written Hazard Communication Program will be available upon request to employees, their designated representative(s), Emergency Responders, and government representatives.

CHEMICAL LISTS/MATERIALS

A list of hazardous chemicals used or stored on company property will be assembled and maintained and will be updated in a timely fashion to reflect the chemicals actually in use or stored on company property.

SDSs (Safety Data Sheet) will be obtained from any supplier providing hazardous chemicals. We will review SDSs for completeness and general accuracy and will maintain a master file of SDSs that is readily accessible to employees during work hours.

LABELING

LABELING

Containers of hazardous materials must be labeled.

1. Original labels on containers are not to be removed.

2. If a different material is placed in the container, the label must be changed to reflect the true contents. All labels should include the following:

   a. Identity of the hazardous chemical (Chemical name)

   b. Hazards present

Chapter 20: HAZARDOUS WASTE OPERATIONS

INTRODUCTION/OVERVIEW

As required by various government regulations, ALEXANDER MECHANICAL has instituted a formal Hazardous Waste program suited to the wastes generated in our normal field and shop operations. The only wastes we generate on a routine basis are:

Waste oil from engine generators,
etc. Refrigeration oil contaminated
with refrigerant Cutting oil from pipe
threaders

TRAINING

At the time of hire, and periodically thereafter as necessary, all employees should be given written instruction on the proper handling and disposal of waste oil, paint, and hazardous waste.

SAFETY PRECAUTIONS

Chemicals shall be stored in such a way to minimize the potential for a spill. Spill response materials or spill kits must be adequate for any anticipated spills. Proper communication measures must be in place and initiated upon a spill or release of materials. The area where chemicals are to be stored shall be kept clean and organized to prevent an accidental spill of any kind. Foreman shall check these areas to ensure good housekeeping practices are being adhered to.

Waste oil, while not classified as a hazardous waste, must be collected and properly disposed of. In order to ensure that the waste oil remains "non-hazardous", it is important that the waste oil storage barrels not be contaminated by any other product, such as solvents, paint, etc. Each branch must take the necessary precautions to ensure that our employees who have access to the waste storage barrels are properly trained to avoid mixing different kinds of products. Disposal of waste oil is to be handled through a qualified service company, such as Safety Kleen, who will provide documentation of proper disposal.

If other forms of hazardous waste are generated for a specific project or application, the manager in charge of the operation must take whatever steps are required to properly

handle and dispose of the material as required by all applicable regulations. The services of a reputable hazardous waste disposal company should generally be employed.

GENERAL WASTE OPERATIONS

INTRODUCTION/OVERVIEW

Alexander Mechanical has instituted a formal Waste Management program suited to the wastes generated in our normal field and shop operations.

On all projects: wastes, trash and/or scrap materials will be taken into consideration before work begins.

TRAINING

At the time of hire, and periodically thereafter as necessary, all employees should be given written instruction on the proper handling and disposal of waste items. These instructions are to stress the following:

- Projects should be pre-planned to reduce the quantity of waste generated.
- Waste should be segregated and minimized by recycling and using all materials possible. They will be properly stored and handled to minimize the potential for a spill or impact to the environment.
- The location of available recycling and disposal sited that minimize our impact to the environment.
- During outdoor activities, receptacles must be covered to prevent dispersion of waste materials and to control potential for run-off.

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Chapter 21: NOISE CONSERVATION-HEARING PROTECTION

Introduction

In some workplace situations mechanical construction, service, and fabrication shop workers can be exposed to noise levels that are at or above established permissible exposure levels. When mechanical construction workers are exposed at or above 90 dBA over an 8-hour Time Weighted Average (TWA), and when mechanical service and fabrication shop workers are exposed at or above 85 dBA over and 8-hour TWA, the affected employers must establish hearing conservation programs to help prevent occupational noise-related hearing loss in the affected workers.

Many insurance companies have loss control representatives who can measure noise levels with noise dosimeters or noise level meters to establish objective data regarding worker exposure. Companies can also retain the services of a safety professional or industrial hygienist to measure noise levels or purchase their own noise-level sampling equipment. Regardless of the method you choose to measure noise levels, if the results show that your workers are not exposed at or above permissible noise levels, you are not required to establish a hearing conservation program. However, when noise levels exceed established limits, your company must establish and implement a hearing conservation program.

There are two distinctly different OSHA standards on occupational noise exposure that affect mechanical industry contractors. OSHA's construction standard— *Occupational Noise Exposure*—is a concise, user friendly, pragmatic standard that takes into consideration the transient nature of construction workers. The agency's general industry standard, also called *Occupational Noise Exposure,* applies to mechanical service work and fabrication shops, and is a much more elaborate standard. Both standards address the issues of hearing loss and hearing loss prevention in workers. However, some of the compliance requirements are different, which can be confusing to companies whose employees work in both general industry and construction settings. The *MCAA Model Hearing Conservation Program*, properly tailored to your company's specific applications, will help the company comply with either standard.

This model program is not intended to provide exhaustive treatment on the subject of hearing conservation in construction or general industry workplaces. It should not be used as a substitute for reading and interpreting federal or state OSHA regulations or any other pertinent state or local laws, rules, regulations, or standards. Further, it is not intended to provide legal advice. Employers must make independent determinations regarding the need for legal assistance.

Table of Contents

Definitions

Action Level – The level of noise exposure at which an affected worker must participate in the (Alexander Mechanical Inc.) *Hearing Conservation Program*. The action level for mechanical construction applications is 90 dBA over an 8-hour Time Weighted Average (TWA). The action level for mechanical service and fabrication applications is 85 dBA over an 8-hour TWA.

Decibel (dB) – The standard unit used to measure sound levels. The A-weighted decibel scale, abbreviated as
DBA is used to measure sounds received by the human ear.

Hertz (Hz) – The unit of measure for noise frequency in cycles per second – (1 cycle/second = 1 Hz)

Permissible Exposure Limit (PEL) – The maximum permissible noise exposure established by

OSHA. The current PEL for mechanical construction, service, and fabrication shops is 90 dBA over an 8-hour TWA.

Noise Reduction Rating (NRR) – The anticipated measure of noise reduction that hearing protection equipment/devices provide.

Standard Threshold Shift (STS) – A change in hearing threshold relative to the baseline audiogram of an average of 10 dBA or more at 2,000; 3,000; and 4,000 Hz in either ear.

Purpose

The purpose of this program is to help affected (**Alexander Mechanical Inc.**) workers avoid work- related hearing loss. (**Alexander Mechanical Inc.**) establishes and implements engineering and/or administrative controls to reduce noise levels to acceptable levels whenever it is feasible to do so. When engineering and/or administrative controls are infeasible or inadequate to reduce noise levels below the applicable action level shown below, (**Alexander Mechanical Inc.**) requires all affected workers to participate in, and fully comply with, this hearing conservation program. The program includes noise sampling, audiometric testing, hearing protection equipment, training, and other protective measures to help affected workers safeguard their hearing.

Action Levels for Mechanical Construction, Service and Fabrication Shops

Action Level for	Duration Per Day (in Hours)	Sound Level (dBA Slow Response)
Mechanical Construction	8	90
Mechanical Service and Fabrication Shops	8	85

Permissible Noise Exposures for All Workers

Duration Per Day (in Hours)	Sound Level (dBA Slow Response)
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

Chapter 28: PROTECTIVE EQUIPMENT

Personal Protective Equipment Policies

Introduction

The purpose of the Personal Protective Equipment Policies is to protect the employees of Alexander Mechanical from exposure to workplace hazards and the risk of injury through the use of personal protective equipment (PPE). PPE is not a substitute for more effective control methods and its use will be considered only when other means of protection against hazards are not adequate or feasible. It will be used in conjunction with other controls unless no other means of hazard control exist.

Personal protective equipment will be provided, used, and maintained when it has been determined that its use is required to ensure the safety and health of our employees and that such use will lessen the likelihood of occupational injury and/or illness.

This section addresses general PPE requirements, including eye and face, head, foot and leg, hand and arm, body (torso) protection, and protection from drowning. Separate programs exist for respiratory protection and hearing protection as the need for participation in these programs is established through industrial hygiene monitoring.

The Alexander Mechanical Personal Protective Equipment Policies includes:

- Responsibilities of supervisors and employees
- Hazard assessment and PPE selection
- Employee training
- Cleaning and Maintenance of PPE

Responsibilities

(Safety Person or designated person) is responsible for the development, implementation, and administration of Alexander Mechanical's PPE policies. This involves

Conducting workplace hazard assessments to determine the presence of hazards which necessitate the use of PPE.

Selecting and purchasing PPE.

Reviewing, updating, and conducting PPE hazard assessments whenever

- a job changes
- new equipment is used
- there has been an accident
- a supervisor or employee requests it
- or at least every year
- Maintaining records on hazard assessments.
- Maintaining records on PPE assignments and training.

Providing training, guidance, and assistance to supervisors and employees on the proper use, care, and cleaning of approved PPE.

Periodically re-evaluating the suitability of previously selected PPE.

Reviewing, updating, and evaluating the overall effectiveness of PPE use, training, and policies.

Supervisors (leads, etc., and/or designated persons)

Supervisors (leads, etc., and/or designated persons) have the primary responsibility for implementing and enforcing PPE use and policies in their work area. This involves

- Providing appropriate PPE and making it available to employees.
- Ensuring that employees are trained on the proper use, care, and cleaning of PPE.
- Ensuring that PPE training certification and evaluation forms are signed and given to (Safety Person or designated person responsible for your workplace safety and health program).
- Ensuring that employees properly use and maintain their PPE and follow Alexander Mechanical PPE policies and rules.
- Notifying Alexander Mechanical management and the Safety Person when new hazards are introduced or when processes are added or changed.
- Ensuring that defective or damaged PPE is immediately disposed of and replaced.

Employees

The PPE user is responsible for following the requirements of the PPE policies. This involves

- Properly wearing PPE as required.
- Attending required training sessions.
- Properly caring for, cleaning, maintaining, and inspecting PPE as required.
- Following Alexander Mechanical PPE policies and rules.
- Informing the supervisor of the need to repair or replace PPE.

Employees who repeatedly disregard and do not follow PPE policies and rules will be subject to: Verbal Counseling, Written Reprimand, possible Termination depending on severity of infraction.

Procedures

Hazard Assessment for PPE

(Safety Person or designated person), in conjunction with Supervisors, will conduct a walk-through Safety survey of each work area to identify sources of work hazards.
Each survey will be documented using the Hazard Assessment Certification Form, which identifies the work area surveyed, the person conducting the survey, findings of potential hazards, and date of the survey. (Safety Person or designated person) will keep the forms in the (Safety Office at Alexander Mechanical's files).

(Safety Person or designated person) will conduct, review, and update the hazard assessment for PPE whenever

a job changes

new equipment or process is installed there has been an accident

whenever a supervisor or employee requests it or at least every year

Any new PPE requirements that are developed will be added into Alexander Mechanical's written accident prevention program.

Selection of PPE

Once the hazards of a workplace have been identified, (Safety Person or designated person) will determine if the hazards can first be eliminated or reduced by methods other than PPE, i.e., methods that do not rely on employee behavior, such as engineering controls (refer to Confined Spaces for Controlling Hazards).

If such methods are not adequate or feasible, then (Safety Person or designated person) will determine the suitability of the PPE presently available; and as necessary, will select new or additional equipment which ensures a level of protection greater than the minimum required to protect our employees from the hazards. Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards will be recommended for purchase. Alexander Mechanical will take the fit and comfort of PPE into con- sideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and will be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH or ANSI (American National Standards Institute) standards will be procured or accepted for use. Newly purchased PPE must conform to the updated ANSI standards which have been incorporated into the PPE regulations, as follows:

Eye and Face Protection ANSI Z87.1-1989 Head Protection ANSI Z89.1-1986

Foot Protection ANSI Z41.1-1991

Hand Protection (There are no ANSI standards for gloves, however, selection must be based on the performance characteristics of the glove in relation to the tasks to be performed.)

Affected employees whose jobs require the use of PPE will be informed of the PPE selection and will be provided PPE by Alexander Mechanical at no charge. Careful consideration will be given to the comfort and proper fit of PPE in order to ensure that the right size is selected and that it will be used.
Employers should make sure that each employee demonstrates an understanding of the PPE training as well as the ability to properly wear and use PPE before they are allowed to perform work requiring the use of the PPE. If an employer believes that a previously trained employee is not demonstrating the proper understanding and skill level in the use of PPE, that employee should receive retraining. Other situations that require additional or retraining of employees include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

Defective or Unserviceable PPE

"Defect" means any characteristic or condition which tends to weaken or reduce the strength of the tool, object, or structure of which it is a part.

As an example, always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

All EMPLOYEE's are to notify the Supervisor/Site Foreman or Alexander Mechanical Safety Officer immediately when Deterioration or defective equipment is discovered. Unserviceable PPE shall be **immediately** removed from service and replaced.
Regardless of the type of equipment it is, if defects, wear and tear or faulty operation is discovered with any piece of PPE, it is to be removed from service until repaired or replaced. Supervisors and employees are responsible for periodic checks, month as well as annual inspection of equipment.

Training

Any worker required to wear PPE will receive training in the proper use and care of PPE before being allowed to perform work requiring the use of PPE. Periodic retraining will be offered to PPE users as needed. The training will include, but not necessarily be limited to, the following subjects:

When PPE is necessary to be worn What PPE is necessary

How to properly don, doff, adjust, and wear PPE The limitations of the PPE

The proper care, maintenance, useful life, and disposal of the PPE

After the training, the employees will demonstrate that they understand how to use PPE properly, or they will be retrained.

Training of each employee will be documented using the Personal Protective Equipment Training Documentation Form and kept on file. The document certifies that the employee has received and understood the required training on the specific PPE he/she will be using.

Retraining

The need for retraining will be indicated when

an employee's work habits, or knowledge indicates a lack of the necessary understanding,

motivation, and skills required to use the PPE (i.e., uses PPE improperly)

new equipment is installed

changes in the workplace make previous training out-of-date

changes in the types of PPE to be used make previous training out-of-date

Cleaning and Maintenance of PPE

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. Employees must inspect, clean, and maintain their PPE according to the manufacturers' instructions before and after each use.
Supervisors and employees are responsible for ensuring that users properly maintain their PPE in good condition.

Personal protective equipment must not be shared between employees until it has been

properly cleaned and sanitized. PPE will be distributed for individual use whenever possible.

If employees provide their own PPE, make sure that it is adequate for the workplace hazards, and that it is maintained in a clean and reliable condition.

Defective or damaged PPE will not be used and will be immediately discarded and replaced.

NOTE: *Defective equipment can be worse than no PPE at all. Employees would avoid a hazardous situation if they knew they were not protected; but they would get closer to the hazard if they erroneously believed they were protected, and therefore would be at greater risk.*

It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

Safety Disciplinary Policy

Alexander Mechanical believes that a safety and health Accident Prevention Program is unenforceable without some type of disciplinary policy. Our company believes that in order to maintain a safe and healthful workplace, the employees must be cognizant and aware of all company, State, and Federal safety and health regulations as they apply to the specific job duties required. The following disciplinary policy is in effect and will be applied to all safety and health violations.

The following steps will be followed unless the seriousness of the violation would dictate going directly to Step 2 or Step 3.

1. A first-time violation will be discussed orally between company supervision and the employee. This will be done as soon as possible.

2. A second time offense will be followed up in written form and a copy of this written documentation will be entered into the employee's personnel folder.

3. A third time violation will result in time off or possible termination, depending on the seriousness of the violation.

Ladder Inspection Form

Provided by Werner Co.

Company Name: _____
Please Print

Inspector _____ Date. _____

❑ Stepladder

Size _____ ft.

❑ Fiberglass ❑ Aluminum

Circle Areas of Damage

		Yes	No
Steps:	Loose, Cracked, Bent or Missing	❑	❑
Rails:	Cracked, Bent, Split or Frayed Rail Shields	❑	❑
Labels:	Missing or Not Readable	❑	❑
Pail Shelf:	Loose, Bent, Missing or Broken	❑	❑
Top:	Cracked, Loose or Missing	❑	❑
Spreader:	Loose, Bent or Broken	❑	❑
General:	Rust, Corrosion or Loose	❑	❑
Other:	Bracing, Shoes, Rivets	❑	❑

Actions:
❑ Ladder tagged as damaged & removed from use
❑ Ladder is in good condition

❑ Extension Ladder

Size _____ ft.

❑ Fiberglass ❑ Aluminum

Circle Areas of Damage

		Yes	No
Rungs:	Loose, Cracked, Bent or Missing	❑	❑
Rails:	Cracked, Bent, Split or Frayed	❑	❑
Labels:	Missing or Not Readable	❑	❑
Rung Locks:	Loose, Bent, Missing or Broken	❑	❑
Hardware:	Missing, Loose or Broken	❑	❑
Shoes:	Worn, Broken or Missing	❑	❑
Rope/Pulley:	Loose, Bent or Broken	❑	❑
Other:	Bracing Rivets	❑	❑
General:	Rust, Corrosion or Loose	❑	❑

Actions:
❑ Ladder tagged as damaged & removed from use
❑ Ladder is in good condition

Chapter 23: LEAD EXPOSURE PROTECTION

INTRODUCTION/OVERVIEW

All hazardous substances are not created equal. The seriousness of the hazard varies, as does the amount of exposure that could bring on health problems. Sometimes exposure to a substance may lead to short-term health problems like skin rashes or headaches; some exposures can cause more serious long-term consequences to our organs or systems.

In addition, we know more about some hazardous substances than others. Tests and research indicate that exposure to some substances **may** cause health risks, so we take precautions just in case.

But there are some substances that we **know** are hazardous. And perhaps no substance has such clearly documented health hazards as lead. Not surprisingly, lead is also the subject of particularly detailed and cautious OSHA regulations. Designed to protect the health of all those who work with it.

Because we didn't always know as much as we do now about the hazards of lead, the greatest risks can come from old buildings and equipment. You may have heard or read that children can become seriously ill or suffer permanent damage from eating chips of lead-based paint. Well, those same risks apply to anyone who is involved in demolition, repair, and other work on anything old enough to use lead-based paint, lead pipes or solder, and certain construction materials that contain lead. In addition, any work that involves lead-containing products is potentially hazardous.

The dangers of lead are serious enough to deserve close attention from all of us. *Alexander Mechanical's policy is that our employees will not remove or abate lead. When at all possible Alexander Mechanical's employees will not work on sites where lead abatement is being performed, by the owner or other trades. Where Alexander Mechanical's employees must work in facilities, buildings or construction sites immediately adjacent to areas where removal or abatement is being performed that work must be performed under adequate and proper containment. At any time that there is inadequate containment or improper procedures, Alexander Mechanical's employees will notify the*
Alexander Mechanical project manager or designate representative, and those employees will be removed from the site and not return until the area has been properly cleaned up.

The Company will provide the requisite training to ensure that our employees acquire an understanding of the kinds of monitoring, testing, and protective measures required by OSHA's lead regulations. These standards are designed to protect anyone who could be exposed to lead from suffering serious health consequences.

General Hazards

We know that overexposure to lead can have serious effects on health.

Lead's dangers come not from skin contact but from breathing in too much lead dust or fumes. There's also a risk of swallowing lead if you touch food, cigarettes, cosmetics, etc., when your hands are contaminated by lead.

Lead-based paint and paint debris are a key hazard when painting, repainting, rehabbing, demolishing, or renovating buildings, tanks, bridges, etc. Lead bricks, mortar and sheets, lead support rods and construction materials, mineral wool insulation with lead contaminants, lead pipes, lead solder and leaded steel roofing materials are potential hazards when involved in renovation, re- insulation, industrial vacuuming, etc.

There's also a risk of hazardous exposure in any work environment that makes or uses products that contain lead.

Very large doses of lead - for example, children eating large amounts of lead-based paint - can have almost immediate effects. It can cause seizures, coma and, in a matter of days, death.

Most of the effects, however, take time to show up. When lead enters the body, it gets into the bloodstream and from there into organs and body tissues. If the body takes in more lead than it can naturally eliminate, the lead builds up and, over time, can cause sever and irreversible damage to the blood-forming, nervous, urinary, and reproductive systems.

The milder short-term effects of overexposure to lead can include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, tremors, numbness, dizziness, hyperactivity, and stomach pain. If you work with or around lead and have any of these symptoms, it's crucial that you report them immediately. That's because chronic overexposure to lead can cause much more serious problems - problems that rarely show symptoms until it's too late to reverse them.

Chronic overexposure to lead can cause:

1. **Anemia.** That's a decrease in the blood's capacity to carry oxygen, which can make you weak and tired.

2. **Nervous System Damage.** Sometimes this is temporary, but the worst cases can lead to severe, or even fatal, brain damage. The symptoms of lead-caused nervous system damage can be vomiting, poor memory, restlessness, irritability, tremors, convulsions, muscular weakness, and a feeling of dullness progressing to drowsiness and stupor. Again, it's important to report any of these symptoms if you have been exposed to lead. In the worst cases, people may have seizures, go into a coma, and even die.

3. **Kidney Disease.** Unfortunately, urinary problems and other symptoms of lead- related kidney disease don't usually show up until kidney damage is major and usually permanent.

4. **Reproductive Impairment.** Lead is a reproductive risk for both men and women. It may decrease women's fertility and cause abnormal menstrual cycles. For men, overexposure may decrease the sex drive or cause impotence or sterility. One of lead's worst hazards is the danger it poses to both men and women who plan to have children. Women who are pregnant, or hope someday to be, should avoid long- term exposure to lead. If either parent has been overexposed to lead, there's apparently a greater chance of miscarriage or stillbirth. Any children born to a parent exposed to high lead levels are more likely to have birth defects, mental retardation, behavioral disorders, and/or die during the first year of childhood.

SHA REGULATIONS

Because lead is so potentially hazardous, OSHA has a detailed regulation (29 CFR 1910.1025) designed to identify hazardous work and to reduce exposure. As noted earlier, work on old structures or equipment can pose particularly high exposure risks. So OSHA also has a separate, but almost identical, rule (29 CFR 1926.62) to protect construction workers from risk.

The regulations set a permissible exposure limit (PEL) of a time-weighted average of 50 micrograms of lead per cubic meter of air. That is the highest level of lead in the air to which you can be exposed over an eight-hour workday. Short-term exposures above the PEL are permitted as long

as the workday average stays within the regulated limit.

OSHA notes in its regulation, however, that exposure to levels below 40 micrograms is desirable. For those who intend to have children, OSHA recommends keeping exposure below 30.

OSHA's separate regulation for lead exposure in construction applies to all jobs that might have employment-related exposure to metallic lead, inorganic lead compounds, and organic lead soaps.

OSHA specifically mentions the risk of exposure when work involves:

1. Demolition or salvage of structures with lead or lead-containing materials.
2. Removal or encapsulation of materials containing lead.
3. Construction, alteration, repair or renovation of structures, substrates or portions thereof that contain lead or lead- containing materials.
4. Installation of products containing lead.
5. Lead contamination/emergency cleanup.
6. Transportation, disposal, storage, or containment of lead or lead- containing materials at the construction site.
7. Maintenance operations associated with these construction activities.

For both construction and general industry, OSHA sets not just a permissible exposure limit, but what it calls an action level for lead. If workers are exposed to 30 micrograms of lead in the air over an eight-hour day, without wearing a respirator, employers must meet various OSHA regulatory requirements. These include:

1. Monitoring the air around affected employees to determine lead levels.
2. Giving blood tests to affected employees to determine blood lead levels.
3. Providing a thorough medical exam before assigning an employee to a lead- containing area.
4. Initiating efforts to reduce employee exposure.

The frequency of air monitoring and blood tests varies depending on the levels of lead in the work area and the results of previous blood tests. For instance, employers must take air samples every three months to monitor

the exposure of employees who work in areas where lead is at or above the PEL. If exposure is at or above the action level 30 or more days per year, an affected employee's blood must be tested for lead at least every six months. If blood tests show that the employee has 40 or more micrograms of lead per 100 grams of whole blood, he or she will have to have a blood test every two months as well as a very detailed medical exam at least annually.

Because construction workers tend to do short-term jobs with potentially very high lead levels, OSHA requires even more frequent blood tests for them.

OSHA also requires a medical exam for any employee who works around lead and:

- Has symptoms associated with lead exposure.
- Has trouble breathing during a respirator fit test.

OSHA also requires an employee's temporary removal from a lead-exposed job situation when:

- Use of engineering controls, protective clothing, respirators, etc. can't bringthe blood lead levels down.
- Blood lead levels average at or above 50 micrograms per 100 grams of whole blood in a series of tests.
- A medical exam places the employee at increased risk of "material impairment of health" due to lead exposure.

Removal from a job is obviously a last resort, but if it's necessary, the OSHA regulation states that the affected employees must retain their pay levels, seniority, and benefits. Once blood levels reach the safety zone, exposed workers can return to their jobs. Of course, close monitoring and testing must continue.

PROTECTION AGAINST HAZARDS

The fact that this regulation includes such a rigid requirement for air and blood testing - and even for removal from the job in certain circumstances - gives you an idea of how seriously government and employers take lead exposure. Fortunately, there are also many ways we can protect ourselves from these hazards. OSHA's regulations also include provisions regarding these protective measures.

TRAINING

One protection is training programs like this one. They're required by OSHA to make sure you understand the hazards of lead, the provisions of the lead regulation, and the protective measures we can all take to avoid health problems.

Construction industry employers must also have a written compliance plan before they start jobs where employee exposure to lead, without respirators, will exceed the PEL. These plans have to:

- Describe the activities that emit lead.
- Document the lead emissions.
- Explain the engineering and administrative controls, work practices, PPE, etc. that will be used to reduce exposure and protect employees.

