Safety Handbook for

Masonry

A resource guide for the masonry industry

Ohio | Bureau of Workers' Compensation

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Introduction

Your employees are your organization's most valuable asset. By improving safety and preventing accidents you can protect your work force while reducing your workers' compensation costs. And BWC's Division of Safety & Hygiene (DSH) is here to help.

The Federal Bureau of Labor Statistics states: "The leading types of injuries sustained by bricklayers and blocklayers include back strains/pulled muscles, followed by herniated/ruptured disks, fractures, cuts and lacerations." When bricklayers and blocklayers are asked if they ever lost work time because of an on-the-job injury, they cite overexertion in lifting as the leading cause of injury, followed by:

- Bending, climbing, crawling, reaching and twisting;
- Contact with objects and equipment.

In a focused effort to prevent hazards in the masonry industry, a multidisciplinary team of safety and health professionals developed this resource guide. The guide identifies and explains common hazards associated with the masonry industry; addresses effective accident-prevention principles and techniques; provides information supporting the implementation of sound safety processes; and helps safety teams meet their goals and objectives.

This manual is not intended to be all encompassing, nor is it a document to provide merely compliance standards. Safety and health processes must be individualized to meet the needs of each workplace. The team who authored this guide developed it with the goal of making the masonry industry a safer and healthier workplace. Please join BWC in making occupational safety and health a way of doing business in your masonry company.

However, safety isn't the only thing you can do to reduce your workers' compensation costs. You also can lower your costs by proactively managing your workers' compensation claims. This includes incident investigation, early reporting of injuries and working with your BWC employer services specialist and claims service specialist.

DSH employs many safety and health professionals who work extensively with the masonry industry. Many are certified in safety and industrial hygiene, and several have more than 20 years of experience in the field of safety and health.

To learn more about the safety services BWC offers, visit our Web site, ohiobwc.com, or call 1-800-OHIOBWC to request a *Safety Services Catalog*.

Identifying concerns

Assessing your company's current safety process

As a beginning step, ask yourself about present circumstances in your business. It may seem unusual to ask yourself questions about your company's business and quality concerns as you assess the safety situation. However, if you hold the business issues of quality, production and safety on an even plane (all core values of your organization, without any one being more important than the other), you will see the importance of the association. The issues are the same, but take on a different significance or priority depending on the responder's level within the organization.

First, choose the correct category below that best fits your position within the company. Then, ask yourself questions to evaluate your present circumstances.

Strategic issues (for company president, top officers)

Current situation

What would you consider a quick overview of your current status?
What are your company's strengths?
What is your situation with regard to safety?
Who has responsibility for safety?
Do you hold all those who report to you accountable for safety in your organization and, if so, what measurements do you use to ensure that accountability?

Problem

What are your most pressing business concerns at this point? (labor, quality, production)
What are the economic consequences of these problems?
What are your goals for these concerns this year?
Are you aware of your experience modification rating and its impact on your bottom line?
What do you think contributed most to your safety performance?

Opportunity
What is your vision for the company? Where would you like it to be in four years? Could you describe the end result you would like to achieve?
If you could achieve that vision, what economic impact would that have on the business?
How does creating a safe work environment fit into your vision of the future?

Avoidance
From your past experience, is there anything you would want to avoid as you move forward?

Have the answers to these questions given you any insight as to where your safety systems are today and what you would like to achieve tomorrow?

Middle management issues (for human resources, safety and operations)

Current situation
What is the overall emphasis of the entire management team for the business this year? (costs, profits, quality)
What does your safety process look like?
What are your responsibilities?
How are you held accountable for your safety performance, and what measures do you use?

Problem
What are your most pressing safety concerns at this point?
What do you think are the causes of these concerns?
What are the economic consequences of those problems?
What are your goals for those concerns this year?

Opportunity
What is the desired situation you would like to see the business achieve?
If you could achieve that vision, what economic impact would that have on the business?
What would a safe work environment look like in your business? What would be the economic impact?

Avoidance
From your past experience, is there anything you tried that didn't work for you?

Have the answers to these questions given you any insight as to where your safety systems are today and what you would like to achieve tomorrow?

Issues for supervisors, team leaders and employees

Current situation
What is the overall emphasis of the entire management team for the business this year? (costs, profits, quality)
What are your job responsibilities?
What do you enjoy the most about your job?
How are you held accountable for safety, and what measures are used?

Problem
How do you view safety?
What are your most pressing problems and concerns?
What do you think are the causes of these concerns?
What are the economic consequences of those problems?

Opportunity
If you were the boss, what would you do differently?
What would a safe work environment look like in your business? What would be the economic impact?

Avoidance
From your past experience, is there anything you tried that didn't work for you?

Have the answers to these questions given you any insight as to where your safety systems are today and what you would like to achieve tomorrow?

Self-assessment for BWC's 10-Step Business Plan

Take time to thoroughly evaluate your specific safety programs and policies with the following assessment.

The next section of this guide contains an Action Plan template. As you identify areas requiring action, make note of them on your own action plan.)

1. Visible, active senior management leadership

Visible senior management leadership promotes the belief that management of safety is an organizational value.

This requires the following:

- Authorizing the necessary resources for accident prevention;
- Discussing safety processes and improvements regularly during staff or employee meetings;
- Ensuring all members of management are held accountable for accident-prevention activities and for managing accident-prevention processes;
- Assessing the success of the safety process annually by using perception surveys, personal interviews and/or behavior sampling;
- Encouraging employees to take an active part in maintaining a safe workplace.

Has your organization addressed each of the above requirements? Why or why not? Should the organization do more to promote the belief that safety is an organizational core value?

2. Employee involvement and recognition

Employee involvement and recognition that affords employees the opportunity to participate in the safety management process.

Employee participation opportunities include, but are not limited to, the following:

- Safety and health involvement teams, focus groups or safety and health committees;
- Accident investigations analysis and assessment;
- Safety and health audits;
- Acting as instructors for safety and health training programs.

How do your employees participate in the safety management process (in other words, how are they involved in decision making and problem solving), and how often do they meet with management to specifically discuss this process? There is no magic answer to this question. Employee involvement must fit within your organizational philosophy.

How do you recognize employees for their actions and efforts in bettering the safety-management process? Do you recogonize employees for their contributions to decision making? Recognition includes establishing an ongoing process to identify and formally acknowledge employees for excellence in accident prevention.

3. Medical treatment and return-to-work practices

Employers can establish a post-injury or disability-management policy and procedure consistent with BWC's Health Partnership Program to help injured or ill employees obtain quality medical care and return to work.

Components of a disability-management procedure can include, at a minimum:

- Employer informing the employees of their selected managed care organization (MCO);
- Informing employees of procedures identifying where they can obtain medical treatment;
- Providing employees with other supporting information or materials;
- Immediate reporting of accidents and illnesses to a supervisor;
- Regular supervisory communications with off-work employees while they are convalescing;
- Investigating all accidents within 24 hours to identify system or process improvements so management can take corrective measures;
- When not prohibited by a labor agreement, a modified duty or transitional work program that allows employees to return to work in a productive capacity during the recuperative period.

Have you informed employees about your current MCO? _____

Do your employees know where they can obtain medical treatment? _____

Describe the accident-reporting process and the time frame in which this occurs. How and when do you communicate this to employees?

Describe your medical treatment, accident analysis and correction procedures.

Do your supervisors contact recuperating injured workers? _____

If a supervisor does not contact injured workers, who contacts them? _____

How often does your company contact injured workers? _____

Do you have a modified duty or transitional work policy? If no, why not? If yes, have you used it? How many times per year?

_____

_____

_____

4. Communication

A program of regular communications on safety and health issues to keep all employees informed and to solicit feedback and suggestions.

How often do you advise employees about individual and organizational safety performance?

_____

How do you obtain suggestions, and how do you respond to these suggestions?

_____

_____

_____

How do you communicate and ensure all employees are informed about safety matters?

_____

_____

_____

5. Timely notification of claims

Employers must report claims immediately to BWC or its designee, i.e., the MCO, which in turn, must report to BWC within 24 hours.

However, employers must ensure all cases involving lost time of more than seven days are reported to BWC within 14 days of the date of injury, or one week after being notified by the ill or injured employee of the incident.

What is your process to immediately report injuries to BWC or your MCO? _____

_____

_____

Do you report claims within the 14 days of the date of injury or within one week after notification from the ill or injured employee? _____

If the answer is no, what causes the delay? _____

_____

_____

What are you doing or what would you do to follow up with your MCO to ensure timely claim filing?

_____

_____

_____

6. Safety and health process coordination

Assigning an individual the role of coordinating safety efforts for the company.

Duties must include:

- Helping management and employees identify accident prevention, and safety and health training needs (possibly by using perception surveys, interviews, behavior sampling or other methods);
- Helping supervisors make changes or develop strategies that improve the organization's safety systems and processes;
- Identifying and communicating new safety and health requirements;
- Compiling accident or illness-related records;
- Tracking progress on safety and health-related projects;
- Working with employees to optimize safe work practices.

What is the name of your accident-prevention coordinator(s)? _____

How does your accident-prevention coordinator(s) perform the above duties?

7. Orientation and training

Orientation and training for all employees.

Orientation must include:

- Presentation of the company's safety and health policy;
- Employee responsibilities;
- Medical procedures, such as how and when to report injuries or illnesses;
- Actions to take in case of an emergency;
- How to report unsafe practices and conditions;
- Return-to-work procedures.

How does your organization accomplish the above orientation activities?

Develop a written safety and health training process that documents specific training objectives and instruction processes.

Training, at a minimum, must cover procedures for using machinery and tools safely and efficiently, including:

- Ergonomic risk factors and preventing cumulative trauma disorders;
- Chemical hazards and how to prevent contact or exposure;
- If appropriate, procedures for lockout/tagout, hot work permits and confined space entry.

Do you survey your employees to determine their safety and health training needs?

What other methods do you use to determine your training needs?

Do you have a written training plan designed to meet your employees' needs? _____

8. Written and communicated safe work practices
Publish safe work practices so employees have a clear understanding of how to safely accomplish their job requirements.

You must identify, document and make available both general and job-specific safe-work practices.

Do you have written general safe-work practices? _____

Do you have written job-specific safe-work practices? _____

What jobs still need written job-specific safe-work practices? (As a guide, see the technical information pertaining to training needs under the Occupational Safety and Health Administration (OSHA)).

_____

_____

_____

Do you require employees to sign a statement that they have read, understand and will follow the safe work practices? _____

How do you plan on keeping these written practices current so employees remain informed?

_____

_____

_____

9. Written safety and health policy
Your top executive must sign a safety and health policy document, which you give to all new hires. Communicate the policy to all employees, and then review it with them annually.

Do you display this policy on a bulletin board? If no, do you post it? _____

Do you display it in an employee handbook? _____

If no to both B and C, where do you post it? _____

What other method do you use to inform employees that their safety and well-being is important to your organization's senior officer? _____

_____

_____

How often do you review the safety policy with employees? _____

10. Recordkeeping and data analysis
Internal program verification to assess the success of the company safety efforts, to include audits, surveys and record analysis.

Compile injury- and illness-related data to:

- Identify safety and health process problems;
- Help manage the compensation process;
- Provide information necessary for developing solutions to problems.

What injury- and illness-related data does your organization record and compile?

_____

_____

_____

Do you keep an OSHA 300 log? If not, how do you record injuries? _____

_____

_____

How has recordkeeping and data analysis helped you identify problems, develop solutions and manage the compensation process? _____

_____

_____

Do you track near miss or close calls? If yes, what trends have you discovered and/or corrected?

_____

_____

_____

Safety- and health-management assessment and action plan (Step 1)

Please use the templates below and on the next seven pages to document your plan for improving your safety and health management process. The assessment section helps you review your organization and identify areas that may not exist or need improvement. The plan is an effective way to list intended improvements, required action steps, who is responsible for completing each item and the deadline for completing each step. As mentioned earlier, accountability is critical for effectively completing the performance goals. This type of action plan will help you hold people accountable.

Step 1 **Visible, active senior management leadership**	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) Authorizing necessary resources for accident prevention				
b) Discussing safety processes and improvements regularly during staff or employee meetings				
c) Ensuring management is held accountable for accident-prevention activities and for managing accident-prevention processes				
d) Assessing annually the success of the safety process by using surveys, personal interviews and/or behavior sampling				
e) Encouraging employees to take an active part in maintaining a safe workplace				

Safety- and health-management assessment and action plan (Step 2)

Step 2 Employee involvement and recognition	Plan of action (describe) a) Doing now	 b) Improvements you'll make	Person responsible	Completion date
a) Safety and health involvement teams, focus groups, or safety and health committees				
b) Accident investigation analysis and assessment				
c) Safety and health audits				
d) Acting as instructors for safety and health training programs				
Recognition opportunities				
a) Recognizing employees for excellence in accident prevention				
b) Recognizing employees for consistently high contribution to safety and health				
c) Recognizing employees for their contributions to continuous improvement through participation in problem solving, decision making or perception surveys				
d) Recognizing employees who suggest safety and health improvements or complete safety and health projects				

Safety- and health-management assessment and action plan (Steps 3 and 4)

Step 3 Medical treatment and return-to-work practices	Plan of action (describe) a) Doing now	 b) Improvements you'll make	Person responsible	Completion date
a) Informing employees of procedures for obtaining medical treatment, including informing employees of the selected MCO				
b) Immediate reporting of injuries and illnesses to a supervisor				
c) Regular communication with injured or ill employees who are off work				
d) Investigation of all injuries or illnesses within 24 hours to identify processes and corrective measures				
e) When not prohibited by a labor agreement, a modified duty or transitional work program that allows employees to return to work in a productive capacity during the recuperative period				

Step 4 Communication	Plan of action (describe) a) Doing now	 b) Improvements you'll make	Person responsible	Completion date
a) Quarterly written and/or verbal feedback to all employees on their accident-prevention performance				
b) A process for upward communication and downward communication throughout the organization, including obtaining and responding to employee suggestions				

Safety- and health-management assessment and action plan (Steps 4, 5 and 6)

c) Communication can include memos, bulletin boards, staff and general meetings			
d) Feedback should include the organization's overall safety and health performance			

Step 5 Timely notification of claims	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) Claims are reported immediately to the MCO				
b) Verified MCO reports claim to BWC within 24 hours				

Step 6 Safety- and health-process coordination	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) Helping management and employees identify accident prevention and safety and health training needs through perception surveys, interviews, behavior sampling or other similar methods				
b) Helping supervisors make changes or develop strategies that improve the organization's safety systems and processes				

Safety- and health-management assessment and action plan (Steps 6 and 7)

c) Identifying and communicating new safety and health requirements				
d) Compiling injury- and illness-related records				
e) Tracking progress on safety- and health-related projects				
f) Working with employees to optimize safe work practices				

Step 7 Written orientation and training plan	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
Safety and health written orientation and training plan				
a) Organizational safety and health policy statement				
b) Employee responsibilities				
c) Medical procedures, such as how and when to report injuries or illnesses				
d) Actions to take in case of an emergency				

Safety- and health-management assessment and action plan (Step 7)

e) How to report unsafe practices and conditions				
f) Return-to-work procedures				
Safety and health training				
a) Hazard communication				
b) Bloodborne pathogens, if applicable				
c) Specific job/task safe work practices and hazard recognition				
d) Recordkeeping of employee training and sign-off of training				
Training elements				
a) Procedures for safe and efficient use of machinery and tools				
b) Ergonomic risk factors, including preventing of cumulative trauma disorders				
c) Chemical hazards and how to prevent contact or exposure				

Safety- and health-management assessment and action plan (Steps 7, 8 and 9)

d) If appropriate, procedures for lock-out/tagout, hot work permits and confined space entry			

Step 8 Written and communicated safe work practices	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) General safe-work practices				
b) Job-specific safe-work practices				
c) Employees sign statement that they understand and will follow safe-work practices				

Step 9 Written safety and health policy	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) Top administrator's philosophy on safety and well-being of employees with his/her commitment to quality				
b) Managers', supervisors', team leaders' and employees' responsibilities regarding the organization's commitment to workplace safety and health				

Safety- and health-management assessment and action plan (Steps 9 and 10)

c) Commitment to returning injured or ill employees to work at the earliest opportunity				
d) Communicated to employees verbally, posted on bulletin board, in employee handbook				

Step 10 Recordkeeping and data analysis	**Plan of action (describe)** **a) Doing now**	**b) Improvements you'll make**	**Person responsible**	**Completion date**
a) Identify safety- and health-process problems				
b) Help manage the compensation process				
c) Provide information necessary for developing solutions				
d) Linkage between accident prevention and profitability				
e) Specific costs associated with safety and health problems and accidents				

Best management practices

Real change starts at the top. The success of any safety effort depends on the commitment, involvement and support of the employer.

Safety and health rules and regulations

Safety is more than just compliance with OSHA regulations and other governmental rules. It's a state of mind that must permeate the entire company, including office and field personnel, management and hourly employees. No business can expect to have good safety performance unless the president, chief executive officer or owner demonstrates, through personal conduct and concrete actions, that safety is expected and required of all employees.

However, because managers face non-safety related problems each day that require immediate handling, they are often tempted to overlook safety and health activities. That's why a company must establish and enforce safety rules to communicate its commitment to safety, and ultimately, to prevent incidents and injuries.

Company rules

Company safety rules serve primarily as training aids to familiarize employees with potentially hazardous situations and operational errors that can result in injuries. You can easily develop safe work rules by observing existing conditions and reviewing previous accidents.

Rather than having top management create and implement company rules, it's better to have all parties help develop them. Involvement from supervisors, safety coordinators and employees leads to cooperation, and an understanding of why the rules exist and what hazards they control. Involving all parties also helps ensure the rules are presented in terms the workers understand.

Whenever possible, rules should state what to do, rather than what is prohibited, because positive statements are more effective. Rules also should be logical, enforceable and applicable to the specific company or departmental operations.

Rules, such as be careful around electricity, are too general, and therefore, not enforceable. Also, rules that are not or cannot be enforced impair the effectiveness of other rules and dilute management's safety and health commitment.

In addition to general company rules, develop specific safety rules for non-routine tasks, operating dangerous equipment and other hazardous jobs.

Review and revise all rules on an ongoing basis, and communicate them regularly to employees through training. Conduct training on the rules during new-employee orientation and throughout the year at weekly toolbox talks, as well as through constant communication between supervisors and employees.

Governmental rules

In addition to company rules, employers must become familiar with the various governmental laws that define minimum duties, actions and precautions all employers must take to ensure their employees' safety and health. Federal rules include OSHA's regulations for construction (29 CFR Part 1904 and 1926) and for general industry (29 CFR Part 1904 and 1910).

Other safety regulations include the Ohio Administrative Code's (OAC's); specific safety requirements of the BWC relating to construction (4123:1-3) and to all workshops and factories (4123:1-5); Environmental Protection Agency (EPA); and state fire and building codes.

Written safety and health programs

OSHA requires all construction companies to develop and implement written safety and health programs. A program should describe the whole of the company's safety and health activities, and should be thought of as an ongoing process. Organized leadership with proper application of the program is essential to attaining good safety and health performance, which pays off through:

- Fewer accidents;
- Improved production;
- Increased employee efficiency;
- Enhanced employee morale;
- Lower workers' compensation costs;
- Decreased OSHA citations and fines.