The plan, which has to be updated every six months, also has to provide for frequent and regular inspections of jobsites, materials and equipment by a person who knows how to identify lead hazards and is authorized to take prompt corrective measures to eliminate them.

SIGNS

To make sure that all employees, regardless of industry, are aware that they are entering areas where lead exposure exceeds the PEL. OSHA also requires these areas to be clearly labled with signs that say:

WARNING!

LEAD WORK AREA NO SMOKING OR EATING

VENTILATION - ENGINEERING CONTROLS

Ventilation is one common protection against overexposure to airborne lead. It may be provided by a mechanical system used with enclosures or in containment situations. Or, it may be a local portable ventilation system. Shrouded tools with ventilation are another option. OSHA requires that when ventilation is used to control exposure, employers must measure the ventilation system's effectiveness at least every three months.

JOB ROTATION - ADMINISTRATIVE CONTROLS

Another way to reduce lead exposure is to rotate jobs so that each individual has less exposure to lead. If this type of administrative control is used, employers must keep records documenting who is rotated, where and when.

RESPIRATORY PROTECTION

OSHA also requires the use of personal protective clothing and equipment including respirators, in an effort to keep an individual's exposure to lead at a safe level.

Respirators are required when ventilation, job rotation, and other engineering and administrative controls aren't enough to reduce lead exposure below the PEL. OSHA also gives you the right to request a respirator even if lead levels aren't high enough to require one.

OSHA explains just what types of respirators must be used to provide the needed level of protection for different tasks. In addition, the agency requires employers to train employees to select and use respirators and to conduct fit testing programs. (Refer to the chapter entitled ***Respiratory Protection***.) It's essential that the respirator fit properly to make sure that it won't let contaminated air in. The regulation, which recognizes that not everyone can work effectively while wearing a respirator, goes into more detail on respirator fit testing and selection.

Because construction-related tasks tend to be relatively short-term and create high lead levels, OSHA assumes that respirators will be needed for many tasks. The lead regulation for construction breaks jobs down into three respirator-type categories, based on the level of exposure associated with each type of job. Unless testing has proved otherwise, employers must assume that these tasks generate sufficient lead levels to require respiratory protection. In addition, employees must also be provided with other types of protection, including Personal Protective Equipment (PPE), change areas, hand washing facilities, training, and blood tests.

PERSONAL PROTECTIVE EQUIPMENT (PPE) - RESPIRATORS

A half-mask air-purifying respirator is required when performing tasks with the lowest levels of lead exposure above the PEL. These tasks include:

1. Using a sledgehammer or similar tool to manually demolish walls or other building components coated with lead-based paint.

2. Manual scraping and sanding of a surface with lead-based paint.

3. Using a heat gun to melt lead paint on a surface prior to scraping.

4. General cleanup in lead containing areas.

5. Removing dirt, scale or paint from structures with lead-based paint using power tools with dust collection systems. These tools might include grinders, brushes, needle guns, or sanders.

6. Spray painting.

A powered air-purifying respirator is OSHA's choice for tasks with the next highest Levels of lead exposure. These include:

1. Repainting, repairing or relining high-pressure acid tanks lined with specialized tile or lead brick held in place with lead-containing mortar or grout.

2. Lead turning that uses torch melting or fusing of lead or alloyed lead to another lead object.

3. Removing dirt, scale, or paint from lead-based painted structures with power tools that don't have dust collection systems.

4. Cleaning up after blasting with dry expendable abrasives on structures with lead-based paint.

5. Moving or removing the enclosures within which abrasive blasting is performed. These enclosures usually have quite a bit of lead residue.

A supplied respirator is needed for the jobs that risk exposure to especially high levels of lead in the air. They include:

1. Abrasive blasting with sand, steel grit, steel shot, aluminum oxide etc.

2. Using an acetylene torch or arc welder to weld, cut, or burn on steel structures whose coatings or paint contain lead.

Respirators are a crucial part of your protection when you work in areas with high lead levels. No matter what type of work you do, OSHA says that you can change a respirator's filter elements any time you have an increase in breathing resistance. You can also leave the work area to wash your face and respirator face piece whenever necessary to prevent skin irritation.

PERSONAL PROTECTIVE EQUIPMENT (PPE) - CLOTHING

A respirator isn't the only protection you're given in a work area with lead exposure above the PEL. OSHA also requires employers to provide protective clothing at least weekly - and you're required to wear it. In areas with exposure more than four times the PEL without a respirator, you get clean protective clothing daily. In any case, protective clothing may include:

1. Coveralls or similar clothing.

2. Gloves, hats, shoes or disposable shoe covers.

3. Face shields, vented goggles, or other appropriate protective equipment.

To make sure the protective clothing does its job and doesn't create other problems, employers must repair, replace, clean, launder and dispose of protective clothing in a way that doesn't spread the lead contamination around.

An explanation of lead hazards must also be provided to those responsible for cleaning or laundering the protective clothing. In addition, disposal or laundry containers must be labeled 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.

SAFETY PROCEDURES

Even though the various regulations regarding overexposure to lead provide a variety of protections, each employee must do his or her part too in order to reduce the chances of developing lead-related health problems.

WEAR REQUISITE PPE

First of all, you must use the respirators and protective clothing that are assigned to you. Be sure to check that they are in good condition before each use. Then remove them according to regulations to prevent the spread of contamination.

GOOD HYGIENE

Never take food, beverages, tobacco products or cosmetics into work areas with lead exposure at or above the PEL. In addition, wash carefully before handling any of those items.

To further reduce the possibility of spreading lead contamination, employers are required to provide showers, change rooms, and lunchrooms for workers exposed to airborne lead above the PEL. **Use them.** In other words, when working with lead, don't just sit down in the work area and eat lunch. At the end of the shift, don't just change clothes and go home.

When it's time for lunch, wash your hands and face, remove your contaminated work clothing or have it vacuumed or cleaned of surface dust. **Never remove lead from protective clothing by blowing or shaking.** That would just put more lead dust into the air. Once you are cleaned up, go to the lunchroom to have lunch.

At the end of the shift, remove your contaminated work clothing according to our rules, shower, and leave the work clothing in the change room. In the change room itself, store work clothing and personal clothing in separate areas so you don't take lead dust home with you.

GOOD HOUSEKEEPING

OSHA standards mandate that all surfaces be maintained as free as practicable of accumulations of lead.

OSHA recommends the use of vacuums with HEPA filters to clean up floors or other surfaces. Don't use compressed air. Don't shovel, brush,

or use dry or wet sweeping unless vacuuming has been tried and found not to work well.

TIMELY ATTENTION TO SYMPTOMS

Be aware of health symptoms that might indicate overexposure and **report any possible symptoms immediately.**

Once the report has been submitted, the Company must offer and pay for a thorough medical exam. OSHA requires employers to provide such an exam when an employee is first assigned to work around lead, when the blood lead level is 40 or more micrograms per 100 grams of whole blood, or when an employee is removed from the job because of overexposure to lead.

SUMMARY/CONCLUSION

It's up to each one of us to take possible lead exposure seriously. Regularly review the summary outline at the conclusion of this chapter. Don't ignore any symptoms that could indicate health problems related to working with lead. Pay attention to them and report them immediately so we can investigate the problem and do everything possible to prevent dangerous lead exposure and its effects on health.

(a) WORKING SAFELY WITHLEAD

KNOW AND REPORT SYMPTOMS OF INHALING OR SWALLOWING LEAD

SHORT-TERM EFFECTS:

1. Loss of appetite
2. Metallic taste in the mouth
3. Anxiety, nervousirritability
4. Constipation
5. Pallor
6. Nausea, dizziness
7. Headache
8. Numbness
9. Tiredness, weakness, insomnia
10. Muscle/joint pain or soreness
11. Hyperactivity
12. Tremors
13. Stomach pain

LONG-TERM EFFECTS OF CHRONIC OVEREXPOSURE:

1. Anemia
2. Nervous system damage (Symptoms: vomiting, poor memory, restlessness, irritability, tremors, convulsions, muscular weakness, and dull feeling progressing to drowsiness and stupor)

3. Kidney disease

4. Reproductive impairment (Male or female fertility problems; miscarriage; stillbirth; children more likely to die during first year or have birth defects, mental retardation, behavioral disorders)

OSHA LEAD EXPOSURE LIMITs

1. **Permissible Exposure Limit (PEL)** - 50 micrograms per cubic meter of air over 8-hour day.

2. **Action Level** - 30 micrograms per cubic meter of air over 8-hour day.

3. **Desirable exposure limit** - below 40 micrograms (below 30 for those planning to have children).

EMPLOYER ACTIONS REQUIRED FOR EXPOSURE AT ACTION LEVEL

1. Air monitoring
2. Blood tests
3. Thorough pre-job assignment medical exam
4. Efforts to reduce exposure

EMPLOYER ACTIONS REQUIRED FOR EXPOSURE AT OR ABOVE THE PEL

1. Employee training programs explaining hazards and protections.

2. Written compliance plan - Construction Industry employers.

3. *Signs - WARNING - LEAD WORK AREA - NO SMOKING OR EATING*

4. Engineering controls - Ventilation that must be checked every three months to measure the system's effectiveness.

5. Administrative controls - Thoroughly documented job rotation.

6. Respiratory protection when other controls don't reduce exposure below the PEL, or upon employee request.

7. Respirator selection appropriate for hazards - Half-mask air-purifying respirator; Powered air-purifying respirator; supplied air respirator.

8. Respirator fit tests and employee training on selection and use. Change respirator filters if breathing resistance increases; wash face and respirator face piece to prevent skin irritation.

9. Provide personal protective clothing and equipment (PPE).

10. Repair, replace, clean, dispose of PPE to prevent contamination.

11. Inform PPE cleaners/launderers of lead hazards and label all disposal and laundry containers with proper warning signs.

12. Prohibit food, beverages, tobacco, and cosmetics in work areas and require washing before handling those items.

13. Provide showers for exposed workers' use at end of shift.

14. Provide change rooms with separate work/street clothes storage.

15. Vacuum or clean lead dust from work clothes before removal or going to lunchroom (never blow or shake lead dust from clothes).

16. Wash before going to employer-provided lunchroom.

17. Leave dirty work clothes in change room for cleaning/disposal.

18. Use vacuums with HEPA filters to clean floors and other surfaces (never use compressed air); use shovels, brushes, brooms only if vacuums can't dothe job.

PROVIDE EMPLOYEE MEDICAL EXAMS FOR

1. Assignment to work area with lead at or above action level.

2. Blood lead levels 40 or more micrograms per 100 grams whole blood.

3. Symptoms associated with lead exposure experienced.

4. Breathing trouble experienced during respirator fit test.

5. Employees who request advice on lead exposure and childbearing.

PROVIDE TEMPORARY REMOVAL FROM LEAD-EXPOSED JOB WHEN

1. Blood lead levels average at or above 50 micrograms per 100 grams of whole blood in a series of tests.

2. Use of engineering controls, protective clothing, respirators, etc. can't bring blood lead levels down.

3. Medical exam finds employee at increased risk of "material impairment of health" due to lead exposure.

When such temporary removal from a lead-exposed job is required, the employee is to retain full pay, seniority, and benefits.

SAMPLE INFORMATIONAL/WARNING SIGNS

OVEREXPOSURE TO LEAD CAN CAUSE

SERIOUS HEALTH PROBLEMS INCLUDING

Kidney Disease

Nervous System Damage

Reproductive Difficulties

PRACTICE GOOD HYGIENE

Don’t keep food, beverages, tobacco products, or cosmetics in lead containing work areas.

Do not handle food, beverages, tobacco products, contact senses, or cosmetics until you’ve washed your hands thoroughly.

BEWARE!

Construction work on old buildings, bridges, tanks, and other structures creates an exposure hazard to paint and other materials containing lead.

Chapter 24: MEDICAL SERVICES AND FIRST AID

INTRODUCTION/OVERVIEW

First aid is defined as the IMMEDIATE and TEMPORARY care given the victim of an accident or sudden illness until the services of a physician can be obtained.

Every jobsite must have at least one person who has a valid certificate in first aid training that can be verified by documentary evidence. (OSHA 1926.50c) In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. First aid training is primarily received through the American Heart Association, American Red Cross, National Safety Council (NSC), and private institutions. The American Heart Association, American Red Cross and NSC offer standard and advanced first aid courses via their local chapter/training centers.

All our jobsites must have sufficient first aid supplies, approved by the Company's consulting physician, to care for the particular size of workforce assigned to that location. **The kit must be checked at least weekly** to ensure expended items are replaced.

Each jobsite is to have the name, number and address of a doctor, clinic, hospital, and ambulance service posted near the jobsite telephone.

TRAINING

Our policy is to have our lead men all trained in first aid by an outside recognized training organization. Training typically requires 8 hours and is valid for a period of 3 years. Renewal classes require about 4-1/2 hours. A certification card will be issued by the training agency.

FIRST AID

1. In emergency cases, **always use an ambulance**, never a car or truck.

2. Never move a person with a broken or fractured bone unless there is greater danger in leaving him where he is.

3. Use extreme care in case of fractured spine, neck or skull. Do not move the person. Get immediate medical help.

4. In cases of near drowning, gas poisoning, electric shock, heart failure or suffocation; attempt to restore breathing with artificial respiration while another person calls for a fire department resuscitator.

5. In cases of severe bleeding, attempt to control bleeding by putting a clean cloth over wound and applying direct pressure.

6. Remember that the most important thing to do for an injured person is to keep him/her quiet, protected and reassured that everything possible is being done for him/her as quickly as possible.

7. In case of emergency, call 9-1-1 or your local emergency number (if lives and/or property are in immediate danger). Additional contacts: Fire: Police: Ambulance: Hospital: Security: Building Manager: Safety Coordinator: Poison Control: Safety Area, record and post these numbers prominently for everyone's use.

8. Non-Emergency cases can be transported to the local Urgent Care Facility by the Foreman or Supervisor.

9. In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.

ACCIDENT REPORTING

1. Remember that anyone injured on the job, no matter how small the injury, must report to the foreman immediately.

2. **Foreman** - Make out an accident report on any person sent to a doctor, hospital or clinic.

3. **Foreman** - Immediately notify the on-site safety representative and main office safety director in case of lost time, serious injury, or fatality

4. **Foreman** - Interview any witnesses and obtain statements concerning lost time cases, fire, theft, equipment damage, vehicle accident and other instances of material damage.

5. If a person is in need of immediate medical attention, remain calm, and call 9-1-1 or
   your local emergency numbers.

6. An employer must provide emergency washing facilities at a workplace where hazardous, irritating or corrosive substances are used. Each site after evaluation to determine need will be provided the appropriate level Eyewash station.

7. To determine the number, location and type of washing stations required, reference Part 21 of the Manitoba Workplace Safety and Health Act and Regulations Emergency Washing Facilities and ANSI Standard Z358.1- 04, American National Standard for Emergency Eyewash and Shower Equipment.

Chapter 25: RESPIRATORY PROTECTION

INTRODUCTION/OVERVIEW

Employers are required by the OSHA General Industry Standard for respiratory

Protection, 29 CFR 1910.134 and 1926.103, establish a Respiratory Protection Program. This program's primary objective is to prevent excessive exposure to occupational dusts, fumes, mists, radionuclides, gases and vapors through the use of engineering controls and/or personal respiratory equipment. This chapter presents a summary outline of the essential components of our respiratory protection program.

TRAINING REQUIREMENTS

All employees using a respirator must be instructed in the application of this program. There is no certification required. Individual training on this procedure will be done when respirators are issued. Toolbox Talks will reinforce basic requirements.

GENERAL PROGRAM REQUIREMENTS

MANAGEMENT

1. Determine what specific applications require the use of respiratory equipment.

2. Provide proper respiratory equipment to meet the needs of each specific application using the guidelines set forth by the American Industrial Hygiene Association or another similar body.

3. Maintain an adequate stock of respiratory equipment in the tool crib.

4. Provide adequate training and instructions on the use of all respiratory protection equipment.

5. Provide adequate training on the proper maintenance, cleaning, and storage of all respiratory equipment.

6. Establish procedures in case of an emergency.

7. Ensure that all protective equipment is regularly inspected and tested, and that defective equipment is immediately removed from service.

8. Ensure that no respiratory equipment is fit tested or issued to an employee without receiving prior approval from the Company's consulting physician.

9. Ensure that all respiratory equipment is worn **only** by the specific individual for which it has been fit tested.

EMPLOYEES

1. Wear the respiratory equipment issued in accordance with the manufacturer's specifications.

2. Immediately report to the supervisor any malfunction of the equipment.

3. Never use another employee's equipment.

SPECIFIC PROGRAM REQUIREMENTS

EVALUATION OF THE ATMOSPHERE

Management is responsible for determining the nature and degree of actual or potential exposure. The following guidelines can be used when identifying those specific applications requiring the use of respiratory equipment.

Oxygen - Deficient Atmospheres

Any atmosphere that tests perceptibly lower than the normal 19.5% of oxygen is considered to be oxygen deficient. Use only self-contained breathing apparatus or airline respirator supplied from cylinders.

Immediately Hazardous Atmospheres

Atmospheres where gases are present in concentrations that would rapidly endanger a person are considered to be immediately hazardous atmospheres. These atmospheres are **not oxygen deficient**. Use only self-contained breathing apparatus, supplied air masks, or cartridge masks.

Not Immediately Hazardous Atmospheres

Atmospheres containing gaseous contaminants or particulate matter are considered to be not immediately hazardous.

Use chemical cartridge respirators for gaseous contaminants.

Use mechanical filter respirators to protect against particulate matter.

SELECTION OF EQUIPMENT - GUIDELINES

Mechanical Filter Respirators

Use for protection against airborne particulate matter including dusts, mists, metal fumes and smoke.

Do not use to protect against gases, vapors, or oxygen deficiency.

Chemical Cartridge Respirators

Use to protect against light concentrations of certain acid gases and organic vapors. Protection is afforded by utilizing various chemical agents to purify inhaled air.

Do not use in atmospheres that are oxygen deficient.

Do not use 1/2 mask to protect against gaseous material that is extremely toxic in small concentrations (hydrogen cyanide, hydrogen sulfide).

Do not use 1/2 mask to protect against exposure to harmful gaseous material that cannot be detected by odor (carbon monoxide).

Do not use 1/2 mask to protect against gaseous material in concentrations that are highly irritating to the eyes (ammonia, chlorine).

Air Supplied Hood

Use to protect against nuisance levels of material. Use when an cooling purposes.

Do not use in any situation where the user would be endangered by loss of air pressure.

Airline Respirator

An airline respirator consists of a full-face mask supplied with breathing air by either a compressor or multiple stationary cylinders.

Use in any atmosphere. Provides protection regardless of the degree of contamination or oxygen deficiency.

Precautions

1. Attach a rope to user's harness whenever used in an atmosphere immediately dangerous to life.
2. Require standby person or persons to be present, with suitable rescue equipment near at hand, whenever used in an atmosphere immediately dangerous to life.
3. Guard against damage to the hose and regulator while in use.
4. Carefully store to avoid damage.

Cylinder Type Self-Contained Breathing Apparatus (SCBA)

Use in any atmosphere. Provides protection regardless of the degree of contamination or oxygen deficiency because it utilizes compressed breathing air.

Precautions

1. Require standby person or persons to be present, with suitable rescue equipment near at hand, whenever used in an atmosphere immediately dangerous to life.
2. Immediately exit the hazardous atmosphere when the low- pressure alarm sounds.
3. Carefully evaluate the service life of the cylinders. This equipment should provide breathing air for approximately 30 minutes; however, extreme caution or emotional strain may reduce the rated times

MEDICAL EVALUATION

Employees should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The Company's physician shall review the employee's health and physical condition at least annually.

FIT TESTING AND ISSUANCE OF EQUIPMENT

Description - Fit Testing

Fit tests are performed in plastic bag (supported) using high efficiency dust filters on the appropriate mask and smoke tubes.

Requirements - Fit Testing

1. Fit test only those individuals who have first received proper approval from the Company's consulting physician in accordance with the following guidelines.

    a. Ruptured or perforated eardrums prohibit issuance of half-mask respirators.

    b. Pulmonary or cardiac problems may prohibit issuance of half-mask respirators.

    c. Pulmonary or cardiac problems may prohibit use of SCBA, or air supplied full-face respirators.

    d. Deficient olfactory sense may limit use of respirators.

2. Fit test all 1/4, 1/2 and full-face mask users where cartridges, canisters, or dust filters will be used. OSHA and ANSI Standards require fit testing for all 1/2-mask respirators covering the nose and mouth. Fit testing is not required for airline units operated at constant flow or for SCBA used in emergency situations.

3. Do not fit test employees with full beards, long sideburns, chin whiskers, or large mustaches. These persons are not permitted to use demand units of any kind, i.e., 1/4, 1/2, full- face mask with dust filter, cartridge, or canister units.

4. Maintain complete records of test results - name, date, and type of mask.

5. Maintain complete records of specific equipment issued - date, mask ID# and employee ID#.

Procedure - Fit Testing & Issuance of Equipment

1. Select mask, which appears to fit best.

2. Install high-efficiency dust filters.

3. Check mask for leaking inhalation and exhalation valves, straps, condition of materials, cracks, checks, tears, etc.

4. Remove glasses.

5. Place mask on face.

6. Enter test enclosure, closing eyes to prevent irritation.

7. Inject test atmosphere with employee standing at ease.

8. Inject test atmosphere while employee tilts head up, down, side to side and talks.

9. Exit test enclosure.

10. Record results.

11. Inspect mask for signs of leakage.

12. Issue the appropriate, tested respirator along with the appropriate cartridges.

13. Attach a ticket to the respirator indicating when the job charge must be performed.

14. Instruct employee to return the respirator to a specific location or cabinet for cleaning and storage.

15. Instruct employee to replace the cartridge at the first indication of breakthrough as evidenced by odor inside the mask.

16. Remind employee that cartridges used to protect against benzene must be changed at the end of the shift.

17. Ensure that the following emergency precautions are in place whenever issuing respiratory equipment where its failure could cause the user to be overcome by a toxic or oxygen deficient atmosphere.

    a. Require standby person or persons to be present at all times with the necessary emergency rescue equipment close at hand. The standby persons must be so positioned as to be unaffected by any likely emergency incident.

    b. Maintain constant communication with affected employee - visual, voice or signal.

    c. Prohibit any vessel entry, even with appropriate respiratory equipment, in atmospheres that test above 10% of the lower exposure limit (LEL).

MAINTENANCE AND CARE OF RESPIRATORY PROTECTIVE EQUIPMENT

Inspection

1. Routinely inspect all respiratory protective equipment before and after each use.

2. Maintain spare breathing air cylinders at a minimum of **1800** lbs. pressure except when being depleted during use.

3. Inspect all regulators and warning devices for proper function.

4. Check the tightness of all connections.

5. Check the condition of the face pieces, headbands, valves, connecting tubes, canisters, and hoses.

6. Check rubber or elastomer parts for pliability and signs of deterioration.

7. Inspect all equipment not routinely used, including that kept ready for emergency use, at least monthly as well as after each use.

Cleaning

1. Clean and inspect all equipment issued for the **routine use of one person** at the end of each day. User is responsible for this routine maintenance.

2. Clean, inspect, and disinfect equipment issued for the **use of more than one person** after each use. Each individual user is responsible for this maintenance each time he/she uses the equipment.

3. Clean, inspect, and disinfect **emergency use equipment** after each use. The user is responsible for this maintenance.

4. Clearly label all defective equipment with a **Do Not Use** tag and return it to the supervisor. Repairs will be made by authorized and trained individuals only.

Storage

1. Always protect equipment against dust, sunlight, heat, extremecold, excessive moisture or damaging chemicals.

2. Store respiratory protective equipment kept at jobsite in clearly marked compartments, which are easily accessible at all times.

3. Store all respiratory protective equipment so that the face piece and exhalation valve rest in a normal position.

4. Store all respiratory protective equipment so that elastomer does not become set in an abnormal position.

5. Do not store respiratory protective equipment in lockers or toolboxes unless they are in carrying cases or cartons.

Repair

1. Only authorized and trained persons shall repair respiratory protective equipment.

2. Only use parts designed for the specific equipment.

3. Do not attempt to replace components or make adjustments or repairs beyond the manufacturer's recommendations.

4. Return all reducing or admission valves or regulators directly to the manufacturer or to a trained technician for any adjustment or repair.

APPENDIX A

Atmospheric Contaminants to be Protected Against	Color Codes on Cartridges
Chlorine	white
Sulfur dioxide	white
Chlorine dioxide	white
Organic vapors	black
Paint, lacquer, enamel mists, pesticides, dust and fumes	black with pre-filter & retainer
Ammonia/methylamine	green
Formaldehyde & organic vapor	brown
Chloride	yellow
Hydrogen chloride	yellow
Sulfur dioxide	yellow
Organic vapors	yellow
Hydrogen fluoride	yellow
Radioactive materials Asbestos containing dusts & mists	all color-coded cartridges will work with the hepa filter and adapter

APPENDIX B

RESPIRATORY PROTECTIVE EQUIPMENT TRAINING RECORD

EMPLOYEES NAME AND IDENTIFICATION NO.	TYPE OF EQUIPMENT	DATE	EMPLOYEE'S SIGNATURE	INSTRUCTOR'S SIGNATURE

APPENDIX C

SELF-CONTAINED BREATHING APPARATUS INSPECTION SHEET

Device_____SN_____

Date Inspected_____Inspected by _____

Location_____User Group_____

Person Responsible for Monthly Inspection _____

CHECKLIST

Rubber Face piece_____Fog proof _____

Rubber Head Harness_____Air Cylinder Pressure _____

Rubber Hose_____Cylinder Valve_____

"O" Ring (Reg. Connector)_____Bypass Valve _____

Inhalation Valve_____Mainline Valve_____

Exhalation Valve_____Pak Alarm _____

Instruction Sheet_____Storage Box _____

_____

(Required Monthly)

Comments

_____

_____

_____

APPENDIX D.1

FACIAL HAIR POLICY

The nature of certain jobs in business and industry requires the use of a respirator. These jobs that require the use of protective equipment may be routine or emergency in nature.

Because we depend on this equipment for our protection, it is of considerable importance that the face-to-respirator seal is reliable. The extended growth of facial hair interferes with this seal and reduces the level of respiratory protection desired to protect personnel in either routine or emergency situations.

To maintain the highest level of seal integrity, the Company has established this policy on facial hair. **Violations will be treated just as any other safety rule violation.**

1. Employees who work in an environment where respiratory protection is a requirement of the job must be clean-shaven when reporting to the jobsite.

2. Visitors, guests, general contractor employees and vendors will comply with the Company rules and regulations as appropriate.

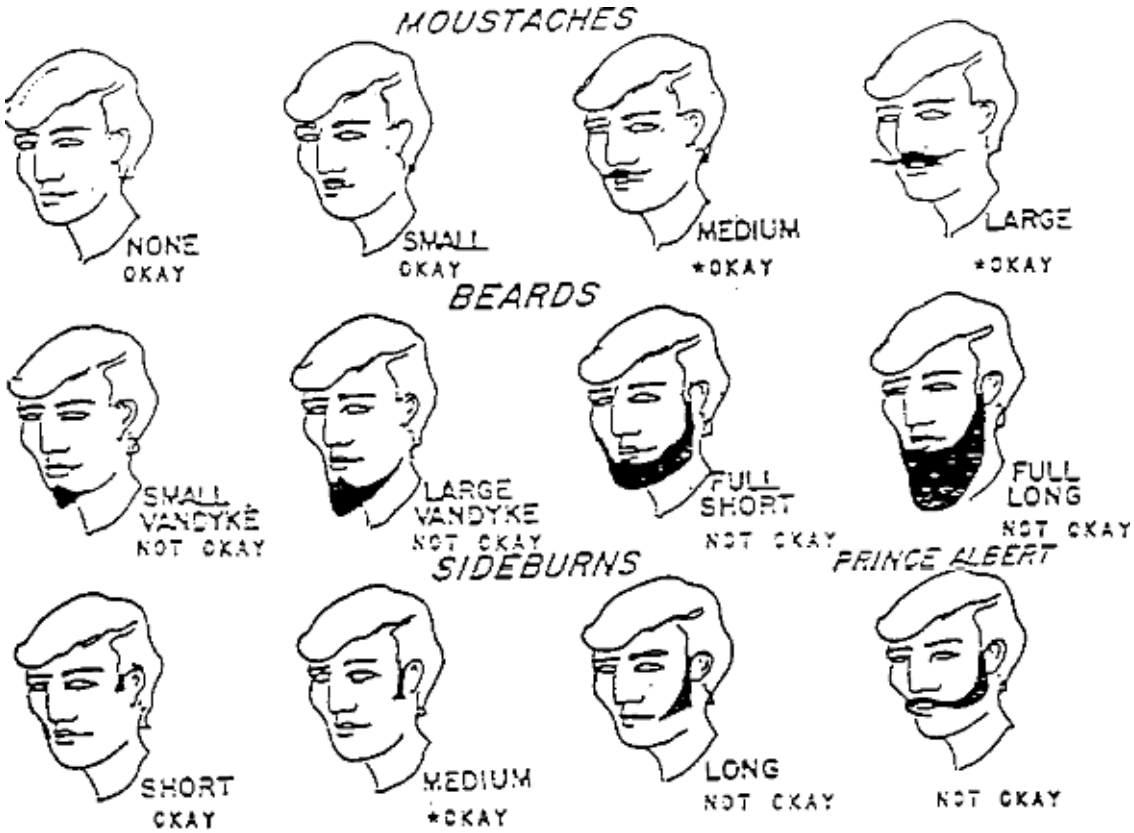
3. Persons required to be clean-shaven will be given twenty-four (24) hours to prepare for compliance with this policy. If after twenty-four (24) hours any person fails to comply with the requirements of this policy, he will be denied access to the jobsite.

4. Any person who has facial hair that intrudes into the area where the respirator seals against the face shall not be fitted with a respirator.

5. Anyone who is not clean-shaven according to this policy will not be allowed to wear a respirator, without regard to previous fit tests.

APPENDIX D.2

FACIAL HAIR ILLUSTRATIONS



* Moustaches extending beyond the face-to-respirator seal area must be trimmed or tucked inside the respirator. Sideburns may not extend into the seal area.

APPENDIX E

RESPIRATOR MEDICAL EVALUATION FORM

This questionnaire is used in determining whether or not you have a medical condition that may affect your ability to safely wear a respirator. We anticipate being able to approve most people for respirator use based on this questionnaire alone. In some cases, we may ask for more information or additional medical testing/evaluation. Fit testing is also required and is done separately. All medical information is considered confidential.

All Information Must Be Completed for Respirator Approval

Date _____

Name_____Age_Employee # _____

Location_____Work Phone_____

1. When using respirator, work is	☐ Light	Moderate	☐ Heavy
2. Shifts per week respirator is worn	☐ <1	1-4	☐ Almost every
3. Length of time respirator is worn	☐ <1 hour	1-5 hours	☐ 5-12 Hours

Medical History
Has a doctor ever told you that you have any of the following?

1. Angina	☐ Yes	☐ No
2. Heart Attack	☐ Yes	☐ No
3. Heart Disease	☐ Yes	☐ No
4. Epilepsy or Seizures	☐ Yes	☐ No
5. High Blood Pressure	☐ Yes	☐ No
6. Diabetes Treated w/Insulin	☐ Yes	☐ No
7. Lung Disease	☐ Yes	☐ No
8. Emphysema	Yes	No
9. Asthma	Yes	No

10. Are you allergic to natural rubber latex? ☐ Yes ☐ No

Explain any "Yes" answers by number.

_____

11. Smoking History ☐ Smoker ☐ Ex-Smoker ☐ Never Smoked

12. Are you currently taking any medications? ☐ Yes ☐ No

If yes, please list _____

Review of Systems

13. Are you short of breath at rest? ☐ Yes ☐ No

14. Do you get short of breath when walking? ☐ Yes ☐ No

15. Do you get short of breath at work? ☐ Yes ☐ No

16. Do you get chest pain with certain activities? ☐ Yes ☐ No

17. Do you get chest pain at work? ☐ Yes ☐ No

18. Do you have medical problems that might interfere with respirator use? ☐ Yes ☐ No

19. Have you ever had problems wearing a respirator? ☐ Yes ☐

No Explain any "Yes" answers by number.

_____

Employee's Signature_____Date _____

Physician Use Only

☐ Approved ☐ Approved with Restrictions ☐ Denied

☐ More Information Needed, Please Specify _____

Restriction Remarks_____

Physician's Signature_____Date _____

Chapter 26: SCAFFOLDING

INTRODUCTION/OVERVIEW

Scaffolding is a basic tool in the construction industry but is one that contributes to a significant number of injuries and fatalities each year. OSHA devotes an entire subpart to the proper erection and usage of scaffolding. This chapter summarizes the basic safety rules that apply to common scaffolding used in our industry.

The OSHA regulations and scaffolding manufacturers should be consulted for specialty scaffolding and unusual applications. For additional information concerning aerial lifts, consult Chapter 16 and OSHA Standard 1926.453

Basic Requirements – OSHA 1926.451 and 452

1. Do not use unstable objects such as barrels, boxes, loose brick, or concrete blocks to support scaffolds or planks.

2. Never erect, move, dismantle, or alter any scaffold except under the supervision of competent persons.

3. Install guardrails and toe boards on all open sides and ends of platforms that are more than 10 feet above the ground or floor.

4. Install guardrails and toe boards on all open sides and ends of platforms for all scaffolds 4 feet to 10 feet in height with a minimum horizontal dimension in either direction less than 45 inches.

5. Provide a screen between the toe board and guardrail on all scaffolds under which persons are required to work or walk.

6. Immediately repair or replace any scaffold, including accessories such as braces, brackets, trusses, screw legs, ladders, etc., that has been damaged or weakened from any cause whatsoever.

7. Secure scaffolds to the building or structure at intervals not exceeding 30 feet horizontally and 26 feet vertically.

8. Ensure that when freestanding mobile scaffold towers are used the height shall not exceed four times the minimum base dimension. Outriggers can be used to increase the base dimension.

9. Provide all casters with a positive locking device to hold the scaffold in position.

10. Tightly plank all platforms for the full width of the scaffold except for necessary entrance opening.

11. Secure all platforms in place. Use prefabricated planks wherever possible.

12. Provide a ladder or stairway for proper access and exit from the scaffold. Design and locate this mean of access/egress in such a way that it will not have a tendency to tip the scaffold.

13. It is highly recommended that employees do not ride on scaffolds when they are being moved.

See OSHA 1926.451 and 1926.452 for additional information as well as the specific requirements for specialty types of scaffolding.

TRAINING REQUIREMENTS – OSHA 1926.454

Each employee who performs work on a scaffold must be trained by a qualified person to recognize the hazards associated with the type of scaffold being used. Each employee who erects, disassembles, moves, operates, repairs, maintains, or inspects a scaffold must be trained by a Competent Person to recognize any hazards associated with the work.

The employee training program must include at least the following areas:

- The nature of any electrical hazards, fall hazards, and falling object hazards in the work area.
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used.
- The proper use of the scaffold, and the proper handling of materials on the scaffold.
- The maximum intended load and the load-carrying capacities of the scaffolds used.
- The nature of scaffold hazards
- The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question

RETRAINING REQUIREMENTS

After initial training has been completed, refresher safety training sessions must ensure that workers are aware of the hazards associated with scaffold use. One method we use for conducting such training is the use of Toolbox Talks.

When we have reason to believe that any employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, we must ensure that the employee is retrained so that the requisite proficiency is regained.

Retraining is required in at least the following situations:

- Where changes at the worksite present a hazard about which an employee has not been previously trained
- Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained
- Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

Guidelines in Tagging Scaffolds

Scaffold tags are used to protect the lives of your workers. It identifies if a scaffold is safe or unsafe for use. Follow the guidelines below when tagging scaffolds.

1. Inspection and tagging of the scaffold are to be performed by a competent person experienced in the erection of scaffold.
2. A unique scaffold identification tag number must be clearly identified on all tags for tracking purposes.
3. All scaffolds shall be inspected after the erection per regulatory requirements.
4. All scaffold identification tags will be of a solid green, yellow, or red color with black lettering.
5. Front information displayed and completed for each tag.
6. It is common practice to use the following color schemes: Green, Yellow, Red
7. **Green** – tags will be hung on scaffolds that have been inspected and are safe for use. A green "**SAFE FOR USE**" tag(s) and should be attached to the scaffold at each access point after the initial inspection is complete.
8. **Yellow** – "**CAUTION**" tag(s), will replace all green "Safe Scaffold" tag(s) whenever the scaffold has been modified to meet work requirements, and as a result, could present a hazard to the user. This tag indicates special requirements for safe use.
9. **Red** – "**DANGER – UNSAFE FOR USE**" tag(s), will be used during erection or dismantling when the scaffold is left unattended and replace all green "Safe for Use " tag(s) or yellow "Caution / Hazard" tag(s) in the event a scaffold has been deemed unfit for use.

   NOTE: Use of the "yellow tag" status is not intended to override the green tag system. All efforts should be made to return the scaffold to a "Green Tag" status as soon as possible.

Chapter 27: WELDING SAFETY

INTRODUCTION/OVERVIEW

This chapter presents the basic safety requirements found in 29 CFR 1926, Subpart J as well as capsule summaries of the major health hazards associated with the welding process. If welding/cutting cannot be conducted safely, it will not be performed by any employee of Alexander Mechanical. The safety manager should be contacted, and this communicated to them

Individuals performing welding/cutting shall receive training annually and through joint contractor/union training programs.

The Company provides training in hazard identification and awareness. Be aware of these hazards and take the requisite precautions.

BASIC REQUIREMENTS OSHA Subpart J

ARC WELDING AND CUTTING

1. Do not use pipelines containing gases or flammable liquids, or conduits containing electrical circuits, as a ground return.

2. Ensure that the required electrical contact exists at all joints when a structure or pipeline is employed as a ground return circuit. The generation of an arc, sparks, or heat at any point shall cause rejection of the structures as a ground circuit.

3. Ground the frames of all arc welding and cutting machines either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.

4. Open the power supply switch to the equipment when the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved.

5. Report any faulty or defective equipment to the supervisor.

6. Shield all arc welding and cutting operations, whenever practicable, by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

FIRE PREVENTION

1. Never permit welding, cutting or heating where the application of flammable paints or the presence of other flammable compounds creates a hazard. If objects to be welded or cut cannot readily be moved, all moveable fire hazards shall be removed. If fire hazards cannot be removed, then guards shall be used to confine the heat, sparks and slag to protect the immovable fire hazards.

2. Always maintain suitable fire extinguishing equipment in the work area so that fire extinguishers are readily available for employees engaged in hot work. This equipment must be readily accessible and in a state of readiness for instant use.

3. Assign additional personnel to guard against fire whenever the welding, cutting or heating operation is such that normal fire prevention precautions are not sufficient. For example, if combustibles cannot be removed from the work area, or if hot work is happening in an area where sparks/slag can fall into a process that will cause a fire. This additional person is to be present while the actual welding, cutting, or heating operation is being performed and for a sufficient period of time after completion of the work to ensure that no possibility of fire exists. Fire watch must be performed for a minimum of
½ hour, unless the customer has more stringent requirements. Fire watch will be performed by a qualified person who has been trained to use a fire extinguisher, how to notify occupants in the building in the event of a fire, procedures for identifying possible fire and notifying authorities when a fire is beyond an incipient fire.

4. Prior to beginning hot work, a hot work permit must be obtained from the Alexander Foreman, completed and approved by the Foreman and/or customer representative on-site. The hot work permit must remain in the area where the hot work is being performed. Upon completion of the hot work and fire watch the permit must be signed off by the Alexander Foreman and the customer representative.

VENTILATION

1. Provide adequate ventilation as necessary to maintain welding fumes and smoke within safe limits as defined in Subpart D (OSHA 1926.55). Generally, if you are welding in an open space of more than 10,000 square feet, or if the ceiling height is more than 16 feet, natural ventilation is adequate for general purpose welding. If in doubt, an environmental laboratory can run tests to determine the degree of hazard.

2. Mechanical ventilation, if required, should have sufficient capacity and be arranged to produce the number of air changes necessary to maintain safe limits. Local ventilation, if required, consists of freely movable hoods intended to be placed by the welder as close as possible to the work.

3. Provide suitable mechanical ventilation or respiratory protective equipment whenever unusual physical or atmospheric conditions create an unsafe accumulation of contaminants even if the process of welding, cutting, and heating, not involving the materials of toxic significance outlined below, does not normally require the use of such mechanical ventilation or personal protective systems.

4. Provide either general mechanical or local exhaust ventilation when welding, cutting or heating in any enclosed spaces the metals of toxic significance listed below.

   a. Zinc bearing base or filler metals, or metals coated with zinc- bearing materials.

   b. Cadmium bearing filler materials.

   c. Chromium bearing metals or metals coated with chromium bearing materials.

5. Provide either local exhaust ventilation in accordance with the requirements of 1926.353(a) or provide employees with airline respirators in accordance with the requirements of OSHA Subpart E when welding, cutting, or heating in any enclosed spaces the metals of toxic significance listed below.

   a. Metals containing lead, other than as an impurity, or metals coated with lead bearing materials.

   b. Cadmium bearing or cadmium coated base metals.

6. No employee is to engage in or be exposed to the process of **inert- gas metal- arc welding** until the following **special precautions** have been taken. These precautions are required since the inert- gas metal-arc welding process involves the production of ultraviolet radiation of intensities of 5 to 30 times that produced during the shielded metal-arc welding as well as the liberation of toxic fumes and gases and the decomposition of chlorinated solvents by ultraviolet rays.

   a. No chlorinated solvents are to be used within 200 feet of the exposed arc, unless shielded.

   b. Ensure that all surfaces prepared with chlorinated solvents are thoroughly dry before welding is permitted on such surfaces.

c. Ensure that all employees in the area who are not protected from the arc by screening are protected by filter lenses meeting the requirements of OSHA Subpart E.

d. Ensure that all welders and other employees who are exposed to radiation are suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays.

e. Provide local exhaust ventilation or airline respirators to all employees who perform inert-gas metal-arc welding on stainless steel in any enclosed spaces. These ventilation and respiratory protection requirements must be met to protect against dangerous concentrations of nitrogen dioxide.

HEALTH HAZARDS - CHEMICAL AGENTS

ZINC

Zinc is used in large quantities in the manufacture of brass, galvanized metals, and various other alloys. Inhalation of zinc oxide fumes can occur when welding or cutting on zinc-coated metals. Exposure to these fumes is known to cause metal fume fever. Symptoms of metal fume fever are very similar to those of common influenza. They include fever (rarely exceeding 102°1=), chills, nausea, dryness of the throat, cough, fatigue, and general weakness and aching of the head and body. The victim may sweat profusely for a few hours, after which the body temperature begins to return to normal. The symptoms of metal fume fever have rarely, if ever, lasted beyond 24 hours. The subject can therefore appear to be more susceptible to the onset of this condition on Mondays or on weekdays following a holiday than they are on other days.

CADMIUM

Cadmium is used frequently as a rust preventative coating on steel and also as an alloying element. Acute exposures to high concentrations of cadmium fumes can produce sever lung irritation. Long-term exposure to low levels of cadmium in air can result in emphysema (a disease affecting the ability of the lung to absorb oxygen) and can damage the kidneys.

BERYLLIUM

Beryllium is sometimes used as an alloying element with copper and other base metals. Acute exposure to high concentrations of beryllium can result in chemical pneumonia. Long-term exposure can result in shortness of breath, chronic cough, and significant weight loss, accompanied by fatigue and general weakness.

IRON OXIDE

Iron is the principal alloying element in steel manufacture. During the welding process, iron oxide fumes arise from both the base metal and the electrode. The primary acute effect of this exposure is irritation of nasal passages, throat, and lungs. Although long- term exposure to iron oxide fumes may result in iron pigmentation of the lungs, most authorities agree that these iron deposits in the lung are not dangerous.

MERCURY

Mercury compounds are used to coat metals to prevent rust or inhibit foliage growth (marine paints). Under the intense heat of the arc or gas flame, mercury vapors will be produced. Exposure to these vapors may produce stomach pain, diarrhea, kidney damage, or respiratory failure. Long-term exposure may produce tremors, emotional instability, and hearing damage.

LEAD

The welding and cutting of lead-bearing alloys or metals whose surfaces have been painted with lead-based paint can generate lead oxide fumes. Inhalation and ingestion of lead oxide fumes and other lead compounds will cause lead poisoning. Symptoms include metallic taste in the mouth, loss of appetite, nausea, abdominal cramps, and insomnia. In time, anemia and general weakness, chiefly in the muscles of the wrists, develop.

FLUORIDES

Fluoride compounds are found in the coatings of several types of fluxes used in welding. Exposure to these fluxes may irritate the eyes, nose, and throat. Repeated exposure to high concentrations of fluorides in air over a long period may cause pulmonary edema (fluid in the lungs) and bone damage. Exposure to fluoride dusts and fumes has also produced skin rashes.

CHLORINATED HYDROCARBON SOLVENTS

Various chlorinated hydrocarbons are used in degreasing or other cleaning operations. The vapors of these solvents are a concern in welding and cutting because the heat and ultraviolet radiation from the arc will decompose the vapors and form highly toxic and irritating phosgene gas. (See Phosgene.)

PHOSGENE

Phosgene is formed by decomposition of chlorinated hydrocarbon solvents by ultraviolet radiation. It reacts with moisture in the lungs to produce hydrogen chloride, which in turn destroys lung tissue. For this reason, any use of chlorinated solvents should be well away from welding operations or any operation in which ultraviolet radiation or intense heat is generated.

CARBON MONOXIDE

Carbon monoxide is a gas usually formed by the incomplete combustion of various fuels. Welding and cutting may produce significant amounts of carbon monoxide. In addition, welding operations that use carbon dioxide as the inert gas shield may produce hazardous concentrations of carbon monoxide in poorly ventilated areas. This is caused by a breakdown of shielding gas. Carbon monoxide is odorless and colorless and cannot be detected. Common symptoms of overexposure include pounding of the heart, a dull headache, flashes before the eyes, dizziness, ringing in the ears, and nausea.

NITROGEN OXIDES

The ultraviolet light of the arc can produce nitrogen oxides (NO, NO_2), from the nitrogen (N) and oxygen (0_2) in the air. Nitrogen oxides are produced by gas metal arc welding (GMAW or short-arc), gas tungsten arc welding (GTAW or hell-arc), and plasma arc cutting. Even greater quantities are formed if the shielding gas contains nitrogen. Nitrogen dioxide (NO_2), one of the oxides formed, has the greatest health effect. This gas is irritating to the eyes, nose and throat but dangerous concentrations can be inhaled without any immediate discomfort. High concentrations can cause shortness of breath, chest pain, and fluid in the lungs (pulmonary edema).

OZONE

Ozone (O_3) is produced by ultraviolet light from the welding arc. Ozone is produced in greater quantities by gas metal arc welding (GMAW or short- arc), gas tungsten arc welding (GTAW or hell-arc), and plasma arc cutting. Ozone is a highly active form of oxygen and can cause great irritation to all mucous membranes. Symptoms of ozone exposure include headache, chest pain, and dryness of the eyes, nose and throat.
Excessive exposure can cause fluid in the lungs (pulmonary edema). Both nitrogen dioxide and ozone are thought to have long-term effects on the lungs.

HEXAVALENT CHROMIUM

Hexavalent chromium [Cr (VI)] is one of the valence states (+6) of the element chromium. It is usually produced by an industrial process. Cr (VI) is known to cause cancer. In addition, it targets the respiratory system, kidneys, liver, skin and eyes.
Chromium metal is added to alloy steel to increase hardenability and corrosion resistance. A major source of worker exposure to Cr (VI) occurs during "hot work" such as welding on stainless steel and other alloy steels containing chromium metal. Cr (VI) compounds may be used as pigments in dyes, paints, inks, and plastics. It also may be used as an anticorrosive agent added to paints, primers, and other surface coatings. The Cr (VI) compound chromic acid is used to electroplate chromium onto metal parts to provide a decorative or protective coating.
Requirements to protect workers from Cr (VI) exposure are addressed in specific OSHA hexavalent chromium standards in construction (1926.1126).

HEALTH HAZARDS - PHYSICAL AGENTS

ULTRAVIOLET RADIATION

Ultraviolet radiation (UV) is generated by the electric arc in the welding process. Skin exposure to UV can result in severe burns, in many cases without prior warning. UV radiation can also damage the lens of the eye.

Many arc welders are aware of the condition known as "arc-eye", a sensation of sand in the eyes. This condition is caused by excessive eye exposure to UV. Ultraviolet rays also increase the skin effects of some industrial chemicals (coal tar and cresol compounds, for example).

INFRARED RADIATION

Exposure to infrared radiation (IR), produced by the electric arc and other flame cutting equipment may heat the skin surface and the tissues immediately below the surface. Except for this effect, which can progress to thermal bums in some situations, infrared radiation is not dangerous. Most welders protect themselves from IR (and UV) with a welder's helmet (or glasses) and protective clothing.

INTENSE VISIBLE LIGHT

Exposure of the human eye to intense visible light can produce adaptation, pupillary reflex, and shading of the eyes. Such actions are protective mechanisms to prevent excessive light from being focused on the retina. In the arc welding process, eye exposure to intense visible light is prevented for the most part by the welder's helmet. However, some individuals have sustained retinal damage due to careless "viewing" of the arc. At no time should the arc be observed without eye protection.

ALEXANDER MECHANICAL inc

Hot Work Permit

A Hot Work Permit must be obtained from the supervisor prior to beginning any hot work. Hot work includes welding, cutting with a torch, brazing, grinding, soldering, or any other activity involving open flame, high temperatures or sparks.

Permit Issued To: _____ Start Date:_Start Time:_____AM/PM

Location of Proposed Work:

_____

_____

Permit Expires: Date:_____Time:_____AM/PM

Description of Hot Work:

☐ Welding ☐ Brazing ☐ Use of Oxygen/Acetylene Torch Grinding
☐ ☐ Soldering ☐ Other (describe)

_____

_____

_____

_____

Fire Hazards & Controls

Identify the potential sources of hazards (and their locations) of the hot work

Fire Hazards in Hot Work Area	**Locati on**	**Contro l(s)**
Flammable Gas		
Flammable Liquids		
Combustible dust		
Combustibles (paper, cardboard, lumber, etc.)		
Other:		
Other:		

Permit Holder (signature):_____Date: _____

Signature / Date of Permit Issuer:_____Date: _____

Chapter 28: PROTECTIVE EQUIPMENT

Personal Protective Equipment Policies

Introduction

The purpose of the Personal Protective Equipment Policies is to protect the employees of Alexander Mechanical from exposure to workplace hazards and the risk of injury through the use of personal protective equipment (PPE). PPE is not a substitute for more effective control methods and its use will be considered only when other means of protection against hazards are not adequate or feasible. It will be used in conjunction with other controls unless no other means of hazard control exist.