Programs should address, at a minimum:

- Management's commitment and leadership — Management's visible support in encouraging safe and healthy behaviors, and in backing up enforcement procedures, is critical to the program. Issue clearly stated policies that outline the commitment and set the standard by which management will judge safety and health behavior;
- Assignment of responsibility — From top management to the front-line workers, all employees must understand what the employer expects of them. They must be involved in the safety and health process. Specifically, identify safety and health responsibilities and expectations for employees;
- Identify and control hazards — Address how to identify hazards and how to abate hazardous situations and behavior. Company audits or inspections are a crucial part of the program;
- Training and education — A training program for all supervisors and employees must be ongoing and effective. It must include general safety and health issues, along with site-specific hazards and non-routine tasks;
- Recordkeeping and hazard analysis — Evaluate all incidents, including near-misses, so management can determine trends and causes, and initiate corrective action;
- First aid and medical assistance — Evaluate emergency procedures and first-aid supplies available at each job site;
- Site-specific issues — In addition to general safety and health provisions, address hazards that are unique to each construction site. Before performing any work, do an inspection to determine the unique hazards and to inform all employees about how to eliminate or avoid the hazards.

Elements of a site-specific plan may include, but are not limited to, these items:

- Emergency procedures;
- Contact with utilities;
- Interaction with other contractors;
- Weather conditions, temporary heating, wind protection;
- Environmental conditions;
- Unique activities known to be hazardous, such as confined space entry and limited access zone for masonry work and demolition;
- Material-storage/staging areas;
- Access routes;
- Specific training requirements.

Employee safety and health education

General training

Employee training is key to the effectiveness of a company's safety and health program, and to preventing injuries and illnesses. Employers must train their employees to recognize and avoid unsafe conditions, and to know the regulations applicable to their work environments.

The purpose of employee training is to provide instruction in safe work practices and rules. Employee training also provides the skills and knowledge necessary to identify and control workplace hazards. Awareness of the physical or administrative consequences of ignoring safe practices will foster a healthy respect for the company's policies and procedures, as well as the hazards themselves.

Training should be an ongoing process for all employees, including office workers and field personnel. It should address general safety and health issues, as well as specific procedures for working safely.

You can conduct training individually or in a group, and it can come in many forms such as:

- New-employee orientation;
- Supervisor training;
- Communication of company safety rules;
- Site-specific training;
- Training for non-routine tasks;
- Equipment and machinery training;
- Hazard-communication training;
- Weekly toolbox talks.

Document all training, including meeting minutes or a synopsis of the items discussed, with the signatures or names of employees who participated.

Use the following steps to conduct training:

- Explain the purpose of training and why it is so important to the employee;
- Break down the training into understandable parts and identify key points. Be concise and clear with the training issues;
- Conduct demonstrations to emphasize key areas or points. Remember the adage, "A picture is worth a thousand words;"
- Encourage employees to ask questions;
- Conduct testing to ensure employees understand the covered information.

Toolbox talks

Toolbox talks are a useful vehicle for maintaining a viable safety and health education program in the construction industry. They are one of the most effective ways to promote safety awareness among employees.

For best results, follow these guidelines:

- Schedule regular weekly meetings. Never skip a meeting because you are too busy;
- Limit topic discussion to about 10 to 15 minutes in length;
- Review the talk in advance and deliver the information in your own words;
- Encourage group participation. Receive and act upon questions, ideas and suggestions;
- Avoid holding meetings in noisy areas. Use an atmosphere conducive to learning;
- Devote meetings exclusively to health and safety matters that apply to the particular group of workers;
- Use visual aids, where available or appropriate;
- Write a synopsis to document the meeting and include attendees' signatures;
- If the talk involves an incident, address injury factors, causes and recurrence prevention, rather than the individual involved in the accident;
- If the meeting involves work being planned, discuss potential hazards, safety equipment to use and basic procedures to follow.

Competent persons

According to OSHA, a competent person is someone the company designates to identify potential and existing hazards. He or she has the authority to correct the hazards. This person does not need a specific class, degree or years of experience to earn this designation, but training helps.

Typically, the company designates a job foreman, supervisor or superintendent as a competent person. Upper management relies upon this individual to address hazards and train others in safety and health issues.

Many rules and regulations require very specific safety training, which you can reference through OSHA codes and the OAC.

Supervisory safety performance evaluation

While this chapter deals solely with supervisors, it is equally important to evaluate employee safety performance.

Before any organization can expect good safety performance, top management must establish goals and commit to a safe and healthy work environment. This commitment must continue in an unbroken chain to the job-site supervisor.

Supervisory Safety Performance Evaluations (SSPEs) provide a complete and orderly method for determining the safety capabilities of each job-site supervisor. Including the SSPE on performance appraisals will help to determine which supervisors have a good and consistent safety performance, and which ones need additional training. Make safety training available to all supervisors to ensure the company achieves its goals and objectives.

Ideally, the supervisor's immediate manager should serve as the safety auditor. Forward the completed SSPEs to the next level of management for review and comments. Continue this progression upward through the chain of command until it reaches the top management level. Note corrective action taken on specific items on the SSPEs as they pass through management's review. The job site supervisor's immediate manager should inform him or her of comments and corrective actions required.

Conduct SSPEs periodically throughout the year. The supervisor and his or her immediate manager should set the goals and objectives prior to the beginning of each evaluation period.

SSPEs are not just based on numbers alone, but also on the quality of all safety functions. These functions may require a supervisor to:

- Be accountable for the safety of employees. This includes promptly correcting unsafe conditions or work practices, enforcing established safety rules, laws and procedures, and having high housekeeping standards;
- Ensure each employee is provided with, wears or uses any necessary personal protective equipment (PPE) according to the company's safety and health program or appropriate regulations;
- Enforce all safety rules and regulations fairly and equitably;
- Set a good example by following safety and health rules, and safe practices;
- Instruct each employee on the hazards of his or her job and how to avoid and/or control them. Take proper corrective action whenever people observe or report unsafe behaviors or unsafe conditions;
- Ensure the preventive-maintenance program is followed. Track to completion any repair and replacement needs found during those activities;
- Require all vendors, customers, subcontractors and visitors comply with the company's safety and health program;
- Conduct regular safety inspections and submit written reports to management upon completion. Determine what corrective action is needed when you find safety discrepancies. Establish a time frame to correct them;
- Personally investigate all accidents and incidents, and determine the accident's cause. Correct any unsafe practices or conditions that might cause recurrence;
- Promptly complete and forward all accident-report forms to appropriate company officials;
- Maintain the company's job-site medical kit as required by OSHA regulations;
- Conduct regular employee safety meetings or toolbox talks;
- Maintain all postings and written safety policies and programs as required. Ensure the hazard communication program and material safety data sheet book are current.

Fire prevention and protection

Fires require three elements to burn — fuel, oxygen and heat. A construction site contains all three elements, although their quantities and locations change constantly.

Examples include:

- Fuel sources — gasoline, diesel fuel, paint thinner, piles of wood scraps, cardboard, straw, paper and other trash;
- Heat sources — electricity, cutting, welding, cigarettes, roofers' tar kettles and temporary heaters;
- Oxygen — present both in the atmosphere and as a compressed gas.

Fuel sources are the easiest element to remove. Concentrate on cleanup by disposing of scrap before it accumulates. Store flammable liquids in listed or approved self-closing containers keeping all flammable and combustible material away from all heating devices or heat sources. Shut off engines to allow hot parts to cool before refueling.

Every worker on a construction site should know:

- Locations of fire extinguishers;
- How to operate fire extinguishers and the hazards involved with the beginning stage of firefighting;
- Classifications of fire extinguishers and classes of fires;
- Location(s) of telephones and how to call the fire department;
- Who to notify and how to ensure that a used fire extinguisher is recharged.

Fire and fire extinguisher classification Types of fires

- **Class A** — Wood, rubber, paper, cloth and most plastics. The most effective type of extinguishing agent is water or a solution containing large concentrations of water because the quenching-cooling effect reduces the burning material's temperature below its ignition point;
- **Class B** — Flammable or combustible liquids such as petroleum products and greases. A blanketing-smothering effect of an agent that excludes oxygen or inhibits the chemical chain reaction such as carbon dioxide, dry chemical, halon or foam, are most effective.
- **Class C** — Electrical. Carbon dioxide, dry chemical and halon are examples of nonconductive extinguishing agents used to snuff out electrical fires.
- **Class D** — Combustible metals, such as aluminum, magnesium, zirconium and titanium. The use of water and other conventional types of extinguishing agents are ineffective and may even cause a violent reaction. Extinguish these fires with specially prepared agents.

Fire extinguishers

The ABC dry chemical fire extinguisher is the most commonly found extinguisher on construction job sites. Maintain firefighting equipment in good operating condition and periodically inspect it. Immediately replace defective equipment. Conduct an annual maintenance check of the fire extinguisher and record the maintenance date. Retain this date for one year after the last entry or the life of the shell, whichever is less. Regular inspection of the fire extinguisher allows for replacement or repair as needed.

Provide a fire extinguisher rated not less than 2A for each 3,000 square feet of protected building area or major fraction thereof. Mount each fire extinguisher on the wall and mark its location. The travel distance from any point of the protected area to the nearest fire extinguisher cannot exceed 100 feet.

Provide one or more fire extinguishers rated not less than 2A on each floor of a multistory building with at least one located near a stairway. Provide a fire extinguisher rated not less than 10B wherever you use more than five gallons of flammable or combustible liquids, or five pounds of flammable gas on the job site.

General rules for fire extinguishers

Use fire extinguishers in the upright position. If possible, discharge the fire extinguisher about 8 feet from the fire with the wind at your back. Attack the fire as you advance.

Quick work is important because the discharge time to empty the extinguisher's contents is usually about one minute. If you are out in the open, be prepared to retreat in case of a sudden change in wind direction. In enclosed areas, you may be on your knees with your head no higher than the upright extinguisher you are using. The best air to breathe will be between knee level and the floor.

With water-type extinguishers, direct the stream at the base of the fire and move forward. When using dry-chemical extinguishers, attack the nearest edge of the fire and go forward, moving the nozzle rapidly with a side-to-side sweeping motion. When fighting flammable-liquid fires with carbon dioxide extinguishers, use the carbon dioxide in a sweeping formation to clear the flames off the burning surface. Begin fighting at the near edge of the fire and gradually move forward, waving the discharge slowly from side to side. When using this extinguisher in an enclosed area, be careful because carbon dioxide may result in an oxygen deficiency within the area.

When two or more persons use fire extinguishers on a flammable liquid fire, they must act as a team, working from the same side of the fire and making sure it does not re-ignite between them.

Emergency action plans

The employer is responsible for preparing and implementing plans to ensure employee safety in the event of fire or other emergencies such as tornadoes, floods or other natural or manmade disasters. The elements of this plan include:

- Emergency-escape procedures and emergency escape-route assignments;
- Procedures for employees who remain to operate critical equipment before they evacuate;
- Procedures to account for all employees after emergency evacuation is complete;
- Rescue and medical duties for employees who perform them;
- Establishing the preferred means of reporting fires and other emergencies;
- Names and regular job titles of persons employees can contact for further information or explanation of duties under this plan.

Fire alarms

In the event of a fire, make a process available for calling the fire department quickly. Post signs instructing personnel how and where to turn on an alarm, whether by telephone, siren or horn. Finally, ensure firefighters have easy access to all parts of the project.

Training

Prior to implementing the emergency action plan, the employer will designate and train sufficient personnel to assist in the safe and orderly evacuation of employees. The employer will also review the plan with each employee when developed and whenever an employee's duties under the plan change.

For further detailed information on fire prevention and protection, consult OSHA's Construction Standards, 29 CFR Subpart F, 1926.150 and 1926.151.

Accident and incident investigation

Accident and incident investigation is primarily a fact-finding procedure. The facts revealed can help to prevent similar accidents. Properly handled, these investigations can also increase safety and health awareness by all employees.

Obviously, you can reduce injuries and illnesses by eliminating unsafe or hazardous situations. You may never be able to prevent all accidents. However, it is easier and more effective to make physical and cultural changes to eliminate and reduce hazards than it is to teach employees to work around these hazards.

Minimize your hazards. You can do this by changing equipment, installing guards, changing work and material-handling procedures, and substituting less-hazardous processes and chemicals. When investigating accidents, identify the unsafe or hazardous conditions and other pertinent facts. Make efforts to reduce the hazards.

When an accident occurs, its severity can be a matter of chance. Assume, for example, that two employees are working in an area where carbon monoxide is escaping into the atmosphere from a propane heater. One worker, a laborer, slumps to the floor, is removed from the area and quickly revived. The other, a carpenter, is on a ladder replacing acoustical tile. He falls to the floor, strikes his head and dies. Both accidents had the same basic causes, but one led to a minor non-disabling injury and the other to a fatality.

You can use even minor injuries and incidents that do not involve property damage or personal injury to reveal hazards that, if corrected, can help to prevent serious injuries. Investigate these incidents with the same thoroughness as serious injuries and fatalities.

Once you identify unsafe or hazardous conditions or procedures, take immediate action to eliminate or reduce the hazard as much as possible.

With those objectives in mind, the procedures that you should follow immediately after an accident include:

- Ensuring any injured person receives proper medical care;
- Promptly initiating the accident investigation. Maintain all of the conditions that existed at the time of the accident until the investigation is conducted. Allow no one to perform the job function that resulted in the accident or injury until the matter is cleared up;
- Having the supervisor under whose direction the employee worked or the supervisor in whose area the accident occurred conduct the investigation. Persons involved should submit their findings in writing in an accident investigation report. Use a form similar to OSHA No. 301 (*Supplementary Record of Occupational Injuries and Illnesses*) or BWC's *First Report of an Injury, Occupational Illness or Death* (FROI-1).

Have a responsible member of management review reports and take corrective action. The organization should review accident-investigation reports. Forward reports to anyone who is directly involved in making changes. In the case of very serious accidents, you also may appoint a fact-finding committee to thoroughly investigate the accident and submit a report.

Include photographs, sketches or other exhibits in the investigation report to help clarify the facts of the accident. Include detailed statements from all witnesses to the accident as well as others who can contribute information.

Evidence shows the biggest mistake in accident investigations is the lack of follow-up action to correct the conditions and/or behaviors that led to the accident. In your report, note the specific actions that you will take, the name of the management representative responsible for completing each item and the deadline for completion. Later, the responsible member of management should follow up to ensure action is taken. Unless you follow this procedure, the entire investigation has little value.

After the investigation is completed and corrective action taken, bring the findings to the attention of all employees in the accident area and those working in similar areas. Use these findings to provide additional safety training and make operational changes based on the facts involved in the accident. Also, inform employees about actions taken to protect their safety and health, and prevent similar occurrences.

Job safety analysis

Job safety analysis (JSA) is a simple but comprehensive means to determine the hazards involved, as well as potentially unsafe procedures most likely to occur in a given task or job. Employers use this analysis is used to reduce hazards and to train workers in safe procedures. A JSA is essential to any effective safety program. It should be one of the first steps you take when there is a possibility of worker injury. You can determine the best way to perform a job efficiently and safely by carefully studying each element involved in its procedure.

When considering a JSA, first analyze the tasks with the worst accident experience or the greatest potential to cause injury to workers. Then, analyze the tasks with lesser risks. By establishing priorities, you can use the JSA as a focal point of the accident-prevention program.

A JSA serves two valuable purposes. It provides a systematic means of taking advantage of workers' previous experience and knowledge to establish safe work procedures. It also promotes employee involvement in establishing safety awareness while developing safe work practices.

To accomplish these objectives, management should:

- Understand the objectives and means of analyzing jobs, element by element;
- Establish a plan for analyzing job elements on a regular basis;
- Analyze statistical data, accident experience, and management and employee experience to develop the sequence of job elements to use;
- Devise an action plan to control hazards identified with a timetable for implementing the plan;
- Have supervisors review the results of all JSAs covering job elements for which they have supervision;
- Provide supervisors with a copy of approved safe job procedures developed because of a JSA;
- Train workers in accordance with the conclusions of the JSA, both initially and each time the task is analyzed;
- Have supervisors regularly observe workers to ensure they follow safe work practices;
- Give supervisors the authority and responsibility to enforce adherence to safe work habits.

In practice, this means the person conducting the JSA must be competent, qualified and practical in assessing each job element. He or she must follow a management-approved breakdown of each job to be analyzed.

As you conduct the JSA, it is important to search for the hazards of each element — whether produced by the environment or connected with the job procedure. When done properly and thoroughly, this will help to make the entire job safer and more efficient.

To assist in gathering the necessary information, refer to the Job Safety Analysis form on page 80 to ensure you use consistent and acceptable procedures.

The JSA procedure, if properly developed and maintained, is an important tool for maximizing safety and efficiency. Make the JSA available on the job site.

Safety observations

The principal purpose for safety observations is to determine if employees are at risk of injury. Many construction injuries result from operational errors. Good safety observations and coaching can reveal and correct these deviations before they lead to accidents.

The following are key elements required for good safety observations:

- Make observations when you can concentrate all of your attention on safety;
- Observe the work area, making mental and written notes of any potentially dangerous situations or conditions;
- Whenever possible, take immediate corrective action to prevent reoccurrence.

Planned safety observations are effective because they focus your attention on the safety aspects of the job. Thus, they point to those conditions requiring immediate action. In addition, the observations may indicate the need for more extensive training. They also provide a record of unsafe procedures or conditions for further reference.

Non-routine tasks

A non-routine task is one that is not normally performed as part of a job assignment. Tackling a non-routine task takes preparation — the less familiar the task, the more planning required to do it safely. Prior to starting work on such a task, give each affected employee information concerning the hazards on-the-job. The immediate supervisor will determine what hazards may be present and/or created. In addition, the supervisor will communicate this information to appropriate employees.

This information should include, but is not limited to:

- Specific hazardous conditions;
- Protective/safety measures the employee must take, including special equipment;
- Measures the company has taken to lessen the hazards.

Upon completion of each non-routine task, document and distribute information to supervisors concerning the hazards encountered during the task. This will ensure supervisors communicate the proper information concerning this task to the affected employees. Keep this documentation on file for future references.

When implemented correctly, the Job Safety Analysis form on page 80, will assist supervisors in defining the hazards in a non-routine task.

Technical support

Hazard communication standard

The purpose of OSHA's Hazard Communication Standard (1926.59) for construction is to ensure employees are aware of and protected from hazardous substances in the workplace. It requires employers to evaluate the presence and potential hazards of chemicals and other substances employees may be exposed to in their workplaces.

Employers must pass on this information to employees through training, material safety data sheets (MSDSs), labels and other identifying means.

Inventory

To meet the standard's requirements, employers should compile a master list of substances used in the facility and on the job sites. At this point, do not make judgments as to whether a substance is hazardous — list everything. You must obtain information for this list from several sources, including:

- A complete inventory of the office, warehouse, job sites and any other areas where the company may store materials;
- Materials the company may use regularly that are not on hand at this time; check with other company offices, such as purchasing or receiving for information;
- Janitorial and office supplies used by company personnel.

MSDSs

Use the inventory to contact manufacturers and/or suppliers to obtain MSDSs for all the identified substances. If a manufacturer or supplier says the material is not hazardous, ask for a letter or other documentation, and keep it on file.