Personal protective equipment will be provided, used, and maintained when it has been determined that its use is required to ensure the safety and health of our employees and that such use will lessen the likelihood of occupational injury and/or illness.

This section addresses general PPE requirements, including eye and face, head, foot and leg, hand and arm, body (torso) protection, and protection from drowning. Separate programs exist for respiratory protection and hearing protection as the need for participation in these programs is established through industrial hygiene monitoring.

The Alexander Mechanical Personal Protective Equipment Policies includes:

- Responsibilities of supervisors and employees
- Hazard assessment and PPE selection
- Employee training
- Cleaning and Maintenance of PPE

Responsibilities

(Safety Person or designated person) is responsible for the development, implementation, and administration of Alexander Mechanical's PPE policies. This involves

Conducting workplace hazard assessments to determine the presence of hazards which necessitate the use of PPE.

Selecting and purchasing PPE.

Reviewing, updating, and conducting PPE hazard assessments whenever

a job changes
new equipment is used

there has been an accident

a supervisor or employee requests it

or at least every year

Maintaining records on hazard assessments.

Maintaining records on PPE assignments and training.

Providing training, guidance, and assistance to supervisors and employees on the proper use, care, and cleaning of approved PPE.

Periodically re-evaluating the suitability of previously selected PPE.

Reviewing, updating, and evaluating the overall effectiveness of PPE use, training, and

policies.

Supervisors (leads, etc., and/or designated persons)

Supervisors (leads, etc., and/or designated persons) have the primary responsibility for implementing and enforcing PPE use and policies in their work area. This involves

1. Providing appropriate PPE and making it available to employees.

   Ensuring that employees are trained on the proper use, care, and cleaning of PPE.

Ensuring that PPE training certification and evaluation forms are signed and given to (Safety Person or designated person responsible for your workplace safety and health program).

Ensuring that employees properly use and maintain their PPE and follow Alexander Mechanical PPE policies and rules.

Notifying Alexander Mechanical management and the Safety Person when new hazards are introduced or when processes are added or changed.

Ensuring that defective or damaged PPE is immediately disposed of and replaced.

Employees

The PPE user is responsible for following the requirements of the PPE policies. This involves

2. Properly wearing PPE as required.
3. Attending required training sessions.
4. Properly caring for, cleaning, maintaining, and inspecting PPE as required.
5. Following Alexander Mechanical PPE policies and rules.
6. Informing the supervisor of the need to repair or replace PPE.

Employees who repeatedly disregard and do not follow PPE policies and rules will be subject to: Verbal Counseling, Written Reprimand, possible Termination depending on severity of infraction.

Procedures

Hazard Assessment for PPE

(Safety Person or designated person), in conjunction with Supervisors, will conduct a walk-through Safety survey of each work area to identify sources of work hazards.
Each survey will be documented using the Hazard Assessment Certification Form, which identifies the work area surveyed, the person conducting the survey, findings of potential hazards, and date of the survey. (Safety Person or designated person) will keep the forms in the (Safety Office at Alexander Mechanical's files).

(Safety Person or designated person) will conduct, review, and update the hazard assessment for PPE whenever

a job changes

new equipment or process is installed there has been an accident

whenever a supervisor or employee requests it or at least every year

Any new PPE requirements that are developed will be added into Alexander Mechanical's written accident prevention program.

Selection of PPE

Once the hazards of a workplace have been identified, (Safety Person or designated person) will determine if the hazards can first be eliminated or reduced by methods other than PPE, i.e., methods that do not rely on employee behavior, such as engineering controls (refer to Confined Spaces for Controlling Hazards).

If such methods are not adequate or feasible, then (Safety Person or designated person) will determine the suitability of the PPE presently available; and as necessary, will select new or additional equipment which ensures a level of protection greater than the minimum required to protect our employees from the hazards. Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards will be recommended for purchase. Alexander Mechanical will take the fit and comfort of PPE into con- sideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and will be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH or ANSI (American National Standards Institute) standards will be procured or accepted for use. Newly purchased PPE must conform to the updated ANSI standards which have been incorporated into the PPE regulations, as follows:

Eye and Face Protection ANSI Z87.1-1989 Head Protection ANSI Z89.1-1986

Foot Protection ANSI Z41.1-1991

Hand Protection (There are no ANSI standards for gloves, however, selection must be based on the performance characteristics of the glove in relation to the tasks to be performed.)

Affected employees whose jobs require the use of PPE will be informed of the PPE selection and will be provided PPE by Alexander Mechanical at no charge. Careful consideration will be given to the comfort and proper fit of PPE in order to ensure that the right size is selected and that it will be used.
Employers should make sure that each employee demonstrates an understanding of the PPE training as well as the ability to properly wear and use PPE before they are allowed to perform work requiring the use of the PPE. If an employer believes that a previously trained employee is not demonstrating the proper understanding and skill level in the use of PPE, that employee should receive retraining. Other situations that require additional or retraining of employees include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

Defective or Unserviceable PPE

"Defect" means any characteristic or condition which tends to weaken or reduce the strength of the tool, object, or structure of which it is a part.

As an example, always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

All EMPLOYEE's are to notify the Supervisor/Site Foreman or Alexander Mechanical Safety Officer immediately when Deterioration or defective equipment is discovered. Unserviceable PPE shall be **immediately** removed from service and replaced.
Regardless of the type of equipment it is, if defects, wear and tear or faulty operation is discovered with any piece of PPE, it is to be removed from service until repaired or replaced. Supervisors and employees are responsible for periodic checks, month as well as annual inspection of equipment.

Training

Any worker required to wear PPE will receive training in the proper use and care of PPE before being allowed to perform work requiring the use of PPE. Periodic retraining will be offered to PPE users as needed. The training will include, but not necessarily be limited to, the following subjects:

When PPE is necessary to be worn What PPE is necessary

How to properly don, doff, adjust, and wear PPE The limitations of the PPE

The proper care, maintenance, useful life, and disposal of the PPE

After the training, the employees will demonstrate that they understand how to use PPE properly, or they will be retrained.

Training of each employee will be documented using the Personal Protective Equipment Training Documentation Form and kept on file. The document certifies that the employee has received and understood the required training on the specific PPE he/she will be using.

Retraining

The need for retraining will be indicated when

an employee's work habits, or knowledge indicates a lack of the necessary understanding,

motivation, and skills required to use the PPE (i.e., uses PPE improperly)

new equipment is installed

changes in the workplace make previous training out-of-date

changes in the types of PPE to be used make previous training out-of-date

Cleaning and Maintenance of PPE

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. Employees must inspect, clean, and maintain their PPE according to the manufacturers' instructions before and after each use.
Supervisors and employees are responsible for ensuring that users properly maintain their PPE in good condition.

Personal protective equipment must not be shared between employees until it has been

properly cleaned and sanitized. PPE will be distributed for individual use whenever possible.

If employees provide their own PPE, make sure that it is adequate for the workplace hazards, and that it is maintained in a clean and reliable condition.

Defective or damaged PPE will not be used and will be immediately discarded and replaced.

NOTE: *Defective equipment can be worse than no PPE at all. Employees would avoid a hazardous situation if they knew they were not protected; but they would get closer to the hazard if they erroneously believed they were protected, and therefore would be at greater risk.*

It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

Safety Disciplinary Policy

Alexander Mechanical believes that a safety and health Accident Prevention Program is unenforceable without some type of disciplinary policy. Our company believes that in order to maintain a safe and healthful workplace, the employees must be cognizant and aware of all company, State, and Federal safety and health regulations as they apply to the specific job duties required. The following disciplinary policy is in effect and will be applied to all safety and health violations.

The following steps will be followed unless the seriousness of the violation would dictate going directly to Step 2 or Step 3.

1. A first-time violation will be discussed orally between company supervision and the employee. This will be done as soon as possible.

2. A second time offense will be followed up in written form and a copy of this written documentation will be entered into the employee's personnel folder.

3. A third time violation will result in time off or possible termination, depending on the seriousness of the violation.

Chapter 29: Hexavalent Program

Amendment One to Alexander Mechanical Safety Policy

OBJECTIVE

An effective hexavalent chromium program can prevent respiratory related aliments due to overexposure to hexavalent chromium. In order to comply with the federal Occupational Safety and Health Administration Standards (OSHA) and most state plan OSHA requirements, this written program has been established for ***Alexander Mechanical Inc.*** (hereafter referred to as "the Company"). All company projects and facilities are included and comply with this program. Copies of this written program, including a copy of the OSHA Standard, are available for review by any employee.

BACKGROUND

The purpose of this hexavalent chromium compliance program is to help ensure that worker exposure levels to hexavalent chromium are accurately assessed, and that workers are not exposed to hexavalent chromium at levels that are above the Permissible Exposure Limit (PEL) of 5 micrograms per cubic meter of air (5 ug/m^3). The measured concentrations of hexavalent chromium (above, at, or below the PEL) will dictate which compliance procedures described in this program will be implemented.

Hexavalent Chromium Emitting Activities

Hexavalent chromium compounds are widely used in the chemical industry as ingredients and catalysts in pigments, metal plating and chemical synthesis. Hexavalent chromium can also be produced when welding or grinding on stainless steel or chrome painted surfaces.

As a point of technical reference for the mechanical industry, the low levels of hex chrome identified in the welding process are generated in the welding fumes found in two main sources. Hexavalent chromium is a chemical by-product when conducting welding or grinding operations on stainless steel, and to a lesser extent, galvanized steel, and chrome-coated metals. In addition, low levels of hex chrome may be an ingredient of the welding rods and wires used in the welding processes.

However, there are limited studies that show the consequences of hex chrome specific exposures or how hex chrome is part of the health effects found in fume *overexposures*. The likelihood of overexposures (exposures above the new regulatory limit) to hex chrome in a typical fabrication shop or construction site where welding is conducted is low. However, there may be tasks or jobs that could generate fumes that contain excessive amounts of hexavalent chromium and those tasks would need to be evaluated.

The key is identifying the tasks and processes that generate welding fumes and determine if overexposures are possible.

HOW CHROMIUM ENTERS THE BODY

Hexavalent chromium enters the body in two ways: inhalation and ingestion. Chromium can be inhaled when chromium dust, mist, or fumes enter the workers breathing zone (head and shoulders). For welders / workers, the most common risk factor is welding on stainless steel. Chromium dust can also get on cigarettes. If contaminated cigarettes are smoked, the smoker may inhale additional chromium along with the tobacco smoke. Particles of chromium can be swallowed if the dust gets on hands, clothing, or facial hair and is transferred to food or beverages.

HOW TO CONTROL CHROMIUM EXPOSURE

The two best ways to prevent overexposures to hex chrome during welding operations are substituting chromium-free materials and using local exhaust ventilation in combination with adequate general ventilation. If a substitute cannot be found, a mechanically powered local exhaust vent should be placed at the point of operation where chromium is released into the air, or the entire process should be contained within a hood.
Properly designed and maintained local exhaust ventilation draws off most of the chromium before it can be released into the ambient air and inhaled by workers.

Using local exhaust ventilation is preferred over dilution of chromium-contaminated air by natural ventilation through open windows and doors, or general ventilation with fresh air through a duct. With the dilution approach alone, overexposure can still occur at the point of chromium release into the air, or if the dilution air does not mix well with the room air.

Wearing an air-purifying respirator, such as a filtering facepieces (P-100 respirators) or respirators with screw-in filters, is the least effective way to control exposure. In fact, good safety practice always recommends personal protective equipment be used to prevent overexposure only as the last resort. This is because the use of respirators is complex and prone to error, possibly resulting in inadequate protection.

In controlling chromium exposure, the respirator must be approved for the type of particles in the air; for example, a paper dust mask designed for removing powder particles will not remove the fume particles created by welding. Also, the respirator must be fit-tested to ensure that it fits the wearer's face, and the respirator must be kept in good condition. The fit should be checked regularly. Workers should also be medically examined for their ability to wear a respirator.

The enclosed hexavalent chromium air monitoring checklist can be used to help identify risk factors that would likely affect air sampling results collected to measure hexavalent chromium in the air.

In most cases, worker exposure levels will be determined by process-specific air monitoring based on a hazard assessment conducted by the Safety Manager and appropriate Supervisor. When exposure levels exceed the PEL all workers will be notified immediately.

Written notification will be established to describe the corrective action being taken to reduce worker exposure levels to a point that is at or below the PEL. Affected workers and their representatives will be permitted to observe any air monitoring. Appropriate personal protective equipment will be provided for any observers.

The Safety manager or appropriate Supervisor will ensure that the air monitoring methods that were used for exposure determination purposes were within an accuracy range of 25 percent and produce a statistical confidence level of 95 percent for concentrations at or above the Action Level.

SPECIAL CONTROL MEASURES FOR WELDING

If stainless steel welding or cutting is done in an "enclosed space" where using local exhaust ventilation is impractical or ineffective, respiratory protection including approved airline respirators may be required.

Exposure Determination

Initial (and possibly periodic) exposure assessments are needed to determine if airborne exposures to hex chrome exceed the action level (2.5 ug/m^3) or the PEL (5.0 ug/m^3), and therefore would require compliance with the some or all provisions of the standard.

The Company has two options for making exposure assessments: ☐ Scheduled Exposure Assessments

Conduct initial exposure monitoring to determine what actions to take. If results are above the action level, periodic monitoring is needed, as described below:

- If results are below 0.5 ug/m^3, monitoring is no longer needed, and the remaining standard provisions do not apply.
- If results are at or above 2.5 ug/m^3, but below 5.0 ug/m^3, the Company has met the Action Level requirements (see Methods of Compliance). The Company will need to complete additional monitoring every 6 months.
- If results are at or above 5.0 ug/m^3, the Company has met the PEL requirements (see Methods of Compliance). The Company will need to complete additional monitoring every 3months.

☐ Performance Oriented Assessments

According to OSHA, employers may rely on “historical” or “objective” data to make exposure determinations. That is, employers may use existing data from previous monitoring results as a way of determining future compliance actions. The objective data includes “industry- wide” data from similar work processes and tasks, not just company results.

Although the Federal OSHA standard for Hexavalent Chromium allows for "objective data" and "historical data as means to show expected levels of hexavalent chromium during particular jobs or tasks, the sheet metal industry has not been able to collect this type of data. This is mainly due to the many variables that can affect air monitoring results during welding and grinding operations (as described in the enclosed hexavalent chromium air monitoring checklist) and the lack of consistent data as to be defined as clearly objective or historical.

Methods of Compliance

The goal of this program is to ensure that no employee is exposed to hex chrome above the PEL. In order to meet this requirement, the Company has the following options:

- Action Level Requirements: If air monitoring results are above 2.5 ug/m^3, but below 5.0 ug/m^3, the Company only needs to complete periodic air monitoring every 6 months to determine future action. No control measures are required. Medical surveillance is required at this level (see below).

- PEL Requirements I: If air monitoring results indicate that exposure levels are *above 5.0 ug/m^3 for less than 30 days* during a 12 month period, the Company must use effective control measures, including respiratory protection, to ensure actual exposure levels are below 5.0 ug/m^3. Note: Engineering controls are not required at this level.

- PEL Requirements II: If air monitoring results indicate that exposure levels are *above 5.0 ug/m^3 for 30 days or more* during a 12-month period, the Company must use effective control measures to ensure actual exposure levels are below 5.0 ug/m^3. The control measures must be implemented in this order:

- Use feasible engineering and work practice controls*.
- In addition, use respiratory protection if levels cannot get below 5.0 ug/m^3 by engineering and work practice controls alone.

*Note: Engineering controls are not required until May 31, 2010.
Respiratory protection can be used until that time.

Program Implementation Schedule

The basic steps to implement this program are:

- It was determined that workers could be exposed to hexavalent chromium above the PEL.
- The processes that led to the overexposure are identified.
- All other employers on the job site will be notified about the hexavalent chromium hazard.
- Engineering and work practice controls will be implemented.
- Respiratory protection training, fit testing and equipment will be provided if necessary.

- Appropriate hexavalent chromium hazard signs will be posted.
- Personal protective clothing will be provided.
- Appropriate hygiene facilities will be provided, and proper hygiene practices will be established.
- Hand- and face-washing facilities will be provided for affected workers.
- Medical surveillance will be implemented.
- Affected workers will receive advanced training on hexavalent chromium hazards, effects and protective measures.
- Regular air monitoring will be conducted.
- Proper housekeeping procedures will be implemented.
- Medical removal protection procedures will be implemented if necessary.
- Appropriate recordkeeping procedures will be implemented.

Work Practice Requirements

- Provide clean, dry coveralls. Coveralls and will be laundered on a weekly basis whenever hexavalent chromium levels exceed the PEL, without regard to respirator use, when hexavalent chromium compounds that could cause skin irritation are present or as necessary for interim protection.
- Provide protective clothing and equipment and, when necessary, will dispose of it properly.
- Ensure that all protective work clothing is removed at the completion of each work shift in specially provided change areas.
- Ensure that contaminated protective work clothing that is to be cleaned, laundered or disposed of is placed in a closed container inside the established change area.
- Inform all persons who clean or launder protective clothing or equipment about the harmful effects of hexavalent chromium exposure.
- Ensure that each container of contaminated protective clothing and equipment is affixed with labels that state the following:

  Caution: Clothing contaminated with hexavalent chromium. Do not remove dust by blowing or shaking. Dispose of hexavalent chromium-contaminated wash water in accordance with applicable local, state or federal regulations.
- Prohibit the removal of hexavalent chromium from protective clothing by blowing, shaking or any other means that disperses hexavalent chromium into the air.
- Ensure that surfaces are kept free of hexavalent chromium dust as much as practicable.
- Ensure that cleaning is done by vacuuming or other methods that minimize the likelihood of hexavalent chromium becoming airborne.
- Ensure that vacuums are equipped with High Efficiency Particulate Air (HEPA) filters and emptied in a way that minimizes reentry of hexavalent chromium into the workplace.
- Ensure that compressed air is not used to remove hexavalent chromium from the workplace unless it is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.
- Ensure that workers do not have food, beverages, tobacco products or cosmetics in their possession when they are exposed to hexavalent chromium above the PEL, without regard to respirator use.
- Provide clean change areas for workers who are exposed to hexavalent chromium above the PEL and as an interim protective measure.
- Establish change areas with separate storage facilities for work clothing and equipment and street clothes.

- Ensure that workers do not leave the workplace wearing protective clothing or equipment that is required to be worn during the work shift.
- Provide workers with shower facilities where feasible when they are exposed to hexavalent chromium at concentrations above the PEL.
- Provide clean, hexavalent chromium-free, readily accessible eating areas for workers who are exposed to hexavalent chromium above the PEL without regard to respirator use.
- Ensure that workers wash their hands and faces prior to eating, drinking, smoking or applying cosmetics when exposure to hexavalent chromium is above the PEL, without regard to respirator use.
- Ensure that workers do not enter eating facilities with work clothing unless surface hexavalent chromium dust has been removed by vacuuming, use of a downdraft booth or other methods that limit dispersion of hexavalent chromium dust.
- Provide workers with adequate hand-washing facilities; and
- Ensure that workers wash their hands and faces at the end of each work shift when showers are not provided.

Medical Surveillance

Medical surveillance simply means doctor examinations by a physician or other licensed health care professional (PLHCP). Medical surveillance requirements are required in the following situations:

- When an employee is or may be occupationally exposed to hex chrome *at or above the action level for 30 or more days in a 12-month period*.
- When an employee is experiencing signs or symptoms of adverse health effects associated with hex chrome exposure; or
- When an employee is exposed in an emergency. The Company will provide a medical examination:
- Within 30 days after initial assignment, unless the employee has received a hex chrome related medical examination that meets the requirements of this paragraph within the last twelve months, Annually.
- Within 30 days after a PLHCP's written medical opinion recommends an additional examination.
- Whenever an employee shows signs or symptoms of the adverse health effects associated with hex chrome exposure.
- Within 30 days after exposure during an emergency which results in an uncontrolled release of hex chrome: or
- At the termination of employment, unless the last examination that satisfied the requirements of the standard was less than six months prior to the date of termination.

Regulated Area (General Industry only)

A regulated area means an area, established by the employer, where an employee's exposure to airborne concentrations of hex chrome exceeds, *or can reasonably be expected to exceed*, the PEL. In a typical shop, this area is likely the immediate area around the welding operation. The regulated area must be demarcated (separated) from the rest of the workplace in a manner that adequately establishes and alerts employees of the boundaries of the regulated area. This can be accomplished by using signs, warning tape, or other physical warning device.

Access to the regulated area is only permitted by:

- Persons authorized by the employer and required by work duties to be present in the regulated area.
- Any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures; or
- Any person authorized by the Occupational Safety and Health Act or regulations issued under it to be in a regulated area.

Chapter 30: BENZENE POLICY

BENZENE AWARENESS
Safety Policy

Amendment Two – Alexander Mechanical

TABLE OF CONTENTS

PURPOSE

The purpose of this policy is to minimize occupational exposure to benzene and meet the requirements of the OSHA Benzene Standard 29 CFR 1910.1028.

SCOPE

This procedure applies to projects where exposures to benzene can occur. This plan is to be reviewed as part of the annual corporate assessment, any time that monitoring data indicates there is an increase in exposure levels or there is a change in a process.

APPLICATION

This procedure will apply to all workplaces for all project and contract personnel at all project locations.

DEFINITIONS

This procedure contains no unique definitions.

1.0 GENERAL REQUIREMENTS

1.1. *Exposure Limits*

Permissible Exposure Limit (PEL) 1.0 ppm (parts per million) averaged over 8 hours. Short-Term Exposure Limit (STEL) 5.0 ppm averaged over 15 minutes.

Action Level (AL) - The exposure level at which various parts of the benzene standard are required to be implemented, for example, medical surveillance and training. The AL is 0.5 ppm averaged over 8 hours.

2.0 METHODS OF REDUCING EXPOSURE

2.1. *Engineering and Work Practices Controls*

Employer should be aware of Owners contingency plan provisions. Employees must be informed where benzene is used in host facility and aware of additional plant safety rules. Where feasible, benzene exposures should be controlled through engineering controls and work practices. Respirators and protective clothing should be used to control exposures that are intermittent or caused by emergency conditions and while awaiting engineering controls to be implemented.

2.2. *Respiratory Protection*

Respiratory Protection shall be NIOSH approved and as outlined below.

Benzene Concentration	Respirator*	Cartridge
Unknown (i.e., no air sampling information and/or emergency response for a release)	Supplied Air	Not applicable
Less than 1.0 ppm	None required	Not applicable
Greater than or equal to 1.0 ppm, but less than 10 ppm	Half-Mask Air Purifying	Organic vapor (Black) or organic vapor / acid gas *Yellow) cartridges
Greater than or equal to 10 ppm, but less than 50 ppm	Full Face Air Purifying or supplied Air	Organic vapor (Black) or organic vapor / acid gas *Yellow) cartridges
Equal to or above 50 ppm	Supplied Air	Not Applicable

2.3. *Additional Personal Protective Equipment (PPE)*

When liquids containing benzene are present, additional PPE i.e., aprons, chemical suites, gloves, boots, goggles and face protection shall be used to prevent eye contact and limit dermal exposure. PPE must meet the requirements of 29 CFR 1910.133 and provided at no cost toemployees.

3.0 EMPLOYEE TRAINING

All employees working in areas with potential benzene exposures must be properly trained. Training will be conducted upon initial employment and repeated annually or any time there is a change in this procedure.

Employees must receive additional training if there is a change in or addition of a process or operation that creates the potential for exposure. The project HSE department is responsible for tracking and maintaining employee training records.

Training will include the specific hazards of benzene, the contents of the benzene standard medical surveillance program and the appropriate protective measurements to control benzene exposures during normal operations and emergency situations.

Area emergency alarms and evacuation routes, the location of emergency eye wash stations and showers and emergency phone numbers are to be included as part of the employees' pre-job STA.

4.0 REGULATED AREAS

Potential locations where employees may be exposed to Benzene are:

- Petroleum refining sites
- Tank Gauging (tanks at producing, pipeline and refiningoperations
- Field maintenance

Toxicity, Color, Odor, Solubility, Flammability and Toxic by-products are characteristics of Benzene. Whenever airborne concentrations of benzene in an area or specific operation exceed or can be reasonably expected to exceed 1.0 ppm the areas and or operations are to be identified and regulated. The project HSE

Manager is responsible for contacting the client HSE department to ascertain area(s) or operations that are or have the potential to exceed 1.0 ppm level.

The project HSE Manager shall identify the areas or operations on a facility plot plan. The plot plan is to be included as part of the New Hire Orientation program, Hazard Communication Program and Benzene Exposure training module.

The following are examples of activities that can be reasonably expected to be a Benzene Regulated Area:

- Venting, draining, blinding or opening process equipmentand piping containing or having contained greater than I0%benzene.
- Unplanned releases or spills greater than 5 gallons of liquids which contain 0. I%or more of benzene (i.e., gasoline, crude oil, crude ethyl benzene, mixedxylenes).

To limit access to authorized personnel, the regulated area should be posted with the appropriate warning signs.

Warning signs should contain the following warning:

DANG ER BENZE NE CANC ER HAZA RD

FLAMMABLE - NO SMOKING AUTHORIZED PERSONNEL ONLY RESPIRATORY PROTECTION REQUIRED

Once established, an area will remain regulated until monitoring indicates the concentration of benzene in the air is less than 1.0 ppm.

Only employees trained in the hazards of benzene are permitted to enter a benzene regulated area.

All personnel entering a regulated area will wear all appropriate respiratory protection and protective clothing.

5.0 EXPOSURE MONITORING

Personal exposure monitoring will be coordinated by the Project HSE Department.

5.1. Initial Monitoring

Initial personal monitoring will be performed to determine representative exposures for each job function in which exposures to benzene may exceed the OSHA action limit or short-term exposure limit.

5.2. *Periodic Monitoring*

For job functions in which initial monitoring indicates benzene exposure above the action level, a periodic monitoring program will be established.
Periodic Monitoring will be completed depending on exposure levels. For employees who are or may be exposed to benzene at or above the action level 30 or more days per year - above the PEL 20 or more days-for employees who have been exposed to more than 10 PPM of benzene for 30 or more days in a year.

- Periodic monitoring will be conducted semi-annually when engineering controls or work practices do not reduce benzene exposure below the PEL or STEL.
- Periodic monitoring will be conducted annually when engineering controls or work practices do not reduce benzene exposures below the action level.

5.3. *Employee Notification*

Each employee monitored will be notified in writing of his/her personal monitoring result within 15 days of the receipt of analytical results.
In the event of overexposure, the individual will be notified of any corrective action through his/her supervisor.

5.4. *Observation of Monitoring*

The monitoring process may be observed by all employees whom the monitoring affects.

5.5. *Atmospheric Testing*

Benzene specific Draeger tube, bag sample and gas chromatograph (GC) analysis shall be used to conduct atmospheric testing. Atmospheric testing will be conducted for confined spaces that have contained benzene or other areas that have been identified as benzene regulated area.

6.0 MEDICAL SURVEILLANCE

6.1. *Initial and Periodic Medical Evaluations*

Employees working in areas who have potential exposure to benzene shall receive pre-employment and periodic medical evaluations.
If initial or periodic medical evaluations indicate an abnormal condition, further evaluations will be given, and referrals made as determined by the project physician. Medical evaluations will be done periodically for individuals that have been identified as having

benzene exposures above 10 ppm for 30 or more days per year.
Health effects of Benzene include eye and skin irritations and short term breathless, Irritability, Euphoric, etc.

6.2. *Medical Evaluations as a Result of Emergency Exposures*

In the event of exposure, without the use of proper respiratory protection, to an unforeseen release of benzene-containing vapor or liquid, the employee shall provide a urine specimen to the Project HSE Department. The specimen must be collected no sooner than 6 hours and no later than 8 hours following the exposure.
If the urine specimen indicates an abnormal condition further evaluation will be performed and referrals made as determined by the project physician.

6.3. *Medical Records*

Medical records associated with benzene medical surveillance will be maintained by the Project HSE Department.
An employee's medical records shall be made available to the Assistant Secretary, the Director, affected employees and designated employee representatives.

7.0 EXPOSURE HAZARDS

Benzene is listed as a carcinogen; therefore, any exposure to benzene should be avoided. Benzene liquid is highly flammable, and vapors may form explosive mixtures in air. Fire extinguishers must be readily available. Smoking is prohibited in areas where benzene is used or stored.

7.1. *Routes of Entry*

Inhalation is the primary route of entry into the body. Exposures may occur during accidental spills and release or in/near confined spaces. These exposures typically can be experienced in operations such as sampling, liquid draining and equipment maintenance.
Skin Contact presents a possible route of absorption, but generally at a much lower rate than through the respiratory system. Benzene is poorly absorbed through the skin, but can find its way into the blood stream through cuts, cores, etc. Benzene is a solvent and an irritant to the skin. The primary effect of skin contact is defatting, resulting in dermatitis.
Ingestion of benzene is a remote form of exposure and is mainly due to poor personal hygiene practices such as failure to wash hands before eating, chewing, dipping or smoking.

7.2. *Effects of Overexposure*

A. Acute

Overexposure to high concentrations of benzene may result in feelings of breathlessness, irritability, euphoria, or light headiness. Irritation of the eyes, nose and respiratory tract may be experienced.
Headaches, dizziness, nausea, or intoxication may develop. Severe exposure may lead to convulsions and loss of consciousness.

B. Chronic

Repeated or prolonged exposure to benzene, without the use of personal protective equipment, may result in various blood disorders. Anemia and leukemia, a fatal cancer of the blood, are examples of adverse effects that may result from exposure to benzene.

7.3. *First Aid Procedures*

Remove exposed employee to an uncontaminated atmosphere. Wash exposed skin with soapy water. Remove benzene wetted clothing immediately. If benzene is ingested, do not induce vomiting. Seek medical attention.

7.4. *Physical Data*

Color Clear and colorless
Characteristic pleasant acrid odor at low concentrations; disagreeable at higher concentrations.
Odor Threshold Greater than
4.6 PPM Explosive Limits 1.4
- 8%
Boiling point 176 F
Specific Gravity 0.879 Floats on water
Vapor Density 2.8 Heavier than air

Chapter 31: SAFETY DISCIPLINARY POLICY

Safety Disciplinary Policy

1) All employees must comply with the Safety Rules and standards established by the corporation and the customers we serve.

2) The company expects each of its employees to adhere to the highest standards of personal conduct. When an employee fails to follow Safety standards, violates Safety rules of the corporation and our customers or deviates from the norms of safe behavior Alexander Mechanical will take any necessary disciplinary action warranted including up to immediate termination.

3) Other-than-serious hazard disciplinary action:

a. 1st offense-Verbal warning

b. 2nd offense-Employee will be written up

c. 3rd offense –Employee will be written up and suspended up to 5 days without pay

d. 4th offense-Termination

4) Serious and Imminent Danger Violation: The disciplinary action will depend on the opinion of the Safety Director and/or the Supervisor of the employee and/or the Customer.

5) PPE: If an employee is found not wearing their Personal Protective Equipment in accordance with the company policy, they will be giving a verbal warning the 1st offense, Written up the 2nd offense, Suspended without pay up to 5 days on the 3rd offense, and Terminated on the 4th offense.

Other-than-serious hazard means any condition or practice which would be classified as an other-than-serious violation of applicable federal or state statutes, regulations or standards, based on criteria contained in the current OSHA field instructions or approved State Plan counterpart. Serious hazard means any condition or practice which would be classified as a serious violation of applicable federal or state statutes, regulations or standards, based on criteria contained in the current OSHA field instructions or approved State Plan counterpart, except that the element

of employer knowledge shall not be considered. Imminent danger means any conditions or practices in a place of employment which are such that a danger exists which could reasonably be expected to cause death or serious physical harm immediately.

All violations will be sent to the Union Hall to be put on each employee's record.

Safety Disciplinary Policy

Employee's Name _____

Job #_____**Job Location**: _____

Date of Violation: _____**Time of Violation:** _____

Brief Description: _____

_____

Employee Comments: _____

_____

_____

Type of Violation:_____Other Than Serious_____Serious_____Imminent Danger

Action:_____Verbal Warning_____Written Warning_____Suspension

_____Suspension Days without Pay _____Termination

Other than Serious Hazard Disciplinary Action:

- 1st Offense -Verbal warning
- 2nd Offense - Employee will be written up
- 3rd Offense - Employee will be written up and suspended up to 5 days without Pay
- 4th Offense - Termination

Employee's Signature_____

Supervisors Signature_____

Chapter 32: HYDROGEN SULFIDE

Hydrogen sulfide (H_2S) is a colorless gas with a strong odor of rotten eggs. Exposure to hydrogen sulfide may cause irritation to the eyes and respiratory system. It can also cause apnea, coma, convulsions; dizziness, headache, weakness, irritability, insomnia; stomach upset, and if liquid: frostbite. Workers may be harmed from exposure to hydrogen sulfide. The level of exposure depends upon the dose, duration, and work being done. Hydrogen sulfide is used in many industries. For example, it's used to produce textiles. Some examples of workers at risk of being exposed to hydrogen sulfide include the following:

- Factory workers in plants where rayon textiles are manufactured
- Petroleum and natural gas workers involved in drilling and refining
- Workers in wastewater treatment industries
- Agricultural workers on farms with manure storage pits or landfills

Occupational Risk Assessment

Occupational risk assessment is a method for estimating health risks from exposure to various levels of a workplace hazard. Understanding how much exposure to a hazard poses health risks to workers is important to appropriately eliminate, control, and reduce those risks. The aim of a risk assessment is to answer three basic questions:

- What can happen?
- How likely is it to happen?
- What are the consequences if it does happen?

NIOSH conducts risk assessments on chemical hazards including carcinogens and non-carcinogens; physical hazards such as noise, radiation, musculoskeletal injury; and other hazards such as shift work. These assessments provide the scientific basis for NIOSH recommendations.

The National Institute for Occupational Safety and Health (NIOSH) Personal Protective Technology (PPT) Program's mission is to prevent work-related injury, illness, and death by advancing the state of knowledge and application of PPT. PPT in this context is defined as the technical methods (e.g., fit testing methods), processes, techniques, tools, and materials that support the development and use of personal protective equipment (PPE) worn by individuals to reduce the effects of their exposure to a hazard.

The PPT Program is responsible for testing and certifying new respirators before they enter the market. This ensures that NIOSH-approved respirators meet the minimum construction, performance, and respiratory protection standards to keep users safe. The program conducts post-market activities such as the Long-Term Field Evaluation Program, the Certified Product Investigation Process, and the site and product audit programs. In addition, the PPT program works to evaluate and improve equipment worn by workers by conducting research on new technologies, emerging hazards, and PPE test methods. Based on the research, the Program is able to develop and implement science-based national guidance for respiratory and other personal protective technologies.

Location of Company Hazard Communication Materials

(Alexander Mechanical) *Hazard Communication Program and corresponding safety data sheets (SDS) are available for observation at any time by any company worker and any affected jobsite employer at* **(**https://www.sdsbinderworks.com/**)**.
Workers who have questions about anything regarding hazard communication should direct their questions to **(Safety Officer)**.

Purpose

The purpose of this hazard communication program is to protect **(Alexander Mechanical)** workers from chemical hazards. Each worker will receive a copy of this hazard communication program during his or her initial hazard communication training session. Also, during initial training workers will be informed about where the hazard communication program is kept on site.
Workers will have access to the program at all times and will be provided with an additional copy at any time upon request.

Labeling

(Supervisor, Foreman or Safety Officer) is responsible for ensuring that all jobsite containers and shipped containers of chemicals that belong to **(Alexander Mechanical)** are properly labeled. All labels will be in English, easy to read and prominently displayed.

Each label will include (1) a product identifier, (2) a signal word, (3) one or more pictograms, (4) hazard statements, (5) precautionary statements, and (6) the name, address, and telephone number of the chemical manufacturer, importer or other responsible party.

The chemical containers will be inspected on a regular basis by **(designated company rep)** to ensure that they are properly labeled and that the labels are current and legible.

Containers with labels that have been removed or defaced will be immediately removed from the work area until a proper label is securely attached to the container.

When a chemical is transferred into a secondary container, the container will be properly labeled unless the contents are to be used immediately and completely. **Designated company person)** will immediately revise the label of any chemical whenever **(he or she)** becomes aware of any significant information changes that affect hazard communication.

All OSHA regulated chemicals will be labeled according to the requirements of the applicable standard.

Safety Data Sheets

(Safety Officer or designated company Rep) is responsible for obtaining and maintaining safety data sheets for every chemical that **(Alexander Mechanical)** workers could be exposed to on the jobsite.

(Alexander Mechanical) requires all of its suppliers to provide a safety data sheet for each chemical that it provides to the company. **(Safety Officer or designated company Rep)** will verify that each chemical used by this company is recorded on the chemical information list and that there is a corresponding safety data sheet for that substance. Each chemical on the chemical information list will have its own designated number written in the box at the far right of each horizontal row. Each safety data sheet will have the corresponding chemical information list number written on the upper right corner of its first page.

Each time a new chemical arrives at the jobsite and each time newly received chemical information becomes apparent, **(Safety Officer or designated company Rep)** will update the chemical information list and safety data sheets as appropriate.

Safety data sheets will be maintained **(**https://www.sdsbinderworks.com**)** Workers who need immediate access to safety data sheets can access them by **(**https://www.sdsbinderworks.com**.)**.

When safety data sheets are not received from a supplier at the time of the first shipment, the following procedure will be implemented.

1. The supplier will not be paid until safety data sheets are provided for the chemicals being purchased.
2. **(Safety Officer or designated company Rep)** will immediately contact the supplier to request copies of all missing safety data sheets. The request will be documented.

3. A copy of the request documentation will be kept on file.

4. When SDSs are not received within three weeks after issuing the first request, a second, urgent request will be made and documented. The documentation will indicate that urgency was stressed in the second request.

5. A copy of the documentation will be kept on file.

6. When SDSs are not received within three weeks after issuing the second request a third, urgent request will be made and documented. The documentation from all three requests will be sent to **(Safety Officer at Alexander Mechanical)**.

Worker Information and Training

(Safety Officer or designated company Rep) is responsible for conducting hazard communication training for this company's workers.

General

The training format will be as follows:

The training will be based on the specific criteria established by OSHA for classification of health hazards, physical hazards, and mixtures. Specific information on each chemical will be readily accessible to all workers through container labels and safety data sheets.

At the initial training session, each worker will receive a copy of the company's hazard communication program including the completed chemical information list, a sample chemical container label, a pictogram chart, and a sample safety data sheet.

These items will be used as training materials.

Workers will view a hazard communication worker safety and health training presentation produced by the Mechanical Contractors Association of America. The program covers:

1. The applicable requirements of OSHA's *Hazard Communication Standard*
2. Routes of chemical entry into the human body.

3. The hazards covered by the health, flame, exclamation mark, gas cylinder, corrosion, exploding bomb, flame over circle, and skull and crossbones pictograms.

4. The measures that workers can take to protect themselves from the hazards, such as safe work practices, personal protective equipment (PPE), emergency procedures, etc.

Workers will participate in a classroom type-setting discussion on:

1. The identity of the company's designated person for worker questions or concerns regarding hazardous chemicals on the jobsite.

2. The location of the company's hazard communication program and safety data sheets.

3. The contents of the company's hazard communication program, including the chemical information list.

4. The chemical container labeling requirements.

5. How to read and interpret hazard warning labels and safety data sheets.

6. Specific jobsite operations where hazardous chemicals are present.

7. The methods and observations that may be used to detect the presence or release of hazardous chemicals in the workplace; and

8. How workers can obtain and use the appropriate hazard information.

At the initial training session and at each subsequent training session, workers will be encouraged to ask questions and engage in discussion about hazard communication.

A hazard communication training session will be arranged for each new worker. Workers will receive the company's initial hazard communication training before they are permitted to start work where exposure to a hazardous chemical could occur.

Each time a new chemical hazard is introduced into the workplace, all company workers will receive **Re-training** on the identity of the new chemicals, the hazards associated with them, and how they can protect themselves from the hazards.

Workers who have already received initial hazard communication training that does not include the labeling and SDS format requirements established in the revised standard will not be required to retake the entire hazard communication training course, but will receive additional **Re-training** on the new GHS label elements and new SDS format.

Non-Routine Tasks

Each time it is necessary to conduct a non-routine work task where chemicals are involved, each company worker who could be exposed to a chemical hazard will receive task-specific chemical hazard training before starting the work.

The training will be conducted in a classroom-type setting and participants will be encouraged to ask questions and engage in discussion about the task- specific chemical hazards and the means by which they can protect themselves from the hazards.

All hazard communication training sessions will be carefully documented. Each trainee will be required to sign a training documentation sheet and take a 20- question multiple choice test. The completed tests will be kept on file as part of the training documentation process.

Multi-Employer Work Sites

Each employer on a multi-employer work site will receive a form letter and a copy of **(Alexander Mechanical)** hazard communication program. The form letter will invite each employer to access safety data sheets at any time and include the location of the data sheets on the jobsite. The hazard communication program states that affected employers can access **(Alexander Mechanical)** safety data sheets.

The form letter to other employers will also request that each of them provide a copy of their company's hazard communication program, including their chemical information list, to (**Safety Officer or designated company Rep)**.

Hydrogen sulfide Characteristics Synonyms & Trade Names

Hydro sulfuric acid, Sewer gas, Sulfuretted hydrogen
CAS No. 7783-06-4 **RTECS No.** MX1225000 **DOT ID & Guide** 1053 117
Formula H_2S
Conversion 1 ppm = 1.40 mg/m^3

IDLH

100 ppm
See: 7783064

Exposure Limits NIOSH

C 10 ppm (15 mg/m^3) [10-minute]

OSHA PEL

C 20 ppm 50 ppm 10-minute maximum peak

Measurement Methods NIOS H 6013;

OSHA ID141

Physical Description

Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & cannot be relied upon to warn of the continuous presence of H_2S. Shipped as a liquefied compressed gas.]

Molecular Weight

34.1

Boiling Point

-77°F

Freezing Point

-122°F

Solubility

0.4%

Vapor Pressure

17.6 atm

Ionization Potential

10.46
eV

Flash
Point

NA
(Gas)

Upper Explosive Limit

44.0%

Lower Explosive Limit

4.0%

Relative Gas Density

1.19

Flammable Gas Incompatibility & Reactivities

Strong oxidizers, strong nitric acid, metals

Exposure Routes

inhalation, skin and/or eye contact

Symptoms

irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite

Target Organs

Eyes, respiratory system, central nervous system Hydrogen sulfide 7783-06-4

Prevent skin contact/Frostbite 8hr: Tychem 4hr: Teflon Prevent possible skin freezing from direct liquid contact

Respirator Recommendations

NIOSH

Up to 100 ppm:

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self- contained positive-pressure breathing apparatus

Escape:

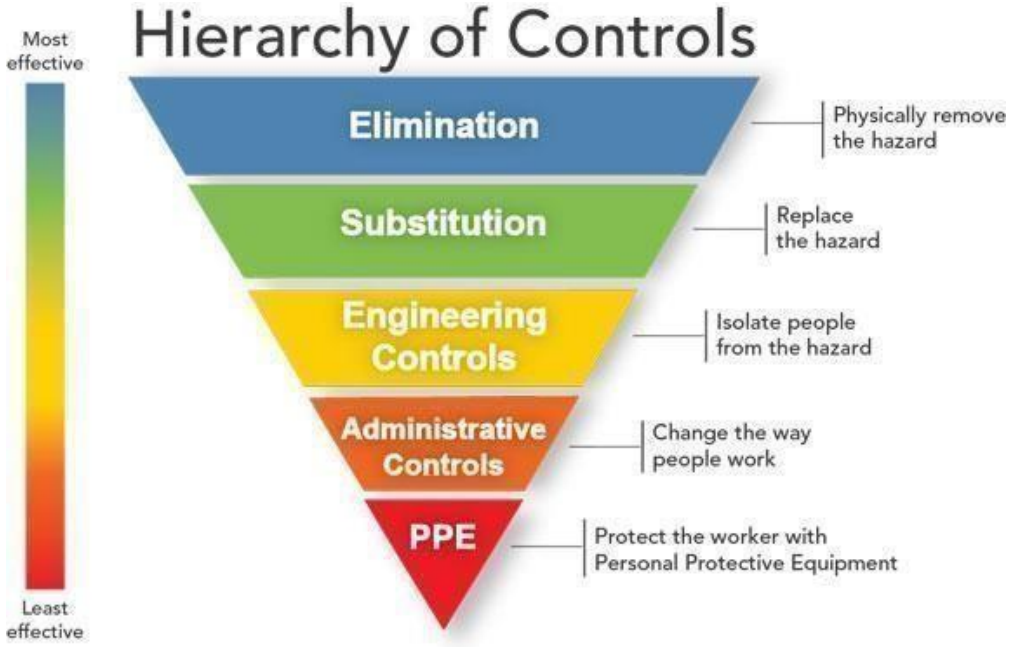
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin- style, front- or back-mounted canister providing protection against the compound of concern
Any appropriate escape-type, self-contained breathing apparatus

ENGINEERING CONTROLS

Engineering controls protect workers by removing hazardous conditions or by placing a barrier between the worker and the hazard. Examples include local exhaust ventilation to capture and remove airborne emissions or machine guards to shield the worker. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions.
They typically do not interfere with worker productivity or personal comfort and make the work easier to perform rather than more difficult. The initial cost of engineering controls can be higher than some other control methods, but over the longer term, operating costs are frequently lower, and in some instances, can provide a cost savings in other areas of the process. To learn more about how engineering controls fit into the strategy for reducing and/or eliminating occupational hazards, visit our hierarchy of controls website.

Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions.

One representation of this hierarchy is as follows:



The idea behind this hierarchy is that the control methods at the top of graphic are potentially more effective and protective than those at the bottom.
Following this hierarchy normally leads to the implementation of inherently safer systems, where the risk of illness or injury has been substantially reduced.

NIOSH leads a national initiative called Prevention through Design (PtD) to prevent or reduce occupational injuries, illnesses, and fatalities through the inclusion of prevention considerations in all designs that impact workers.
Hierarchy of controls is a PtD strategy.

NIOSH researchers help prevent occupational disease and injury by conducting engineering control technology evaluations and developing practical, solutions- oriented control technology interventions. To conduct these efforts, NIOSH works collaboratively with partners both in the United States and around the world.

RESPONSIBILITIES

The **Company Approved Supervisor** shall be responsible for the total implementation of the H2S site plan.

The Company Approved Supervisor shall be in complete command during any emergency.

The Company Approved Supervisor shall designate a backup Supervisor in the event that he/she is not available.

This program applies to all employees who may work in H2S Atmosphere or confined space, as well as supervisors or anyone that may act as an attendant.

Company Approved Supervisor will be responsible for Training employees on H2S plans and all atmosphere contingency plans and making plan available to every employee or prominently displaying at worksite.

The specific responsibilities established under this program are as follows: Supervisor – The entry Supervisor is responsible for the following:
Know the hazards which may be encountered during entry, including the mode of exposure, signs or symptoms and consequences of exposure.
Verifies emergency plans and checks that appropriate entries have been made on the permit; that all tests specified are complete, systems are safe, and procedures and equipment are in place before allowing entry. Terminates the entry and cancels the permit when entry operations are completed or if a new hazardous condition exists.
Verifies that rescue services are available, they have been notified of the entry, and the means to summon them are operational.
Notifies the employer if rescue services become unavailable.
Remove unauthorized personnel who enter or attempt to enter the permit space during entry operations.

Ensures that procedures for entry and work operations are conducted in accordance with entry procedure and permit requirements.
Completes the hazard assessment checklist and permit/non-permit flowchart Entrant – Each entrant must know the following:
The hazards which may be encountered including the mode, signs, symptoms and consequence of exposure.
Proper use of all equipment used inside the permit space. Communication with the attendant is necessary to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate.

Alert the attendant and other entrants whenever:

PRE-ENTRY PREPARATIONS

General Requirements:
Implement all measures necessary to prevent unauthorized entry. Identify and evaluate the hazards that may be encountered in the permit space. Specify acceptable entry conditions. Conduct preliminarypurging, inerting, flushing or ventilating of the permit space as appropriate to eliminate or control atmospheric hazards. Provide barriers to control pedestrian and vehicle traffic to protect the entrants from external hazards.

Train and Educate:

We will provide training to all our employees before their initial work assignment

in a permit required, H2S or confined space. Upon completion of the training we will issue a certificate of training to those employees who successfully complete

the training. Appendix B provides the training syllabus to be followed in training

of our employees. Considering the fact that there are a large variety of Atmosphere compromised worksites and confined spaces with their own unique requirements, our employees shall receive additional instructions that cover the specifics of a particular permit space prior to entry into the space.

Company Approved Supervisor will be responsible for training employees on H2S plans and all atmosphere contingency plans and making plan available to every employee or prominently displaying at worksite.

Training will be conducted prior to arrival at worksite or prior to entry to work area. Each employee for Alexander Mechanical will review training and evacuation procedures once at least annually.

When working in an area where Hydrogen Sulfide (H2S) might be encountered, definite training requirements must be carried out. The Company Supervisor will ensure that all personnel, at the site, have had adequate training in the following:

1. Downing supplied air respiratory equipment (SCBA) and/or evacuate the area upon sounding of H2S alarms.
2. Hazards and characteristics of Hydrogen Sulfide.
3. Physicals effects of Hydrogen Sulfide on the human body.
4. Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
5. H2S detection, Emergency alarm and sensor location.
6. Emergency rescue.
7. Resuscitators.
8. First aid and artificial resuscitation.
9. The effects of Hydrogen Sulfide on metals.
10. Location safety.
11. Annual or New orientation Training on Evacuation Procedures

Service company personnel and visiting personnel must be notified if the zone contains H2S, and each service company must provide adequate training and equipment for their employees before they arrive at the site.

Test Atmosphere:
Before a permit required confined space is entered by our employees it shall be tested with a calibrated, direct reading air monitor to determine if acceptable entry conditions exist. If the permit required confined space is large or is part
of a continuous system (e.g. a sewer), pre-entry testing shall be performed to the extent feasible, and if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entry personnel are working. The standard acceptable conditions for entry are:
Because of the lack of natural air movement, the atmosphere in a confined space may be extremely hazardous. This characteristic of confined spaces can result in oxygen deficient atmospheres, flammable atmospheres, and/or toxic atmospheres.
Oxygen-deficient atmosphere: Has less than 19.5% available oxygen (O2). Any atmosphere with less than 19.5% oxygen shall not be entered. The oxygen level in a confined space can decrease because of work being done, such as welding, cutting, or brazing or, it can be decreased by certain chemical reactions (rusting)
or through bacterial action (fermentation). Air monitoring will identify these potential changes.