An MSDS describes a single substance such as gasoline or a mixture of substances, like concrete. An MSDS must provide the following information:

- Substance name, both chemical and common;
- Chemical and physical characteristics, including appearance and odor;
- Physical and health hazards;
- Primary routes of entry into the body;
- Recommended and required exposure limits;
- Known control measures;
- Measures to protect workers during use or cleanup of the substance;
- First-aid measures to use in case of accidental exposure;
- Name, address and telephone number of the chemical manufacturer or other responsible party;
- Preparer or distributor's name and the date prepared.

An MSDS for a substance containing a mixture of ingredients also must include the chemical and common names of ingredients amounting to 1 percent or more when it constitutes a health hazard; or 0.1 percent if the ingredient is a carcinogen. The manufacturer or distributor must disseminate new information about hazards or protective measures within three months of its appearance.

Maintain copies of MSDSs in a central file and also in the area where workers use the substance. Have MSDS files easily accessible to employees at all times while they work with the substances. Use the MSDS to determine whether the substance is hazardous. The OSHA Standard 1926.59 provides guidance for this determination.

Labeling

The hazard communication standard requires all containers be labeled with the following information:

- The substance's chemical and common names;
- Physical and health hazards, including target organs;
- Manufacturer or distributor's name and address.

Maintain these labels in a legible manner employees can understand. Teach this in your training program.

Training

Employee training is the key to a company's successful implementation of the OSHA Hazard Communication Standard. You can divide this training into two categories, general and specific.

Give general training to all company employees, whether or not they will be exposed to hazardous substances in their workplaces. Any qualified trainer may conduct general training during employee orientation. Training includes:

- Awareness of the hazard communication standard and its provisions;
- Information on the company's hazard communication program;
- How to read MSDSs and labels.

Give specific training to employees who will or may be exposed to hazardous substances in their workplaces. A foreman or supervisor who is familiar with the hazardous substances in the workplace should conduct this training. It includes:

- Identification of hazardous substances in the workplaces;
- Measures to protect against exposure to the hazardous substances;
- How to read the labels on chemical containers;
- Location of MSDSs for hazardous substances.

Document all training. Retain sign-in sheets for training sessions and include the date, subject covered and instructor.

Hazardous non-routine tasks

Construction companies are generally not aware of the types of hazardous non-routine tasks when writing and implementing their safety plans. Therefore, you should include a statement that when certain tasks arise that were not known at the time the plan was written, the company will develop a procedure to accomplish these tasks.

Informing outside contractors

(multi-employer work sites)

Employers in the construction industry generally share a work site with a number of other employers. The standard requires the exchange of information among employers concerning substances brought onto the work site that may pose a hazard. This exchange should include:

- Substances you will store or use on-site;
- Hazards to which other employers' workers may be exposed;
- Methods that other employers can use to protect their workers;
- Other employers' accessibility to the appropriate MSDSs for the hazardous substances.

Outline this procedure in the company's hazard communication plan.

Written hazard communication plan

The hazard communication standard requires employers prepare and implement a written procedure detailing how they will accomplish the standard's requirements. This plan should include company-specific means to accomplish the objectives set out by the topics included in this chapter. Once completed, you must make this plan available to all employees, employees' designated representatives and OSHA's assistant secretary of labor or designated representative.

OSHA References

1926.59 Hazard communication

Confined space entry

This chapter describes the procedures and responsibilities for employees to safely enter confined spaces. It distinguishes between confined spaces that require entry permits and those that do not.

Requirements mentioned in this chapter are contained in the confined-space standard for general industry. OSHA has not issued a separate confined-space rule for construction, but the regulations in

the respirator standard (29CFR 1910.134) regarding entry into atmospheres immediately dangerous to life and health (IDLH) apply to construction.

Responsibility

The employer will identify and evaluate all confined spaces and whether entry requires a permit. It is the employer's responsibility to take all precautionary measures necessary for safe confined space entry and to instruct employees in the nature of hazards involved, precautions to take, proper use of PPE and any emergency equipment required. The entry supervisor in charge will have the responsibility of initiating the confined space entry permit before allowing anyone into the confined space. Employees are responsible for following the guidelines set by management.

Definitions

A confined space:

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

A permit-required confined space has one or more of the following characteristics:

- 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 that slopes downward and tapers to a smaller cross-section;
- Contains any other recognized serious safety or health hazard.

A hazardous atmosphere is one that may expose employees to the risk of death, incapacitation, impairment of ability to escape unaided from a permit space, injury or acute illness from one or more of the following causes:

- Flammable gas, vapor or mist in excess of 10 percent of its lower flammable limit (LFL);
- Airborne combustible dust at a concentration that meets or exceeds its LFL;
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- Atmospheric concentration of any substance for which a dose or a permissible exposure as limit exists as published in 29 CFR 1910 Subpart Z and could result in employee exposure in excess of its dose;
- Any other atmospheric condition that is IDLH.

Examples of confined spaces may include, but are not limited to:

- Excavations;
- Sewers;
- Pipelines;
- Storage tanks;
- Underground utility vaults;
- Pits;
- Ventilation and exhaust ducts;
- Tunnels;
- Boilers;
- Bins;
- Vessels.

Hazards

Examples of commonly encountered hazards are:

- Toxic air contaminants;
- Flammable gas;
- Insufficient oxygen;
- Electric shock from portable lights, tools or assorted electrical equipment;
- Physical hazards, such as slipping, falling and falling objects;
- Physical deficiencies due to hot or cold temperature extremes;
- Inadvertent activation of mechanical equipment, such as agitators and mixers;
- Inadvertent starting of pump and/or opening valves leading in or out of tanks or vessels.

Training

The employer will provide adequate training in pre-entry and entry practices to all affected employees, and document the completed training.

Permit-required confined space procedure

Pre-entry

- Specify acceptable entry conditions.
- Identify and evaluate the hazards of permit spaces before employees enter.
- Conduct periodic or continuous testing the entire time the confined space is occupied. When testing for atmospheric hazards, test first for oxygen, then combustible gases and vapors, and then for toxic-air contaminants.
- Isolate the permit space.
- Purge, flush or ventilate atmospheric hazards as needed to make inert.
- Implement measures necessary to prevent unauthorized entry.
- Provide an entry permit identifying the space to be entered, purpose of entry, date(s), authorized entrants and other pertinent information.
- Provide barriers to protect entrants from external hazards.
- Provide trained attendants capable of rescuing or summoning rescuers outside the space.
- Provide the following equipment at no cost to employees, maintain that equipment properly and ensure employees use it properly:

  1. Testing and monitoring equipment;
  2. Ventilation equipment;
  3. Communications equipment;
  4. PPE;
  5. Lighting equipment;
  6. Barriers and shields;
  7. Equipment for safe entrance and exit;
  8. Rescue and emergency equipment;
  9. Any other equipment necessary for safe entry into and rescue from permit spaces.

Entry

If a hazardous atmosphere is detected during entry, each employee should leave the space immediately. Then evaluate the space to determine how the hazardous atmosphere developed. Implement measures to protect employees from the hazardous atmosphere before anyone seeks subsequent entry. Continuous forced-air ventilation is required when alternative entry is permitted under 1910.146 (c) (5). Test the atmosphere within the space at various levels to ensure the continuous forced-air ventilation is preventing the accumulation of a hazardous atmosphere.

Permit-required confined space entry practices

(Review Section (g) (3) of 1910.134 for complete requirements.)

- Station one or more attendants at the access opening at all times when employees are working inside. The attendants must be in constant communication with the entrants.
- No one should enter a confined space under any condition without an outside attendant who is trained and capable of rescuing the entrant.
- The attendants must never enter the confined space without self-contained breathing apparatus (SCBAs) or equivalent protection. (This is the cause of most confined space entrant deaths.)
- Only use non-spark-producing tools in a potentially explosive atmosphere.
- To reduce the risk of electrical shock, consider using low-voltage (12 volts or less) electrical lighting and equipment, or portable battery lights.
- Use only approved, grounded electrical equipment.
- Consider using air-operated tools where possible.
- Do not take cylinders of oxygen and other gases, except SCBAs, into tanks or vessels.
- Use retrieval systems or methods, such as a safety harness with lifeline (as required by 1910.146), except where it creates a hazard.
- Complete and post a confined space entry permit at the entry point.

Use the following personal protective clothing and equipment for employee protection when applicable:

- Safety harness with lifeline (except where it creates a hazard itself);
- Air-line respirator (with escape bottle in IDLH atmospheres) or SCBA equipment;
- Protective suit;
- Safety glasses, hard hat, rubber gloves or other equipment appropriate for the environment.

These procedures are intended as a minimum precaution; you should carefully consider each entry. Entering confined spaces, whether permit-required or not, may result in injury or death. Circumstances may change; a non-permit required confined space might become permit-required and vice versa.

OSHA References
1910.146 Confined space
1910.134 Respiratory protection (industry)
1926.21 (b)(6) Training
1926.55 Gases, vapors, fumes, dusts and mists
1926.103 Respiratory protection (construction)
1926.353 (b) and (c) Welding and cutting
1926.651 (g) and (h) Excavations
1926.800 Underground construction
1926.956 Underground lines

Hearing conservation

Employers in the construction industry are required to use feasible engineering and administrative controls as the primary means of reducing excessive sound levels. Where those controls are not feasible, employers should provide their employees with ear-protection devices. Make sure employees wear the protective devices.

Noise can be more than a nuisance. It can cause you to lose your hearing — either temporarily or permanently. The severity of hearing loss depends on:

- How loud the noise is;
- How high-pitched the noise is;
- How long you are exposed to the noise — hourly, daily, weekly, monthly;
- The age of the person exposed to the noise;
- Whether the noise is continuous (impact every second or less) or intermittent;
- Individual susceptibility of the person exposed to the noise.

Permissible noise exposure is based on two factors — intensity of sound and the length of exposure. Hearing loss can result when small hair cells in the inner ear are damaged by repeated exposure to noise. These hair cells bend in response to the amount and intensity of the noise. Too much noise too often stresses the hair cells to the point where they no longer spring back to their original position. Over time, the hearing loss becomes more noticeable.

Wearing hearing protection, even when not legally required, can prevent this irreversible loss of hearing.

Hearing protection is generally available in three categories: earmuffs, canal caps and ear plugs. Earmuffs, which consist of two acoustically insulated cups connected with a metal or plastic band, are placed over the outside of the ears. Canal caps provide protection by sealing off the opening in the outer ear. They consist of two small rubber caps connected together by a semicircular band. The band is fitted behind the neck or under the chin, and the caps are positioned over the canal openings.

There are three categories of earplugs: molded plugs, custom plugs and formable plugs. Custom-molded plugs are manufactured from silicone rubber or plastic and are usually available in small, medium and large sizes. Formable plugs are made from resilient materials, such as expandable plastic foam and wax-impregnated cotton. The plug material is compressed and inserted into the ear. After a few moments, the material expands, sealing off the ear canal.

Employee training in the proper selection and use of hearing protection is an important part of an effective hearing-conservation program.

The Environmental Protection Agency's (EPA's) noise reduction rating (NRR) indicates the level of noise reduction specific types of ear protectors provide. The EPA establishes NRRs on the basis of laboratory tests. Attenuation levels during use are usually less than those achieved in the laboratory.

The *OSHA Industrial Hygiene Technical Manual* provides some guidance for determining the acceptability of ear protection in the field. Using

OSHA's method, subtract seven decibels (dB) from the published NRR to compensate for spectral uncertainty, and divide the result by two to provide a safety factor. Thus, ear protectors with a published NRR of 27 dB will have a field rating of 10 dB ([27-7] divided by 2 = 10).

Employers should do audiometric testing annually on workers exposed to excessive noise levels.

OSHA References
1926.52 Occupational noise exposure
1926.101 Hearing protection

Mobile equipment

Below are general principles for safe, productive motor-vehicle operation, including those that operate within an off-highway job site, not open to public traffic.

Safe, productive motor-vehicle operation requires:

- A qualified operator — a person trained and experienced in operating the vehicle to which he or she is assigned. This person should be in good physical condition with his or her judgment unimpaired by drugs, alcohol or fatigue;
- An operable, well-maintained motor vehicle — a vehicle in good mechanical condition with all controls identified and fully functional;
- An operator's guide — to give the operator an idea of what is expected, such as smooth operation with speeds consistent with the existing job site. Always follow the established traffic patterns and haul routes for the job site;
- A parking/shutdown procedure — to secure the vehicle. Park on as level a surface as possible and as applicable: parking brake set; wheels cramped up-slope and/or blocked; bowl, bucket or blade on the ground and with the tampering or vandalism potential minimized;
- A daily, pre-operation inspection system — to verify the vehicle's condition using a check list specific to the vehicle or using a general, logical system. The operator should:

1. Check fluid levels (cooling, oil, hydraulic, fuel, etc.);
2. Be sure the emergency brake and parking brake are set, and the transmission is not in gear;
3. Start the engine and allow the various systems to warm up to operating temperatures;
4. Check the vehicle to ensure all glass, mirrors, lights and reflectors are clean and intact;
5. Check tires to ensure treads and sidewalls are in good condition, and they are properly inflated (if pneumatic). Check grousers, idlers and drive sprockets of tracked vehicles;
6. Check the vehicle's controls for their proper function (horn, windshield wipers, steering, transmission, etc.). If all is in order, proceed.

OSHA References
1910.176 Handling materials
1926.600 Equipment

Powered industrial trucks — fork lifts

Powered industrial trucks, commonly referred to as fork lifts and rough terrain material handlers, are vehicles of necessity for many companies on construction job sites. However, they also are factors in many injuries: sprains and strains, amputations, bone fractures, burns, contusions, and even fatalities.

Because of an increase in injuries, OSHA mandated that the construction industry provide adequate, organized and documented training for all employees using powered industrial trucks. The training should be based on the operator's prior knowledge and skill, type of powered industrial truck to be used, potential hazards present and the operator's demonstrated ability to operate the powered industrial truck.

Employers should require refresher training in the event of an accident, a near-miss incident or observation of the operator using the powered industrial truck in an unsafe manner. You also should hold refresher training when there are changes in the workplace, new hazards present, or when the operator is assigned to a different type of powered industrial truck.

Complete an evaluation of each operator at least once every three years, and document and keep on file all initial and refresher training. A basic outline of elements you should incorporate into a training program for powered industrial trucks includes:

- A site-specific written training program;
- Training to cover the minimum required elements, including:
  1. Review of the written safety policy related to powered industrial trucks;
  2. Who, when and how initial and refresher training will be conducted;
  3. Tests or examination documentation;
  4. Attendance records and results;
- Written program describing the hands-on testing procedure, including:
  1. Who performs the evaluations;
  2. Specific training the evaluator received;
  3. Hands-on driving exam representative of the actual work environment;
  4. Pre-operational safety check of the equipment incorporated into the driving evaluation;
- The type of physical examination for operators and retention of the records;
- The company issuance of authorization cards, or identification cards, after completion of training;
- The specific measures the company has incorporated to handle novice operators.

OSHA References
1910.178 Powered industrial trucks
1926.602 Material handling equipment

Crane operations

The essence of safe, efficient crane operation is keeping the crane and its load under control at all times. Certain basics apply to every crane operation.

Job planning

During the initial job-planning stage of the construction operation, the company should decide what its crane requirements will be, and then plan for a crane or cranes adequate to accomplish the job. When selecting a crane, consider a variety of factors other than crane capacity. These may include terrain, ground conditions, weather conditions, crane mobility and/or overhead utilities.

Crane

The crane should be in good mechanical condition with sufficient lifting capacity to perform the work required. The crane also should have documented periodic (usually annual) inspections and documented frequent (daily to monthly) inspections. Make sure lifting charts and operator manuals are available on-site.

Operator

A qualified operator is experienced in operating the crane; knowledgeable in methods, means and limitations of crane use; able to conduct frequent inspections of the crane; and able to read and interpret crane load charts and operator's manuals. This operator should be in good physical condition with judgment unimpaired by drugs, alcohol or fatigue.

Signaler

The person giving signals must be familiar with the signals contained in the American National Standards Institute (ANSI) standard B30.5. You may use a telephone or radio for signaling. Whatever system you use, signals must be clearly visible or audible at all times, and the operator should make no response unless signals are clearly understood. The operator and signaler will agree in advance on any special signals to be used while operating the crane. Special signals should not conflict with standard signals.

Load
To properly plan the lift, you should know the weight of the load, including rigging, headache ball, load line, etc. If the weight is unknown, a knowledgeable person should calculate it. Other factors you may need to consider are the center of gravity and attachment points for rigging.

Rigging
Rigging consists of the slings, shackles and spreaders that attach the load to the crane and are designed for the load. Like the operator, the rigger should be qualified through training or experience to determine the best method and equipment to secure the load to the crane. This is one area of crane operations that is often overlooked. You're wrong to assume that just anyone can be a rigger.

Lift
Begin the lift by ensuring the crane is level and on a base with sufficient strength to support the load and pressures generated during the lift. Be sure the swing radius for the boom and counterweight is clear of people and equipment. Check for any overhead obstructions, and make sure that you can maintain the clearance for electrical utilities throughout the lift.

Perform a trial lift where the load is picked up only a few inches from the ground or the staging surface and held. This lets the operator and rigger observe if the choices of crane configuration, line parts, rigging and rigging equipment are correct. If the load shifts or something has been overlooked, land the load and stop the operation until you make adjustments.

Accomplish the lift in a conservative manner using smooth, steady motions, not too fast, with the load under control at all times. Do not make sudden changes of direction or speed. During the lift, never allow the load to swing over personnel. Use taglines to control the load.

References
29 CFR 1926.550 Cranes and Derricks
29 CFR 1926.251 Materials Handling
Ohio Administrative Code (OAC) 4123:1-3-07 Cranes, Hoists and Derricks
ANSI/American Society of Mechanical Engineers (ASME) B30.5
Crawler, Locomotive and Truck Cranes
Bob's Rigging and Crane Handbook

Hand tools
Construction workers are considered experts in the selecting and using hand tools. Yet, every year workers are injured on the job as a result of hand-tool accidents. Hand tools make jobs easier and more efficient. The worker, however, must choose the correct tool for the job being performed, ensure the tool is in good condition, and use the tool properly. Common types of hand tools include striking tools, turning tools, metal-cutting tools, woodcutting tools, screwdrivers, pliers, knives and crowbars.

General requirements
A provision for a tool-maintenance procedure is one of the most important factors in any hand-tool safety program. Extensively used hand tools require careful and frequent inspection to maintain them for safe use.

When hand tools are not sharpened and dressed, inefficient cutting and glancing off material often cause injuries. Straighten bent shafts, replace broken handles, and discard tools you cannot repair. Immediately remove hand tools with defective handles from service.

Use PPE to protect a person using hand tools who is exposed to hazards, such as falling, flying, abrasive and splashing objects, or exposed to harmful dust, fumes, mists, vapors or gases. Follow guidelines described in the PPE section on page 52.

Striking tools
Striking tools include carpenter hammers, sledgehammers, riveting hammers and rubber or rawhide mallets. To enhance safety, follow these guidelines:

- Choose the most appropriate striking tool for the task. Use carpenter hammers for driving and drawing nails, sledgehammers for driving stakes and pins, riveting hammers for sheet

metal and mallets for driving other hand tools, such as a chisel;
- Before using any kind of striking tool, make sure the face of the tool is free of oil or other material that can cause it to glance off the object being struck;
- Check wooden handles to ensure they are free of cracks and splits. Replace cracked or split handles;
- Check hammer heads to make sure they are not loose or chipped.