Flammable atmospheres: There are two elements that make up a flammable atmosphere: oxygen and the proper mixture of a flammable gas, vapor, or dust. Most types of dust are explosive in the proper mixture. Flammable atmospheres can be caused by dust that is created by grinding, using compressed air to clean, sanding, etc. Do not enter a space or create an environment where dust causes visibility to be reduced below 5-feet.
Air monitors used to evaluate air in confined spaces typically measure flammable gases/vapors. Air monitors measuring flammable gases/vapors will display the percent (%) of the lower explosive limit (LEL) of whatever flammable gas/vapor exists in the area. LEL is the minimum mixture of a flammable gas/vapor that will burn or explode. If an air monitor measures 100% on the LEL sensor it means, there are flammable gases/vapors present in a high enough concentration that with any ignition source the space will burn or explode.
If a source of ignition (e.g., a sparking or electrical tool) is introduced into a space containing a flammable atmosphere, an explosion can result. An oxygen- enriched atmosphere (above 23.5%) will cause combustible materials to become more flammable and burn violently when ignited (including clothing and hair). Never use pure/compressed oxygen to ventilate a confined space as it will create
an oxygen-enriched environment. Only ventilate using fans that push in fresh, outside air.

Toxic atmospheres: Most substances (liquids, vapors, gases, mists, solid and dusts) should be considered hazardous in a confined space. Toxic environments can be created by a product stored in the space, the work being performed in a confined space, or from the areas adjacent to the confined space. Work being performed, such as welding, cutting, brazing, painting, scraping, sanding, degreasing, etc. can result in the creation of toxic atmospheres. Common toxic hazards include hydrogen sulfide (sewer gas) or carbon monoxide. Consult with owners / managers of the confined space you are entering for

information on other special toxic concerns; review these hazards with your Safety Department Representative if you need assistance.

ENTRY PROCEDURE

A permit required confined space can be reclassified to a non-permit confined space once all of the four (4) hazard categories have been eliminated or positively controlled of this program for explanation). As a matter of policy, we should avoid situations where it is necessary for our employees to enter a permit required confined space. If the hazards that define a permit required confined space cannot be completely eliminated or positively controlled, the following comprehensive safety program must be implemented. Notify your Safety Department Representative before entry into any permit required confined space.

COORDINATION WITH HOST EMPLOYER OR GENERAL CONTRACTOR

When our employees work in facilities containing permit required confined space(s) that are controlled by the host employer, our representative shall coordinate all permit required confined space entry requirements with a properly authorized representative of the host employer or controlling contractor. As a minimum, the following information shall be exchanged/determined:

The host employer shall advise our representative of all applicable facts including the hazards identified in the permit required for working in H2S atmosphere or confined space; the experiences that the host employer has had with the space and, if appropriate, the reason(s) why a space is classified as a permit required confined space. Any precautions or procedures that have been implemented by the host employer for the protection of their employees.

Coordinate all entry operations to protect both the host employer employees and our employees or employees of another contractor who are working near the H2S or confined space to be entered and implement measures to prevent unauthorized entry. authorized representative shall obtain from the host employer any available information regarding the permit space hazards and any entry operations mandated by the host employer.

Our authorized representative shall debrief the host employer at the conclusion of the entry operation regarding the permit required confined space program followed, and of any hazards encountered or created in the permit spaces during entry operations and actions taken to protect the safety of the assigned entry personnel.

REQUIRED ENTRY EQUIPMENT

Our authorized representative shall ensure that necessary equipment is available on location, that the equipment is in proper operating conditions, and that personnel operating/using the equipment have been properly trained. The following items of equipment shall be available, at no cost to the employee:
Air Monitor: This properly calibrated instrument shall not be taken into a confined space that may contain hazardous gases; rather sampling lines (probes) must be used so the permit required confined space attendant can monitor the atmosphere. Monitors shall be capable of measuring (at a minimum) oxygen, combustible gas, carbon monoxide and hydrogen sulfide. Our employees who are designated to use testing or monitoring equipment shall be properly trained to know how to properly use the gas detection equipment. NOTE: All testing equipment must be calibrated according to manufacturer's specifications before use.

Communication Equipment: Appropriate communications equipment shall be used to maintain contact between authorized entrants and the attendant, to monitor the status of the entrant(s) and to alert them if the need arises for them to evacuate the space. The type of communications shall be based on the conditions in the permit space and may include one or more of the following:

- Visual (observation)
- Voice
- Telephone
- Two-way radio
- Other means as appropriate

Ventilation Equipment: Ventilating by a blower or fan may be necessary to remove harmful gases and vapors from a Site. A common method of ventilating a space is to use a large hose with one end attached to a fan and the other end lowered into the confined space. The air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be. The air intake shall be placed in an area that will draw in only fresh air. Ventilation shall be continuous to keep hazardous atmospheres from reforming.

Personal Protective Equipment: Our standard PPE policy shall be followed. In addition, certain conditions may require additional protection such as: protective clothing, hearing protection, respiratory protection, body harness, etc.
Lighting Equipment Appropriate lighting equipment shall be provided within and outside the permit space to allow our employees to enter safely, perform the required work and exit the confined space.
Some of the precautions that shall be taken when selecting lighting are as follows:
If the atmosphere inside the confined space is classified as flammable/explosive, the electrical equipment used shall conform to Article 500, National Electric Code.

All personnel entering the confined space shall be provided with a flashlight or glow stick as a means of alternative lighting in case main task lighting malfunctions.

Barrier and Shields: Appropriate barriers and shields shall be used to isolate the confined space from personnel who are not directly involved in the entry operations. High visibility warning tape may be used to keep unauthorized personnel at a safe distance. If the confined space is located in an area accessible to public, barriers that keep pedestrian and vehicular traffic away from the entry operation shall be erected.

Entry and Exit Equipment: Ladders and other types of equipment that provide safe entry and exit to the authorized entrants from the confined space shall be available at the entry location. Necessary precautions shall be taken to ensure that this equipment does not interfere with the ventilating equipment.

Retrieval Equipment: A full body harness and retrieval line system shall be worn by all entrants. A retrieval system will allow the attendant to perform non-entry rescue of the confined space entrants. Since conditions and space characteristics vary from one situation to another, the necessary equipment shall be selected based on the potential hazards and possible contingencies expected to occur during the entry operations.

Evacuation Procedures

They recognize warning signs or symptoms of exposure to a hazard. They recognize a prohibited condition. Exit from the space quickly, whenever: An order to evacuate is given by the attendant or entry supervisor.

The entrant recognizes signs or symptoms of exposure to a dangerous situation. The entrant recognizes a prohibited condition. An evacuation alarm is activated. **Employees must immediately put on supplied air respiratory equipment (SCBA) and/or evacuate the area upon sounding of H2S alarms. Annual or New orientation Training on Evacuation Procedures.**

Service company personnel and visiting personnel must be notified if the zone contains H2S, and each service company must provide adequate training and equipment for their employees before they arrive at the site.

Attendant – Each attendant is responsible for:
Knowing the hazards faced during entry, including the mode, signs, symptoms and consequences of exposure.

Aware of the possible behavioral effects of hazard exposure in authorized entrants. Continuously maintaining an accurate count of authorized entrants, and to identify those listed as authorized on the permit.

Remain outside the permit space until relieved by another attendant.

Communicate with authorized entrants as necessary to monitor entrant status and to alert entrant of the need to evacuate.

Monitor activities inside and outside the space to determine if it is safe for entrants to r Remain inside and to order an immediate evacuation under any of the following conditions: Detection of a prohibited condition, detects behavioral effects of hazard exposure in an authorized entrant, A situation outside the space which could endanger the entrants, If the attendant cannot effectively and safely perform the duties of the attendant.

Summon rescue and other emergency services as soon as the attendant. Determines the entrants need assistance in escaping from permit space hazards. Take the following actions when unauthorized persons approach or enter a permit space when entry is underway.

Warn person to stay away from the permit space.

Advise the persons they must exit immediately if they have entered the permit space. Inform the authorized entrants and entry supervisor that unauthorized persons have entered the permit space.

Perform **non-entry** rescues as specified on the emergency action plan, such as winching entrants out with entry tripod.

Perform no other duties which may interfere with the attendant's primary duty of monitoring and protecting the authorized entrants.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Mandatory PPE in a permit required confined space includes:

· Hard Hat
· Eye Protection
· Gloves
· Safety Harness
· Rescue/Retrieval Equipment
· Chemical gloves
· Protective Clothing
· Face Protection

First Aid Procedures

Code	Definition
Eye: Irrigate immediately	If this chemical contacts the eyes, immediately wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.
Eye: Irrigate promptly	If this chemical contacts the eyes, promptly wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues.
Eye: Frostbite	If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the lower and upper eyelids. If irritation, pain, swelling, lacrimation, or photophobia persist, get medical attention as soon as possible.
Eye: Medical attention	Self-explanatory
Skin: Blot/brush away	If irritation occurs, gently blot or brush away excess.
Skin: Dust off solid; water flush	If this solid chemical contacts the skin, dust it off immediately and then flush the contaminated skin with water. If this chemical or liquids containing this chemical penetrate the clothing, promptly remove the clothing and flush the skin with water. Get medical attention immediately.
Skin: Frostbite	If frostbite has occurred, seek medical attention immediately; do NOT rub the affected areas or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has NOT occurred, immediately and thoroughly wash contaminated skin with soap and water.
Skin: Molten flush immediately/solid-liquid soap wash immediately	If this molten chemical contacts the skin, immediately flush the skin with large amounts of water. Get medical attention immediately. If this chemical (or liquids containing this chemical) contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical or liquids containing this chemical penetrate the clothing, immediately remove the clothing and wash the skin with soap and water. If irritation persists after washing, get medical attention.

Skin: Soap flush immediately	If this chemical contacts the skin, immediately flush the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.
Skin: Soap flush promptly	If this chemical contacts the skin, promptly flush the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.
Skin: Soap promptly/molten flush immediately	If this solid chemical or a liquid containing this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If irritation persists after washing, get medical attention. If this molten chemical contacts the skin or nonimpervious clothing, immediately flush the affected area with large amounts of water to remove heat. Get medical attention immediately.
Skin: Soap wash	If this chemical contacts the skin, wash the contaminated skin with soap and water.
Skin: Soap wash immediately	If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.
Skin: Soap wash promptly	If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly.
Skin: Water flush	If this chemical contacts the skin, flush the contaminated skin with water. Where there is evidence of skin irritation, get medical attention.
Skin: Water flush immediately	If this chemical contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.
Skin: Water flush promptly	If this chemical contacts the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention.
Skin: Water wash	If this chemical contacts the skin, wash the contaminated skin with water.
Skin: Water wash immediately	If this chemical contacts the skin, immediately wash the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and wash the skin with water. If symptoms occur after washing, get medical attention immediately.
Skin: Water wash promptly	If this chemical contacts the skin, promptly wash the contaminated skin with water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with water. If irritation persists after washing, get medical attention.
Breath: Respiratory support	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.
Breath: Fresh air	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary.
Breath: Fresh air, 100% O_2	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering 100% oxygen. Keep the affected person warm and at rest. Get medical attention as soon as possible.
Swallow: Medical attention immediately	If this chemical has been swallowed, get medical attention immediately.

HYDROGEN SULFIDE RELEASE

The following management system elements would help prevent the occurrence of similar incidents: w A written policy defining the goals of the program (i.e., to comply with all Federal, state, and local regulations and to protect the safety of workers and the public). Written procedures for managing the H2S program, which include assignment of responsibilities, definition of training requirements, and work instructions. Management oversight guidelines for ensuring adherence to procedures and identification of hazards through regularly scheduled audits and inspections.

Establishing written operating procedures for the H2S area. Training all facility employees on the hazards of H2S. Installing improved ventilation equipment in the H2S area. Implementing a calibration program for the H2S detector. Installing signs at entrances to the H2S area to warn nonoperating employees of potential hazards.

Evacuation Plan:

- Evacuation routes should be established prior to occupying worksite. **Should be discussed with all personnel.** Designated Areas:
- **Parking and Visitor area:** All vehicles are to be parked at a pre- determined safe distance from the worksite.
- **Designated smoking area**. Safe Briefing Areas: Two Safe Briefing Areas shall be designated on either side of the location at the maximum allowable distance from the worksite so they offset prevailing winds or they are at a 180 degree angle if wind directions tend to shift in the area.

Personal protective equipment should be stored at both briefing areas and if a moveable cascade trailer is used, it should be kept upwind of existing winds. When wind is from the prevailing direction, both briefing areas should be accessible.

Employees must immediately put on supplied air respiratory equipment (SCBA) and/or evacuate the area upon sounding of H2S alarms.

Selecting subcontractors that are fully committed to workplace safety and health is crucial to staying competitive in the mechanical construction industry.

Subcontractors' safety and health practices can positively or negatively impact your company's ability to protect workers, make money, and secure future work.

Following selection, properly managing subcontractors to ensure implementation of effective safety and health programs, and best safe work practices is just as critical. Safe projects are more profitable, and companies whose subcontractors consistently perform safely have a much easier time securing future work.

This guide provides mechanical construction employers with the information needed to objectively select subcontractors that are committed to jobsite safety and health, and assist them through the process of establishing and implementing the programs, policies, procedures, and safe work practices necessary to consistently perform
their work safely. The guide will also help the user verify and document that the necessary safety and health measures have been established and are consistently implemented.

This guide is intended to provide the user with basic information and guidance on one way to manage subcontractors to perform their work safely. It is not intended to provide exhaustive treatment on the subject of subcontractor safety management, and it should not be used as a substitute for reading, interpreting, and complying with the most current, applicable federal, state and local standards and regulations. Further, it is not intended to provide legal advice.
Employers must make independent determinations regarding the need for legal assistance.

Chapter 33: SUBCONTRACTOR SAFETY MANAGEMENT

Introduction

Selecting a Safe Subcontractor

- Intial Safety and Health Program Evaluation
- Leading Indicators of Safety Performance
- Lagging Indicators of Safety Performance

Managing Subcontractor Safety Performance

- Safety and Health Planning
- Site-Specific Safety and Health Plans
- Accident Incident Investigations
- Disciplinary Action
- Modified Duty
- Multi-Employer Worksite Coordination
- Pre-Task Safety and Health Planning
- Recordkeeping (Work-Related Injuries and Illnesses
- Regular Safety and Health Inspections
- Safety and Health Training (Genral)
- Safety and Health Traiing (Worker Safety Orientation)
- Safety and Healthe Traiing 9Workers)
- Saffety and Health Traiinng (Supervisors)
- Safety and Health Training Evaluation (Subcontractor Safety Traiing Quality)
- Safety Incntives
- Substance Abuse and Drug Testing
- MCAA Guide to Subcontractor Safety Management User's Instructions

Appendices

- Appendix A – Hiring Contractor's Pre-Selection Evaluation Checklist
- Appendix B – Subcontractor Safety Prequalification Form
- Appendix C – Hiring Contractor's Subcontractor Safety Performance Evaluation Checklist

Mechanical construction firms frequently hire subcontractors to perform tasks that are within their scopes of work, but which they are unprepared to perform with their own workers. For example, many mechanical construction companies farm out sheet metal and insulation work. Most hire subcontractors to perform work that requires specialized competencies, such as asbestos removal, digging and shielding excavations, performing complex crane picks, etc. Selecting a subcontractor that can perform the work in a quality manner and complete it on schedule usually isn't difficult but selecting one that can also consistently perform the work safely can be challenging.

Most of the subcontractors that you would consider hiring already have work history. If they don't you should consider other candidates. Without at least 3-years of work history behind them there's no way to judge just how much risk you may be assuming. But by considering only established subcontractors and evaluating their safety and health programs and safe work procedures, you can get a good feel for the quality of their safety cultures. This knowledge will set you up to make informed decisions about which of them are best suited to work for you. Your work isn't finished once you have selected a subcontractor for a project, but if you have chosen carefully, the process of subcontractor safety management will be much easier, less time consuming, and will help ensure that the project stays profitable.

Effectively managing subcontractors is largely about hazard identification, communication, planning, verification, and documentation. It comes down to ensuring that they have:

- Identified the potentially hazardous tasks within their scopes of work.
- An understanding of the critical tasks that are outside their scopes of work, but which could impact their workers' safety and health; and
- A site-specific safety plan in place to protect their own, and other affected workers from the hazards associated with the potentially hazardous and critical tasks identified on the project.

For the best possible results, you'll need to carefully select and hire subcontractors who are totally committed to workplace safety and health, scrutinize they're site- specific safety plans before they begin work, verify that they are effectively implementing their site- specific safety plans throughout the lifecycle of the project, and carefully document all of it.

The first question you need answered is whether the subcontractor candidate has a comprehensive safety and health program in writing. If not, move on to other candidates. If so, obtain a copy of the program. To make an initial determination about a subcontractor candidate's commitment to safety pay close attention to items 1 -3 below. If the candidate appears worthy, you'll want to evaluate the written program more carefully and ask the right questions to determine whether it is being properly and consistently implemented on the jobsites.

1. Does the program have all of the basic elements of a sound company safety and health program? At a minimum the elements should include, but are not necessarily limited to, the following.

   - Safe Work Procedures for Each of the Following:
   - Aerial Lifts.
   - Asbestos.
   - Bloodborne Pathogens.
   - Carbon Monoxide.
   - Compressed Air.
   - Compressed Gas Cylinders.
   - Confined Spaces.
   - Cranes/Derricks/Rigging.
   - Damaged Equipment.
   - Disposal Chutes.
   - Electrical Safety.
   - Emergency Action Plan.
   - Excavations.
   - Fall Prevention and Protection.
   - Fire Prevention and Protection.
   - First Aid/CPR/AED Policy and Procedures.
   - Flammable and Combustible Liquids/Materials.
   - Forklifts and Other Powered Industrial Trucks.

- Grinding.
- Handheld Power Tools;
- Hazard Communication (GHS).
- Heating Devices (Temporary).
- Hexavalent Chromium.
- Hoists for Personnel and Materials.
- Housekeeping.
- Illumination.
- Ladders.
- Lasers.
- Lead.
- Liquefied Petroleum Gas.
- Lockout/Tagout.
- Manual Handling of Materials.
- Motor Vehicles and Mechanized Equipment.
- Personal Protective Equipment.
- Pneumatic Tools.
- Powder Actuated Tools.
- Power Transmission and Distribution.
- Respiratory Protection.
- Rigging and Material Handling.
- Rollover Protective Structures.
- Scaffolds.
- Signs, Signals, and Barricades.
- Silica.
- Stairways.
- Toe boards; and
- Welding, Cutting, and Heating.
  - -Accident/Incident Investigation Procedures
  - -Disciplinary Action Policy
  - -Hazard Identification/Regular Inspections Policy
  - -Modified Duty Policy
  - -Multi-Employer Worksite Coordination Procedures
  - -Worker Safety Orientation Requirements
  - -Pre-Task Safety and Health Planning Procedures
  - -Recordkeeping (Work-Related Injury and Illness) Procedures
  - -Safety Incentives and Recognition Program
  - -Substance Abuse Policy

- -Supervisor Safety and Health Training Requirements
- -Worker Safety and Health Training Requirements

2. Is the program up to date? If it's not on a regular schedule for evaluation and revision, it's probably not current. One of the best ways to determine whether the program is current is to evaluate the company's safe work procedures. They should correlate with recent changes in industry best practices, and new or recently revised OSHA standards. If the industry has made recent changes that are not reflected in the program, worker safety and health probably isn't a top priority for that subcontractor.

3. Is the company performing well with regard to work-related injury and illness prevention? You'll want to learn whether the company is performing well presently, and whether it has performed will in the immediate past. To make that determination you'll have to evaluate its leading and lagging indicators of safety performance.

One of the most effective ways to gauge a subcontractor's likely future safety performance is to evaluate the parts of its safety and health program that are leading indicators of safety performance. Leading Indicators of safety performance in construction are measures established and implemented prior to performing the work that are most likely to help prevent work-related injuries and illnesses. By using leading indicators to evaluate your subcontractor candidates you'll be able to identify their strengths and weaknesses before you decide whether to hire them.

There are dozens of leading indicators that can be used to evaluate subcontractor safety performance. However, MCAA recommends, at a minimum, evaluation of the following twelve leading indicators.

1. Implementation of a site-specific safety and health plan for every project.

2. Frequency of project safety and health inspections.

3. Tracking of unsafe work practices identified during inspections.

4. Percentage of inspection issues that are promptly corrected.

5. Frequency of safety and health communication sessions, such as safety meetings, formal safety training sessions, and short-durations safety training sessions, such as toolbox safety talks.

6. Frequency of investigations for incidents that result in work-related injuries or illnesses.

7. Frequency of investigations for near miss incidents.

8. Implementation of action plans that properly address the results of each injury/illness and near miss investigation.

9. Frequency of repeat incidence recurrence.

10. Frequency of task hazard analyses performed for potentially hazardous and critical tasks.

11. Implementation of substance abuse programs, including testing for drugs and alcohol.

12. Implementation of a 100% hardhat, safety glasses and work gloves policy.

Lagging Indicators of safety performance can be helpful in evaluating a subcontractor's commitment to workplace safety and health too, but they can also be misleading. Lagging indicators measure work-related incidents that have already occurred, and that resulted in injury or illness. Examples include worker's compensation insurance Experience Modification Rates (EMR), Recordable Injury and Illness Incidence Rates, Lost Workday Cases Incidence Rates, Lost Workdays Incidence Rates, and Fatality Cases Incidence Rates.

Lagging indicators can be used to tell you exactly how many of your subcontractor candidate's workers have incurred a recordable injury or illness, and just how badly they were injured, or just how will they became. If the subcontractor candidate has a multi-year history showing an inordinate number of work-related injuries and illness, you'll want to explore other candidates. However, be a little cautious because EMR's and incidence rates can be poor indicators of a candidate's safety performance (examples follow).

There are many reasons why EMRs can be misleading indicators of safety performance. The following are a few examples to help you understand how the EMR could work against you as a tool for evaluating safety and health performance accurately.

Example 1 - EMR's are multipliers used to calculate worker's compensation insurance premiums. A company's EMR is essentially a multiplier to a base premium, which establishes a modified premium (actual policy payment amount). In its simplest form, it's a calculation of the dollar losses that occurred over a three-year period divided by the dollar losses that the insurance industry expects you to incur over the same three-year period. The calculation is based on the first three of the last four years. If you were calculating an EMR for this year you would skip the dollar losses from last year and add them for the preceding three years. If a subcontractor candidate has just one single costly loss it would be three years before the cost of that injury is no longer part of its EMR calculation. That subcontractor candidate could be the safest subcontractors around, but its EMR could be well above average for that full three-year period, giving you an inaccurate perception of its safety performance.

Example 2 – If a subcontractor candidate is one of several entities with common majority ownership the losses for each entity will be combined for the purpose of calculating the EMR. Your subcontractor candidate may have never incurred a worker's compensation claim/loss, but if one or more of the other entities has, your subcontractor candidate could have an EMR that is well above average, again giving you an inaccurate perception of that subcontractor's safety performance.

Example 3 – If your subcontractor candidate forms a joint venture with another contractor the EMR's that each of them had at the time they came together will be combined to establish a new EMR. Your subcontractor candidate may have had an EMR well below average. However, if the joint venture is with a contractor with a higher EMR, the new combined EMR, and therefore, your subcontractor candidate's new EMR will increase. The increases can be substantial.

Example 4 – Subcontractor candidates sometimes inadvertently misclassify payrolls to a lower-rated classification. This error can inappropriately increase its EMR.

Example 5 – In some states a subcontractor candidate may be partially self-insured. If a subcontractor candidate pays for medical treatment, hospitalization, prescription drugs, and/or wage replacement out of its own pocket those losses won't be reflected in its EMR since those out of pocket dollar losses won't be considered in the EMR calculation. This subcontractor may appear to be a safe one, but in fact, may be a bad choice.

If you choose to use EMRs, be sure to use them as only a part of your subcontractor candidate evaluation process. The bottom line is that if the subcontractor candidate has a long history of EMR's at or below 1.0, and it's not self-insured, it's probably a candidate worth evaluating further.

Incidence rates are also frequently used to help evaluate safety performance. They can be helpful, but they can also be misleading, and they're based on past safety and health performance, so they're not ideal for projecting future performance.
Here are several reasons why incidence rates can be misleading indicators of safety performance.

1. There are several types of incidence rates, but the ones most frequently used to evaluate past safety performance are Recordable Cases Incidence Rates, Lost Workday Cases Incidence Rates, Lost Workdays Incidence rates, and Fatality Cases Incidence Rates. Incidence rate calculations are based on 100 full-time workers and total work hours. Therefore, they tend to favor larger companies with more total workhours. For example, if a company with 500,000 work hours had one recordable case last year it's Recordable Cases Incidence Rate for that year would be 0.4 per 100 full-time workers. However, if a company with only 100,000 work hours experienced precisely the same recordable case its Recordable Cases Incidence Rate would be 2.0 per 100 full-time workers. The smaller company could be every bit as committed to workplace safety and health as the larger company, but you wouldn't know it just by looking at the numbers.

2. There are many recordable injuries/illnesses that are completely outside the control of any employer. For example, if a worker gets stung by a bee while working, has an allergic reaction, and receives the prescription drug epinephrine for treatment, the case would be recordable. Another example is a worker who incurs an insignificant cut at work, fails to keep it clean,

   sustains an infection over time and ends up taking prescription antibiotics for treatment. This originally insignificant case would become recordable.

3. How healthcare providers choose to treat injuries and illnesses can also impact incidence rates. For example, one health care provider might prescribe a prescription pain killer while another one, for precisely the same injury, might suggest over-the-counter pain killers if needed. These subjective differences in treatment options could be the determining factor in whether or not the case is recordable.

   A combination of positive leading indicators of safety performance, and a history of low lagging indicators, such as EMRs and injury/illness incidence rates is pretty good indication that your subcontractor candidate perceives jobsite safety and health as important, and is committed to establishing and enforcing effective safe work procedures. See Appendix A for a Hiring Contractor's Pre-Selection Evaluation Checklist.

   Effective Safety and health planning are another essential step in subcontractor safety management. It's all about ensuring that each of your subcontractors identifies the hazards that they are likely to encounter and works the appropriate safe work procedures into their site-specific safety plans. Start by requiring all of your subcontractors to identify the potentially hazardous tasks that are within their scopes of work. Potentially hazardous tasks are those tasks that could result in death, serious injury, or serious illness without substantive safety and/or health measures in place. For example, laying a pipeline in an excavation is a potentially hazardous task because death or serious injury is likely to occur without benching, sloping or shielding. Welding in a confined space is a potentially hazardous task because without adequate ventilation or appropriate respiratory protection, death or serious illness is likely to occur. Throughout the potentially hazardous task identification processes your subcontractors need to document each potentially hazardous task they identify in a concise hazard

identification report. The report should briefly describe each potentially hazardous task and specify the hazards.
These reports will be used to establish site-specific safety and health plans.

Once the potentially hazardous tasks are identified and documented, require your subcontractors to use their hazard identification reports to establish site-specific safety and health plans. The plans should accurately address the potentially hazardous tasks/hazards and describe the safe work procedures that will be implemented to help protect affected workers. Your subcontractors need to establish their site-specific safety plans by incorporating each applicable safe work procedure into their written plans. An example follows.

Potentially Hazardous Task:
-Installing pipe hangers in a 20' concrete ceiling

Special Concerns:
-Anticipated difficulty accessing the ceiling with a lift in some places due to existing ducts, pipes, and electrical conduit

-Concrete has a high concentration of crystalline silica

The potential hazards:
-Electrical Shock.
-Falls from Lift.
-Falls from Ladders.
-Inhalation of Respirable Crystalline Silica,
-Objects in Eyes.
-Power Tool Gouges/Cuts/Sprains/Strains; and
-Struck by Overhead and/or Falling Objects.

In your evaluation of the subcontractors' site-specific safety plans cross reference to ensure that the safe work procedures match up with the projected hazards identified for each potentially hazardous task. For this example, the plan should include, at a minimum, current safe work procedures for the following topics:

- Electrical Safety.
- Aerial Lifts.
- Fall Prevention and Protection
- Ladders.
- Personal Protective Equipment.
- Handheld Power Tools.
- Hazard Communication.
- Respiratory protection.
- Scaffolds
- Silica; and
- Signs/Signals/Barricades.

Accident/Incident investigation procedures have been checked off as part of the safety and health program but are the procedures adequate. You'll want to know that both accident and near miss incidents are investigated, how they're investigated, how the results are documented, how the information is communicated throughout the company to prevent recurrence, and what procedures are in place to inform you if an accident/incident occurs while the subcontractor is working for you. To determine whether the accident/incident investigation procedures are adequate refer to MCAA's Model Accident/Incident Investigation Program. The program is free to members and can be found in the resource center at www.mcaa.org.

There are many different types of disciplinary actions, but what matters most is that the subcontractors have a disciplinary action plan and are consistently implementing it. Safe work procedure infractions are more likely to occur if the subcontractors are not monitoring their workers' safety performance and taking disciplinary action immediately whenever it's necessary. It's also important that they carefully document all disciplinary actions. It can be an affirmative defense against an OSHA citation if an affected subcontractor can show employee misconduct.

However, it will need to be able to prove that it is implementing its disciplinary action plan by producing documentation showing that corrective action has been administered in response to the employee misconduct. This helps protect you from OSHA citations based on its multiemployer worksite enforcement policy.

It's worth evaluating your subcontractor's modified duty policy to ensure that it properly manages worker injuries to minimize losses. Make sure you are satisfied with just how urgentlythe subcontractor gets its injured/ill workers back to work, even when the work is modified duty.

Multi-employer worksite coordination procedures for each project should be passed down to all contractors/sub-tier contractors from the GC, CM or construction owner. Your subcontractors' multi- employer worksite coordination procedures should be in sync with the procedures that have been established for the project. The GC, CM, or owner should also establish regular safety and health planning meetings. However, regardless of whether those meetings are performed, be sure to perform your own safety and health planning meetings with your subcontractors on a regular basis to coordinate project activities that are within the scope of work. Carefully document:

- The names of all attendees.
- The topics presented.
- The challenges presented.
- The solutions established to meet the challenges.
- The names of those assigned responsibilities and the specifics of each of assignment.
- The timeline, and
- The next safety and health planning meeting date, time and location.

Adequate pre-task safety and health planning procedures are a critical part of your subcontractor's ability to protect its workers. To confirm that your subcontractor's pre-task safety and health planning procedures are adequate ensure that they include:

- A qualified supervisor to oversee the task.
- Pre-task hazard identification.
- Task hazard analysis.
- Safe work procedures based on the task hazard analysis.
- Effective communication between the supervisor and affected workers regarding the potential hazards and safe work procedures.
- Accountability for all of the tools, equipment and personal protective equipment needed to perform the work safely; and
- A brief review of the potential hazards and safe work procedures immediately prior to starting the task.

For more information on safety planning, see MCAA's Safety Planning Guide, which is available as a benefit of membership in the Resource Center at www.mcaa.org.

Make sure that your subcontractor is recording and reporting work- related injuries and illnesses as required by OSHA's recently revised rule on recordkeeping. Companies with 20 to 249 workers are now required to submit information from their OSHA 300 Log to the agency electronically once each year. Larger companies, with 250 or more workers are required to electronically submit information from their OSHA 300 log, 300A summary, and 301 incident report forms once each year. For more information on the recently revised rule, see MCAA's Safety Bulletin OSHA's Revised Record Keeping Rule-Improve Tracking of Workplace Injuries and Illnesses at www.mcaa.org.

Regular inspections by your subcontractors are necessary to identify new potentially hazardous tasks/potential hazards as they surface throughout the lifecycle of each project.

Make it clear to the subcontractors exactly how often you expect the inspections to occur. Be sure to confirm that whoever the subcontractors identify to perform the inspections are qualified to do so. And then, verify throughout the lifecycle of the project that the:

- -Inspections are occurring at the frequency that you directed.
- -Subcontractors are informing you immediately about newly identified hazards, safety and health violations, and potentially hazardous tasks/potential hazards.
- -Appropriate protective actions are taken immediately when necessary; and
- -Inspection documentation is provided in a timely manner to all designated recipients.

Even the very best safe work procedures aren't much good if the supervisors who will oversee them, and the workers who are to perform them haven't received quality safety and health training for each of them. It's especially important when managing subcontractors to ensure that the affected supervisors and workers have received, or will receive prior to starting the work, quality safety and health training that is specific to the hazards and accompanying safe work procedures established in their site-specific safety plans.

Also, it's incorrect to assume that just because you hire a subcontractor, even a specialty subcontractor, that you are turning all accountability and liability over to it. Likewise, it's never safe to assume that a subcontractor's workers are properly trained. In addition to the increased risk of worker injury/illness from inadequate training, OSHA's multi- employer worksite enforcement policy authorizes the agency to hold the "controlling contractor" accountable for violations committed by its subcontractors, including safety and health training violations.

Worker safety orientation should be comprehensive and thorough. When evaluating subcontractors' new worker safety orientation, verify that the following topics, at a minimum, have been or will be covered before the workers start work on the project.

- Workplace safety and health rights and responsibilities.
- Hazards associated with the work.
- Identification and location of applicable supervisory personnel.
- Hazardous work permits/requirements.
- How to report unsafe conditions and near miss incidents.
- How to report a work-related injury or illness.
- Emergency Procedures (what to do when) and emergency telephone numbers.
- Site-specific location of AEDs, first aid equipment, emergency eyewash stations, and fire extinguishers.
- How and where to access Safety Data Sheets (SDS), the hazard communication program, and all applicable OSHA standards; and
- Disciplinary action procedures.

Ensure that your subcontractor's workers have received the appropriate safety and health training on the site-specific hazards and accompanying safe work procedures. A list of the topics that are most likely to require safe work procedures in mechanical construction follow. However, the listed topics are not necessarily all inclusive.

- Aerial Lifts.
- Asbestos.
- Bloodborne Pathogens.
- Carbon Monoxide.
- Compressed Air.
- Compressed Gas Cylinders.
- Confined Spaces.
- Cranes/Derricks/Rigging.
- Damaged Equipment.
- Disposal Chutes.
- Electrical Safety.
- Emergency Action Plan.
- Excavations.
- Fall Prevention and Protection.
- Fire Prevention and Protection.

- First Aid/CPR/AED Policy and Procedures.
- Flammable and Combustible Liquids/Materials.
- Forklifts and Other Powered Industria lTrucks.
- Grinding.
- Handheld Power Tools.
- Hazard Communication (GHS).
- Heating Devices (Temporary).
- Hexavalent Chromium.
- Hoists for Personnel and Materials.
- Housekeeping.
- Illumination.
- Ladders.
- Lasers.
- Lead.
- Liquefied Petroleum Gas.
- Lockout/Tagout.
- Manual Handling of Materials.
- Motor Vehicles and Mechanized Equipment.
- Personal Protective Equipment.
- Pneumatic Tools.
- Powder Actuated Tools.
- Power Transmission and Distribution.
- Respiratory Protection.
- Rigging and Material Handling.
- Rollover Protective Structures.
- Scaffolds.
- Signs, Signals, and Barricades.
- Silica.
- Stairways.
- Toe boards; and
- Welding, Cutting, and Heating.

In addition, make sure that all of OSHA's worker safety training requirements are covered somewhere in the training process. Most of the training topics will overlap with the required safe work procedures training topics. However, cross reference to ensure that they are addressed if they apply. OSHA's construction safety and health training requirements from 29 CFR 1926, that are most likely to apply to mechanical construction, are as follows.

Subpart C - General Safety and Health Provisions

- General Safety and Health Provisions
- Safety Training and Education
- Employee Emergency Action Plans

Subpart D – Occupational Health and Environmental Controls

- Medical Services and First Aid
- Ionizing Radiation
- Non-Ionizing Radiation
- Gases, Vapors, Fumes, Dust, and Mists
- Hazard Communication
- Lead in Construction
- Process Safety Management of Highly Hazardous Chemicals
- Hazardous Waste Operations and Emergency Response

Subpart E – Personal Protective and Life Saving Equipment

- Hearing Protection
- Respiratory Protection

Subpart F – Fire Protection and Prevention

- Fire Protection

Subpart G – Signs, Signals, and Barricades

- Signaling

Subpart I – Tools-Hand and Power

- Power-Operated Hand Tool
- Woodworking Tools Subpart J – Welding and Cutting
- Gas Welding and Cutting
- Arc Welding and Cutting
- Fire Prevention

- Welding, Cutting and Heating in Way of Preservative Coatings Subpart K – Electrical
- Ground-Fault Protection Subpart L – Scaffolding
- Scaffolding- Training Requirements

Subpart M – Fall Protection

- Fall Protection-Training Requirements

Subpart N – Cranes, Derricks, Hoists, Elevators, and Conveyors

- Cranes and Derricks
- Material Hoists, Personnel Hoists, and Elevators

Subpart O – Motor Vehicles, Mechanized Equipment, and Marine Operations

- Material Handling Equipment

Subpart P – Excavations

- General Protection Requirements

Subpart T – Demolition

- Preparatory Operations
- Chutes
- Mechanical Demolition

Subpart V – Power Transmission and Distribution

- General Requirements
- Overhead Lines
- Underground Lines

Construction in Energized Substations Subpart X – Stairways and Ladders
- Ladders
- Training Requirements

Subpart Z – Toxic and Hazardous Substances

- Asbestos
- Cadmium

Supervisors need the same safety and health knowledge that their workers receive, and then some. When evaluating your subcontractors' safety and health training requirements for supervisors, make sure that, in addition to training on the applicable site-specific safety plan and accompanying safe work procedures, the affected supervisors receive training on:

- Safety leadership.
- Safety management.
- Safety conflict resolution.
- Pre-task planning.
- Effective training/training techniques.
- How to prepare for and effectively manage OSHA inspections and
- Accident/Incident Investigations.

For access to supervisor safety training videos and other applicable resources, visit the Resource Center at www.mcaa.org. The videotapes are available to you as a benefit of membership.

You'll want to carefully evaluate the quality of subcontractors' safety and health training. Otherwise you won't know whether the training was adequate and whether the workers received and retained the information necessary to help them work safely. Start by obtaining copies of the safety and health training documents for each of the subcontractor's supervisors and workers. Ensure that all of the necessary training has been completed by cross referencing the previously identified hazards and accompanying safe work procedures with the safety and health training documentation.

Gauge the quality of the training by determining who presents it. Make inquiries about the instructor(s) qualifications, and then verify them. Keep in mind that training from an experienced knowledgeable foreman is adequate for many

safety and health topics. However, some topics require training from someone with more extensive knowledge.

Document any training deficiencies, inform the subcontractors, and require that documentation of adequate training be provided to you as soon as it is completed. Make sure that the subcontractors know that affected workers can't start work until the necessary training is completed and documented.

In this example the mechanical contractor is replacing an old piping system in a building constructed in 1975. The pipe is covered with insulation that contains asbestos. The piping system is hanging overhead in a narrow hallway from a 12' ceiling. Before the contractor can get his fitters into the work area it has to hire a subcontractor to remove the asbestos and remediate the work area. The subcontractor's site-specific safety plan reveals the following information for this potentially hazardous task.

Potentially Hazardous Task	• Removing pipe insulation from overhead piping system
Special Concerns	• Pipe insulation contains asbestos • Workers performing the task from a scissors lift while wearing protective coveralls, full-face piece air purifying respirators, and head covers. • In two places where the piping system can't be accessed by scissors lift…Workers performing the task from ladders while wearing protective coveralls, full-face piece air purifying respirators, and head covers • Poor lighted work area
The Potential Hazards	• Falls from lift • Falls from ladder • Falls from walking/working surfaces • Cuts/lacerations from hand tools • Inhalation of asbestos fibers
Safe Work Procedures	• Ariel lifts • Asbestos • Fall prevention and protection • Handheld tools • Hazard communication • Housekeeping • Illumination • Ladders • Personal protective equipment • Respiratory protection

The hiring contractor needs to ensure that there is acceptable training documentation for each affected worker covering each of these safe work procedures. Most of them, such as aerial lifts, fall prevention and protection, hazard communication, ladders, personal protective equipment, and scaffolds are standard and could be effectively presented by a qualified foreman in formal training sessions. Others, such as handheld tools, housekeeping, and illumination could be presented in short-duration training sessions, such as toolbox safety talks. However,

some safe work procedures require a much higher level of trainer expertise and in- depth training. Asbestos removal/site remediation is one of them. Other safe work procedure topics, such as respiratory protection, may or may not require a higher level of training. In this case it depends on the level of protection needed. For example, if workers need standard air-purifying respirators for protection against overexposure to silica while drilling holes for pipe hangers, many foremen are qualified and capable of effectively providing that kind of training. However, if the workers need supplied air, or self- contained breathing apparatuses (SCBA) because airborne asbestos levels can't be adequately controlled with ventilation, a higher level of training expertise may be needed.

In this example the hiring contractor would want to evaluate the qualifications of the trainer(s) by assessing its credentials. If a trainer is qualified to present the topic by a well-known credible source, such as the OSHA Training Institute (OTI), or the National Institute for Occupational Safety and Health (NIOSH), you're good to go. Once the qualifications/credibility of the trainer prove to be adequate make sure that there is adequate training documentation for every one of the subcontractor's workers who will be working on the project.

It's also very important to have some knowledge about the specific safety and/or health training topics, especially where specialty subcontractors are concerned. The knowledge will help you ensure that the training is satisfactory. In the asbestos removal example, workers removing asbestos containing pipe insulation would be required to have training for Class I asbestos related activities. That's a minimum of 40 hours of training for the contractor/supervisor, and 32 hours of training for the

affected workers. However, there are other classes involving asbestos related activity that require substantially less training. For example, Class III asbestos workers require only 16 hours of training, and Class II asbestos workers require only 8 hours of training.

However, workers in all classes must receive repeat training at least annually. The point is you should review the topic's specific training requirements before starting verification of your subcontractors' safety and health training to ensure that it is satisfactory.

Ideally, all qualified instructors would require each trainee to pass a written test to ensure that each of them understands the content of the training. This is especially true for the activities that require specialized competencies, such as asbestos removal. Ask the instructors in writing whether they test their trainees. Although it's the responsibility of the subcontractors to ensure that their workers understand the training concepts, if you as the controlling employer are not making documented inquires, you could be partially accountable.

Safety incentives can be very effective. However, there are many different types of safety incentives. When evaluating your subcontractors' safety incentives make sure that none of them could be misconstrued as discouraging workers from reporting work-related injuries and/or illnesses.

Your subcontractors' substance abuse policies are another area that warrants extra scrutiny. You've already checked to ensure that it is part of their safety and health program.
However, make sure that it includes drug and alcohol testing, and is in compliance with current DOT drug and alcohol testing regulations. The most efficient way to make that determination is to compare it with the most current UA/MCAA SMARTDISPATCHMODELSUBSTANCEABUSETESTINGand TREATMENT PROGRAM POLICY. The model policy is free to members and can be accessed at www.mcaa.org. Finally, make sure it is being consistently implemented by asking the right questions. Who collects the samples, what lab is used for analysis, who can I contact to confirm it, etc.?

There are three items in the appendices to help you with the subcontractor safety management process. All of them can be modified as needed for each of your specific applications but be sure to read through the guide before making the changes.

Start with the Hiring Contractor's Pre-Selection Evaluation Checklist. It may take several days to complete the checklist because you'll have to wait for the Subcontractor Safety Prequalification Form to be completed and returned. And, you'll need additional time to evaluate the completed form to verify that the information is accurate.

This form is for subcontractor safety qualification only. It has nothing to do with a subcontractor's ability to perform the work. Once you have completed the initial evaluation of the subcontractor candidate's safety and health program, and you are satisfied with the results, provide this form to the candidate electronically, and request that it be completed and sent back to you. Evaluate the completed form and verify that its contents are accurate. Consider:

- Interviewing the subcontractor candidate to verify that the leading indicators of safety performance described on the completed form are accurate. Ask for the names and contact information of recent references, and for copies of the subcontractor's OSHA 300, 300A and 301 forms for the past three full years, but with the names of the affected workers removed or blacked out.

- Calling several of the subcontractor candidate's past, but fairly recent clients to verify that the leading indicators of safety performance described on the competed form are accurate.

- Contacting the subcontractor candidate's worker's compensation insurance carrier to verify that the Experience Modification Rates (EMRs) shown on the competed form are accurate; and

- Cross referencing the information on the completed Subcontractor Safety Prequalification Form with information in the subcontractor candidate's OSHA 300, 300A and 301 forms for the past three full years.

This checklist will help you stay on top of the numerous inquiries and actions you'll be performing while managing your subcontractors. Some items will be checked off fairly quickly, while others will remain unchecked for a time. Skim through the checklist regularly so that you don't inadvertently fail to address an important action item.

Subcontractor Name _____
Project Name_____ Project Start Date _____

- ☐ Safety and Health Program Received
- ☐ Safety and Health Program Evaluated
- ☐ Safety and Health Program Contains all Key Elements
- ☐ Safety and Health Program Up to Date
- ☐ Subcontractor Safety Prequalification Form Provided to Subcontractor
- ☐ Completed Subcontractor Safety Prequalification Form Received
- ☐ Leading Indicators of Safety Performance Appear Adequate
- ☐ Implementation of Leading Indicators Confirmed by Interview & Reference Checks
- ☐ Current and Past Experience Modification Rates (EMR) Appear Adequate
- ☐ EMRs Verified by WC Insurance Carrier
- ☐ Past Three-Year Fatality Incidence Rates Appear Adequate
- ☐ Past Three-Year Recordable Injury and Illness Incidence Rates Appear Adequate
- ☐ Past Three-Year Lost Workday Cases Incidence Rates Appear Adequate
- ☐ Past Three-Year Lost Workdays Incidence Rates Appear Adequate
- ☐ Accuracy of Injury/Illness Incidence Rates Verified by Cross Reference with Completed OSHA-Work Related Injury/Illness Logs/Summary Forms/Incident Report Forms

Subcontractor/Co. _____

Company Address_____

Number of Years in Business Under Current Company Name
_____N_____
umber of Years Under Current Management ___
Primary Contact Name & Telephone # _____

1. How does your company ensure consistent implementation of its safety and health program? (Include name/title of person with this responsibility)

2. How does your company ensure consistent implementation of each site- specific safety and health plan? (Include name/title of person with this responsibility)

3. What is the frequency of project site safety and health inspections? (Include name/title of person with this responsibility)

4. How does your company track unsafe work practices that are identified during the inspection process? (Include name/title of person with this responsibility)

5. What percentage of inspection issues are immediately corrected? (Include name/title of person with this responsibility)

6. What is the frequency of safety and health communication sessions, such as safety meetings, formal safety training sessions, short- durations safety training sessions, i.e. toolbox safety talks? (Include name/title of person with this responsibility)

7. What is the frequency of investigations for incidents that result in work- related injuries or illnesses? (Include name/title of person with this responsibility)

8. What is the frequency of investigations for near miss incidents? (Include name/title of person with this responsibility)

9. How does your company ensure that the results of each injury/illness investigation and near miss investigation are properly addressed? (Include name/title of person with this responsibility)

10. What is the frequency of repeat incidence recurrence?(Include name/title of person with this responsibility)

11. What is the frequency of task hazard analyses performed for potentially hazardous tasks? (Include name/title of person with this responsibility)

12. How does your company ensure consistent implementation of its substance abuse program, includingtesting for drugs and alcohol? (Include name/title of person with this responsibility)

13. How does your company ensure implementation of a 100% hardhat, safety glasses and work gloves policy? (Include name/title of person with this responsibility)

14. Are you partially self-insured for workers' compensation insurance? Yes ☐ No ☐

EMR (Current Year) _____
EMR (LastYear) _____
EMR (Year Before Last) _____EMR (Two Years Before Last)

Worker's Compensation Insurance Carrier
Contact Name_____Phone_____E-Mail _____

Year (current year first)	Fatalities	Recordable Cases	Lost Workday Cases	Lost Workdays	Total Work Hours	Incidence Rates
1						
2						
3						
4						
5						

To calculate incidence rates, plug in any number (N) from the table above into the formula below.

Fixed Numbers and Variables

-200,000 = 100 Full Time Workers x 40 Hours per Week x 50 Weeks per Year
-N = The Number from the Type of Incidence Rate You Are Calculating
-WH = Total Work Hours Formula
N x 200,000
= Incidence Rate (Per 100 Full Time Workers) WH

For Example, If (N) = (4) Recordable Cases and WH = 400,000
4 x 200,000 / 400,000 Work Hours = 4.0
Recordable Cases Incidence Rate= 2.0

- ☐ Potentially Hazardous Tasks (Within Scope of Work) Identified by Subcontractor
- ☐ Hazard Identification Report Completed
- ☐ Site-Specific Safety and Health Plan Established
- ☐ Plan Includes Potentially Hazardous Tasks, Special Concerns, Potential Hazards, and Safe Work Procedures Specific to the Hazard/Task
- ☐ Accident/Incident Investigation Procedures Adequate
- ☐ Sub Properly and Consistently Implements Accident/Incident Investigation Procedures
- ☐ Disciplinary Action Plan Established
- ☐ Sub Consistently Enforces Disciplinary Action Plan
- ☐ Sub Properly Documenting Disciplinary Actions
- ☐ Sub Assertively Implementing Modified Duty When Needed
- ☐ Sub Has Assumed GC's, CM's, Owner's, and/or Your Own Multi- Employer Worksite Coordination Procedures
- ☐ Regular Safety and Health Planning Meetings with Subcontractor Performed
- ☐ Contents/Results of Safety and Health Planning Meetings Properly Documented
- ☐ Sub Accurately Recording/Reporting Work-Related Injuries and Illnesses
- ☐ Sub Performing Regular Safety and Health Inspections
- ☐ Sub Immediately Informs You of Newly Identified Hazards/Hazardous Tasks
- ☐ Sub Taking Immediate, Appropriate Protective Action to Address Newly Identified Hazards/Hazardous Tasks
- ☐ Sub Properly Documenting Regular Inspections/Corrective Actions
- ☐ Documentation of Sub's Workers' Having Completed Worker Safety Orientation
- ☐ Documentation of Sub's Workers' Having Completed Safe Work Procedures Training
- ☐ Specialty Safety Training Requirements Evaluated/Determined/Established
- ☐ Documentation of Sub's Workers' Having Completed Applicable OSHA Required Training Not Covered as Part of Safe Work Procedures Training
- ☐ Documentation of Sub's Supervisors' Having Completed Safe Work Procedures Training
- ☐ Documentation of Sub's Supervisors Having Completed Additional Supervisor Training
- ☐ Credibility of All Training Instructors/Credentials Verified
- ☐ Safety Incentives in Use
- ☐ Sub's Safety Incentives Do Not Discourage Workers from Reporting Injuries/Illnesses
- ☐ Substance Abuse and Drug Testing Policy in Place
- ☐ Policy Includes Testing for Drugs and Alcohol
- ☐ Policy is in Compliance with Current DOT Drug/Alcohol Testing Regulations
- ☐ Drug/Alcohol Testing Lab Qualifications Verified

ADDENDUM

The purpose of this plan is to outline the steps that every employer and employee can take to reduce the risk of exposure to COVID-19. The plan describes how to prevent worker exposure to coronavirus, protective measures to be taken on the jobsite, personal protective equipment and work practice controls to be used, cleaning and disinfecting procedures, and what to do if a worker becomes sick.[1]

****

Alexander Mechanical takes the health and safety of our employees very seriously. With the spread of the coronavirus or "COVID-19," a respiratory disease caused by the SARS-CoV-2 virus, we all must remain vigilant in mitigating the outbreak. This is particularly true for the construction industry, which has been deemed "essential" during this Declared National Emergency. In order to be safe and maintain operations, we have developed this COVID-19 Exposure Prevention, Preparedness, and Response Plan to be implemented throughout the Company and at all of our jobsites. We have also identified a team of employees to monitor available U.S. Center for Disease Control and Prevention ("CDC") and Occupational Safety and Health Administration ("OSHA") guidance on the virus.