Turning tools

Turning tools, better known as wrenches, are used to exert a twisting force on bolt heads, nuts and pipes. Wrenches include open-end, box, socket, torque, lockjaw and pipe wrenches. Safety principles for use of turning tools include the following:

- Place the jaws on the nut and pull the wrench toward your body. This method will help maintain leverage;
- Use socket wrenches for hard-to-reach places, and to loosen and tighten nuts and other fasteners with the aid of a ratchet apparatus;
- Use box wrenches, which have box openings at both ends, to free frozen nuts. Each opening is a different size;
- Use open-end wrenches, which are made with a 15-degree opening, for a variety of purposes. Do not use these wrenches to free frozen nuts;
- When using wrenches, never use hammers or extension pipes to gain leverage on a wrench;
- When using a wrench, always ensure that the gripping surfaces are clean and oil free to prevent slipping;
- It is essential to use a wrench that fits the nut or pipe properly. Be careful when using adjustable wrenches, often called knuckle-busters, because this wrench can slip if not adjusted snugly to fit the nut.

Metal-cutting tools

Snips and shears, bolt-cutters, hacksaws, chisels, and files are metal-cutting tools. Below are guidelines for the proper use of metal-cutting tools.

- Oil and adjust snips and shears to make cutting easier, and to produce surfaces that are free of burrs.
- Make sure fingers are clear of the jaws and hinges when using bolt-cutters.
- Never use cutters near live electrical circuits.
- Use hacksaws to cut metal that is too heavy for snips or bolt-cutters. Install hacksaw blades so that the teeth point away from the handle of the saw. The main danger in using hacksaws is injury to the hands if the blades break. To operate a hacksaw properly, apply pressure on the downward stroke. After the forward pressure, stroke, slightly lift the saw and lightly pull it back in the cut to protect the teeth. Twisting the blade or applying too much pressure may break the blade and result in hand or arm injuries.
- In most cases, you can determine a hand tool's safety by the condition of its cutting and striking ends, particularly in the case of sharp-edged and pointed tools, such as cold chisels. A cold chisel with a mushroomed or cracked head is a common cause of injury. When a mushroomed head is struck, chips may be knocked off the chisel. You can redress a mushroomed head to its original shape.
- Keep files sharp when not in use by wrapping them in paper or cloth to protect the teeth. A file with a tongue should have a handle attached; make sure that it fits tightly with the file.

Woodcutting tools

Woodcutting tools include handsaws, planes and wood chisels. Safety tips for these tools include the following:

- Keep handsaws sharp and free of rust to prevent them from binding or jumping and causing injuries. Always make saw cuts directly across the material, with a slow, careful downward stroke. Crowding or forcing the saw through the cut may cause it to buckle or fly out and injure the user;
- Keep the cutting edge on wood planes sharp;
- Store planes in a rack designed to protect the cutting edges from damage and workers from injury;
- Hold material being planed securely in a vise, clamp or other holding device;
- When using a chisel, never cut toward yourself;
- Always keep the cutting edge sharp.

Screwdrivers

Screwdrivers are designed to drive and remove screws. Never use screwdrivers as pry bars, scrapers or punches. Guidelines for the safe use of screwdrivers include the following:

- Use the proper size screwdriver so the blade properly fits the screw. This prevents the screw slot from burring, which can cause injury;
- Keep screwdriver tips away from live electrical circuits. Never put any part of your body in front of the screwdriver blade tips while working.

Pliers

Pliers are used for cutting, as well as holding and gripping small articles. Guidelines for safe use of pliers include the following:

- Do not use pliers to cut hard wire unless they are specifically manufactured for this purpose;
- When using pliers, always cut at a right angle;
- Never use pliers as hammers or to remove nuts and bolts.

Knives

Safely use knives by following these guidelines:

- Cut away from the body, or keep the body clear from cutting and wear protective clothing. Avoid jerky motions, sudden strains or other movements that might cause loss of balance.
- Keep a knife in a sheath or holder when carrying it on the job. Never leave knives lying on benches or shelves.
- Keep knives sufficiently sharp to do the work for which they are intended.

Crowbars and prybars

Maximize the safe use of crowbars by following these guidelines:

- Use the correct size crowbar for each job.
- Do not use makeshift tools (cheaters) such as pipe lengths, iron bars or extensions for leverage. To prevent slips, place a block of wood under the head of the crowbar;
- When using spud bars, ensure a firm grip on the handle and stand at the side of the bar to prevent injury caused by recoil.

Power tools

Portable power tools present greater hazards than hand tools. Nearly all power-tool accidents are caused by improper handling and poor maintenance. Use power tools only after becoming thoroughly familiar with their controls, safety requirements and operating procedures. The categories under which most power tools fall are electric power tools, fuel-powered hand tools, fuel-cell tools, pneumatic power tools and hydraulic power tools.

General safety precautions

Employers must provide employees who use hand and power tools, and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases with the proper personal protective equipment. (See the PPE section on page 52.)

You can prevent hazards involved in the use of power tools by following five basic safety rules:

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job.
- Examine each tool for damage before use.
- Operate according to the manufacturer's instructions.
- Provide and use the proper protective equipment.

Employees and employers have a responsibility to work together to establish safe working procedures. If an employee encounters a hazardous situation, correct it immediately.

Guards

You need to safeguard the hazardous moving parts of a power tool. For example, you must guard belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment if such parts are exposed to contact by employees.

Provide guards, as necessary, to protect the operator and others from the following:

- Point of operation;
- In-running nip points;
- Rotating parts;
- Flying chips and sparks.

Never remove safety guards when using a tool. For example, you must equip portable circular saws 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 you withdraw the tool from the work.

Safety switches

Equip the following hand-held powered tools with a momentary contact on-off control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than two inches in diameter, disc and belt sanders, reciprocating saws, saber saws and other similar tools. You also may equip these tools with a lock-on control provided that turn-off can be accomplished by a single motion of the same finger or fingers that turn it on.

Electric tools

Employees using electric tools must be aware of several dangers; the most serious is the possibility of electrocution. Examples of electric power tools are portable drills, grinders and saws.

Among the chief hazards of electric-powered tools are burns and shocks that 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, or be double insulated.

Follow these general practices when using electric tools:

- Protect tools with a ground fault circuit interrupter;
- Operate electric tools within their design limitations;
- Wear gloves and safety footwear when using electric tools;
- When not in use, store tools in a dry place;
- Do not use electric tools in damp locations;
- Work areas should be lit well;
- Never remove the third prong from the plug.

Gasoline powered tools

Masonry, concrete-cutting and chain saws are examples of fuel-powered tools. Guidelines for the safe use of these tools include:

- Ensuring the tool has stopped and is cool before refueling, servicing or adjusting;
- Using caution when handling fuel by moving the fuel at least 10 feet from the cutting machine before starting the engine;
- Keeping the handles dry, clean and free of oil or fuel;
- Making sure all guards are on and in good working order;
- Operating the machines only in well-ventilated areas; failure to work in a well-ventilated area can lead to serious injury or death;
- Wear appropriate PPE including eye and hearing protection.

Powder-actuated tools

Exercise caution when using powder-actuated tools. Proper use of powder-actuated tools include:

- Ensuring employees are trained for the specific tool they will use;
- Inspecting and testing each powder-actuated tool in accordance with its manufacturer's recommended procedure before every work shift to ensure no defects exist, and that all safety devices are in proper working order;
- Loading the powder-actuated tool with the correct charge just prior to firing; insert the fastener before inserting the cartridge;

- Never storing a loaded tool, and never leaving a loaded tool unattended;
- Treating the powder-actuated tool as a firearm; keep hands and other body parts away from the open barrel end and the tool, whether loaded or unloaded, and never aim at anyone;
- Following the manufacturer's recommended procedures in the event the load fails to ignite;
- Never attempting to fasten at an angle to the work surface or fasten through a pre-drilled hole unless adequate guidance is provided;
- Not fastening into a concrete area that is chipped;
- Never using the tool in an explosive or flammable atmosphere;
- Not attempting to fasten into very hard or brittle material, such as cast iron, glazed tile, surface-hardened or high-tensile-strength steel, glass block, rock, face brick or hollow tile;
- Inspecting the area before using the tool;
- Wearing appropriate PPE in accordance with manufacturer's recommendations.

Pneumatic power tools

These guidelines apply to the safe use of pneumatic power tools.

- Ensure the supply pressure meets rated pressure; if not, use pressure regulators.
- Relieve air hoses and lines of compressed air before disconnecting or disjointing.
- Do not use synthetic lubricants, which can cause deterioration of elastomer seals, in air systems for tools.
- Secure pneumatic power tools to the hose by a positive locking clamp or other means.
- Install safety clips or retainers on pneumatic impact tools to prevent attachments from being forced out.
- Ensure all pneumatically driven nailers, staplers and other tools, which operate at more than 100 pounds of pressure, have a muzzle device to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- Inspect, lubricate and maintain the equipment in accordance with manufacturer's recommendations.

Hydraulic power tools

The fluid used in hydraulic-powered tools must be fire-resistant fluid and retained in the tool. The operating characteristics of the hydraulic-powered tool must withstand the most extreme temperatures at which you will expose the tool. Follow the manufacturer's directions, especially to ensure that you do not exceed the safe operating pressures of hoses, valves, pipes, filters and other fittings.

Ladders

The frequent use of ladders at home and on construction sites tends to dull awareness of the dangers involved in using them. Although there are varieties of ladders, many of the same requirements and safe work practices apply.

The following information applies to all portable ladders used in construction, alteration, repair (including painting and decorating), and demolition of work sites covered by OSHA's construction safety and health standards. When using ladders for such use, make sure they are a minimum Type I (250-pound rating) or greater.

The following general requirements apply to all portable ladders and job-made ladders:

- Provide a double-cleated ladder or two or more ladders when ladders are the only way to enter or exit a work area for 25 or more employees, or when a ladder serves two-way traffic;
- Ladder rungs, cleats and steps must be parallel, level and uniformly spaced when the ladder is in position for use;
- Space rungs, cleats and steps of portable ladders not less than 10 inches apart, nor more than 14 inches apart, along the side rails;
- Provide a metal spreader or locking device on each stepladder to hold the front and back sections in an open position when using the ladder;
- Surface ladder components to prevent injury from punctures or lacerations, and prevent snagging of clothing;

- Do not coat ladders with an opaque covering (such as paint) except for identification or warning labels that may be placed only on one face of a side rail;
- Do not tie or fasten ladders together to create longer sections unless they are specifically designed for such use;
- Prior to each use, inspect the ladder for:
  1. Cracks, splits or deterioration of the side rails;
  2. Broken or missing rungs, cleats or steps;
  3. Loose rivets, screws, bolts or hardware;
  4. Corroded components;
  5. Damaged or non-functioning safety shoes;
  6. Oil, grease or other slipping hazards;
  7. Other faulty or defective components.

If you note defects, immediately mark or tag the ladder with "Do Not Use" or similar language and withdraw the ladder from service until repaired. When repairing a ladder, you must restore it to a condition meeting its original design criteria. If you cannot repair a ladder, destroy it; then discard it.

The following are suggested safe work practices when using portable ladders:

- When using portable ladders to access an upper landing surface, the side rails must extend at least 3 feet above the upper landing surface. If this is not possible, place a hand rail to assist mounting and dismounting the ladder;
- Keep ladders free of oil, grease and other slipping hazards;
- Use ladders only for the purpose for which they are designed;
- Do not load ladders beyond the maximum intended load for which they are built;
- Use straight ladders at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder;
- Use ladders only on stable and level surfaces unless secured to prevent accidental movement;
- Never use ladders on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement;
- Secure or barricade ladders when using them in passageways, doorways or driveways where they can be displaced by workplace activities or traffic;
- Keep the area around the top and bottom of the ladder clear;
- Do not move, shift or extend ladders while occupied;
- Do not use the top or top rung of a ladder as a step;
- Do not climb the cross bracing on the rear section of stepladders unless the ladder is designed and provided with steps for climbing on both sections;
- When ascending or descending a ladder, face the ladder;
- Use at least one hand to grasp the ladder when moving up or down the ladder;
- A worker on the ladder must not carry any object or load that could cause him or her to lose balance and fall;
- Ladders must have nonconductive side rails if used where they could contact exposed energized electrical conductors or equipment;
- Support, protect from damage, and keep out of traffic areas ladders that are in storage. Store fiberglass ladders out of direct sunlight when possible.

Training

Train each employee to recognize hazards associated with using ladders, such as:

- Fall hazards in the work area;
- Procedures for erecting, maintaining and disassembling fall-protection systems;
- Proper use and placement;
- Maximum intended loads;
- Relevant standards, OSHA standards and OAC.

Retrain employees as necessary to maintain their understanding and knowledge of using ladders safely.

References

1926.1053 Ladders
OAC 4123:1-3-11 Ladders
ANSI A14.3 Ladders-fixed, safety requirements

ANSI A14.2 Ladders-portable metal, safety requirements
ANSI A14.5 Ladders-portable reinforced plastic, safety requirements
ANSI A14.1 Ladders-portable wood, safety requirements
ANSI A14.4 Ladders-job-made, safety requirements

Slings

To ensure safety when using slings made with wire rope (chokers), alloy steel chain and synthetic web, in conjunction with other material-handling equipment, such as cranes and hoists, follow these tips.

- Do not use slings that are damaged or defective.
- Never shorten slings with knots, bolts or other makeshift devices.
- Never load slings in excess of the rated capacities.
- Always pad or protect the slings from the sharp edges of the loads.
- Always keep suspended loads clear of all obstructions.
- Always keep employees clear of loads to be lifted and suspended loads.
- Always keep hands and fingers clear of the load while tightening the sling around the load.
- Never pull a sling from under a load that is resting on the sling.

Inspection procedures for wire rope slings

Remove slings from service if any of the following conditions are present:

- Ten randomly distributed broken wires in one lay or five broken wires in one strand in one lay;
- Kinking, crushing, bird caging or any other damage;
- Evidence of heat damage;
- Cracked or deformed attachments, or ones with worn ends;
- Stretched or twisted hooks.

Inspection procedures for alloy steel chain slings

Remove slings from service if any of the following conditions are present:

- Defective welds;
- Bending or elongation of chain links;
- Cracked or deformed master and coupling links;
- Removal of the identification tag.

Inspection procedures for synthetic web slings

Remove slings from service if any of the following conditions are present:

- Acid or caustic burns;
- Melted or charred sling surface;
- Broken stitches;
- Snags, tears or cuts to the point of exposure of the colored threads;
- The identification tag has been removed.

Sling storage

- Store slings in a dry environment out of the sun, off the floor or ground, to prevent damage due to corrosion.
- Hang slings from hooks to prevent tangling, and allow for easy access, when needed.
- A good sling inspection program is not only required; it is cost effective. This prevents sling deterioration and serious accidents caused by sling failure.

Rigging

Improper rigging can lead to accidents involving personal injury or damage to equipment or material. Slings are like any other tool; allow only trained workers to rig loads. The employer should designate who is qualified to use slings to rig loads.

Scaffolds

Scaffolds vary in design and the construction industry uses them for a variety of purposes. You can obtain more information from OAC 4123: 1-3-10 or OSHA 1926, Subpart L.

Scaffold erection

While scaffolding varies greatly in design and construction, there are many similarities when it comes to erection and dismantling requirements. Erect and dismantle scaffolding under the direct supervision of a competent person. Scaffolding requires the following items:

- All components must be free of damage;
- Planking must be scaffold grade;
- Unless planking is secured, it must extend a minimum of 6 inches over the bearer, but not exceed 12 inches;
- Safe access;
- Keep scaffold free of debris or slippery substances;
- All x-braces must be in place;
- An 18-inch minimum platform width is recommended;
- Erect scaffold away from energized or unguarded power lines;
- If erected over walkways or traffic areas, place 18-gauge screen or equivalent in place to prevent items from falling off;
- All scaffold components, including casters, must be capable of supporting, without failure, their own weight and at least four times the maximum intended load.

Supported scaffolds

When erecting a scaffold from the ground up, give special attention to footing. It must be solid and stable. We suggest you use mudsills, but you should not use block, brick and similar items. Erect the scaffold plumb and level. The installation of all x-braces will assist in this goal. Fall protection, such as guardrails and toe boards are required when the working platform is more then 10 feet in elevation. Lock pins should be in place to prevent frame separation. Secure the scaffold to the building or structure using guys, ties and braces as recommended by the manufacturer and required by OSHA.

Manually propelled mobile scaffolds

Do not build manually propelled mobile scaffolds higher than four times the minimum base dimension. Use horizontal and diagonal bracing to prevent racking. The supporting casters must have operating locks on them and be engaged while the scaffold is in use. Fully plank mobile scaffold work platforms. Take special care to avoid striking piping, electric lines or other obstructions when moving scaffolds. Secure or remove tools, materials and equipment from the platform prior to relocation. Do not allow employees to ride a moving scaffold. Guardrailing requirements for manually propelled mobile scaffolds are the same as those for supported scaffolds.

Suspended scaffolds

Suspended scaffold support devices must be capable of sustaining four times the intended workload. The suspension ropes (wire, synthetic or fiber) must be capable of sustaining six times the intended workload. Workers should be protected using a personal fall-arrest system. To prevent the platform from swinging, secure it to the building or structure.

Ladder jack scaffolds

Limit ladder jack scaffolds to light-duty use. Their height should not exceed 20 feet. Use heavy-duty ladders (Type 1A) to support the platform and workload. If bearing on the rungs only, the bearing area should be at least 10 inches wide. The platform should be a minimum of 12 inches wide. If you use wood planks, provide support every 8 feet.

Metal-bracket and form scaffold

Secure metal-bracket and form scaffolds in place by either welding or bolting them in place. Use clip-on or hook-over brackets if the form whalers are secured in place. The maximum permissible span is 8 feet; standard guardrailing and toe boards are required.

Stilts

Equip stilts with skid-resistant feet, and use them in accordance with manufacturer's recommendations. The walking surface should be free from debris and obstruction.

Training

Selecting the type of scaffold to use is as important as tool selection. An ongoing program that trains personnel in selecting and using scaffolding is im-

perative to reducing accidents in the workplace. If you need more detailed information, consult the references and manufacturer's recommendations.

Definitions

- Competent person — A person capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous or dangerous to employees, and who is authorized to take prompt corrective measures;
- Brace — A rigid connection that holds one scaffold member in a fixed position with respect to another member or to a building or structure;
- Guardrail system — A vertical barrier, consisting of, but not limited to, toprails, midrails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels;
- Heavy-duty scaffold — A scaffold designed and constructed to carry a working load not to exceed 75 pounds per square foot;
- Ladder jack scaffold — A light-duty scaffold consisting of a platform resting on brackets attached to ladders;
- Lean-to or shore scaffold (use prohibited) — A scaffold which is kept erect by tilting it toward and resting it against a building or structure;
- Light-duty scaffold — A scaffold designed and constructed to carry a working load not to exceed 25 pounds per square foot;
- Mobile scaffold — A powered or non-powered, portable caster or wheel-mounted supported scaffold;
- Medium-duty scaffold — A scaffold designed and constructed to carry a working load not to exceed 50 pounds per square foot;
- Qualified person — A person who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated his or her ability to solve or resolve problems related to the subject matter, work, or project;
- Scaffold — Any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage) used for supporting employees, materials or equipment;
- Suspended scaffold — A scaffold supported from above — manually or power operated, and single- or two-point suspended;
- Toe board — A barrier secured along the sides and ends of a platform to stop materials from falling (3.5-inch minimum height);
- Working load — The load on the scaffold, including employees, material and equipment.

References

1926.451 Scaffolding, general requirements
1926.450 Definitions for scaffolding
1926.452 Additional requirements
1926.453 Aerial lifts
1926.454 Training
4123:1-3-10 Scaffolding
ANSI A10.8 Scaffolding safety requirements
ANSI/Scaffold Industry Association (SIA) A92.5 Boom-supported elevating work platforms
ANSI/SIA A92.3 Manually propelled elevating work platforms
ANSI A14.7 Mobile ladder stands and mobile platforms
ANSI A120.1 Powered platforms for building maintenance

Aerial lifts

There are varieties of aerial lifts included within the OSHA Subpart L-scaffold standard, including extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers or a combination of any of these devices. The following information applies to company-owned, leased and borrowed equipment.

Manufacturers' information

Manufacturers of aerial lifts provide important in-

formation about the lift that the end user must be familiar with, including:

- Warnings, cautions or restrictions for safe operation and maintenance;
- Make, model, serial number and manufacturer's name and address;
- Rated work load, including number of occupants;
- Maximum travel height;
- Nominal voltage rating of batteries;
- Notice to study the operator's manual;
- Notice of required inspections;
- Alternative configuration use statement, such as outriggers, platform extension and attachments, and extendible axles;
- Notice if platform or other parts are electrically insulated;
- Warning on key-part replacement.

User responsibilities

To ensure safe usage of aerial lifts, users must:

- Maintain copies of operating/maintenance manuals;
- Inspect and maintain to manufacturer's specifications;
- Provide operator training;
- Instruct operator on intended purpose and function of each control;
- Read and understand manufacturer's operating instructions and user's safety rules;
- Understand all instructions, warnings and decals displayed on lift;
- Demonstrate proficiency and knowledge on the same model type.

The operating/maintenance manual provides the user with critical information about the type of lift and ratings of the aerial platform, maximum voltage of the electrical systems, and maximum hydraulic and pneumatic operating pressure. It also includes instructions, operational safety rules, and information about maintenance and the equipment's intended use.

Inspections

Manufacturers provide various inspection intervals to address equipment function, wear and tear, and deterioration of components. Frequent inspections increase the life of equipment and their components, and should include examination of:

- All functions and their controls for speed(s), smoothness and limits of motion;
- Lower controls, including provisions for overriding the upper controls;
- All chain and cable mechanisms for adjustment, and worn or damaged parts;
- All emergency and safety devices;
- Filter elements, hydraulic oil, engine oil and coolant, and lubrication of all moving parts;
- Structural components and critical components through visual inspection;
- Placards, warnings and control markings;
- Any additional items specified by the manufacturer.

Daily pre-start inspection procedures should include quick visual checks and proper functioning of the following items:

- Operating and emergency controls;
- Safety devices;
- Personal protective devices;
- Air, hydraulic and fluid leaks;
- Cables and wiring harnesses;
- Loose or missing parts;
- Tires and wheels;
- Placards, warnings, control marking and operating manuals;
- Outriggers, stabilizers and extendible axles;
- Guardrail system, and access gates and openings;
- Load and its distribution on platform and any platform extensions;
- Any other items specified within the manufacturer's operating manual.

Operating procedures

Before starting work and while performing work from an aerial lift, you must address various site inspection and operating procedures, including:

- Avoiding drop-offs, holes or bumps;
- Checking for floor obstructions and debris;
- Avoiding grades, slopes and ramps;
- Watching for overhead obstructions/high voltage conductors;
- Being aware of wind or weather conditions;
- Providing adequate surface support;
- Looking out for hazardous locations;
- Operating the platform on a surface within limits specified by the manufacturer;
- Using stability enhancing means as manufacturer requires;
- Closing guardrails, access gate or openings per manufacturer's instructions;
- Making sure the load and its distribution are within manufacturer's rated capacity;
- Ensuring adequate clearance from overhead obstructions;
- Having personnel wear required safety gear;
- Maintaining maximum safe-approach distance to energized lines and parts;
- Determining hazardous locations;
- Maintaining a firm footing on the platform floor;
- Taking precautions for any other moving equipment operating in the same area;
- Preventing ropes, electric cords, hoses, etc., from entangling with the platform;
- Following rated capacities;
- Clearing personnel and equipment from surrounding areas before lowering the platform;
- Shutting down the engine while fueling;
- Charging batteries in well-ventilated areas free of flames, sparks or other hazards that could cause a fire;
- Not using other objects to steady the platform;
- Not using aerial lifts as cranes;
- Limiting travel speed to travel conditions;
- Limiting platform travel height to no more than twice the base width;
- Avoiding stunt driving and horseplay;
- Not altering safety devices or interlocks;
- Driving on grades, slopes or ramps only within the manufacturer's ratings;
- Ceasing operation if any suspected malfunction occurs;
- Permitting only manufacturer's authorized alterations to be made;
- Immediately reporting problems or malfunctions to the supervisor;
- Immediately reporting potential hazardous locations to the supervisor.

Fall protection

The operator of an extensible and articulating boom lift must wear a body harness with a lanyard attached to the boom or basket when working from an aerial lift. Also, the operator of a ladder or tower truck must wear a body harness with an attached lanyard. The manufacturer's information, provided with the lift device, includes the proper attachment points and procedures. There are no requirements for wearing a body harness and lanyard while working from a scissors-type lift. If it is your company's policy to wear a body harness with an attached lanyard in a scissors lift, contact the manufacturer to obtain information about suitable anchorage points and proper tie-off procedures.

References

1926.453 Aerial lifts
ANSI/SIA A92.2 Vehicle mounted elevating and rotating aerial devices
ANSI/SIA A92.6 Self-propelled elevating work platforms

Respiratory protection

Not only is it a good idea to have a written respiratory protection program, it is an OSHA requirement. As with other PPE, respirators are especially critical when administrative and/or engineering controls are inadequate.

You can choose the correct protection from these respirator classifications and definitions.

- Air purifying-particulate filter respirators are generally called dust, mist or fume respirators, and filter particulates before they are inhaled. This type of respirator does not provide oxygen, and must not be worn in an oxygen-deficient atmosphere (an atmosphere where the percentage of oxygen by volume is less than 19.5 percent). In addition, it does not protect against toxic gases and vapors.

- The selection of N-, R- and P-series filters depends on the presence of oil particles. Identify for use as follows:
  - N – for Not resistant to oil,
  - R – for Resistant to oil,
  - P – for oil Proof.
- Air purifying-chemical cartridge/canister respirators remove the gas or vapor by absorbing specific gas or vapor on an absorbent material before inhalation of the air. The cartridge or canister is specifically designed to protect against a single chemical or class of chemicals. Read the label on the cartridge or canister to ascertain the agent against which it will protect, maximum concentration and, in some instances, the service life of the element. If no end-of-service-life-indicator (ESLI) is on the chemical cartridge, develop a change-out schedule as part of your respiratory protection program. Air purifying-chemical cartridge/canister respirators do not supply oxygen. You cannot use them in an oxygen-deficient atmosphere. You must not use them in an atmosphere IDLH or where warning properties of the contaminant are poor, and therefore, would not signify that the filter has been consumed.
- Powered air-purifying respirators protect against particulates, gases and vapors. The air-purifying element may be a filter, chemical cartridge, combination filter and chemical cartridge, or canister. The respirator may be loose-fitting or tight-fitting. This type of respirator uses a battery-pack power source to operate a blower that passes air across the air cleaning element to supply air to a respiratory inlet covering. Powered air-purifying respirators generally offer very good protection because they supply air at positive pressure, and leakage is usually outward from the face piece.
- SAR/SCBA respirator provides the wearer with a respirable atmosphere independent of the ambient air, and can be supplied air, SCBA, and combination SCBA and supplied air. The type C supplied-air respirator, known as an air line, is connected to a suitable compressed air source by a small-diameter air hose. SAR provide the user with Grade D certified breathing air from a central source via an air supply line or hose. A supplied air respirator may be a constant flow unit, which has a regulated amount of air fed to the face piece, a demand-flow type which delivers air flow only during inhalation, and the pressure-demand flow which provides positive pressure during both inhaling and exhaling. A SCBA is a self-contained supply air respirator and is generally only used for short periods of time.

Respirator need and selection

(sample procedure)

To determine the need for respirator protection in each situation:

- Assess whether potential exposures exist and to what extent;
- Review all available industrial hygiene data to establish need and assist in selecting the correct respiratory protection. Conduct additional industrial hygiene surveys as necessary;
- Assess engineering and/or administrative controls used to prevent exposure;
- Review any work requirements and conditions that may impair an employee's ability to wear respiratory protection;
- Assess the characteristics and limitations of available respiratory protection;
- Only select and use respirators approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration.

Medical evaluation (sample procedure)

1. Examine employees to evaluate their medical status as it relates to respiratory protection, and to ensure they can physically perform the work while wearing a respirator.
2. A medical examination consists of:
   - Completion of respiratory questionnaire;
   - Physical examination, which may include a pulmonary function test.
3. Review the medical status of all employees who use respiratory protection based on physician recommendations.

Training (sample procedure)

1. Only medically-approved employees will receive training in respiratory protection.
2. The training program will include:
   - Purpose of respiratory protection;
   - Types of protection available and the limitation of each type;
   - How to properly wear the equipment and check the face-piece fit;
   - How to properly clean, inspect and store the equipment;
   - Discussion of the company's written respiratory protection program.
3. Provide all employees the opportunity to wear the respirator of their choice for 15 minutes before the face-piece fit-testing procedure.

Program surveillance

Periodically, management will survey the work area(s) to ascertain the effectiveness of the program and modify it as necessary.

PPE

When a hazard is identified on a construction site, make every possible effort to eliminate it so that you avoid harm. Use protective clothing or equipment to reduce risk when you cannot completely eliminate hazards from normal operations using engineering controls.

PPE covers:

- Face and eye protection — safety glasses, goggles, face shields, welding and laser protection;
- Head protection — hard hats capable of protection against impact and electrical shocks and burns;
- Hearing protection — earmuffs, and molded and formable ear plugs;
- Protective footwear — steel-toed safety shoes, rubber boots, metatarsal guards and slip-resistant soles;
- Respiratory protection — filter respirators, cartridge respirators, supplied-air respirator and self-contained breathing apparatus;
- Body harness, lanyards and lifelines;
- Special clothing — chemical protective clothing, hot/cold environmental clothes and high-visibility clothing (traffic vests).

Hazards of PPE

While PPE is considered to be part of the job in the construction industry as a rule, it is considered a last resort and a temporary type of protection. For normal operations, always try to eliminate the hazard in the environment before turning to PPE (unless the law requires the use of PPE).

No single combination of protective equipment and clothing is capable of protecting against all hazards. Thus, you should use PPE in conjunction with other protective methods. The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress, and impaired vision, hearing, mobility and communication.

In general, the greater level of PPE protection, the greater level of associated risks. For any given situation, select equipment and clothing that provide an adequate level of protection.

Developing a PPE program

Develop a formalized, written program once you decide that employees will use PPE. This program should include at least the following elements:

- A communicated policy on using PPE for employees and visitors;
- Responsibility for selecting equipment;
- The requirements of a PPE training program;
- Instructions on the correct use and maintenance of the equipment;
- Corrective action for policy violations;
- Employee involvement and recognition for safe behavior.

For the safe use of any personal protective device, it is essential that employers properly instruct employees on its selection, use and maintenance. In addition, competent persons should instruct both supervisors and employees about how to use the PPE. It also is critical that contractors purchase safety equipment that fits properly and provides protection. It may be necessary to purchase more than one style of personal protective devices. Make routine and planned inspections to determine if PPE is being properly issued, used and maintained.

Legal requirements

OSHA Standards for the Construction Industry (29 CFR Part 1926) addresses PPE as follows:

1926.28 Personal protective equipment
The employer is responsible for requiring the wearing of appropriate PPE in all operations where there is an exposure to hazardous conditions or where the part indicates the need for using such equipment to reduce the hazards to the employees.

Regulations governing the use, selection and maintenance of personal protective and lifesaving equipment are described under Subpart E of this part.

OSHA Construction Standards, 29 CFR,
Subpart E — Personal Protective and Lifesaving Equipment Sections:

- Criteria for PPE
- Foot protection
- Head protection
- Hearing protection
- Eye and face protection
- Respiratory protection
- Safety belts, lifelines and lanyards
- Safety nets
- Working over or near water
- Definitions applicable to this subpart

Fall protection

Falls are complex events involving a variety of factors. Consequently, the OSHA standard for fall protection, 1926 Subpart M, deals with both the human and equipment-related issues in protecting workers from fall hazards. The fall-protection rule identifies areas or activities where protection is needed. It also clarifies what employers can do to provide fall protection for employees, such as identifying and evaluating fall hazards, and providing specific training.

The fall-protection rule sets a uniform threshold height of 6 feet. This means employers must protect employees from fall hazards and falling objects whenever walking/working on a surface 6 feet or more above a lower level. The rule covers most construction workers except those inspecting, investigating or assessing workplace conditions prior to the actual start of work or after the completion of all work.

Other OSHA regulations cover fall protection requirements for workers on scaffolds, cranes and derricks, steel erection, equipment used in tunneling, electrical transmission and distribution lines, and stairways and ladders.

Definitions

Competent person — One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who is authorized to take prompt corrective measures to eliminate them

Controlled access zone — An area in which certain work — for example, overhand brick laying — may take place without the use of guardrail systems, personal fall-arrest systems or safety-net systems, and access to the zone is controlled

Conventional fall protection system — A guardrail system, personal fall-arrest system or safety-net system

Infeasible — A situation in which it is impossible to perform the construction work using a conventional fall-protection system, or it is technologically impossible to use one of these systems to provide fall protection

Low-slope roof — A roof having a slope less than or equal to 4 inches in 12 feet (vertical to horizontal)

Qualified person — One who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, successfully demonstrates his/her ability to solve or resolve problems relating to the subject matter, work or project

Roofing work — The hoisting, storage, application and removal of roofing materials and equipment, including related insulation, sheet metal and vapor barrier work, but excluding the construction of the roof deck

Steep roof — A roof having a slope greater than 4 inches in 12 feet (vertical to horizontal)

Duty to have fall protection

OSHA requires employers to assess the workplace to determine if the walking/working surfaces on which employees work have the strength and structural integrity to safely support workers. Once employers determine the surface is safe to work on, they must select a fall-protection system if there are any hazards present.

Protection from falling objects

Recommendations for protection against falling objects include all affected workers wearing hard hats, and at least one of the following measures:

- Install toe boards, screens or guardrail systems to prevent objects from falling from higher levels;
- Erect canopy structures and keep potential falling objects far enough from the edge to prevent accidental displacement;
- Provide barricades around areas where objects could fall, and prohibit employees from entering those areas.

Systems criteria and practices

Guardrail systems should comply with the following provisions:

- The top edge height of toprails should be 42 inches (plus or minus 3 inches) above the walking/working level;
- Install mid-rails or equivalent intermediate members at a height midway between the top edge of the guardrail system and the walking/working level;
- Guardrail systems should be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction;
- Guardrail systems should be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing;
- Toprails and mid-rails must be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations. If using a wire rope for toprails, flag it at not more than 6-foot intervals with high-visibility material;
- Inspect manila, plastic or synthetic ropes used for toprails or mid-rails as frequently as necessary to ensure they meet the strength requirements.

Safety-net systems should comply with the provisions listed below.

- Install safety nets as close as practicable under the walking/working surface on which employees work, but no more than 30 feet below it.
- Ensure safety nets extend outward from the outermost projection of the work surface as listed below.

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of the net from the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet

- Ensure safety nets have sufficient clearance to prevent contact with objects below.
- Install nets capable of absorbing the impact force of a drop test, which you should perform and document at the job site. The drop test consists of a 400-pound bag of sand, 30 inches long, plus or minus 2 inches in diameter, dropped from the highest walking/working surface where employees are exposed to fall hazards, but not from less than 42 inches above that level.
- If the employer can demonstrate that a drop test is unreasonable, a competent person can prepare a certification record that the net can withstand the impact force equal to the drop test.
- Inspect the nets at least weekly; look for wear, damage and other deterioration. Remove defective nets from service. Clear material, scrap and equipment caught in the safety net as soon as possible, and at least before the next work shift.
- The maximum opening of the safety net should not exceed 36-square inches and be no longer than 6 inches on any side. When measuring center to center, the rope or webbing should not exceed 6 inches.
- The breaking strength of border rope should be a minimum of 5,000 pounds. Connectors need to be as strong as the integral net and spaced no more than 6 inches apart.

Personal fall-arrest systems should comply with the following provisions:

- Body belts are not acceptable as part of a personal fall-arrest system. The use of a body belt in a positioning device system is acceptable;
- Only locking-type snap hooks are permitted;
- On suspended scaffolds or similar work platforms with horizontal lifelines, which may become vertical lifelines, the devices used to connect to a horizontal lifeline must be capable of locking in both directions;
- Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds. They also must be protected against being cut or abraded;
- Self-retracting lifelines and lanyards which limit free-fall distance to 2 feet or less must be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully-extended position;
- Anchorages used for attachment of personal fall-arrest equipment must be independent of any other anchorage being used to support or suspend platforms. The anchorages must also be capable of supporting at least 5,000 pounds per employee attached, or be designed, installed and used as follows:

1. As part of a complete fall-arrest system which maintains a safety factor of at least two;
2. Under the supervision of a qualified person;
    - When stopping a fall, personal fall-arrest systems must:
        A. Limit arresting force on the body to 1,800 pounds when used with a body harness;
        B. Be rigged so that an employee can free-fall no more than 6 feet;
        C. Bring an employee to a complete stop and limit his or her maximum deceleration distance to 3.5 feet;
        D. Have sufficient strength to withstand twice the potential impact energy of an employee free-falling a distance of 6 feet, or the free- fall distance permitted by the system, whichever is less;
- When personal fall-arrest systems and components are subjected to impact loading, immediately remove them from service;
- Inspect personal fall-arrest systems and components prior to each use for wear, damage and other deterioration. Remove defective components from service;
- Never attach personal fall-arrest systems to guardrail systems.

Positioning device systems should comply with the following provisions:

- Ensure that positioning devices are secured to an anchorage capable of supporting at least

twice the potential impact load of an employee's fall or 3,000 pounds, whichever is greater;
- Requirements for all hardware and components must meet the same criteria as those for personal fall-arrest systems.

Warning-line systems should comply with the provisions below.

- Erect warning lines around all sides of the roof work area.
- When not using mechanical equipment, erect the warning line no less than 6 feet from the roof edge.
- Warning lines may consist of ropes, wires or chains and supporting stanchions erected as follows:
  1. Flag the line at not less than 6-foot intervals with high-visibility material;
  2. Rig the line and support it so that its lowest point is no less than 34 inches from the surface, and its highest point no more than 39 inches;
  3. After being erected with the line attached, stanchions must be capable of resisting without tipping a force of at least 16 pounds applied horizontally against the stanchion, 30 inches above the surface;
  4. The line must have a minimum tensile strength of 500 pounds.
- Attach the line at each stanchion in such a way that pulling on one section between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.
- Do not permit employees in the area between a roof edge and warning line unless they are performing roofing work in that area.