This Plan is based on currently available information from the CDC and OSHA and is subject to change based on further information provided by the CDC, OSHA and other public officials. The Company may also amend this Plan based on operational needs.

Note: The need to protect workers from COVID-19 should not decrease the focus on other hazards related to workplace injuries and illnesses. With COVID-19 a healthcare crisis, it is especially critical to avoid the need for workers to seek treatment at clinics, doctors' offices and hospitals.

I. Responsibilities of Managers and Supervisors

All managers and supervisors must be familiar with this Plan and be ready to answer questions from employees. Managers and supervisors must set a good example by following this Plan at all times. This involves practicing good personal hygiene and jobsite safety practices to prevent the spread of the virus. Managers and supervisors must encourage this same behavior from all employees.

[1] *This document is a "template" that individual contractors should review carefully and tailor to their own work and jobsites. It does not constitute legal advice and should not be construed on its own as fulfilling a contractor's overall obligations to ensure a safe and healthful work environment. This template was prepared on March 25, 2020. As the COVID-19 outbreak develops, the information and recommendations contained in this document may change and thus, Contractors should continue to monitor developments in this area.*

II. Responsibilities of Employees

We are asking every one of our employees to help with our prevention efforts while at work. In order to minimize the spread of COVID-19 at our jobsites, we all must play our part. As set forth below, the Company has instituted various housekeeping, social distancing, and other best practices at our jobsites. All employees must follow these. In addition, employees are expected to report to their managers or supervisors if they are experiencing signs or symptoms of COVID-19, as described below. If you have a specific question about this Plan or COVID-19, please ask your manager or supervisor. If they cannot answer the question, please contact Alexander Mechanical.

OSHA and the CDC have provided the following control and preventative guidance to all workers, regardless of exposure risk:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol.
- Do not mix cleaning chemicals without proper procedures

  and instructions.
- Avoid touching your eyes, nose, or mouth with unwashed

  hands.
- Follow appropriate respiratory etiquette, which includes covering for coughs and sneezes.
- Avoid close contact with people who are sick.
- In addition, employees must familiarize themselves with the symptoms of

  COVID-19: Coughing.
- Fever.

- Shortness of breath, difficulty breathing; and

- Early symptoms such as chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose.

If you develop a fever and symptoms of respiratory illness, such as cough or shortness of breath, DO NOT GO TO WORK and call your healthcare provider right away. Likewise, if you come into close contact with someone showing these symptoms, call your healthcare provider right away.

III. Job Site Protective Measures

The Company has instituted the following protective measures at all jobsites.

A. General Safety Policies and Rules

- Any employee/contractor/visitor showing symptoms of COVID-19 will be asked to leave the jobsite and return home.

- Safety meetings will be by telephone, if possible. If safety meetings are conducted in-person, attendance will be collected verbally, and the foreman/superintendent will sign-in each attendee. Attendance will not be tracked through passed-around sign-in sheets or mobile devices. During any in-person safety meetings, avoid gathering in groups of more than 10 people and participants must remain at least six (6) feet apart.

- Employees must avoid physical contact with others and direct employees/contractors/visitors to increase personal space to at least six (6) feet, where possible. Where work trailers are used, only necessary employees should enter the trailers and all employees should maintain social distancing while inside the trailers.

- All in-person meetings will be limited. To the extent possible, meetings will be conducted by telephone.

- Employees will be encouraged to stagger breaks and lunches, if practicable, to reduce the size of any group at any one time to less than ten (10) people.

- The Company understands that due to the nature of our work, access to running water for hand washing may be impracticable. In these situations,

- the Company will provide, if available, alcohol-based hand sanitizers and/or wipes.

- Employees should limit the use of co-worker's tools and equipment. To the extent tools must be shared, the Company will provide alcohol-based wipes to clean tools before and after use. When cleaning tools and equipment, consult manufacturing recommendations for proper cleaning techniques and restrictions.

- Employees are encouraged to limit the need for N95 respirator use by using engineering and work practice controls to minimize dust. Such controls include the use of water delivery and dust collection systems, as well as limiting exposure time.

- The Company will divide crews/staff into two (2) groups where possible so that projects can continue working effectively in the event that one of the divided teams is required to quarantine.

- As part of the division of crews/staff, the Company will designate employees into dedicated shifts, at which point, employees will remain with their dedicated shift for the reminder of the project. If there is a legitimate reason for an employee to change shifts, the Company will have sole discretion in making that alteration.

- Employees are encouraged to minimize ridesharing and adhere to one person per vehicle. While in vehicle, employees must ensure adequate ventilation.

- If practicable, employees should use/drive the same truck or piece of equipment every shift.

- In lieu of using a common source of drinking water, such as a cooler, employees should use individual water bottles.

Supervisors/Foreman *Additional Jobsite Safety Precautions Include:*

B. Workers entering Occupied Building and Homes

- When employees perform construction and maintenance activities within occupied homes, office buildings, and other establishments, these work locations present unique hazards with regards to COVID-19 exposures. All such workers should evaluate the specific hazards when determining best practices related to COVID-19.

- During this work, employees must sanitize the work areas upon arrival, throughout the workday, and immediately before departure. The Company will provide alcohol-based wipes or disinfectant spray for this purpose.

- Employees should ask other occupants to keep a personal distance of six (6) feet at a minimum. Workers should wash or sanitize hands immediately before starting and after completing the work.

C. Job Site Visitors

- The number of visitors to the job site, including the trailer or office, will be limited to only those necessary for the work.

- All visitors will be screened in advance of arriving on the job site. If the visitor answers "yes" to any of the following questions, he/she should not be permitted to access the jobsite:

  - Have you been confirmed positive for COVID-19?
  - Are you currently experiencing, or recently experienced, any acute respiratory illness symptoms such as fever, cough, or shortness of breath?
  - Have you been in close contact with any persons who has been confirmed Positive for COVID -19
  - Have you been in close contact with any persons who have traveled and are also exhibiting acute respiratory illness symptoms?

- Site deliveries will be permitted but should be properly coordinated in line

- with the employer's minimal contact and cleaning protocols. Delivery personnel should remain in their vehicles if at all possible. Employees should avoid close contact with delivery personnel and not touch or sign vendor digital signature capturing devices.

D. Personal Protective Equipment and Work Practice Controls

- In addition to regular PPE for workers engaged in various tasks (fall protection, hard hats, hearing protection), employers will also provide:
  - Gloves: Gloves should be worn at all times while on-site. The type of glove worn should be appropriate to the task. If gloves are not typically required for the task, then any type of glove is acceptable, including latex gloves. Employees shall not share gloves. Gloves can be contaminated, so do not touch your face with a gloved hand (or non-gloved hand).
  - Eye protection: Eye protection should be worn at all times while on-site.
  - **NOTE:** The CDC is currently not recommending that healthy people wear N95 respirators to prevent the spread of COVID-19. Employees should wear N95 respirators if required by the work and if available.
- Due to the current shortage of N95 respirators, the following Work Practice Controls should be followed:
  - Keep dust down by using engineering and work practice controls, specifically through the use of water delivery and dust collection systems.
  - Limit exposure time to the extent practicable.
  - Isolate workers in dusty operations by using a containment structure or distance to limit dust exposure to those employees who are conducting the tasks, thereby protecting nonessential workers and bystanders.
- Institute a rigorous housekeeping program to reduce dust levels on the jobsite.

IV. Job Site Cleaning and Disinfecting

The Company has instituted regular housekeeping practices, which includes cleaning and disinfecting frequently used tools and equipment, and other elements of the work environment, where possible. Employees should regularly do the same in their assigned work areas.

- Jobsite trailers and break/lunchroom areas will be cleaned at least once per day. Employees performing cleaning will be issued proper personal protective equipment ("PPE"), such as nitrile, latex, or vinyl gloves and gowns, as recommended by the CDC.

- Any trash collected from the jobsite must be changed frequently by someone wearing nitrile, latex, or vinyl gloves.

- Any portable jobsite toilets should be cleaned by the leasing company at least twice per week and disinfected on the inside. The Company will ensure that hand sanitizer dispensers are always filled. Frequently touched items (i.e. door pulls and toilet seats) will be disinfected frequently.

- Vehicles and equipment/tools should be cleaned at least once per day and before change in operator or rider. Care should be taken not to damage the tool.

- If an employee has tested positive for COVID-19, OSHA has indicated that there is typically no need to perform special cleaning or decontamination of work environments, unless those environments are visibly contaminated with blood or other bodily fluids. Notwithstanding this, the Company will clean those areas of the jobsite that a confirmed-positive individual may have come into contact with before employees can access that workspace again.

- The Company will ensure that any disinfection shall be conducted using one of the following:

  - Common EPA-registered household disinfectant.

  - Alcohol solution with at least 60% alcohol; or

- Diluted household bleach solutions (these can be used if appropriate for the surface).

- The Company will maintain Safety Data Sheets of all disinfectants used on site.

Supervisors/Foreman ***Additional Cleaning and Disinfection Guidelines Include:***

V. Jobsite Exposure Situations

- **Employee Exhibiting COVID-19 Symptoms**

If an employee exhibits COVID-19 symptom, the employee must remain at home until he or she is symptom free for 72 hours (3 full days) without the use of fever-reducing or other symptom-altering medicines (e.g., cough suppressants). The Company will similarly require an employee that reports to work with symptoms to return home until they are symptom free for 72 hours (3 full days). To the extent practical, employees are required to obtain a doctor's note clearing them to return to work.

- **Employee Tests Positive for COVID-19**

An employee that tests positive for COVID-19 will be directed to self- quarantine away from work. Employees that test positive and are symptom free may return to work when at least seven (7) days have passed since the date of his or her first positive test and have not had a subsequent illness. Employees that test positive and are directed to care for themselves at home may return to work when: (1) at least 72 hours (3 full days) have passed since recovery;[2] and (2) at least seven (7) days have passedsince

symptoms first appeared. Employees that test positive and have been hospitalized may return to work when directed to do so by their medical care provider. The Company will require an employee to provide documentation clearing their return to work.

- **Employee Has Close Contact with a Tested Positive COVID-19 Individual**

Employees that have come into close contact with a confirmed-positive COVID-19 individual (co-worker or otherwise), will be directed to self- quarantine for 14 days from the last date of close contact with the carrier. Close contact is defined as six (6) feet or less for a prolonged period of time.

If the Company learns that an employee has tested positive, the Company will conduct an investigation into co-workers that may have had close contact with the confirmed- positive employee in the prior 14 days and direct those individuals that have had close contact with the confirmed-positive employee to self-quarantine for 14 days from the last date of close contact with the carrier. If an employee learns that he or she has come into close contact with a confirmed-positive individual outside of the workplace, he/she must alert a manager or supervisor of the close contact and also self-quarantine for 14 days from the last date of close contact with the carrier.

VI. OSHA Recordkeeping

If a confirmed case of COVID-19 is reported, the Company will determine if it meets the criteria for recordability and reportability under OSHA's recordkeeping rule. USHA requires construction employers to record work-related injuries and illnesses that meet certain severity criteria on the OSHA 300 log, as well as complete the OSHA Form 301 (or equivalent) upon the of these injuries. For purposes of COVID-19, OSHA also requires employers to report to OSHA any work-related illness that (1) results in a fatality, or (2) results in the in-patient hospitalization of one or more employee. "In-patient" hospitalization is defined as a formal admission to the in-patient service of a hospital or clinic for care or treatment.

OSHA has made a determination that COVID-19 should *not* be excluded from coverage of the rule – like the common cold or the seasonal flu – and, thus, OSHA is considering it an "illness". However, OSHA has stated that only

confirmed cases of COVID-19 should be considered an illness under the rule. Thus, if an employee simply comes to work with symptoms consistent with COVID-19 (but not a confirmed diagnosis), the recordability analysis would not necessarily be triggered at that time.

If an employee has a confirmed case of COVID-19, the Company will conduct an assessment of any workplace exposures to determine if the case is work-related. Work- relatedness is presumed for illnesses that result from events or exposures in the work environment, unless it meets certain exceptions. One of those exceptions is that the illness involves signs or symptoms that surface at work but result solely from a non- work-related event or exposure that occurs *outside* of the work environment. Thus, if an employee develops COVID-19 *solely* from an exposure outside of the work environment, it would *not* be work-related, and thus not recordable.

The Company's assessment will consider the work environment itself, the type of work performed, risk of person-to-person transmission given the work environment, and other factors such as community spread. Further, if an employee has a confirmed case of COVID-19 that is considered work-related, the Company will report the case to OSHA if it results in a fatality within 30 days or an in-patient hospitalization within 24 hours of the exposure incident occurring.

VII. "Essential" Industry

Several States and localities are issuing orders that prohibit work and travel, except for essential businesses. In general, construction work has been deemed essential and the Company is committed to continuing operations safely. If upon your travel to and from the worksite, you are stopped by State or local authorities, you will be provided a letter that you can show the authorities indicating that you are employed in an "essential" industry and are commuting to and from work.

VIII. Confidentiality/Privacy

Except for circumstances in which the Company is legally required to report workplace occurrences of communicable disease, the confidentiality of all medical conditions will be maintained in accordance with applicable law and to

the extent practical under the circumstances. When it is required, the number of persons who will be informed of an employee's condition will be kept at the minimum needed not only to comply with legally-required reporting, but also to assure proper care of the employee and to detect situations where the potential for transmission may increase. A sample notice to employees is attached to this Plan. The Company reserves the right to inform other employees that a co-worker (without disclosing the person's name) has been diagnosed with COVID-19 if the other employees might have been exposed to the disease so the employees may take measures to protect their own health.

IX. General Questions

Given the fast-developing nature of the COVID-19 outbreak, the Company may modify this Plan on a case by case basis. If you have any questions concerning this Plan, please contact **Safety Manager or Company Rep.**

Essential Industry Employee

Re: Shelter-in-Place Orders

To whom it may concern:

Please be informed that the bearer of this letter is employed at Alexander Mechanical located at 10405 N Fisk Ave Kansas City, MO 64154. The Company is a Mechanical Contractor. We have reviewed all applicable Orders and have determined that our operations qualify as essential/critical infrastructure and that we are able to continue to operate under those Orders.

Employees in possession of this letter have been deemed essential to the minimum basic operations of our business. All non-essential personnel have been notified to work remotely until further notice. Employees who are critical to the minimum basic operations of the business have been instructed to comply with social distancing rules/requirements in the jurisdiction, as well as other safety and health precautions.

If you have questions regarding the nature or scope of this letter, please do not hesitate to contact Bill Alexander at 816-833-0700.

Sincerely,

Bill Alexander
President

Employee Notification

DATE: [DATE]

TO: [CLOSE CONTACT EMPLOYEE]

FROM: [COMPANY REP]

We have been informed by one of our [our employees/customers/vendors/etc.] working at [SITE] that he/she has a confirmed case of COVID-19, commonly known as “Coronavirus,” based on test results obtained on [DATE] . Per company policy, this [employee/customer/vendor/etc.] has been directed to self-quarantine until permitted to return to work.

We are alerting you to this development because, based on the Company’s investigation, we believe that you may have come into contact with the confirmed- positive case, on or about [DATE]. Based on Company policy we are directing you not to report to work (i.e., self- quarantine) until, at least, [14 days from last contact with confirmed case]. In the interim, we encourage you to seek medical advice and a COVID-19 test, especially if you are exhibiting symptoms of the virus.

If you do not test positive for COVID-19, or experience symptoms, by [14 days from last contact with confirmed case], you may return to work. However, please inform [COMPANY CONTACT] if any of the following occur during your self-quarantine: you experience flu-like symptoms, including fever, cough, sneezing, or sore throat; or you test positive for COVID-19.

We are committed to providing a safe environment for all of our employees and top-quality service to our customers. It is in the interest of those goals that we provide this information out of an abundance of caution.

We also want to take this opportunity to remind you that one of our core values as a company is respect for and among our employees [or customers]. We will treat information regarding the identity of employees [or customers] with suspected or confirmed cases of COVID-19 as confidential to the extent practicable and will comply with applicable laws regarding the handling of such information. Further, per Company policy, we will not tolerate harassment of, or discrimination or retaliation against, employees [or anyone].

Please contact [COMPANY CONTACT AWARE OF APPROPRIATE PROTOCOLS] at [PHONE NUMBER]

if you have any questions or concerns.

For more information about COVID-19, please visit the CDC website at: http://www.cdc.gov/coronavirus/2019-ncov/index.html

COVID-19 Checklist for Employers and Employees Know the Symptoms of COVID-19

- Coughing, fever, shortness of breath, and difficulty breathing.
- Early symptoms may include chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose. If you develop a fever and symptoms of respiratory illness, DO NOT GO TO WORK and call your health-care provider immediately. Do the same thing if you come into close contact with someone showing these symptoms.

Employer Responsibilities

- Develop a COVID-19 Exposure Action Plan.
- Conduct safety meetings (toolbox talks) by phone if possible. If not, instruct employees to maintain 6-feet between each other. The foreman/supervisor will track attendance verbally rather than having employees sign an attendance sheet.
- Access to the job site and work trailer will be limited to only those necessary for the work.
- All visitors will be pre-screened to ensure they are not exhibiting symptoms.
- Employees, contractors, and visitors will be asked to leave the jobsite and return home if they are showing symptoms.
- Provide hand sanitizer and maintain Safety Data Sheets of all disinfectants used on site.
- Provide protective equipment (PPE) to any employees assigned cleaning/disinfecting tasks
- Talk with business partners about your response plans. Share best practices with other businesses in your communities (especially those in your supply chain), chambers of commerce, and associations to improve community response efforts.

Employee Responsibilities

- Become familiar with the Exposure Action Plan and follow all elements of the Plan.
- Practice good hygiene: wash hands with soap and water for at least 20 seconds. If these are not available, use alcohol-based hand rub with at least 60% alcohol. Avoid touching your face, eyes, food, etc. with unwashed hands.

Cleaning/Disinfecting Job Sites and Other Protective Measures

- Clean and disinfect frequently used tools and equipment on a regular basis. This includes other elements of the jobsite where possible. Employees should regularly do the same in their assigned work areas.
- Clean shared spaces such as trailers and break/lunchrooms at least once per day. Disinfect shared surfaces (door handles, machinery controls, etc.) on a regular basis. Avoid sharing tools with co-workers. If not, disinfect before and after each use.
- Arrange for any portable job site toilets be cleaned by the leasing company at least twice per week and disinfected on the inside.
- Trash collected from the jobsite must be changed frequently by someone wearing gloves.

Personal Protective Equipment and Alternate Work Practice Controls

- Provide and wear the proper PPE.
- Keep the dust down by using engineering and work practice controls, specifically through the use of water delivery and dust collection systems.

COVID-19 Toolbox Talk

What is COVID-19?

The novel coronavirus, COVID-19 is one of seven types of known human coronaviruses. COVID-19, like the MERS and SARS coronaviruses, likely evolved from a virus previously found in animals. The remaining known coronaviruses cause a significant percentage of colds in adults and children, and these are not a serious threat for otherwise healthy adults.

Patients with confirmed COVID-19 infection have reportedly had mild to severe respiratory illness with symptoms such as fever, cough, and shortness of breath.

According to the U.S. Department of Health and Human Services/Centers for Disease Control and Prevention ("CDC"), Chinese authorities identified an outbreak caused by a novel—or new—coronavirus. The virus can cause mild to severe respiratory illness. The outbreak began in Wuhan, Hubei Province, China, and has spread to a growing number of other countries—including the United States.

How is COVID-19 Spread?

COVID-19, like other viruses, can spread between people. Infected people can spread COVID-19 through their respiratory secretions, especially when they cough or sneeze. According to the CDC, spread from person-to-person is most likely among close contacts (about 6 feet). Person-to-person spread is thought to occur mainly *via* respiratory droplets produced when an infected person coughs or sneezes, like how influenza and other respiratory pathogens spread. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. It is currently unclear if a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes.

In assessing potential hazards, employers should consider whether their workers may encounter someone infected with COVID-19 in the course of their duties. Employers should also determine if workers could be exposed to environments (e.g., worksites) or materials (e.g., laboratory samples, waste) contaminated with the virus.

Depending on the work setting, employers may also rely on identification of sick individuals who have signs, symptoms, and/or a history of travel to COVID-19- affected areas that indicate potential infection with the virus, in order to help identify exposure risks for workers and implement appropriate control measures.

There is much more to learn about the transmissibility, severity, and other features associated with COVID-19, and investigations are ongoing.

COVID-19 Prevention and Work Practice Controls:

Worker Responsibilities

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. Always wash hands that are visibly soiled.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
- Avoid touching your eyes, nose, or mouth with unwashed hands. Avoid close contact with people who are sick.
- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home—DO NOT GO
- TO WORK.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.

General Job Site / Office Practices

- Clean AND disinfect frequently touched objects and surfaces such as workstations, keyboards, telephones, handrails, and doorknobs. Dirty surfaces can be cleaned with soap and water prior to disinfection. To disinfect, use products that meet EPA's criteria for use against SARS- CoV-2external icon, the cause of COVID-19, and are appropriate for the surface.
- Avoid using other employees' phones, desks, offices, or other work tools and equipment, when possible. If necessary, clean and disinfect them before and after use.
- Clean and disinfect frequently used tools and equipment on a regular basis.
    - This includes other elements of the jobsite where possible.
    - Employees should regularly do the same in their assigned work areas. Clean shared spaces such as trailers and break/lunchrooms at
- least once per day.
- Disinfect shared surfaces (door handles, machinery controls, etc.) on a regular basis.

- Avoid sharing tools with co-workers if it can be avoided. If not, disinfect before and after each use.
- Arrange for any portable job site toilets to be cleaned by the leasing company at least twice per week and disinfected on the inside.
- Any trash collected from the jobsite must be changed frequently by someone wearing gloves.
- In addition to regular PPE for workers engaged in various tasks (fall protection, hard hats, hearing protection), employers will also provide:
    - Gloves: Gloves should be worn at all times while on-site. The type of glove worn should be appropriate to the task. If gloves are not typically required for the task, then any type of glove is acceptable, including latex gloves. Gloves should not be shared if at all possible.
    - Eye protection: Eye protection should be worn at all times while on-site.

CLEANING OF TOOLS TO HELP PREVENT SPREAD OF COVID-19

by Milwaukee Tool, SMACNA Premier Partner

Should a tool need to be cleaned that does not have blood or visible bodily fluids on it, Milwaukee® recommends the following protocol. This protocol is subject to the recommendations of the Centers for Disease Control ("CDC"), OSHA, and those of State and Local Health Departments. Please follow applicable guidelines of these agencies.

- People handling tools should wash their hands or use a proper hand sanitizer before and after use to help prevent contamination.
- People handling tools should be properly trained and protected using necessary Personal Protective Equipment (PPE).
- Clean tools with mild soap, a clean damp cloth, and, as needed, an approved diluted bleach solution only. Certain cleaning agents and solvents are harmful to plastics and other insulated parts and shouldn't be used.
- Milwaukee® does not recommend cleaners that have conductive or corrosive materials, especially those with ammonia. Some of these include gasoline, turpentine, lacquer thinner, paint thinner, chlorinated cleaning solvents, ammonia and household detergents containing ammonia.
- Never use flammable or combustible solvents around tools.

CLEANING OPTIONS:

1. **MILD SOAP & REST**

- If no blood was present on the product, it can be **cleaned with mild soap and a damp cloth to remove the fluids and then left to rest for 3 days.** This is based on CDC advisement that the virus may live on plastic surfaces for up to 72 hours, which suggest that the virus would no longer be harmful after the resting period. After this, the tool can be cleaned again.

*Recommended for batteries

2. **MILD SOAP & DILUTED BLEACH SOLUTION**

- If no blood was present on the product, it can be **cleaned with a mild soap and damp cloth to remove dirt and grease and then decontaminated with a diluted bleach solution**, which is consistent with CDC advise. The full diluted bleach cleaning procedure can be found below.

*Not recommended for batteries

PROCEDURE

1. Clean the product surface with mild soap and water to remove dirt and grease.
2. Dip a clean cloth into the dilute bleach solution.
3. Wring out the cloth so it is not dripping wet.
4. Gently wipe each handle, grasping surfaces, or outer surfaces with the cloth, using care to ensure liquids do not flow into tool.
5. No other cleaning material should be used as the diluted bleach solution should never be mixed with ammonia or any other cleanser.
6. Allow the surface to dry naturally.
7. The cleaner should avoid touching their face with unwashed hands and should immediately wash their hands after this process.

A properly diluted bleach solution can be made by mixing:

- tablespoons (1/3rd cup) bleach per gallon of water; or
- teaspoons bleach per quart of water

NOTE: If blood was on the product, advance cleaning is needed. Follow established Bloodborne Pathogen protocols for your business. Under OSHA requirements, anyone required to perform this type of cleaning should be trained in Bloodborne Pathogens and the use of the necessary PPE for this work.