Controlled access zones should conform to the provisions below.

- When used to control access to areas where leading edge and other operations are taking place, define the zone by a control line or other means that restrict access.
- When using control lines, erect them no less than 6 feet or more than 25 feet from the unprotected or leading ledge, except when erecting precast members.
- When erecting precast members, erect them no less than 6 feet or more than 60 feet, or half the length of the member being erected, whichever is less, from the leading edge.
- Extend the line along the entire length of the unprotected or leading edge, and ensure it is parallel to the unprotected or leading edge.
- Connect the line on each side to a guardrail system or wall.
- When used to control access to areas where overhand bricklaying and related work are taking place:
  1. Define the zone by a control line erected not less than 10 feet or more than 15 feet from the working edge;
  2. Extend the line for a distance sufficient for the zone to enclose all employees performing overhand bricklaying and related work at the working edge and be approximately parallel to the working edge;
  3. Erect additional control lines at each end to enclose the zone;
  4. Permit only employees engaged in overhand bricklaying or related work in the zone.
- Control lines can consist of ropes, wires, tapes or equivalent materials, and supporting stanchions, as follows:
  1. Flag or clearly mark each line at not more than 6-foot intervals with high-visibility material;
  2. Rig each line so that its lowest point is not less than 39 inches from the surface, and its highest point is not more than 45 inches;
  3. Each line must have a minimum breaking strength of 200 pounds.

Safety-monitoring systems should comply with the provisions below.

- The employer must designate a competent person to monitor the safety of other employees, and ensure the monitor complies with the following requirements:
  1. Be competent to recognize fall hazards;

2. Warn affected employee when it appears that he or she is unaware of a fall hazard or is acting in an unsafe manner;
3. Be on the same surface and within visual sighting distance of the employee being monitored;
4. Be close enough to communicate orally with the employee;
5. Must not have other responsibilities that could take his or her attention from the monitoring function.

- Do not use or store mechanical equipment in areas where safety systems monitor employees engaged in roofing operations on low-sloped roofs.
- No employee, other than one engaged in roofing work on low-sloped roofs or one covered by a fall-protection plan, is allowed in an area where an employee is being protected by a safety-monitoring system.

Covers for holes in floors, roofs and other walking/working surfaces should meet the requirements below.

- Covers located in roadways and vehicular aisles must be capable of supporting at least twice the maximum axle load of the largest vehicle.
- All other covers must be capable of supporting at least twice the weight of employees, equipment and materials that may be imposed on such covers at any one time.
- Secure all covers when installed to prevent accidental displacement.
- Color-code or mark all covers with "HOLE" or "COVER" to provide warning of the hazard.

Falling-object protection should comply with the provisions below.

- Erect toe boards along the edge of the overhead surface for a distance sufficient to protect employees below.
- Ensure toe boards are capable of withstanding a force of at least 50 pounds in any downward or outward direction.
- Toe boards must be a minimum of 3.5 inches in vertical height from their top edge to the level of the surface and have no more than one-fourth inch clearance above the surface.
- Where tools, equipment or materials are piled higher than the top edge of a toe board, you must erect paneling or screening from the surface or toe board to the top of a guardrail system, or to a mid-rail for a distance sufficient to protect employees below.
- When using guardrail systems as protection from falling objects, ensure all openings are small enough to prevent passage of objects.
- While performing of overhand bricklaying and related work:
  1. Do not store materials or equipment, except masonry and mortar, within 4 feet of the working edge;
  2. Ensure you keep excess mortar, broken or scattered masonry units, and all other materials and debris clear from the work area by removing them at regular intervals.
- While performing roofing work:
  1. Do not store materials and equipment within 6 feet of a roof edge unless guardrails are erected at the edge;
  2. Ensure that material grouped or stacked near a roof edge is stable and self-sup - porting.

Training

Design employee training programs so employees who are exposed to hazards from falling objects can recognize and minimize the hazards. A competent person must train employees in the following areas:

- Nature of fall hazards;
- Erecting, maintaining, disassembling and inspecting the fall-protection system;
- Use and operation of fall-protection systems;
- Role of employees in safety-monitoring systems;
- Use of mechanical equipment during low-sloped roofing work;
- Handling and storage of equipment and material, and erection of overhead protection;
- Role of employees in fall-protection plans;
- Standards contained in subpart M.

The employer must verify training was conducted by preparing a written certification record, including names or other identities of employees trained, and the date and signature of the person or the company conducting the training. If another employer conducted training, the record should indicate the date prior training was determined adequate, rather than the date of actual training. Maintain all training records and keep them current.

Employees may receive more training when an employer believes they do not understand or have the skills needed to recognize and minimize these hazards. Retraining may also be in order when changes in the workplace or with the fall-protection equipment render make training obsolete.

Welding and cutting

Procedures for welding and cutting safely are extensive because of the many hazards involved. Common hazards include handling compressed gases and exposure to electricity, fumes, gases, noise, radiation, fire and explosions. Thorough and effective training of workers involved in welding and cutting is critical to ensure the safe use of equipment and processes, and that employees follow procedure to control hazardous conditions. General housekeeping also is important in preventing fires and avoiding injuries such as a welder tripping over debris or gas hoses due to restricted vision while wearing eye protection.

Compressed gases

The most frequent OSHA citations related to welding involve the misuse, careless handling and improper storage of compressed gas cylinders. Compressed gas cylinders are difficult to handle because of their size and weight. They pose additional hazards because of their exposed valves and because the gas content is under pressure. When moving cylinders a short distance, you can tip them and roll them on the bottom edge. Do not drag the cylinders along the floor. It's best to move cylinders using a suitable hand truck. Hoist cylinders by securing a cradle sling board, pallet or special carrier included for this purpose.

Do not hoist cylinders by using an electromagnet or choker sling. Always store and use cylinders in the upright position and secure them against falling. Do not use cylinders without labels; return them to the supplier. Valve-protection caps are used to protect the cylinder valves and the safety devices. Caps should always be in place, except when the cylinders are in use. Separate stored oxygen cylinders from fuel-gas cylinders or combustible materials by a minimum distance of 20 feet or by a noncombustible barrier at least 5-feet high having a fire-resistance rating of at least one-half hour.

Always use a pressure-reducing device when withdrawing gas from gas cylinders used for welding and cutting operations. Inspect connection nuts and fittings before each use to detect faulty seats, which may allow leakage once the regulator is attached to the cylinder valves or hoses. Before connecting a regulator to a cylinder valve, wipe the valve outlet with a clean cloth free of oil or lint. Then, crack the valve by opening the valve momentarily and immediately closing it. This clears the valve of dust or dirt that might otherwise enter the regulator. Mark "USE NO OIL" on gauges used for oxygen service, and drain oxygen before attaching it to the cylinder. Always open oxygen cylinder valves slowly. Do not use acetylene at a pressure in excess of 15 pounds per square inch gauge (psig). At about 25 psig, acetylene becomes unstable and doesn't need a spark or flame to ignite and explode.

Distinguish fuel gas and oxygen hoses from each other. In the United States, the generally recognized colors are:

- Red for fuel gas hose;
- Green for oxygen hose;
- Black for inert gas and air hose.

Do not interchange the oxygen and fuel gas hoses. You can tape them together for convenience and to prevent tangling, but do not use more than 4 inches of tape for every 12 inches of hose. Repair or replace hoses showing leaks, burns, worn places or other defects.

Clean torch-tip openings, which become clogged, with suitable cleaning wires, drills or other devices designed for such purposes. Inspect torches prior to use for leaking shutoff valves, hose couplings and tip connections. Use friction lighters or other approved methods to light torches; do not use matches or hot work.

PPE

Welding produces molten metal, sparks, slag and hot work surfaces. Workers should wear protective clothing made of suitable materials that provide sufficient coverage to minimize skin burns caused by sparks, spatter or radiation. Keep sleeves and collars buttoned, and eliminate pockets from the front of clothing to prevent sparks from lodging in rolled-up sleeves, pockets or cuffs of overalls or pants. All welders and cutters must wear protective flame-resistant gloves. Use gloves with insulated lining to protect workers from exposure to high radiant energy. Employees can use leather or flame-resistant aprons to protect the front of their bodies against sparks and radiant energy. Flame-resistant leggings are available for additional leg protection.

When welding or cutting from overhead, wear cape sleeves or shoulder covers with bibs made of leather or other flame-resistant clothing. Keep clothing free of grease and oil, and don't carry combustible materials in pockets.

The equipment and the processes used in welding and cutting generate noise. Engine-driven generators can emit high noise levels, as do some high frequency and induction welding processes such as air carbon arc and plasma arc cutting. If at all possible, control the noise at the source. If this is not possible, use personal protective devices, such as earmuffs or earplugs.

You must provide adequate ventilation for all welding, cutting and brazing operations. The ventilation must keep exposure to hazardous concentrations of airborne contaminants below levels specified by OSHA or the American Conference of Governmental Industrial Hygienists (ACGIH). If natural or mechanical ventilation cannot effectively control airborne contaminants, workers must wear respirators. Whenever the use of respirators is necessary, implement a program to ensure their proper selection, fit and use. Train welders and cutters to avoid breathing the fume plume directly. You can do this by using ventilation or by positioning the head to direct the plume away from the face.

Another significant hazard of welding and cutting operations is the possibility of eye injuries. These operations generate ultraviolet radiation. When the eyes are exposed to excessive ultraviolet radiation, they may develop sharp pains and become red and irritated.

Employees must wear proper eye and face protection that complies with ANSI Standard Z87.1, Practice for Occupational and Educational Eye and Face Protection. Employees must wear welding helmets with filter lenses that protect the face, forehead, neck and ears from radiant energy from the arc and from weld spatter. Select the filter lens based on the type of welding process being performed, electrode size and arc current. Wear safety glasses or goggles to protect against slag chips, grinding fragments, wire wheel bristles and similar hazards. Welding helmets will not provide adequate protection against objects with severe impact, such as fragmenting grinding wheels or abrasive discs.

Electricity

Welders can avoid electrical shock. Therefore, it is essential that employers thoroughly train them how to do so. Severity of shock is determined by the path, duration and amount of current flowing through the body, which is dependent upon voltage and contact resistance of the area of skin involved.

Faulty installations, improper grounding and incorrect operation and maintenance of equipment are all sources of danger. Ground all electrical equipment and the work piece.

The work lead is not a ground lead. Use it only to complete the welding circuit. Use the correct cable size because overloading will cause cable failure

and result in possible shock or a fire hazard. When electrode holders are left unattended, remove the electrodes and the holders placed or protected so that they cannot make electrical contact with workers or conducting objects. Do not dip hot electrode holders in water because this may expose the welder or cutter to electrical shock.

Disconnect or de-energize a welding circuit while the electrode, torch or gun is changing or adjusting to avoid electrical shock. Inspect welding cable regularly, since it is subject to severe abuse as it is dragged over work areas under construction and across sharp corners.

Replace or repair cable with damaged insulation or connectors to achieve mechanical strength, insulating quality, electrical conductivity and water tightness of the original cable.

Fire protection

Welding and cutting should preferably be done in specially designated areas designed and constructed to minimize fire risk. Sparks, which can travel horizontally up to 35 feet from their source and fall much greater distances, start many fires. Sparks can pass through or lodge in cracks, holes and other small openings in floors and walls.

Material most commonly ignited are combustible floors, roofs, partitions and building contents, including trash, wood, paper, textiles, plastics, chemicals, and flammable liquids and gases. Outdoors, the most common combustibles are dry grass and brush.

When you cannot move the work to a designated safe location, remove all nearby fire hazards. If the work and fire hazards are immovable, use guards to protect the hazards and nearby personnel from heat, sparks and slag. Have sufficient fire-extinguishing equipment ready for use when welding and cutting. When performing welding or cutting operations in areas not normally designed for such operations, use a hot-work permit system. The hot-work permit system includes a check list of safety precautions and also alerts other workers to the extraordinary danger of fire.

References
1926.350 Gas Welding and Cutting
NIOSH Publication #88-110
Welding, Brazing and Thermal Cutting
AWS Z49.1 Safety in Welding and Cutting

Electrical safety

There are two types of electrical currents used in construction — alternating current (AC) and direct current. AC alternates or changes its direction of travel many times a second whereas DC flows in only one direction.

AC is the type of electricity used at most construction sites and in homes because you can transform it to higher voltages and transported long distances without losing much power.

How electricity travels in a circuit

For an electrical current to get from one place to another, it must have a path to follow. The path that current follows is provided by material known as a conductor. A conductor is simply anything that allows electrons to flow through it. Metals make good conductors as does water. The human body is a conductor because it consists mostly of salt water.

Any conductor can provide a path for a current, which creates a hazard to those working on or around electrical units at a construction site. Currents are especially dangerous because they can show up on any conductor that is in contact with a fault, such as water, wire rope, metal studs or the frame on equipment.

Not everything conducts electricity. A material that does not allow electrical current to flow through it is called an insulator. Insulators protect you from electrical shock. Metal wires and cables are often coated with plastic, which is a great insulator.

This is why electricians should wear approved, protective rubber gloves and rubber boots when they perform hot electrical work. Other insulators include wood, plastic, ceramic, fiberglass and glass.

What is an electrical ground?

To make a complete electrical circuit, a current must flow in a circular path, beginning and ending at the source, such as a tool or piece of equipment.

Electricity will take the path of least resistance, including you if you happen to become part of the circuit. The path of least resistance may be any path that allows electricity to flow through it more easily than through another as it travels back to the source. If there is more than one conducting path for the current, it will flow through all the conductors. More current will flow through the better conductors and less current will flow through the poorer conductors.

Effects of electricity

What you feel when a current passes through your body is called an electrical shock. Most of us are familiar with the mildest form of shock, the slight tingling sensation felt when you touch a defective appliance or energized equipment. This situation may not be dangerous or even painful. However, circumstances need be only slightly different to change a mild dose of a current into a killing jolt.

The degree of injury to the body varies from mild shock, to burns, to death. The degree of injury is affected by the amount of current, path through the body and the amount of time in contact with the electricity. Even mild shock can cause you to drop what you are holding, causing injury to someone else; or, it can cause you to fall and sustain a more serious injury.

It doesn't take a lot of electricity to kill you. The amount of current needed to light an ordinary 60-watt light bulb is five times what can kill a person. Thus, all electrical equipment on construction sites is potentially deadly.

Electrical inspections on construction sites

Electrical extension cords are numerous on construction sites and become damaged because of the rough conditions in which they are used.

Inspect to ensure:

- All extension cords are three-wire cords;
- The ground pin is on a male plug;
- There is no unbroken insulation on the cord;
- End appliances (plug and receptacle) are gripped to insulation;
- All wires are continuous and unbroken;
- All cords are protected from damage, likely to occur when passing through a door or window;
- Metal boxes with knockouts are not used on extension cords;
- Plugs are dead-front (molded or screwed in place);
- Romex (non-metallic sheathed cable) is not used as flexible cord;
- Cords are not stapled or hung from nails;
- Bushing is passing through holes in covers or outlet boxes.

Also, check these items:

- Temporary lights are not supported by cords;
- Bulb guards are used on temporary lights;
- Electrical power tools with non-dead man switches have a magnetic restart (when injury to the operator might result if motors were to restart following power failures);
- Provisions are made to prevent machines from automatically restarting upon restoration of power in place;
- Outlets do not have reversed polarity;
- Power tools are double insulated or have a ground pin;
- Guard all of exposed electric of more than 50 volts so no one can come in contact (receptacles, light-bulb sockets, bare wires, load center, switches). Guard by:
  1. Using approved enclosures;
  2. Locating them in a room, vault or similar enclosure accessible only to qualified persons;
  3. Arranging suitable permanent, substantial partitions or screens so only qualfied persons have access to the space within reach of live parts;
  4. Locating them on a suitable balcony or platform that is elevated and arranged to exclude unqualified persons;
  5. Elevating them 8 feet or more above the working surface.

Ground-fault circuit interrupters (GFCIs)

All 125-volt, single-phase, 15- and 20-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel should have ground-fault circuit-interrupter protection. You must provide GFCI protection for personnel if a receptacle or receptacles are installed as part of the permanent wiring of the building or structure, and used for temporary electric power. On construction sites, you must take precautions to aid the effective operation of GFCIs. Most laboratory-tested appliances have 0.5 mA leakage or less under normal operating conditions; however, moisture and improper maintenance on portable hand-held power tools common at construction sites can create conditions under which you can expect GFCIs to trip.

Extension cords running through water, motors with dirty brushes, carbon-tracking on commutators or moisture in windows contribute to current leakage.

A common-sense approach to installing, using and maintaining GFCI circuits will do a lot to eliminate nuisance tripping at construction sites. Actually, tripping under any of the conditions previously mentioned is not nuisance tripping, but merely a device performing its intended function.

Moisture is the major culprit behind current leakage in wiring and equipment. Do not subject panel boards, receptacles, cord caps and connectors intended for dry locations to moist conditions. Centrally locate construction receptacles so employees can use cords of 150 feet or less, with a sufficient number of circuits used to keep the number of tools on a circuit to a minimum. Do not have receptacles on the same circuit as lighting or other uses. Perform periodic maintenance of all motors used on construction sites.

Portable generators

Under the following conditions, the frame of a portable generator need not be grounded and can serve as the grounding electrode for a system supplied by the generator:

- The generator supplies only equipment mounted on the generator or cord- and plug-connected equipment through receptacles mounted on the generator, or both;
- The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.

Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated at not more than five kilowatts, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, do not require GFCI protection.

Lockout/tagout procedures

This procedure provides the fundamental components necessary for deactivating mechanical/electrical energy sources through a lockout/blockout/tagout system.

General

Employees are exposed to a variety of energy sources when performing daily repairs, modifications and adjustments to the operating equipment. To eliminate the hazards associated with these activities, employers must teach employees the correct methods to use when performing these operations.

Definitions

- Hazardous energy sources — You may classify a hazardous energy source as mechanical, electrical, pneumatic, hydraulic, chemical, thermal or gravity sources
- Lockout device — A device (a padlock or a combination of padlock and multiple-lock hasp hardware) that you can use to prevent a hazardous energy source from being re-energized
- Tagout device — A warning tag that an employee attaches to critical areas to communicate why an energy source should not be re-energized. The tag contains the name of the employee, date and time the employee initiated the tag and a brief description of work to be performed.

- Authorized employee — A person who locks out or tags out to perform the maintenance or service task
- Affected employee — A person who is exposed to lockout/tagout procedures

Program elements

Follow the steps below prior to initiating any repairs, modifications and/or adjustments to operating equipment.

- Notify an affected employee with jurisdiction over the equipment that energy sources are to be deactivated.
- The authorized employee who will work on the equipment will identify all sources of power that must be locked out, blocked or released.
- To ensure the equipment cannot be re-energized while maintenance activities are performed, the employee must lock out/blank out all potential energy sources. Assign employees padlocks with their names or identification numbers affixed to the locks. Individually key the locks to prevent another employee from removing the lock inadvertently. If more than one employee is assigned to work on the equipment, use a multi-lockout hasp so that all employees working on the equipment will apply their locks and ensure safety.
- Affix a tagout device to all components or systems de-energized to indicate a lockout procedure has been performed.
- Prior to performing any work activities, the authorized person should test the systems to ensure that he or she properly deactivated the equipment.
- Upon completion of the work, the authorized person and the supervisor must verify that the equipment on the system is safe to operate. Give special consideration to the installation of guards and covers for electrical wiring, and ensure all piping systems are properly reconnected. Also notify the affected worker when the machine is safe to use.

Special conditions

During certain operations, it may be necessary to energize the equipment for a short period of time. Notify and direct employees in the immediate area to stay clear of the equipment. If you will deactivate the operation again, have the authorized person repeat the third, fourth and fifth steps in the preceding paragraph before work resumes.

In some instances, work will carry over to another shift. A designated person must affix a department lock to the equipment to ensure it is not energized during the transition. When the next shift employee comes to work on the piece of equipment, he or she will repeat the second through the fifth preceding steps before work resumes on the equipment.

If the work is completed and a lock remains on the equipment, nobody should remove it until the employee responsible for the lock is found or the supervisor of the employee investigates and ascertains the equipment is safe to operate. Unauthorized removal of a lock should subject the employee to disciplinary action.

Electrical work

Prior to doing any electrical work, a qualified person must:

- Lock out the system;
- Open the disconnect;
- Make a visible inspection of the electrical panel to ensure all blades on knife switches are open or that the circuit is open;
- Check the voltage tester on a known energized voltage source;
- Check the voltage on the load side of the circuit to make sure it is de-energized;
- After performing the voltage test, recheck the tester on a known source to ensure it is operating correctly;
- Remove any fuses that are in the motor disconnect box;
- Close the box and place a tag and his or her lock on the disconnect switch prior to doing any other work;

- Discharge and ground any capacitors prior to using them, and then check them with the voltage tester.

Excavation

Trench collapses can occur without warning, regardless of the depth. The vast majority of trenching fatalities occurs in trenches 5- to 15-feet deep. These depths invite taking chances, and often times it is the good, safe-looking material that turns out to be the unsuspecting killer.

But trench cave-ins don't have to happen. The following information can help you avoid these potentially deadly accidents.

General requirements

- Before beginning excavation, establish the locations of underground and overhead utilities and services. Contact utility companies and advise them prior to the start of excavation.
- Remove or support all surface encumbrances, as necessary, to safeguard employees.
- Employees working in trenches 4 feet deep or more should have an adequate and safe means of exit, such as ladders, steps or ramps available at no more than 25 feet of lateral travel.
- Employees exposed to public vehicular traffic must wear suitable garments marked with or made of reflectorized or high-visibility material.
- Do not permit employees to go underneath the loads of lifting or digging equipment.
- When hazardous atmospheric conditions exist or you can reasonably expect them to exist, test and control the atmosphere to prevent exposure to harmful levels.
- Removable-type steel casings, and individually manned lifelines and harnesses are needed to protect employees in bell-bottom pier holes. Follow confined-space entry procedures.
- Employees must not work in excavations in which there is accumulated water unless they follow necessary safety precautions.
- Additional underpinning, shoring or bracing may be required when adjoining utility lines, foundations, walks and footings are endangered.
- Store spoils, equipment and other materials that can pose a hazard at least 2 feet away, or use effective retaining devices.
- Superimposed loads, such as mobile equipment working close to excavation edges, require extra sheet piling, shoring or bracing. The use of mobile equipment near excavations also requires substantial barricades or stop logs.
- Have a competent person on-site who is capable of identifying existing and predictable hazards and has the authority to take prompt corrective action.
- A competent person should be able to identify soil classifications and the protective systems to use in accordance with the OSHA Excavation standard, Subpart P.
- A competent person must make ongoing daily inspections of excavations, adjacent areas and protective systems, including after every rainfall or other hazard-producing occurrence.
- Walkways or bridges are needed for crossing over excavations. Walkways or bridges over excavations greater than 4 feet deep require standard guardrails.
- Erect standard guardrailing or solid sheeting no less than 42 inches above ground level around all tunnel shafts and bore pits.
- Barricade or cover all wells, pits or shafts.
- Back fill excavations upon completion.

Requirements for protective systems

- When employees work in trenches more than 5 feet deep, the employer must protect them from cave-ins by using an adequate protective system. In hazardous soil, employers must provide an adequate protective system in trenches less than 5 feet deep.
- Determine maximum allowable slopes for soil or rock deposits in accordance from Table B-1, Appendix A, of the OSHA standard.
- Have a registered professional engineer design sloping or benching for excavations greater than 20 feet deep.
- Qualified personnel must design and install piling, sheeting, shoring, shields and support

systems. The shoring system must be capable of withstanding all loads imposed upon it.
- Make sure material and equipment used for sheeting, sheet piling, bracing, shoring and underpinning is in good serviceable condition. Use timbers that are sound and free of defects.
- Place members of support systems in true horizontal position, spaced vertically and secured to prevent sliding, falling or kick outs.
- Progress from the bottom of the trench when removing support-system members. Slowly release jacks and supports.
- Remove support systems as you backfill the trench.
- Extend trench boxes and shields to the bottom of the trench and no less than 18 inches above the vertical part of the trench face, except in certain cases.
- Do not allow employees in shields during their installation, removal or relocation.
- When portable trench boxes are stacked,provide attaching means to prevent them from separating.
- Do not work outside of trench shields or shoring protection in unprotected trenches.

Reference
OSHA 1926 Subpart P Excavations

Ergonomics

Proper ergonomics and good safety and health practices on the construction site can help make your business more profitable. The high incidence of injuries in construction makes workers' compensation a very costly part of remaining in business. Aggressively preventing these losses can make construction a much more profitable endeavor.

Injuries and illnesses are the second largest cost in construction today. Half of the workers' compensation costs in construction result from musculoskeletal disorders. The frequency rate of back injuries for construction work is more than twice that of general industry.

That means a substantial number of work-site injuries are a result of wear and tear on the body, where workers overexert themselves or exceed their physical capabilities/limitations. Construction work requires and attracts workers with great strength, skill and agility. However, while muscles can adapt and even grow, the joints, tendons and ligaments cannot. Where recovery for the muscles is rather quick and uncomplicated, the joints and connecting tissues can be subject to permanent damage. These types of injuries too often disable and drastically shorten careers. This may be especially true for construction workers who rely heavily on their hands and backs to perform their tasks.

Cumulative trauma disorders (CTDs)
Cumulative trauma is a term referring to the wear and tear on the musculoskeletal system. Cumulative means that physical stresses add up gradually over a period of time and injury results from repeated stresses on a particular body part. Trauma means a bodily injury or insult. Disorder means a physical ailment or abnormal condition. Common CTDs include carpal tunnel syndrome in the wrist, tendinitis in the wrist, elbow, shoulder and other major joints, and even many back injuries.

Risk factors

Risk factors are elements of a job or a task that we know increase the probability of developing a CTD. The broad categories of occupational risk factors include:

- Repetitive motions;
- Awkward postures (positions);
- Forceful exertions;
- Mechanical pressures on soft tissues;
- Inadequate rest.

Other contributing factors include adverse environmental conditions, such as cold, vibration and personal characteristics. Exposure to risk factors does not always result in CTDs. It is important to note that we are also exposed to such risk factors off the job.

The ability to recognize and evaluate these factors on the work site is important in avoiding and controlling them.

Ergonomics

Ergonomics is a safety science focused on preventing injuries that result from cumulative trauma to the musculoskeletal system. Ergonomics attempts to achieve this by better fitting the task to the worker, rather than forcing the worker to adapt to the work. A good ergonomics program systematically identifies and controls the risk factors that we know contribute to cumulative trauma and overexertion. Ergonomics principles apply to hand-tool use and selection, materials handling, workplace and work-space design, methods, display of dials and gauges, placement of controls, handles and knobs, shift work and more.

Ergonomics has not had much influence in the construction industry to date. The arguments about changing workers, changing environment, location, workstations and other factors have kept ergonomics out of construction for far too long. The fundamental principles of ergonomics apply to any and every work situation imaginable.

Technology that can reduce if not eliminate many risk factors on the job site is now available and advancing every day. We have the technology and the knowledge to fully use ergonomics in construction to gain the same benefits realized by general industry.

So, what is the missing ingredient? Too often in the construction industry, what's missing is a contemporary safety-management process that influences the organizational culture to value safety and health. In short, what's missing is a safety culture. Use of ergonomic principles and necessary training is most successful when a safety culture is in place.

Principles of ergonomics

The most effective means of controlling CTDs is to reduce, if not completely eliminate, a worker's exposure to the known risk factors. Employers can accomplish this through engineering controls. Engineering controls attempt to design the work, work piece and/or work tool to minimize motions, postures and forces that can damage the body and cause premature fatigue. Administrative controls such as reducing a worker's exposure to the risk factors can be helpful complements to engineering controls. General ergonomic principles include:

- Use stools and workbenches as work surfaces, rather than the ground, when possible;
- Keep frequently-used tools within reach or in garment pockets;
- Adjust working heights and reaches to allow the worker to keep the elbows as close to the side of the body as possible;
- Extend reach with tool extensions, according to manufacturer's recommendations, or minimize reach distances with proper placement of work surfaces, like ladders, scaffolds and platforms;
- Use jigs or fixtures to hold work pieces, parts or tools. This allows both hands to operate the tool (more strength and control) and relieves the free hand from serving as a clamp;
- If gloves are necessary for comfort, protection or cleanliness, select the proper size, material and style.

Tools

Tools are often the machine part of the man-machine interface. Pay particular attention to the design, selection, condition and proper use of manual and powered tools. Principles for the safe use of hand tools and general tools are listed below.

- Ensure the availability and accessibility of the right tools and working conditions to perform the job.
- Establish systematic preventive maintenance for all tools and equipment.
- Repair or replace defective tools.
- Bend the tool not the wrist — use ergonomically-designed tools.
- Look for anti-vibration technology in air hammers and chisels.
- Use mobile equipment for material breaking or cutting, rather than hand-held equipment.

- Use powered instead of manual tools or equipment when work requires high forces or repetition.
- Choose tools with the torque and speed to match the task — avoid overkill.
- Handle length should span the full width of the hand (gloved hand) or 4-inch minimum.
- Handgrips should be non-conductive and textured to avoid slipping or twisting, and without contour or finger grooves.

Materials handling

It is important to recognize that materials handling is often one of the largest cost components of a product or operation. Unnecessary handling of materials cost time and money. More importantly, unnecessary handling exposes workers to risk factors. General principles for materials handling include:

- Storing supplies and materials between knee and shoulder height to avoid excessive reaching and bending;
- Using the lifting equipment available on-site to hold and position loads for work;
- Improving housekeeping to avoid complicating materials handling, thus, making daily cleanup part of the job;
- Scheduling and laying out materials for ease of use rather than ease of delivery to reduce repetition and duration of exposure to risk factors;
- Deliberate pre-planning for materials (Just In Time);
- Planning deliveries, including the size of load to be delivered, its position, location and timing;
- Training workers to identify ergonomic hazards and material-handling strategies.

General advice

Safety and health professionals recognize it is crucial to manage safety and health just like any other priority on the job site. Owners, contractors and work leaders have a responsibility to communicate expectations and enforce safe work practices. The following tips should help:

- Never overlook employee participation in problem solving;
- Back problems are not just lifting and postural problems — pay attention to slip, trip and fall hazards;
- Educate supervisors and foremen about locations where losses occur; painters think ladders are relatively safe, while that is the greatest injury agent for their industry;
- Noise, vibration and impact affect equilibrium; therefore, falls are also ergonomic concerns.

Owners can require construction safety planning to establish an operational philosophy. Owners need to:

- Add safety performance into bid criteria for awarding contracts;
- Develop site-specific safety plans, including job safety analysis and phased safety programs;
- Encourage safety networking with contractors and labor, including maintenance of a complaint log;
- Maintain safety statistics — when a spike occurs in frequency, then a recovery plan is required;
- Push for worker training and certification in apprenticeship programs;
- Pay serious attention to proper medical management of an injury;
- Promote joint labor/management safety committee on large jobs.

New technological trends

Many specific technological advances have been made in ergonomics for construction, but there is still no magic solution. The key remains to build in safety and health technologies, and strategies, not add them as an afterthought. Recent innovations used here and abroad follow:

- A pogo stick-looking device that ties rebar in concrete work without bending, cutting or twisting wire;
- Machinery that lays heavy block in Sweden;
- Battery powered screwdrivers that replace manual and electrical versions;
- Torque screw heads that require 40-percent less push force than Philips;
- Garments that include knee-pad pockets, tool holsters, neck air cushions, integrated fall-arrest harness;

- A disk attachment to handles for extension poles to reduce grip forces while working overhead;
- Eyewear with a bifocal feature on the top of the lens for overhead work;
- An extension handle for a floor-spreading trowel that improves posture and productivity;
- Auto feed screws for power drills;
- A handle extension for power drills to allow the worker to stand while fastening floors;
- A redesign of packaging (50- versus 90-pound bags of concrete) for the convenience of the user, rather than the manufacturer;
- Improved cab design for better vision, operation and comfort;
- Truck design for tool storage and accessibility versus pickup-truck method;
- Vehicle seats designed to reduce whole-body vibration;
- Easier erecting scaffolds with sprockets that do not weld to the frames.

Lead

Lead is a metal found in construction materials and on a variety of job sites. Construction materials commonly containing lead include paints, alloyed metals, mortars, electrical wire and its insulation, lead sheeting, solder and drywall used in medical facilities. Renovation and reparation projects also can uncover lead in piping, caulking, certain types of cable, flashings, metal coatings, paint in houses built before 1978 and certain glazing materials. Grinding and abrasive blasting can result in exposures to lead dust. Cutting and welding can result in exposure to lead fumes.

Typically, exposures to lead occur by inhalation or ingestion. However, the body can absorb organic lead vapor through the skin. Lead is stored in the body's fatty tissues. It also can attack the central nervous system and other internal organs. Lead poisoning symptoms include male impotence, irritability, muscle pain, cramps, fatigue, trouble concentrating and confusion. Clothing can become contaminated with lead dust, resulting in its spread to other parts of the job, a vehicle or home. This increases the potential for others to be exposed.

If you believe you may be dealing with lead on the job, it is important to determine the items below.

- Where is the lead located? Review job specifications and MSDSs if they are available.
- Is there a potential for exposure to lead due to the work process?
- Do you need to perform air sampling?
- Is there a potential for employee overexposure?
- Do you need to perform an employee exposure assessment? Will employees be exposed to lead at or above the action level at any time?

If lead is present and will be cut, burned, ground, sanded or otherwise disturbed, you need to conduct an exposure assessment to determine airborne lead levels. Conducting daylong air monitoring that must cover a representative number of employees who may be exposed to the highest levels of lead does this. Results are compared to OSHA's Action Level for lead, which is the limit at which OSHA first requires certain precautions to be taken.

Continuous air monitoring is required for exposures at or over the Action Level, even if employees use respirators.

OSHA also has set a permissible exposure limit (PEL), which is higher than the Action Level. The current limit for lead is 50 micrograms per cubic meter of air, averaged over an eight-hour workday. Since it is an eight-hour average, it does allow for short-term exposure above the PEL, as long as the average does not exceed the PEL.

If exposures exceed the PEL, the standard requires additional protective measures. If engineering or administrative controls are not feasible, employees must use respirators, and the employer must include a written respiratory program explaining the proper selection, use and procedures for cleaning, storing and maintaining respirators. Other precautions required in the standard include the use of protective clothing, laundering practices for

work clothes, medical testing of employees, the availability of change rooms and shower facilities, housekeeping and filtered-air lunchrooms.

Reference
29 CFR 1926.62. OSHA Lead Standard

Silica

Construction workers run a risk of developing an occupational disease called silicosis, which is caused by exposure to silica.

OSHA exposure limits established for dust containing silica vary according to the percentage of silica in the dust. Dust with high silica content will have very low allowable exposure concentrations.

The ACGIH sets a limit for a common form of crystalline silica at 0.1 milligrams per cubic meter of air.

Workers become ill by inhaling dust containing crystalline silica. Typical tasks where workers often inhale dust containing silica include cutting concrete, sandblasting and demolition work. Materials brought to a job site may also contain silica. Over a period of time, silica dust can accumulate in the lungs, where fibrous structures and scar tissue develop around the trapped silica particles. As this disease progresses, breathing may become difficult, and in some cases, results in death. There is no cure for silicosis; prevention is the only control method.

The best way for employers to protect their workers from silica is to limit exposure. Substitute less hazardous materials for silica sand. This practice is commonly used in sandblasting operations.

Other operations use water to control dust in the air. An example of this process is the use of a water jet attached to a concrete cutting saw. Ventilation controls, which remove silica dust before it enters the worker's breathing zone, are also effective. Because silica is so hazardous, respiratory protection is sometimes necessary in addition to engineering controls to limit exposure.

Train all employees on the hazards associated with silica. Hazardous materials taken on a job site are usually accompanied by MSDSs, which explain hazards associated with the use of the material.

Substances, such as silica, which is commonly encountered as a naturally occurring element on the job site, may not have an MSDS explaining the hazards. Free publications are available from OSHA and NIOSH; this information provides guidance for preventing silicosis in the construction industry.

First aid and medical attention

Immediately report work-related injuries and illnesses, regardless of severity, to management. Injured employees should receive proper, competent first aid or medical care. Each facility or job site should have at least one employee per shift who is trained to provide first aid or cardiopulmonary resuscitation (CPR). In the case of confined space entry, you must train at least two employees to provide first aid and CPR in accordance with OSHA's regulations. Administering first aid or CPR in the first few minutes of an emergency, prior to the arrival of doctors, nurses or a life squad, can mean the difference between life and death for an ill or injured employee.

Train designated first-aid providers in first aid, and train and certify them in CPR. First-aid training should be appropriate for the industry and its risks, including, but not limited to:

- Evaluating the safety and danger of the scene;
- Evaluating and treating the patients' injuries and symptons, including shock, bleeding, heart attack, choking, seizures, fractures and sprains, eye injuries, chemical and thermal burns, poisoning and chemical exposure.

Train management appointed first-aid providers to handle bloodborne pathogens and to know the safety procedures needed to avoid these risks. If these providers are exposed to bloodborne pathogens, management must offer them the Hepatitis B inoculation series and medical counseling. Advise first-aid providers acting as volunteers of bloodborne pathogen risks of the necessary

safety procedures.

Make provisions prior to beginning the project for prompt medical attention in case of serious injury. Develop a medical emergency response plan. The plan directs the company's action following an injury or illness. Specifically, it identifies:

- Emergency phone numbers;
- Address and location of the job;
- Individuals responsible for giving first aid on the job site;
- Process of referral to a local hospital, doctor or clinic;
- Location of emergency medical supplies and MSDSs;
- Location of safety equipment needed during a medical emergency that may include respirators, chemical splash suits, emergency lighting, safety harnesses and ropes;
- Procedures for reporting, documenting and investigating the incident.

Keep first-aid supplies in an accessible, convenient area, inspected on a monthly basis and replenished as necessary. It is essential you train all employees in the accepted procedures for reporting injuries and illnesses, and for obtaining appropriate care. Prompt care can often prevent medical complications that can result from apparent minor injuries.

Proper reporting also allows for investigation of both accidents and incidents. Begin the investigation process as soon as the scene is secured and any injured employee is treated. Compose investigation teams of management representatives, supervisors and employees. Investigate accidents and incidents completely to discover true causes.

Investigation leads to the prevention of future accidents and, thus, the prevention of injury and death.

Consider accidents resulting in the serious injury or death of an employee, especially those witnessed by or involving other employees, as occasions to use outside services for critical incident stress debriefing (CISD), which may be available through the company's employee assistance program or through local agencies. CISD, or in some cases grief counseling, can be an effective tool for maintaining good mental health.

Resources

Online references for masonry

www.masoncontractors.org — The Mason Contractors Association of America offers safety information for masonry.

www.scaffold.org — The Scaffold Industry Association offers safety information regarding scaffolding.

www.cdc.gov/elcosh — Electronic library of construction safety and health information presented in both English and Spanish. Items are listed under trade, hazard, job site and others.

www.ergoweb.com – Ergonomics Web site.

www.osha.gov — OSHA's Web site.

www.cdc.gov/niosh — National Institute for Occupational Safety and Health's Web site.

www.nsc.org — The National Safety Council's Web site covers workplace and public safety issues as well as council activities and publications.

www.pp.okstate.edu/ehs — Oklahoma State University Department of Environmental Health and Safety's Web site offers in-depth information on topics ranging from asbestos and bloodborne pathogens, to trenching and shoring and weather safety.

www.hazard.com — The Vermont Safety Information Resources Inc. Web site contains a variety of resources: material data safety sheets, an online library offering safety graphics, PowerPoint and text files, as well as online articles, an e-mail discussion list archive and a list of safety and health consultants.

www.lhsfna.org — The Laborers' Health and Safety Fund of North America offers a Web page on "Ergonomics & Construction."

Appendix

Employer's safety and health program check list

A. Management's commitment and leadership

- ☐ Policy statement: goals established, issued and communicated to employees
- ☐ Program revised annually
- ☐ Participation in safety meetings, inspections; agenda in meetings
- ☐ Commitment of resources is adequate
- ☐ Safety rules and procedures incorporated into site operations
- ☐ Management observes safety rules

B. Assignment of responsibility

- ☐ Knowledgeable and accountable safety designee is on site
- ☐ Supervisors' safety and health responsibilities are understood
- ☐ Employees adhere to safety rules

C. Identification and control of hazards

- ☐ Periodic site safety inspections involve supervisors
- ☐ Preventative controls in place (protective equipment, maintenance, engineering)
- ☐ Action taken to address hazards
- ☐ Safety committee, where appropriate
- ☐ Technical references are available
- ☐ Enforcement procedures by management

D. Training and education

- ☐ Supervisors receive basic training
- ☐ Specialized training taken when needed
- ☐ Employee training program exists, is ongoing and effective

E. Recordkeeping and hazard analysis

- ☐ Records of employee illnesses/injuries maintained and posted
- ☐ Supervisors perform accident investigations, determine causes and propose corrective action
- ☐ Evaluate injuries, near misses and illnesses for trends, similar causes; take corrective action

F. First aid and medical assistance

- ☐ First-aid supplies and medical services available
- ☐ Employees informed of medical results
- ☐ Emergency procedures and training, where necessary

Emergency action plan

Components of an emergency action plan	Complete	Incomplete
Emergency escape procedures and route assignments		
Critical construction operation procedures and route assignments		
Procedure for accounting for personnel after evacuation		
Rescue and medical duties for designated employees		
Reporting means and procedures for fires and other emergencies		
Names and job titles of individual contact personnel for emergency crews' additional information requirements		
Warning alarm systems		
Special types of procedures for specific hazards (tornado, etc.)		
Training for the work force		

BWC *Ohio Bureau of Workers' Compensation*
Division of Safety & Hygiene

Workers' Compensation claim # _____
OSHA 300 case/file # _____

ACCIDENT ANALYSIS REPORT

PART 1 IDENTIFICATION INFORMATION

Employee Name _____

Date of Accident _____ Time _____ AM PM

Occupation _____ Shift _____

Department _____ ID _____

PART 2 SUPPLEMENTARY INFORMATION

Company _____

Mailing Address _____

City State Zip Code

Telephone ( )

Establishment Location (if different from above)

Accident Location ☐ Same as establishment? ☐ On premises? (Check if applies)

Employee Name _____

Employee Address _____

City State Zip Code

Telephone ( ) Social Security Number _____

Gender _____ Age _____ Date of Birth _____

Was injured person performing regular job at time of accident? ☐ Yes ☐ No

Length of service: With employer: _____ On this job: _____

Time shift started _____ ☐ AM ☐ PM Overtime? ☐ Yes ☐ No

Name and address of Physician

City State Zip Code

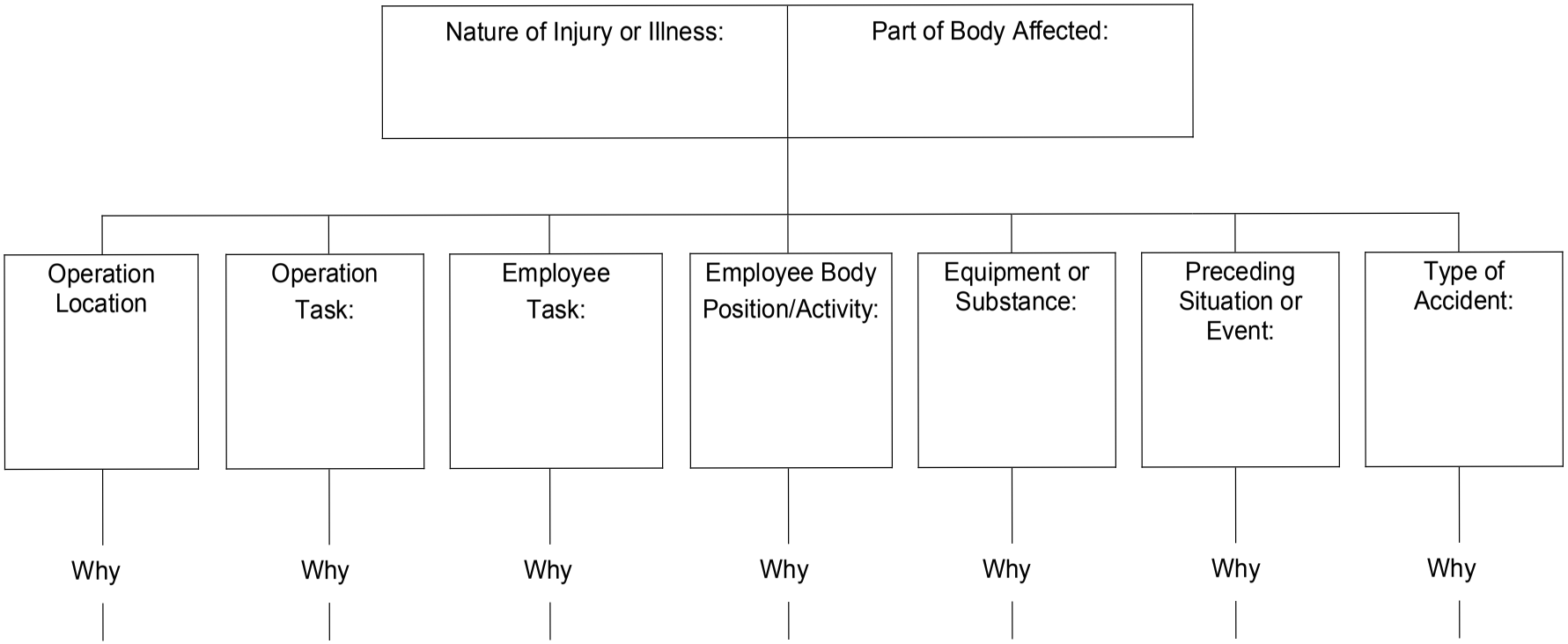
If hospitalized, name and address of hospital

City State Zip Code

Fatality? ☐ Yes ☐ No If yes date of death _____

If death, attach Coroner's Report.

PART 3 ACCIDENT TREE (Refer to Instructions)



PART 4 DESCRIPTION AND ANALYSIS

Fully describe accident:

Attach photos of accident scene and machinery/equipment.

What factors led to the accident (from Accident Tree in Part 3)? _____

MACHINERY/EQUIPMENT INVOLVED

Manufacturer _____ Equipment Age

Serial No. Model

Function _____

Location _____

1. Has machine/equipment been modified?
2. Was it guarded properly?
3. Was there any mechanical failure?

To answer these questions, research and attach equipment history, maintenance history, evant photographs and other reports and comments.

CONSTRUCTION

If construction-related, date of contract

Is firm ☐ General Contractor or ☐ Subcontractor

Names of other contractors _____

WEATHER/ENVIRONMENTAL CONDITIONS (temperature, housekeeping, lighting, work surfaces, etc.)

TRAINING

Did employee receive specific training or instructions relating to safety and health on the job being performed?

☐ **Yes** ☐ **No**

If Yes: Type: _____

Instructed by: _____

When instructed: _____ **Length of training** _____

Attach appropriate training documentation.

PART 5 SPECIFIC ACTION THAT WILL BE TAKEN

ITEM #	DESCRIPTION	ROUTE TO	TARGET DATE

WHAT ADDITIONAL ACTIONS SHOULD BE CONSIDERED?

_____

_____

_____

_____

_____

Completed by: _____ **Date of Investigation** _____

Title: _____

Reviewed by: _____ **Date** _____

Reviewed by: _____ **Date** _____

Attach individual statements from :

(a) the injured worker
(b) any witness(as) or others with contributing information
(c) The employer.

For each statement, include name, job title, home address, home telephone number, and the date the statement was given.

INSTRUCTIONS

OSHA 301 FORM COMPATIBILITY--When fully completed, this report is believed to satisfy the requirements of the OSHA 301 form.

COMPLETION OF THIS REPORT--Parts 1 and 2 may be filled out by office personnel or other staff assigned this function. Parts 3, 4 and 5 **must** be completely filled out by the first line supervisor, in coordination with plant manager and safety director.

PROCEDURE FOR COMPLETING PART 3--ACCIDENT TREE

A. Fill in the top blocks of the tree.

Describe the NATURE of the injury or illness.
This could be a strain, sprain, laceration, contusion, abrasion, carpal tunnel syndrome, and so forth. Write in the space provided at the top of the tree.

Determine the PART OF THE BODY AFFECTED (such as right index finger, shoulder, lower back, and so forth.) and place this information in the adjacent space provided at the top of the tree.

If these specific details are not fully known at this time, do not wait to perform the investigation! Fill out as much as possible and continue.

If investigating accident or near miss, write none in “Nature of Injury or Illness” and “Part of Body Affected” blocks, and continue to next row of tree.

B. Fill in the next row of the tree.

1. Operation--Location

Where is the work being performed? Example: Working in assembly area.

2. Operation Task

On a larger scale, what specific operation is being performed? Examples: Milling keyway in shaft. Stocking shelves.

3. Employee Task

What specific task was the employee performing? Examples: Employee lifting box. Employee was fastening bolt.

4. Employee Body Position/Activity

Briefly describe the position required by the activity that relates to the accident, injury or illness. Examples: Wrist flexed forward. Hands grasping box.

5. Equipment or Substance

What is the equipment or substance which was directly involved in the accident, injury or illness? Examples: The machine or object struck against. The vapor or contaminant inhaled or swallowed. The object lifted, pulled.

6. Preceding Situation or Event

Determine important event(s) that led to the accident, injury, or illness. These may be considered as "triggering events", situations, or circumstances necessary for the accident to occur.

7. Type of Accident

What general type of accident occurred? Examples: Fall off a platform. Slipped on oil. Struck by machine tool. Contact with electricity. Exposure to hazardous substances.

C. Trace each factor in more detail.

Work from each of the factors identified above. Ask why each of the factors is necessary, or why they occurred. Under each factor, write the key words describing "why", and draw a line to connect the two. It is possible for there to be more than one reason "why" under each factor, so be sure to include all that you discover.

D. Repeat the process--build the tree.

The process in step three can be repeated until all questions are answered for each path of the tree. Dead ends are either unanswered questions that require additional investigation or pathways that have been resolved as far as practical.

Job safety analysis

Job: _____ Date: _____

Title of worker who performs job: _____

Foreman/supervisor: _____

Analysis by: _____ Section: _____

Specific work location: _____ Reviewed by: _____

Required and/or recommended personal protective equipment: _____

_____

Sequence of basic job steps	Potential accident or hazards	Recommended safety procedures

Fork lift daily check list

Company: _____ Job: _____

Superintendent: _____

Person conducting the inspection: _____

Fork lift ID: _____ Date: _____ Time: _____

Item	Comment
Crankcase oil level	
Engine belts	
Plug wires	
Brake fluid level	
Hydraulic fluid level	
Fuel tank level	
Tire/wheel rim condition	
Headlights/taillights	
Turn signals	
Warning lights	
Hour meter	
Other gauges	
Forks (for damage)	
Mast chains/hydraulic lines	
LPG tank clamps	
Safety belts/lines	
Fire extinguisher	
Overhead cage condition	
Safe operating capacity of forklift or attachments	
Horn	
Backup lights/buzzers	
Steering	
Service brake and parking brake	
Motorola pedal (forward/reverse)	
Transmission (forward/reverse)	
Seat belt	
Seat safety switch	
Hydraulic controls/stick, marking	
Mast lift operation (up/down)	
Mast tilt operation	
Side shift/squeeze	
Hydraulic leaks	
Battery charge	

Stationary scaffold safety check list

Project: _____

Address: _____

Contractor: _____

Date of inspection: _____ Inspector: _____

	Yes	No	Action/comments
1. Are scaffold components and planking in safe condition or use, and is plank graded for scaffold use?			
2. Is the frame spacing and sill size capable of carrying intended loads?			
3. Did competent persons direct the erection?			
4. Are sills properly placed and adequately sized?			
5. Did you use screw jacks to level and plumb scaffold, instead of using unstable objects, such as concrete block, loose bricks, etc.?			
6. Are base plates and/or screw jacks in firm contact with sills and frame?			
7. Is the scaffold level and plumb?			
8. Are the braces of all scaffold legs properly attached?			
9. Is guardrailing in place on all open sides and does it end above 10 feet?			
10. Is proper access provided?			
11. Is overhead protection or wire screening provided when necessary?			
12. Is the scaffold tied to the structure at least every 30 feet in length and 26 feet in height?			
13. Are freestanding towers guyed or tied every 26 feet in height?			
14. Are brackets properly placed?			
15. Are putlogs properly placed?			
16. Are tubes and clamps properly placed?			
17. Are all nuts and bolts tightened?			
18. Is the scaffold free of makeshift devices or ladders to increase height?			
19. Are working level platforms fully planked between guardrails?			

Stationary scaffold safety check list *continued*

	Yes	No	Action/comments
20. Does plank have a minimum 12-inch overlap and does it extend 6 inches beyond supports?			
21. Are toe boards installed properly?			
22. Are hazardous conditions provided for power lines?			
23. Are hazardous conditions provided for wind loading?			
24. Are hazardous conditions provided for possible washout of footings?			
25. Are hazardous conditions provided for uplift and overturning moments due to the placement of brackets, putlogs or other causes?			
26. Are personnel instructed how to safely use the equipment?			

Weekly inspection check list

Company: _____ Job: _____

Supervisor: _____ Date: _____

Person conducting inspection: _____ Time: _____

This check list covers general construction conditions, and you should not consider it an end-all to the inspection. Additional notes are encouraged.

Y = Yes.
N = No, but this will be given immediate attention, with abatement measures and dates noted.
N/A = Not applicable to the particular job at this time.

Job site information

_____ Are the OSHA poster and other applicable posters displayed conspicuously on the job site?
_____ Was the weekly safety meeting (toolbox talk) held?
_____ Is the first-aid kit stocked and in a conspicuous, accessible place?
_____ Are injury and illness records up-to-date?
_____ Are emergency phone numbers posted?

Housekeeping

_____ Are the working areas generally neat and free of debris?
_____ Is there ample access to, and use of, trash containers?
_____ Is waste disposed of regularly?
_____ Are passageways and walkways clear?
_____ Is there adequate lighting?
_____ Is there adequate ventilation?
_____ Have all protruding nails been removed or bent?
_____ Have oil and grease been removed?
_____ Are sanitary facilities adequate and clean?
_____ Is there an adequate supply of drinking water and disposable drinking cups?

Personal protective equipment

_____ Are hard hats worn at all times when an overhead hazard exists?
_____ Is proper eye protection used?
_____ Is proper hearing protection used?
_____ Is proper respiratory protection used?
_____ Are proper work shoes and clothing worn?
_____ Is proper fall-protection equipment used?

Fire prevention

_____ Has an emergency action plan been developed for the site?
_____ Have employees been instructed in fire policies and procedures?
_____ Have fire extinguishers been checked?
_____ Are “No Smoking” signs posted and rules enforced?
_____ Is the route for emergency vehicles accessible?

Ladders

_____ Are ladders in good condition?
_____ Are ladders properly maintained and stored?
_____ Are metal ladders kept away from all electrical exposure?
_____ Do ladders extend 3-feet above the landing?
_____ Are ladders tied-off?
_____ Are stepladders fully opened when in use?

Scaffolds

_____ Are scaffolds properly erected, under the supervision of a competent person?
_____ Are all connections secured?
_____ Are scaffolds plumb and square, with cross-bracing?
_____ Are guardrails, mid-rails and toe boards in place?
_____ Are scaffolds tied to a structure?
_____ Are foot sills and mudsills used?
_____ Are workers protected from falling objects?
_____ Is scaffold equipment properly maintained and in good working order?

Hand and power tools

_____ Is the proper tool being used for the job?
_____ Have employees been instructed in the correct use of each tool?
_____ Are tools properly maintained and stored?
_____ Are tools inspected for defects?
_____ Are damaged tools repaired or immediately replaced?
_____ Do power tools have the proper grounding?
_____ Are all mechanical safeguards in use for power tools?

Heavy equipment

_____ Is equipment regularly inspected and maintained?
_____ Is there adequate lubrication of moving parts?
_____ Do all lights, brakes and warning signals work?
_____ Are noise arresters in use?

Electrical work

_____ Are tools grounded?
_____ Is there adequate, well-insulated wiring?
_____ Are fire hazards checked and are fire extinguishers provided?
_____ Are electrical dangers posted?
_____ Are terminal boxes equipped with required covers and are covers used?
_____ Have overhead and underground power hazards been assessed and eliminated?

Material handling and storage

_____ Are materials stored neatly and properly?
_____ Are stacks steady and not too high?
_____ Are employees correctly lifting loads?
_____ Is traffic flow maintained and controlled?

Hoists, cranes and derricks

_____ Is a visual inspection conducted daily?
_____ Is a more detailed inspection performed on a regular basis?
_____ Are power lines inactivated, removed or at a distance far enough away?
_____ Are signalmen used when needed?

Flammable gases and liquids

_____ Are all containers clearly labeled?
_____ Are proper storage practices observed?
_____ Are there adequate fire extinguishers nearby?
_____ Are carts used for moving the cylinders?

Notes _____

_____

_____

Notes